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**Maximising Economic Recovery from the UK
Continental Shelf: A Response to the Draft
DECC Consultation Strategy**

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**Aberdeen Centre for Research in Energy Economics and
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NORTH SEA ECONOMICS

Research in North Sea Economics has been conducted in the Economics Department since 1973. The present and likely future effects of oil and gas developments on the Scottish economy formed the subject of a long term study undertaken for the Scottish Office. The final report of this study, The Economic Impact of North Sea Oil on Scotland, was published by HMSO in 1978. In more recent years further work has been done on the impact of oil on local economies and on the barriers to entry and characteristics of the supply companies in the offshore oil industry.

The second and longer lasting theme of research has been an analysis of licensing and fiscal regimes applied to petroleum exploitation. Work in this field was initially financed by a major firm of accountants, by British Petroleum, and subsequently by the Shell Grants Committee. Much of this work has involved analysis of fiscal systems in other oil producing countries including Australia, Canada, the United States, Indonesia, Egypt, Nigeria and Malaysia. Because of the continuing interest in the UK fiscal system many papers have been produced on the effects of this regime.

From 1985 to 1987 the Economic and Social Science Research Council financed research on the relationship between oil companies and Governments in the UK, Norway, Denmark and The Netherlands. A main part of this work involved the construction of Monte Carlo simulation models which have been employed to measure the extents to which fiscal systems share in exploration and development risks.

Over the last few years the research has examined the many evolving economic issues generally relating to petroleum investment and related fiscal and regulatory matters. Subjects researched include the economics of incremental investments in mature oil fields, economic aspects of the CRINE initiative, economics of gas developments and contracts in the new market situation, economic and tax aspects of tariffing, economics of infrastructure cost sharing, the effects of comparative petroleum fiscal systems on incentives to develop fields and undertake new exploration, the oil price responsiveness of the UK petroleum tax system, and the economics of decommissioning, mothballing and re-use of facilities. This work has been financed by a group of oil companies and Scottish Enterprise, Energy. The work on CO2 Capture, EOR and storage was financed by a grant from the Natural Environmental Research Council (NERC) in the period 2005 – 2008.

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Maximising Economic Recovery from the UK Continental Shelf: A Response to the Draft DECC Consultation Strategy

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Maximising Economic Recovery from the UK Continental Shelf:

A Response to the Draft DECC Consultation Strategy

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1. Introduction and Context

The proposition that the central strategic objective towards the UK Continental Shelf should be to maximise economic recovery (MER) is clearly non-contentious. Indeed it would be very odd if this were not the key objective. It has been mentioned over many years in policy statements by DECC and its predecessor bodies. However, the precise meaning of the phrase does require elucidation and elaboration. The Consultation document emphasises the role of the Oil and Gas Authority (OGA), the regulator, in achieving MER in conjunction with the private sector companies who conduct all the operations in the UKCS. There is thus the presumption that there are market failures in the present situation which prevents the achievement of MER. Otherwise why should the OGA have a prominent role?

From a national viewpoint economic investment and ongoing production can legitimately be defined as those which are viable in pre-tax terms. When these activities are undertaken by private sector companies the appropriate discount rate is then the cost of capital to the investor in question. The Consultation document acknowledges this when it refers to a real pre-tax discount rate of 10% as being appropriate. While the weighted average cost of capital (WACC) does vary across companies, reflecting differences in the extent to which their portfolio of assets is diversified, this discount rate is likely to be a reasonable average for the

industry. It should be recognised however, that exploration companies will generally have a higher cost of capital than those with well-diversified production assets.

In assessing investments private sector investors will emphasise post-tax returns. Thus the general aim of policy should be to ensure that projects which are acceptable on a pre-tax basis should remain commercially acceptable after tax. Also, projects which are uneconomic before tax should not be rendered acceptable after tax. These requirements are not easy to fulfil in practice, given the range of investment hurdles likely to be employed by different investors in the UKCS.

