Title: Underground Access Rights clauses in 2014 Infrastructure Bill – impact on oil and gas activities **IA No:** DECC0177 **Lead department or agency:** Department of Energy and Climate Change (DECC) **Other departments or agencies:** None.	Impact Assessment (IA) **Date:** 22 September 2014 **Stage:** Final **Source of intervention:** Domestic **Type of measure:** EANCB Validation **Contact for enquiries:** Mike Earp 03000 685784 mike.earp@decc.gsi.gov.uk;

Summary: Intervention and Options

RPC: RPC Opinion Status

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB in 2009 prices)	**In scope of One-In, Two-Out?**	**Measure qualifies as**
£1252.8 million	£1252.8 million	-£65.09 million	Yes	OUT

What is the problem under consideration? Why is government intervention necessary?

Although the Crown owns the mineral rights to oil and gas in Great Britain, operators wishing to extract oil and gas have to negotiate with landowners for underground access rights. This is a time consuming, uncertain and potentially costly process. The operator can refer the case to the court to establish whether compulsory acquisition of rights should be granted. This process is likely to take between 1 and 2 years, creating further delays, uncertainty and additional costs to developers. Developers of deep geothermal energy projects face similar issues with regard to underground access rights but have no recourse to the court. The Infrastructure Bill measures would apply equally to underground access for oil and gas exploration/production and deep geothermal. Deep geothermal is considered in a parallel impact assessment.

What are the policy objectives and the intended effects?

To simplify the existing procedure for underground access, whilst ensuring that key features, such as payment and notification, are retained.Nothing in the proposed measures will have any effect on other regulatory or legal provisions including the licencing regime (petroleum or water abstraction), planning permission, health and safety regulation and environmental regulation. As noted above, a parallel impact assessment considers the impact on deep geothermal energy projects of the proposed changes to underground access rights.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base) Non-regulatory options are limited as the issue is founded in law. The preferred option is to grant underground access (below 300 metres) for the extraction of oil and gas (and deep geothermal energy) in Great Britain with a concordant voluntarily payment from those companies to communities located above the underground drilling. Three payment options have been considered: no payment (Option 1); payment to individual landowners (Option 2); and community payment (Option 3). Community payment is significantly less costly to administer than individual payments; it removes the costs of individual negotiations and removes the potential for delay to and/or cancellation of projects if access is refused. The proposed measure (Option 3) includes a reserve power to introduce payment in statute if industry reneges on their voluntary agreement. Voluntary payment is preferable to a payment in statute as this gives a greater degree of flexibility of its administration and is thus more adaptable to meet changing needs. However, for the purpose of the Impact Assessment voluntary payment options are assumed to be the same as those in statute. All payment options include a concordant notification system.

Will the policy be reviewed? It will not be reviewed. **If applicable, set review date:** Year

Does implementation go beyond minimum EU requirements?			**No**		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro:** **No**	**< 20:** **Yes**	**Small:** **Yes**	**Medium:** **Yes**	**Large:** **Yes**
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded: 0**	**Non-traded: 0**	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: Matt ... Date: 25/09/2014

Summary: Analysis & Evidence

Policy Option 1

Description: No compensation

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	**PV Base Year** 2014	**Time Period Years** 20	**Net Benefit (Present Value (PV)) (£m)**		
			Low: 135.0	**High:** 1940.2	**Best Estimate:** 1254.0

COSTS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Cost** (Present Value)
Low	0	0	0	**0**
High	0		0	**0**
Best Estimate	0		0	**0**

Description and scale of key monetised costs by 'main affected groups'

Costs are netted off in arriving at the benefits reported below.

Other key non-monetised costs by 'main affected groups'

None.

BENEFITS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Benefit** (Present Value)
Low	0	0	7.6	**135.0**
High	0		105.3	**1940.2**
Best Estimate	0		68.1	**1254.0**

Description and scale of key monetised benefits by 'main affected groups'

The benefits come from the value of additional gas production net of the costs of discovery, development and administration. They all accrue directly to petroleum licensees (oil and gas companies) though much of their benefits would eventually flow through to the Exchequer through higher taxation receipts.

