

Potential Bowland Basin shale gas development Economic and fiscal impacts



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About this report

Cuadrilla Resources Limited (Cuadrilla) holds the development rights to a significant shale gas resource in the Bowland Basin. Cuadrilla has asked Deloitte UK to assess a number of the potential economic and fiscal impacts that this development would have on the United Kingdom. The analysis does not constitute a full economic impact assessment but focuses on potential UK tax payments, the impact on UK gas imports, employment creation, and how the local economy can share in the benefits of shale gas production.

Methodology

The analysis that Deloitte UK has carried out is based on projected cost and production volume estimates provided by Cuadrilla. These estimates are supported by surveys, initial drilling and US experience of shale gas production, but have not been separately validated by Deloitte UK. The estimates are subject to material uncertainty. Accordingly, in this report sensitivity analysis has been applied to Cuadrilla's estimates using gas price scenarios from the UK Department of Energy and Climate Change (DECC), and data from the International Energy Agency (IEA) on the potential range of European shale gas production costs. The assessment of the impact of shale gas development on employment is supported by benchmarks from the US shale gas industry.

In the absence of an alternative tax regime for shale gas, the analysis is based on the existing tax rates applicable to oil and gas production from the UK Continental Shelf (UKCS). While there is considerable uncertainty on many of the input assumptions, the scenarios presented in this report provide insights into the potential scale of some of the key economic impacts and the underlying drivers for the development of UK shale gas resources. The key results from the Deloitte UK assessment are set out in this note.

Executive summary

Oil and gas production in the UK is in decline. Government projections forecast a decrease in oil and gas tax revenue of over 50 per cent from 2011-12 to 2016-17.

In this context, Deloitte UK analysis shows that **Bowland Basin shale gas production could generate tax revenues of around £580 million per annum by 2020**. Deloitte UK's analysis is based on Cuadrilla cost and volume assumptions for shale gas production and the Department of Energy and Climate Change central wholesale price assumptions.

Declining oil and gas production will also lead to a continued increase in imported gas to meet domestic demand. Under the National Grid *Gone Green* scenario, by 2020 some 69 per cent of total UK gas consumption will be imported, equivalent to 21.2 billion therms. **Based on the Reference Case production assumptions, the Bowland Basin development could offset around 14 per cent of this import requirement in 2020.**

In addition, **the development could support up to a peak employment of between 6,900 and 23,600 jobs**. Deloitte UK estimates have been based on data from developed US shale gas fields.

Existing and proposed planning approval and business rate mechanisms will also create material local benefits from the Bowland Basin development. This is particularly the case if arrangements for shale gas business rates are introduced that are similar to those intended to be applied to renewable energy schemes. **Under the highest profitability case for the Bowland Basin project, and using an assumed two per cent of revenue level for business rates, the local authority could receive in excess of £54.5 million per annum**. This is equivalent to three per cent of the current Lancashire council budget or 13 per cent of the council tax charges to local residents.

Context

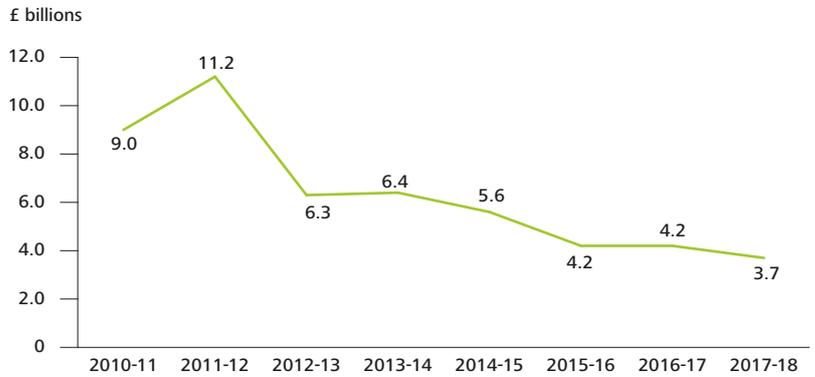
The option to develop shale gas within the UK comes at a time of falling UK gas production and declining overall revenues from the oil and gas sector for the economy. This reduction is significant in both volume and financial terms.

Current projections by HM Treasury show a decline in forecast oil and gas tax revenues of over 50 per cent from £11.3 billion in 2011-12 to just £4.3 billion in 2017-18; in real terms this is equivalent to tax revenues declining from £11.2 billion in 2011-12 to £3.7 billion in 2017-18.

Projections from the Office for Budget Responsibility (OBR) show the contribution of UK oil and gas tax revenue as a percentage of Gross Domestic Product (GDP) continuing to decline over the forecast period and out to 2040.

From a volume perspective, National Grid projections suggest that the market in Great Britain will become increasingly dependent on imports to meet GB gas demand. The key sources of supply for the GB gas market are the UK Continental Shelf (UKCS), Norway, the Balgzand-Bacton Line (BBL), the Belgian interconnector, owned and operated by Interconnector UK Limited (IUK), and liquefied natural gas (LNG) imports.