The present investment environment incorporates serious capital rationing which in turn reflects very constrained net cash flows from existing operations and thus very limited internal funds to finance new investments. Following the banking crisis and the oil price collapse debt finance from the banks is also very constrained. Similarly, new equity finance is also heavily constrained as a result of the oil price collapse.

In these circumstances potential new projects will be ranked by investors. The materiality of prospective returns will be important. This is reflected in the size of the post-tax net present value (NPV). The ratio of post-tax NPV/pre-tax investment, both at the WACC, is likely to be employed to rank new projects. This measures the productivity of the capital invested and is the single most appropriate assessment criterion in the current circumstances of serious capital rationing. To obtain MER it is necessary that policy-makers reflect this in the design of the taxation system. While each company will have different thresholds a reasonable minimum

hurdle could be post-tax NPV@10%/pre-tax $I > 0.3$. A further discussion of detailed aspects of the tax system is given below.

2. Scope of Regulation in Context of Market Failures

The Consultation document highlights the need for investors to put MER at the heart of their investment decision-making process and also highlights the key role of OGA in determining how that may be achieved in particular circumstances. This requires the presence of a range of skills and know-how on the part of OGA. There is ample evidence that relevant multiple skills and knowledge have been acquired by OGA. But no organisation can be omniscient with respect to the investment environment and project risks in the UKCS. There will be ample scope for widely differing views on future oil and gas prices, for example. But these play a key role in determining the economic viability of any proposed investments. It is thus appropriate that, in general, licensees (or other owners of infrastructure) should not be compelled to undertake investments against their own commercial judgements.

But the issue is not a black and white one and there are grey areas. An example would be situations where there is downtime or production below a field's capability due to apparent insufficient investment in repair and maintenance. The issue of declines in production efficiency has received much attention in recent years. The industry has been making substantial efforts to enhance production efficiency and in effect is accepting that performance in this area has been less than satisfactory. DECC already has provisions under the stewardship initiative to exhort operators to improve their performance with back-up sanctions also being available.

The involvement of OGA in this area of production efficiency is hardly contentious as the licensees as well as the nation should generally benefit substantially from increased production efficiency. The decline in production efficiency over the past decade or so can be regarded as a type of market failure which effective regulation can rectify, at least in part. Private sector companies gain considerably from enhanced production efficiency, and in general, there should be no conflict of interest. This would only arise if OGA requested investments where costs were disproportionate in relation to the benefits from enhanced productivity.

But there are other areas where perceived market failures might not be resolved by regulation without requiring private sector companies to undertake investments which they might be reluctant to implement. Example situations include further investment in existing infrastructure facilities to facilitate the development of future new fields. The investments could relate to projects such as oversizing of pipelines, life extension schemes on hub platforms, and provision of additional facilities on hub platforms for third-party use. In the case of cluster developments involving several fields which have different licensees and where the fields are to be developed sequentially rather than simultaneously, there may be economies of scale in having a common infrastructure such as a pipeline or subsea manifold. But there may be a reluctance on the part of the licensees in the first field development to finance an infrastructure which will accommodate fields which may not be developed for several more years. In the current investment climate of low oil prices and serious capital rationing these features could well have a negative effect on investment attitudes.

3. Resolving Possible Conflicts of Interest

The example cases described above relate to situation where there are potential economies of scale which in turn can enhance MER. But they clearly require collaboration among licensees. In a private sector investment environment each company will in general only invest in a project when its own interests are advanced. Thus in situations where collaboration is required to bring a project to fruition there will need to be incentive mechanisms which make this possible. The Consultation document recognises the problem and states that the OGA would not compel a licensee to invest in a project against its wishes. But the document also adds that, where the OGA felt that, where a project was necessary to procure MER in circumstances where the licensee was reluctant to invest, then the OGA should have the power to require the licensee to divest his equity at fair market value. Where the OGA also felt that another licensee could be willing to undertake the project investment the Consultation document indicated that this strengthened the case for divestment by the reluctant investor.