Other key non-monetised benefits by 'main affected groups'

None.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5

Extent of additional/brought forward oil and gas activity and resultant level of production are both uncertain as are the costs of exploration and development and future gas prices. A range is presented above based on different assumptions for gas prices.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			**In scope of OITO?**	**Measure qualifies as**
Costs: 0.00	**Benefits: 65.15**	**Net: -65.15** (benefit)	Yes	OUT

Summary: Analysis & Evidence

Policy Option 2

Description: Individual compensation

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2014	Time Period Years 20	Net Benefit (Present Value (PV)) (£m)		
			Low: 132.8	**High:** 1938.0	**Best Estimate:** 1251.9

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	0	0	**0**
High	0		0	**0**
Best Estimate	0		0	**0**

Description and scale of key monetised costs by 'main affected groups'

Costs are netted off in arriving at the benefits reported below.

Other key non-monetised costs by 'main affected groups'

None.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	7.4	**132.8**
High	0		105.1	**1938.0**
Best Estimate	0		68.0	**1251.9**

Description and scale of key monetised benefits by 'main affected groups'

The benefits come from the value of additional gas production net of the costs of discovery, development and administration. They all accrue directly to petroleum licensees (oil and gas companies) though much of their benefits would eventually flow through to the Exchequer through higher taxation receipts.

Other key non-monetised benefits by 'main affected groups'

None.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Extent of additional/brought forward oil and gas activity and resultant level of production are both uncertain as are the costs of exploration and development and future gas prices. A range is presented above based on different assumptions for gas prices.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0.00	**Benefits: 65.04**	**Net: -65.04** (benefit)	Yes	OUT

Summary: Analysis & Evidence

Policy Option 3

Description: Community compensation

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2014	Time Period Years 20	Net Benefit (Present Value (PV)) (£m)		
			Low: 133.8	**High:** 1939.0	**Best Estimate:** 1252.8

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	0	0	**0**
High	0		0	**0**
Best Estimate	0		0	**0**

Description and scale of key monetised costs by 'main affected groups'

Costs are netted off in arriving at the benefits reported below.

Other key non-monetised costs by 'main affected groups'

None.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	7.5	**133.8**
High	0		105.2	**1939.0**
Best Estimate	0		68.0	**1252.8**

Description and scale of key monetised benefits by 'main affected groups'

The benefits come from the value of additional gas production net of the costs of discovery, development and administration. They all accrue directly to petroleum licensees (oil and gas companies) though much of their benefits would eventually flow through to the Exchequer through higher taxation receipts.

Other key non-monetised benefits by 'main affected groups'

None.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5

Extent of additional/brought forward oil and gas activity and resultant level of production are both uncertain as are the costs of exploration and development and future gas prices. A range is presented above based on different assumptions for gas prices.

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0.00	**Benefits: 65.09**	**Net: -65.09** (benefit)	Yes	OUT

Evidence Base

Problem under Consideration

The UK Government has committed to developing its indigenous oil and gas resources including shale gas. Significant progress has been made in establishing a new tax regime and streamlining the regulatory procedure to allow exploration for shale gas to begin.

Whilst the Crown owns the mineral rights to oil and gas in the UK, landowners still own the land beneath their homes and landowners have legislative and common law rights to be notified and compensated if anyone wishes to access that land, even if the access occurs underground and is unlikely to cause them any inconvenience. We believe that underground horizontal drilling at the depths relevant for shale would not have any negative impacts on the landowner's use of the land – the main risks that could have any perceived impact on landowners and others living above horizontal underground drilling are outlined in the consultation document.[1]

The existing legal procedure for oil and gas requires the operator, if seeking compulsory access, first to seek consent from the landowner.[2] If consent cannot be agreed, the operator may apply to DECC. If DECC considers that the operator cannot progress any further by negotiation, and that there is a suitable case for access, they will refer the case to court. The court will then determine whether access rights should be granted and the basis for any compensation due to the landowner. An operator wishing to drill under an area may find themselves having to face multiple court proceedings in multiple cases depending on how many landowners own land in that area.

Conventional onshore oil and gas exploration and production to date has mostly involved vertical drilling, so operators have had to negotiate with relatively few landowners (and in most cases they will already be negotiating access to a surface drill site; surface access procedures are not affected by the current proposals which focus exclusively on underground access). Drilling for shale gas involves horizontal drilling that can go out as much as 2 miles beyond the vertical well in each direction. The process also involves hydraulic fracturing; this creates fractures that extend beyond the horizontal wells. Therefore a larger subsurface area may be accessed in unconventional (shale gas) exploration and production.

The onshore oil and gas industry has highlighted underground access as one of their most pressing concerns. While they feel able to proceed with shale exploration wells for now (by locating these largely in rural areas with few landowners to negotiate with), they consider the existing legal position will provide a considerable barrier to moving ahead with a shale production phase and with comprehensive exploration near built-up areas.