It is arguable that, before compulsory divestment is seriously considered, further thought should be given to other regulatory measures which can achieve the desired objective in a less draconian manner. With respect to the terms of access to infrastructure and any associated investment DECC already has powers to determine terms when requested by any of the relevant parties. Recent legislation also permits DECC/OGA to be more proactive in this area. Guidance already exists on the criteria which would be employed in making a determination. It is arguable that these criteria should be considered afresh with a view to reassessing whether they are fully consistent with the objective of procuring MER.

This reconsideration should consider the investment hurdles likely to be employed by the companies involved and the associated costs and risks. The issues relating tariff terms to short-run/long-run marginal costs, short-run long-run average costs should be reconsidered. The idea that tariffs should be uniform to different users of an asset, while equitable in an everyday sense, should also be reconsidered, given the possibility that non-uniform pricing could lead to an enhancement of economic recovery¹.

4. **Infrastructure Ownership and MER**

There is evidence that a concentration of ownership of production and infrastructure assets in a particular geographic region can enhance economic recovery². An interesting recent development has been the acquisition of infrastructure assets by non-licensees in the UKCS. Their sole business is to procure third-party business relating to transportation, processing, and other terminal facilities. The fact that their revenues depend on securing further third-party business clearly differentiates them from licensees who are primarily interested in production activities. Thus, in this case it follows that divestment of infrastructure to non-licensees could advance MER. Policy should thus not disadvantage such divestment activities.

Companies which are non-licensees are subject to the non-North Sea tax system which in essence currently means a headline rate of 20% (with further reductions promised), with 18% declining balance relief for plant

¹ For a discussion of the relationship between different tariff arrangements and MER see A.G. Kemp and E. Phimister, Economic Principles and Determination of Infrastructure Third Party Tariffs in the UK Continental Shelf (UKCS), North Sea Study Occasional Paper No. 116, University of Aberdeen Department of Economics, July 2010, pp. 26. <http://www.abdn.ac.uk/research/acreef/>

² See A.G. Kemp and T. Acheampong, E. Phimister, L. Stephen, The Economic Dependencies of Infrastructure Assets in the UK Continental Shelf (UKCS), Aberdeen Centre for Research in Energy Economics and Finance (ACREEF), University of Aberdeen, SPE-175445-MS

and machinery. This contrasts with a headline rate of 50% with 100% capital allowance on most fields. When Supplementary Charge (SC) was introduced in 2002 and subsequently increased as a result of rising oil prices it was automatically applied to tariff incomes as well. Conceptually the case for this is this is dubious though it was administratively convenient. Third-party transport and processing is arguably a separate business from oil and gas production. Against the background of the prime need to achieve MER it is arguable that the SC should be removed from tariff incomes. The directly associated costs would, of course, then not qualify for relief against SC. It should be recalled that in 2003 PRT was removed from new third-party tariffing contracts. The concession was given on the understanding that the benefits would be passed on in lower tariffs to users. In current circumstances and in pursuit of MER there is a clear case for considering the removal of SC from tariff incomes. This should be examined in the context of the recommended review of guidance on terms of third-party access and the pressing need to reduce costs across the UKCS.

5. Encouraging Cluster Developments

Much attention has been drawn to cluster developments, especially in the light of the cluster area tax allowance for SC. This confers some advantages in post-tax terms to a cluster development compared to stand alone, individual field developments. There can be economies of scale with communal facilities relating, for example, to pipelines, processing facilities or subsea manifolds. These economies can be quite valuable³. There is thus merit in encouraging cluster developments. But, when there are different licensees across the fields which comprise the cluster,

³ See A.G. Kemp and L. Stephen, *The Economics of Field Cluster Developments in the UKCS*, North Sea Study Occasional Paper No. 77, University of Aberdeen Department of Economics, August 2000, pp. 59. <http://www.abdn.ac.uk/research/acreef/>

difficulties can emerge in relation to priorities and development concepts. Perhaps the most difficult issue is where the field developments have to be sequential rather than simultaneous and the communal infrastructure has to be available at the time of the first field development. All investors are expected to share the costs of the communal infrastructure. A licensee in a field where development for good reasons cannot take place for some years will not be enthusiastic about making capital cost contributions well in advance of the utilisation of that infrastructure. In these circumstances trading of assets among the licensees in a cluster is one method to procure alignment of interests. But there may be reluctance to trade in this way among the licensees. In these circumstances another solution is to design a scheme whereby the equity holders in fields developed relatively late could obtain some compensation for contributing to the infrastructure costs which were a necessary element in the development of the early fields in the cluster. The present author and Linda Stephen undertook a detailed study of the many ways by which investment and operating costs of a common infrastructure could be shared among different licensees, including in circumstances where field developments were sequential⁴. Various schemes are possible including discounts on contributions to the capital and operating costs of the infrastructure to late field developers, or compensation to them in financial form or even in barrels of oil. Each has its advantages and complications, including the tax treatment of any compensation. But the basic idea is worthy of examination by OGA as an alternative to a requirement to divest equity schemes when the licensee is reluctant to do so.

⁴ See A.G. Kemp and L. Stephen, The Economics of Infrastructure Cost Sharing with Cluster Type Developments in the UKCS, North Sea Study Occasional Paper No. 53, University of Aberdeen Department of Economics, November 1995, pp. 98. <http://www.abdn.ac.uk/research/acreef/>

6. Encouraging Exploration

The exploration effort as measured by the number of wells drilled has been at a very low level for a few years, and even when the oil price exceeded \$100. Thus the financing issue, which has clearly loomed very large after the oil price collapse, is by no means the only cause of the current low level of activity. Over the last several years licence rounds have been held where very many blocks were put on offer. A reasonable number have been taken up but the drilling commitments associated with the winning bids have been very low. However, successive annual estimates of the remaining potential from the UKCS made by DECC have indicated substantial potential recoverable resources with best estimates being put in the 11 – 21 billion boe range. But this says nothing about the likely sizes of fields which could be discovered. This has been falling for a long time, though at a modest pace in recent years. The average size has been around 20 mmboe, but, given the lognormal distribution of reserves, the most likely size is considerably less than 20 mmboe. The exploration success rates using DECC's definition of a significant discovery have been consistently high for a long time.

In general there is no inhibition among investors in collaborating to form groups to bid for new licences. But there is clear provision for competition at the bidding stage. There are no cash bonus bidding schemes which might inhibit small companies with very limited exploration budgets. The assessment criteria put great emphasis on the work programmes to be offered and the details for the marking scheme are admirably clear and transparent.

There remain various explanations relating to the low level of exploration effort, including, low oil prices, the exploration and development costs,

the modest prospectivity in terms of size of expected discovery, and the taxation system. It is also possible that, given the estimates of future aggregate potential noted above, there is some market failure. Despite the existing substantial geological and geophysical knowledge further information could trigger more activity with enhanced success rates and less fruitless drilling. The case for state intervention to procure and provide seismic data is essentially that this could bring national, external benefits. In other words the exploration risks are reduced for the whole industry. The success rate could increase and the failure rate should go down. At a time of serious capital rationing risk reduction is particularly important. It should be noted that the extra information cannot guarantee more drilling, but by reducing the risks, it is increasing the potential success rate. The recent initiative by OGA to procure seismic data for the West of Shetlands region can be justified on the above grounds, particularly as, based on recent historical experience, the upside potential is substantial, despite the very high absolute costs.

7. Tax Incentives for Exploration and Development

The effects of reductions in exploration, appraisal, development, and operating costs, and some non-radical incentives on full cycle returns to new exploration have recently been examined by the present author and Linda Stephen⁵. Key findings are that, with a mean price of \$55, substantial cost reductions are necessary in order to make exploration viable before tax. The study also examined the effects of the following tax incentives on investors in (a) an existing tax-paying position and (b) a project investor without current tax shelters: (1) the granting of eligibility of unsuccessful exploration costs for the investment allowance for

⁵ See A.G. Kemp and L. Stephen, Prospective Returns to Exploration in the UKCS with Cost Reductions and Tax Incentives, North Sea Study Occasional Paper No. 134, University of Aberdeen Department of Economics, December 2015, pp. 81. <http://www.abdn.ac.uk/research/acreef/>