Rationale for intervention

The purpose of this policy is to overcome developmental barriers to the oil and gas (and geothermal industries – these are the subject of a parallel impact asessment) from the existing process in gaining access to underground land. This is intended to give investors greater certainty meaning they are more likely to invest in these industries and will also enable industry to expedite operations.

It is believed that, so far as underground development goes, the existing system does not strike the right balance between the legitimate interests and concerns of landowners and the benefits to the community and nation at large of permitting development, where the development is otherwise acceptable in planning and environmental terms. Since the impact on the landowner from underground drilling is negligible, and broader issues of concern about the environmental and other impacts of the proposed activities are fully addressed through planning and other regulatory frameworks, there is a case for

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1. See pages 15–17 of https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313576/Consultation_on_Underground_Drilling_Access__final_web_version.pdf.
2. Petroleum Act 1998 section 7 (http://www.legislation.gov.uk/ukpga/1998/17/section/7/enacted) and Mines (Working Facilities and Support) Act 1966 (http://www.legislation.gov.uk/ukpga/1966/0).

changing the statutory framework to provide for underground access without the complexity and expense of the existing procedure.

Solving this problem through legislation would remove the need for industry to negotiate with individual landowners for every project, with consequent savings for developers, and also removes the uncertainty on the level of compensation to landowners that may be awarded by the court. This would lead to signifcant efficiency gains for developers and landowners through the reduction in transaction costs. It would also remove the possibility that an entire project could be prevented from proceeding due to the objection of just one landowner even if many others consented.

This policy will not enable any individual or company to drill underneath private land in an irresponsible manner. All existing regulations and safety measures will remain in place, and local people will still be able to make their concerns heard and engage with local developments. The following conditions will still apply to any individual or company who would like to obtain an underground right of access: initial licence; planning permission; permits from the relevant environmental regulator; plans examined and approved by the Health and Safety Executive; and drilling consent for drilling or production.

Government believes that shale gas has the potential to provide the UK with greater energy security, growth and jobs. Successful exploration for unconventional resources in other countries, notably the United States, has proved an important source of energy. We know that there are, for example, large shale resources in the UK but we do not yet know how much of the unconventional oil and gas in the UK is recoverable.

Policy Objective

To simplify the existing procedure for underground access, whilst ensuring that key features, such as payment and notification, are retained.

Nothing in the proposed changes will have any effect on other regulatory or legal provisions including the licencing regime (petroleum or water abstraction), planning permission, health and safety regulation and environmental regulation.

Options Considered

The preferred option is to grant underground access to land below 300 metres from the surface to companies exploring for and/or extracting oil and gas (and geothermal energy) in Great Britain. Different payment options for this access have been considered.

A **voluntary payment** from those companies to the **community** located above the underground drilling is preferred. This measure includes a reserve power to introduce payment in statute if industry reneges on their voluntary agreement. It removes the costs of identifying individual land owners and negotiating access and removes the potential for delay to and/or cancellation of projects if landowners refuse access, however it may not address individual landowners perceived concerns (e.g. about loss of property rights); this is **Option 3**.

A one-off community payment is significantly less costly to administer than an **individual landowner payment system**, which is **Option 2**.

Under the existing process it is likely that a nominal payment would be due to the landowners in return for underground access; however we also considered a **no payment option** for completeness; this is **Option 1**.

In the **Do-Nothing scenario** (carry on with existing underground access processes), the exploitation of petroleum would be seriously inhibited (this scenario is not analysed further).

Voluntary payments are preferable to payments under statute as this gives a greater degree of flexibility in their administration, therefore being adaptable to meet changing needs and different communities. The differential costs and benefits of voluntary and compulsory payments (under options 3 and 2) are not assessed here; they would be the subject of a separate impact assessment if the statutory powers were to be invoked.

All payment options include a **notification system** i.e. advising landowners that underground access will be taking place. For the community payment option the notification system is at a community level while in the individual landowner option the notification is per landowner. The administrative costs for the notification have not been added to the overall administrative costs of each payment option, as the administration and type of notification applied for each payment option is intrinsic to the administration of the payment rather than notification per se and therefore it is not appropriate to add any further notification administration costs.

Impact of Policy Options

The primary benefits and costs which drive the NPV in this IA are the direct net benefits to business.

Methodology

Benefits to business from the changes to the underground access regime would arise from the surplus of revenue over costs from the additional/advanced activity that would result. The key assumptions are therefore the change in the level and timing of activity, production levels, gas prices and finding and development costs.