Supplementary Charge, (2) a refundable tax credit for exploration to be paid to an investor who has no other current income against which to set his allowances, (3) the ability to offset the investment allowance against income other than that to which the new investment relates, and (4) the award of interest (as for the Ring Fence Expenditure Supplement) when the investment allowance, though eligible to be activated, cannot in practice be used because the income available to the investor is insufficient to absorb the allowance. The study found that, while all the incentives increase the full cycle returns to an explorer, the effect of each of the individual reliefs on these returns was quite modest. For investors currently in a tax-paying position the most potent relief was found to be the ability to set the investment allowance against income other than that to which the allowance related. For investors not currently in a tax-paying position the most potent relief was found to be interest on the investment allowance in circumstances where the allowance was available to be activated but the investor had insufficient income against which the allowance could be set. A further general finding was that, in many cases, the available allowances could not be fully utilised because the explorer had insufficient income from a discovery to absorb them. In all cases the full cycle returns for an ongoing tax-paying explorer exceeded those from a project investor. For a project investor the effect of a refundable tax credit for exploration costs on the full cycle returns was found to be fairly modest. There are so many other factors which determine full cycle returns. However, where capital rationing is the key factor restricting the exploration effort the tax credit could have a worthwhile effect. But the full cycle returns are held back by the income constraint from production which can mean that full relief for the other allowances are not received.

8. Wider Benefits of Improved Data

The above discussion has highlighted the usefulness of the availability of seismic data in encouraging exploration and reducing unfruitful drilling. But enhanced data in other areas can also make positive contributions to MER. Examples include fuller information on the likely timing of the cessation of production (COP) of fields. This would not only help the contractors prepare for undertaking the work, but would also provide valuable information on any likely bunching of activities across several structures which could decommission at around the same time. Spikes in this activity can cause undesirable shortages of particular expertise and cost increases. Better information on COP dates can also reveal possible economies of scale in the decommissioning process. For example, if in one geographic area more than one field is to be decommissioned at around the same time, there could be opportunities for economising on the use of heavy lift vessels.

A considerable amount of activity in the UKCS is weather dependent. This applies to the installation of facilities, maintenance programmes, and decommissioning activities. Bad weather can hold up these operations and add to the costs involved. If better, more accurate weather information were available these costs could be considerably reduced. In turn this requires further research and development work by the agencies involved in weather forecasting.

9. Encouraging EOR

To date only a modest amount of enhanced oil recovery (EOR) has taken place in the UKCS. It is quite common in onshore situations in the USA and Canada, but in offshore situations the much higher costs make the projects economically more challenging. Current low oil prices also

greatly contribute to the difficulties in achieving viability for EOR projects such as miscible gas injection, polymer flood, CO₂ injection, and low water salinity injection. Studies conducted by the present author and Linda Stephen⁶ confirm the difficulties in achieving a conventional hurdle rate of return on these investments. The study highlighted a particular issue relating to the characteristics of some EOR projects and the current operation of the tax system. Polymer flood, miscible gas, and CO₂ EOR projects depend on very large amounts of injectants. The costs of polymer and miscible gas are very substantial, as could the costs of CO₂ depending on the CO₂ price. But injectant costs currently do not qualify for the investment allowance for SC. The costs in question are arguably akin to a capital item and the study by Kemp and Stephen found that if they were eligible for the investment allowance the post-tax returns could be significantly enhanced. There is thus a strong case for extending the definition of eligibility for the allowance to injectants required in tertiary recovery system.

10.R and D

It is clear that in present conditions in the UKCS further R and D and innovation are required to enhance productivity, including via cost reductions and by reducing the cycle time from first investment to first production. The study by Kemp and Stephen on prospective returns to exploration⁷ found that reductions in the cycle time enhanced full cycle returns to exploration quite considerably. R and D relating to the UKCS has been at modest levels for many years. Private sector R and D, including by both oil companies and contractors, is currently incentivised

⁶ See A.G. Kemp and L. Stephen, The Economics of EOR Schemes in the UK Continental Shelf (UKCS), University of Aberdeen Department of Economics, SPE-175470-MS, June 2015, pp. 13.

⁷ See A.G. Kemp and L. Stephen, Prospective Returns to Exploration in the UKCS with Cost Reductions and Tax Incentives, North Sea Study Occasional Paper No. 134, University of Aberdeen Department of Economics, December 2015, pp. 81. <http://www.abdn.ac.uk/research/acreef/>

by tax credits, though there is evidence that the uptake varies considerably, sometimes because of lack of knowledge of the credit itself. State support for R and D relating to the oil sector has been muted for many years. Now that there is acknowledgement within government that MER is a national objective the case for state support becomes stronger. The fruits of R and D financed by the state should become widely available in order to maximise the national benefits and thus make the greatest contribution to MER.

To further incentivise R and D by licensees there is a case for adding contribution to R and D as a licence award criterion. This has been the case in the past, but was discontinued in the 1990's following the Single Market Act. Care would be needed in the wording of the condition to avoid conflict with EU non-discrimination rules but this should be possible.

11. Relationship between Collaboration and Competition

The emphasis on collaboration raises the issue of potential conflict with competition law. Historically competition among licensees in the UKCS has been encouraged and anti-competitive practices discouraged. Bidding for licences is an obvious area where competition has been encouraged. The basis for collaboration to procure MER has now also been established, but there may be confusion among investors regarding which collaborative practices are consistent with competition laws and which are incompatible. Given this uncertainty there is a case for the OGA and the Mergers and Competition Authority to provide guidance on the matter. This could greatly speed up the process of reaching agreement among parties about the acceptability or otherwise of proposed collaborative arrangements.

12.Role of Supply Chain

The Consultation document acknowledges rather briefly the role of the supply chain in contributing to MER. But the supply chain undertakes a very high proportion of the activities relating to exploration, appraisal, field investment, production and decommissioning. It is arguable that in the context of MER, including collaboration, cost reduction, R and D and innovation, more attention needs to be given to the role of the supply chain, perhaps particularly in the area of collaboration. Such collaboration means (a) with operators and (b) with other members of the supply chain. There may be many areas where further collaboration can produce major benefits. Subject areas could include contractual relationships. These can take several forms including (a) reimbursable day rate contracts, (b) lump sum contracts, and (c) risk-reward sharing contracts. These could be reappraised within the context of the MER objective. Contractors are also party to competition law and the relationship between (a) fostering collaboration and (b) remaining within competition law may well need clarification. The OGA could play a useful role in facilitating such clarification.

13.Encouraging M and A Activity

It is generally recognised that the encouragement of M and A can contribute to MER. There are already plenty examples of late field life transactions which have led to extra investment and further economic recovery. An asset which is non-core to one company could become a core business to another company. It is arguable that, where two parties wish to engage in an asset sale and purchase which promises to enhance MER, then no artificial blocks should be put on the proposed deal. In the current environment, personified by low oil prices, a particular problem

has arisen relating to decommissioning tax relief. Thus a company might be interested in purchasing a mature asset but, because of a combination of (a) low oil prices and thus very low tax payments on the income from the field, and (b) the current tax rules, the decommissioning relief available to the buyer is very low. In effect he may not have access to all the relief which is available to the seller. This might stop an otherwise beneficial transaction. The current rules do permit the seller to retain the decommissioning obligation and this has happened in several cases. But the seller may well not wish to retain the decommissioning obligation. It is a contingent liability and he will not know the condition of the asset which he will have to decommission. There is thus a case for modifying the tax rules such that the buyer is not disadvantaged in terms of tax relief compared to the position of the seller.

A more radical issue relating to asset transactions relates to the idea that platforms used as hubs for third-party use and subsequently being decommissioned could be taken over by contractor companies. Some already have expertise in running platform operations as duty holders. They will also have expertise in undertaking the decommissioning work. It is arguable that the core expertise of licensees is in undertaking exploration and production operations rather than decommissioning platforms. Currently there is, of course, a licensing obligation. But the idea that contractor companies could take over responsibility for all the decommissioning obligations deserves further consideration.