To measure the surplus of revenues over cost from the additional activity, we assess in this IA the cumulative impact of the change in production caused by a change in the underground access regime multiplied by the annual projected mark up of gas prices relative to underlying finding and development costs. The key assumptions are considered in turn below. The assessment starts from a "Do nothing" baseline which represents the preferred option (ie to introduce new shale-friendly Model Clauses) set out in the recent impact assessment on New Shale-Friendly Model Clauses for Landward Areas.[3] The methodology is essentially similar.

(a) Activity Levels

An assessment has been made of the scale of shale gas activity in Great Britain that is likely (a) in the absence of and (b) with the changes to the underground access regime being considered. Because the current underground access regime is fit for purpose as regards conventional hydrocarbons, it is assumed that there would be no change to the number of new conventional oil and gas fields being developed.

The level of future shale gas activity is at present extremely uncertain. Without action on underground access rights there is expected to be a significant increase in unconventional (shale gas) activity as a result of issuing new licences with shale gas-friendly Model Clauses.[4] However, action to avoid the need to negotiate rights of access to underground land is expected to permit activity much earlier and at a higher level.

If action is taken on underground access rights following award of licences incorporating amended Model Clauses it is assumed that activity would pick up quite quickly and reach a plateau level of 6 pads (i.e. shale gas well centres) per year from 2023 onwards. For the central assessment, the number of new shale gas pads whose exploration and subsequent development is assumed to start each year in Great Britain is as follows:

3. http://www.legislation.gov.uk/uksi/2014/1686/impacts.
4. See the impact assessment for The Petroleum Licensing (Exploration and Production) (Landward Areas) Regulations 2014 published at http://www.legislation.gov.uk/uksi/2014/1686/contents/made.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Do nothing	0.10	0.10	0.10	0.10	0.10	0.10	1.00	1.50	2.00	2.50
Change Access Rights	0.15	0.15	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.00
Change	**0.05**	**0.05**	**1.40**	**2.15**	**2.90**	**3.65**	**3.50**	**3.75**	**4.00**	**3.50**

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Do nothing	3.00	3.50	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Change Access Rights	6.00	6.00	6.00	6.00	6.00	6.00	0.00	0.00	0.00	0.00
Change	**3.00**	**2.50**	**2.00**	**2.00**	**2.00**	**2.00**	**-4.00**	**-4.00**	**-4.00**	**-4.00**

The "Do nothing" scenario assumes no action on underground access but does assume new licences are issued. The lower level of activity after 2030 reflects an assumption for the purposes of the impact analysis that activity will happen sooner with action on access rights. **It should not be inferred that activity would actually cease after 2030.**

(b) Production Levels

Both the number of wells and the average recovery per well are uncertain in the absence of any current development of shale gas in Great Britain and the extremely limited exploration that has been undertaken to date. We have therefore adopted assumptions based on advice from industry which in turn is informed by their North American experience. Each pad is modelled on the basis of a common assumption of 12 producing wells with an average recovery of 4 billion cubic feet of gas per well. Recovery rates per well vary within and between pads in a given play and between plays and as yet we have no actual experience of the productivity of UK shale wells so we have had to rely on industry expectations as reported confidentially to DECC.

The assumptions on numbers of pads and recovery per pad imply total annual production of shale gas of some 6 billion cubic metres (bcm) of gas by 2035 across the whole of Great Britain (and a cumulative total of around 70 bcm from pads started before 2035). That rate is broadly in line with the "Slow Progression" scenario[5] but double the estimate of the International Energy Agency in its *World Economic Outlook 2013*[6] which forecasts UK shale gas production of 3 bcm in 2035. This estimate of production levels is some way below the rates of production projected in the IoD's May 2013 report *Getting shale gas working*[7] and EY's April 2014 report *Getting Ready for UK Shale Gas*[8] which reflect higher assumptions on numbers of pads and/or wells per pad and National Grid's "Gone Green" and "Low Carbon Life" scenarios.

We are therefore using a relatively conservative set of assumptions. National Grid's "No Progression" scenario has no successful development. The level of activity is expected to be the same under all three of the options for change considered here.

In February 2014, Pöyry[9] assumed 100 new wells a year by 2024 spread over about 10 new pads but they did not explicitly report the assumed recovery per well or the implied annual rate of production.

(c) Development Costs

The timing and level of development costs and the profile of production are informed by confidential advice from industry, but there is uncertainty about these costs and – due to the absence of experience in the UK in shale gas exploration and production – they have not been tested and proven yet. Average unit costs for each shale gas pad are DECC estimates based on industry assumptions which are

5. Illustrated in Figure 118 of National Grid's July 2014 *UK Future Energy Scenarios* publication (http://www2.nationalgrid.com/uk/industry-information/future-of-energy/future-energy-scenarios/).
6. November 2013, page 121; http://www.worldenergyoutlook.org/.
7. http://www.iod.com/influencing/policy-papers/infrastructure/infrastructure-for-business-getting-shale-gas-working.
8. http://www.ukoog.org.uk/images/ukoog/pdfs/Getting_ready_for_UK_shale2_gas_FINAL2022.04.14.pdf.
9. http://www.poyry.co.uk/news/new-poyry-point-view-uk-shale-gas-where-are-we-now.

consistent with marginally commercial developments allowing for recovery of the costs of successful and unsuccessful exploration. The implied average unit full-cycle development and production cost for new pads is 58.3p/therm (in 2014 prices). The costs include the costs of exploration, appraisal and development drilling including fracking costs, operating costs including assumed business rate payments and decommissioning costs.

In the absence of changes to the underground access regime, it is assumed (on the basis of industry advice, given the limited number of negotiations to date) that the cost to business associated with securing underground access rights (exclusive of payments to landowners which are treated as a transfer payment) would on average be £400,000 per site. This estimate is based on the cost of negotiating with an assumed 1,000 landowners and considers the staff and administration costs of the following: identifying landowners, negotiating access, ensuring access is established on a legal basis, setting up the payment and ensuring this is appropriately recorded. The options considered for changes to the underground access regime would result in different costs to business (again, exclusive of any compensation to individual landowners (Option 2) or communities (Option 3)).

The estimated average cost to business per site to administer the compensation due under the proposed option varies from zero (Option 1) to £25,000 (Option 3) to £45,000 (Option 2). For Option 3 the cost is an estimate of working with the local community to develop and implement the project(s). The greater cost for Option 2 reflects the need to make payments to numerous individuals. The estimate of £45,000 assumes payments to 1,000 landowners. The total comprises £4,500 for Land Registry searches (at £4.50 per property), £15,000 for administrative costs to prepare letters, make payments to the landowners, log the process and answer telephone queries and £25,000 to employ a GIS expert for 6 months to manage the process i.e. identify landowners, convert data into appropriate formats, etc. These estimates have been informed by discussions with industry but are inevitably speculative at this stage.

(d) Gas Prices

Gas prices have been assumed to remain constant at 75.5p/therm in 2014 prices. This level is consistent with the central gas price case from DECC's latest published fossil fuel price scenarios[10] () converted from 2013 to 2014 prices using the latest HM Treasury GDP deflator forecast[11]. DECC's fossil fuel price scenarios are widely used across Government to assess energy market interventions. It should be noted that in recent months European wholesale gas prices have fallen significantly and spot prices are currently (mid-September 2014) less than half the level assumed here with forward prices for winter 2014 around 60p/therm.

(e) Timing

Each pad is included in the analysis at the point at which exploration is assumed to start on the basis of the NPV of future revenues minus costs which may extend beyond the assessment period (which has been extended to 2034 given the slow build-up of activity assumed and the long life of such projects, which are expected to last for around 25 years). The 21 year assessment period used to assess the net impact on oil and gas from the policy options is used for consistency with the period used in the recent impact assessment on New Shale-Friendly Model Clauses for Landward Areas referenced above.

(f) Administrative Costs

The administrative costs for HMG depend entirely on the extent of additional activity. Given the scale of benefit to industry it is not thought to be proportionate to cost the relatively insignificant incremental administrative cost associated with the increased activity. The costs to business of administering compensation payments are included in section (c) above.

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10. https://www.gov.uk/government/publications/fossil-fuel-price-projections-2013.
11. https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-june-2014-quarterly-national-accounts.

Summary

The net (undiscounted) benefits of the policy intervention are estimated as follows:

$$Net\ Benefit = \sum_{t=1}^{20}((G_t - D_t).\frac{1}{100}).R.\Delta P_t$$

Where t is time (years), G_t is the gas price in pence per therm at time t, D the cost of development and exploration in pence per therm, R is the average discounted gas reserves per project and ΔP_t is the change in the number of projects begun in year t as a result of the policy intervention. For a single project started at time t, the NPV at time t is £60.4 million, calculated as follows:

(75.5p/therm – 58.3p/therm) / 100 * 366 million therms

[366 million therms is the total discounted production from a 12 well pad where each well produces a total of 4 bcf (3.05 bcf discounted) with an average calorific value (BTU/scf) of 1,000.]

For the central case, the time profile of net benefits for the options are as follows:

Net Value (£ million)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Do nothing	6.3	6.3	6.3	6.3	6.3	6.3	62.5	93.8	125.0	156.3
Change Access Rights Option 1	9.4	9.4	94.4	141.5	188.7	235.9	283.1	330.3	377.4	377.4
Change Access Rights Option 2	9.4	9.4	94.3	141.4	188.6	235.7	282.9	330.0	377.2	377.2
Change Access Rights Option 3	9.4	9.4	94.3	141.5	188.6	235.8	283.0	330.1	377.3	377.3
Change (Option 1)	**3.2**	**3.2**	**88.1**	**135.3**	**182.5**	**229.7**	**220.6**	**236.5**	**252.4**	**221.2**
Change (Option 2)	**3.2**	**3.2**	**88.0**	**135.2**	**182.3**	**229.5**	**220.4**	**236.3**	**252.2**	**220.9**
Change (Option 3)	**3.2**	**3.2**	**88.1**	**135.2**	**182.4**	**229.6**	**220.5**	**236.4**	**252.3**	**221.0**

Net Value (£ million)	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Do nothing	187.5	218.8	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
Change Access Rights Option 1	377.4	377.4	377.4	377.4	377.4	377.4	0.0	0.0	0.0	0.0
Change Access Rights Option 2	377.2	377.2	377.2	377.2	377.2	377.2	0.0	0.0	0.0	0.0
Change Access Rights Option 3	377.3	377.3	377.3	377.3	377.3	377.3	0.0	0.0	0.0	0.0
Change (Option 1)	**189.9**	**158.7**	**127.4**	**127.4**	**127.4**	**127.4**	**-250.0**	**-250.0**	**-250.0**	**-250.0**
Change (Option 2)	**189.7**	**158.4**	**127.1**	**127.1**	**127.1**	**127.1**	**-250.0**	**-250.0**	**-250.0**	**-250.0**
Change (Option 3)	**189.8**	**158.5**	**127.3**	**127.3**	**127.3**	**127.3**	**-250.0**	**-250.0**	**-250.0**	**-250.0**

Based on the assumptions described above, the NPV of selecting the favoured option rather than the do nothing option is £1,252.8 million (in 2014 prices).

Extreme uncertainty attaches to the key parameters underlying this estimate; most if not all of the assumptions are subject to very wide margins of error. It is possible that shale gas will not prove to be commercially exploitable in Great Britain (especially if gas prices were to remain low) but equally it is possible that gas prices will be much higher than assumed in the central case or the average well might be much more productive. For illustrative purposes low and high gas prices are used below to show the possible outcomes under alternative assumptions regarding one of the key parameters.

For the lower gas price sensitivity case, the time profile of net benefits for the options are as follows:

Net Value (£ million)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Do nothing	0.6	0.6	0.6	0.6	0.6	0.6	5.9	8.8	11.7	14.7
Change Access Rights Option 1	0.9	0.9	9.4	14.1	18.8	23.5	28.2	32.9	37.6	37.6
Change Access Rights Option 2	0.9	0.9	9.3	14.0	18.6	23.3	28.0	32.6	37.3	37.3
Change Access Rights Option 3	0.9	0.9	9.4	14.0	18.7	23.4	28.1	32.7	37.4	37.4
Change (Option 1)	**0.4**	**0.4**	**8.8**	**13.5**	**18.2**	**22.9**	**22.3**	**24.1**	**25.8**	**22.9**
Change (Option 2)	**0.3**	**0.3**	**8.7**	**13.4**	**18.1**	**22.7**	**22.1**	**23.8**	**25.6**	**22.6**
Change (Option 3)	**0.3**	**0.3**	**8.8**	**13.4**	**18.1**	**22.8**	**22.2**	**23.9**	**25.7**	**22.8**

Net Value (£ million)	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Do nothing	17.6	20.5	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4
Change Access Rights Option 1	37.6	37.6	37.6	37.6	37.6	37.6	0.0	0.0	0.0	0.0
Change Access Rights Option 2	37.3	37.3	37.3	37.3	37.3	37.3	0.0	0.0	0.0	0.0
Change Access Rights Option 3	37.4	37.4	37.4	37.4	37.4	37.4	0.0	0.0	0.0	0.0
Change (Option 1)	**20.0**	**17.1**	**14.1**	**14.1**	**14.1**	**14.1**	**-23.4**	**-23.4**	**-23.4**	**-23.4**
Change (Option 2)	**19.7**	**16.8**	**13.9**	**13.9**	**13.9**	**13.9**	**-23.4**	**-23.4**	**-23.4**	**-23.4**
Change (Option 3)	**19.8**	**16.9**	**14.0**	**14.0**	**14.0**	**14.0**	**-23.4**	**-23.4**	**-23.4**	**-23.4**

Based on the assumptions described above, in the low gas price sensitivity case the NPV of selecting the favoured option rather than the do nothing option is £133.8 million (in 2014 prices).

For the higher gas price sensitivity case, the time profile of net benefits for the options are as follows:

Net Value (£ million)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Do nothing	9.7	9.7	9.7	9.7	9.7	9.7	97.2	145.9	194.5	243.1
Change Access Rights Option 1	14.6	14.6	146.5	219.7	292.9	366.2	439.4	512.6	585.8	585.8
Change Access Rights Option 2	14.6	14.6	146.4	219.6	292.8	366.0	439.2	512.4	585.6	585.6
Change Access Rights Option 3	14.6	14.6	146.4	219.6	292.8	366.1	439.3	512.5	585.7	585.7
Change (Option 1)	**4.9**	**4.9**	**136.7**	**210.0**	**283.2**	**356.4**	**342.1**	**366.8**	**391.4**	**342.7**
Change (Option 2)	**4.9**	**4.9**	**136.7**	**209.9**	**283.1**	**356.3**	**341.9**	**366.5**	**391.1**	**342.5**
Change (Option 3)	**4.9**	**4.9**	**136.7**	**209.9**	**283.1**	**356.3**	**342.0**	**366.6**	**391.2**	**342.6**

Net Value (£ million)	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Do nothing	291.7	340.3	389.0	389.0	389.0	389.0	389.0	389.0	389.0	389.0
Change Access Rights Option 1	585.8	585.8	585.8	585.8	585.8	585.8	0.0	0.0	0.0	0.0
Change Access Rights Option 2	585.6	585.6	585.6	585.6	585.6	585.6	0.0	0.0	0.0	0.0
Change Access Rights Option 3	585.7	585.7	585.7	585.7	585.7	585.7	0.0	0.0	0.0	0.0
Change (Option 1)	**294.1**	**245.5**	**196.9**	**196.9**	**196.9**	**196.9**	**-389.0**	**-389.0**	**-389.0**	**-389.0**
Change (Option 2)	**293.9**	**245.2**	**196.6**	**196.6**	**196.6**	**196.6**	**-389.0**	**-389.0**	**-389.0**	**-389.0**
Change (Option 3)	**294.0**	**245.4**	**196.7**	**196.7**	**196.7**	**196.7**	**-389.0**	**-389.0**	**-389.0**	**-389.0**

Based on the assumptions described above, in the high gas price sensitivity case the NPV of selecting the favoured option rather than the do nothing option is £1,939.0 million (in 2014 prices).

The NPVs and average annual net benefits under the three options are summarised as follows:

	NPV (£ million)	**Annual Average Benefit (£ million)**	**NPV (£ million)**	**Annual Average Benefit (£ million)**	**NPV (£ million)**	**Annual Average Benefit (£ million)**
	Central		***Low***		***High***	
Option 1	1254.0	68.1	135.0	7.6	1940.2	105.3
Option 2	1251.9	68.0	132.8	7.4	1938.0	105.1
Option 3	1252.8	68.0	133.8	7.5	1939.0	105.2

The administrative costs for HMG depend entirely on the extent of additional activity. While these costs could be handled within existing DECC resources they would represent a (small) opportunity cost to the public sector. As noted above, given the scale of benefit to industry it is not thought to be proportionate to cost the relatively insignificant incremental administrative cost associated with the increased activity.

Rationale and evidence that justify the level of analysis used in the IA

The effects of the policy options being considered have a large range of uncertainty. Any of the options for change mean would make timely exploration for and development of shale gas more likely. However, there are uncertainties about the value of the activity, the nature and scale of the hydrocarbon resource and finding and development costs as stated above. The focus in sensitivity analysis has been on future gas prices. Changes to assumptions on average reserves per well and costs per well could also have been considered but the range of net benefits presented is thought to be wide enough to bracket the likely true impact of the measure.

One-in, two-out

The EANCB related to oil and gas activity has been assessed over the 20 year period 2015–2034 which is the period covered by the NPVs of the various options. Apart from the (uncosted) administrative costs, all of the monetary costs and benefits of the policy options fall to business; the ones being counted result directly from the intervention since it is the changes to the underground access regime that will make additional/earlier activity commercially attractive. The costs and benefits do not include indirect effects such as those on the oil and gas supply chain. Any environmental effects are indirect.

The EANCB has been derived using the EANCB calculator with input annual net benefits and costs calculated as described above based on the preferred policy option of a community based compensation scheme. With respect to its impact on oil and gas activities, **the value of the OUT for this policy is £65.09 million.**

Wider impacts

All significant oil and gas operations, such as drilling, fracking or production, require planning permission and are subject to operational regulation by the relevant Environmental Regulator (i.e. the Environment Agency, the Scottish Environment Protection Agency or Natural Resources Wales, as the case may be). The operators may be required to carry out an Environmental Impact Assessment (EIA) before planning permission is considered and the industry are committed to carrying out an EIA in all cases where fracking is involved at exploration. Planning permission will be granted only where the proposed activity is acceptable in terms of land use planning, and the conduct of permitted operations will have to meet the environmental requirements specified by the Environmental Regulator.

DECC conducted a strategic environmental assessment on the potential environmental effects of the activities which might be consented subsequent to the issue of new licences,[12] which was published for public consultation (which closed on 28 March). The results of the assessment, and the views received in the consultation, were considered before the decision was taken to launch a new onshore licensing round.[13]

A September 2013 report by Professor David MacKay and Dr Tim Stone[14] concluded that we can develop shale and keep emissions low – shale emissions are likely to be lower than the liquefied natural

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12. *Strategic Environmental Assessment for further onshore oil and gas licensing: environmental report*, December 2013, available online at https://www.gov.uk/government/consultations/environmental-report-for-further-onshore-oil-and-gas-licensing.
13. See https://www.gov.uk/government/speeches/outcome-of-the-strategic-environmental-assessment and https://www.gov.uk/government/news/new-onshore-licensing-round-opens.
14. See https://www.gov.uk/government/publications/potential-greenhouse-gas-emissions-associated-with-shale-gas-production-and-use.

gas it is likely to replace. In addition, a report published in June 2014 by Public Health England[15] concluded that “currently available evidence indicates that the potential risks to public health in the vicinity of shale gas extraction sites will be low if shale gas extraction is properly run and regulated”. Further to this, in 2012 the Royal Academy of Engineering and the Royal Society conducted an independent review of the scientific and engineering evidence on the risks associated with hydraulic fracturing for shale gas.[16] They concluded that the risks can be managed effectively in the UK, provided that operational best practices are implemented and enforced through regulation.

There are robust regulations in place to ensure on-site safety, prevent water contamination and mitigate seismic activity and air pollution, the proposed policy would not change any of these existing requirements.

Each option is expected to have no negative impact on the justice system. The proposals simplify the current process for underground access, under which court cases can be brought due to (a) a landowner refusing access and the operator in the case of oil and gas referring the case via the Secretary of State to the court (via Mines (Working Facilities and Support) Act 1966); or (b) in the case of trespass, if the operator accesses land without appropriate permission from the land owner. The first of these two possible impacts on the justice system will be removed in respect of oil and gas in underground land below 300 metres, and the second of these will be removed in respect of oil and gas and geothermal energy (the subject of a parallel impact assessment), therefore the policy will reduce the potential burden on the justice system.

Additional hydrocarbon (whether oil or gas) produced as a result of the chosen policy option is assumed to displace imports. Consequences for security of supply and energy prices have not been quantified as they are judged to be second order. With no material effect on UK oil or gas demand there should be no impact on UK carbon dioxide emissions.

We have drawn no conclusions from the results of the studies mentioned in a recent Defra report,[17] which look at research from the housing market and economy in the USA. This is very different to the UK. There has been no evidence of any impact on house prices in over half a century of oil and gas exploration and production in the UK.

Summary and preferred option with description of implementation plan

The government has consulted on options including its preferred option (Option 3).[18] Option 3 has a marginally lower NPV than Option 1 but that option does not consider that there is payment and notification under the existing system, which HMG considers should be retained.

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15. See http://www.hpa.org.uk/Publications/Environment/PHECRCEReportSeries/PHECRCE009/.
16. See https://royalsociety.org/~/media/policy/projects/shale-gas-extraction/2012-06-28-shale-gas.pdf.
17. https://www.gov.uk/government/publications/economics-of-shale-gas.
18. See https://econsultation.decc.gov.uk/decc-policy/consultation-on-underground-drilling-access.