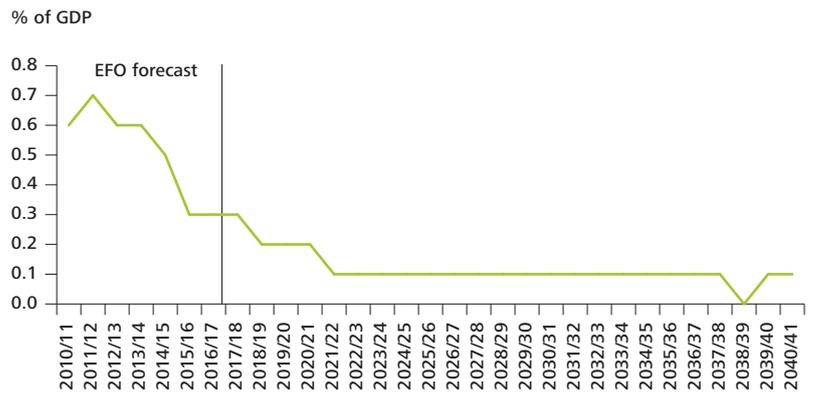
Figure 1. Historical and forecast UK oil and gas tax revenue



Note: Figures have been converted from nominal into real as at 1 January 2012 using an inflation rate of 2.5 per cent, data from 2010-11 historical actuals.

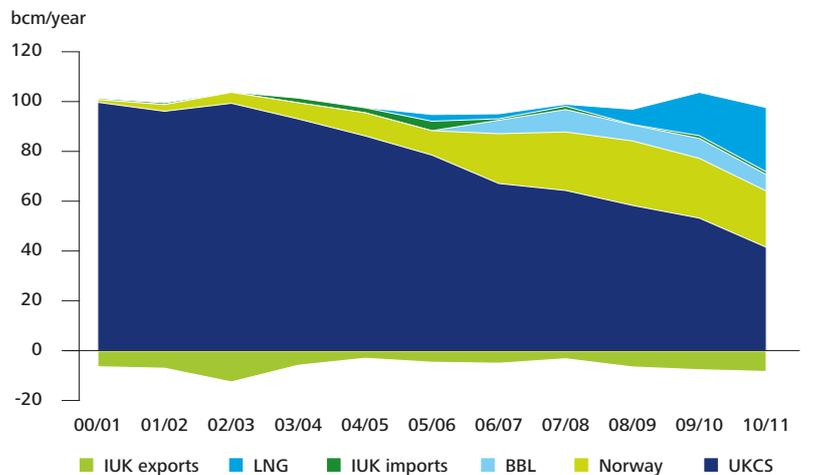
Source: Economic and fiscal outlook forecast (EFO), March 2013

Figure 2. Total UK oil and gas tax revenues as a percentage of GDP



Source: Fiscal sustainability report, July 2012

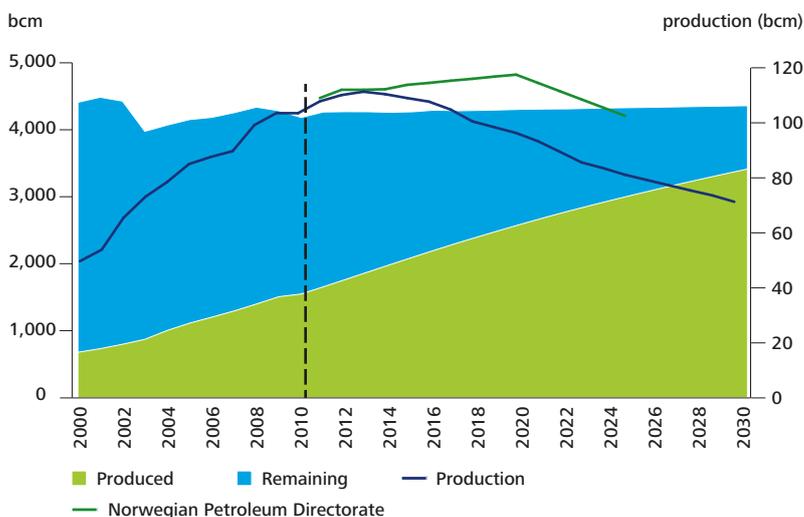
Figure 3. Historical annual GB gas supplies and IUK exports



Source: National Grid

Over the last decade UKCS gas production has been declining due to diminishing reserves. Supply has been supplemented with imports and LNG. Norwegian imports are a key element of the mix due to the country's proximity and direct pipeline connections into the UK market. Supply has also been supplemented to some extent by the new BBL pipeline and to a much larger extent in recent years by LNG as LNG import capacity has increased and the shortfall between UKCS production and UK demand has grown. In addition, future Norwegian imports are expected to decrease as reserves dwindle.

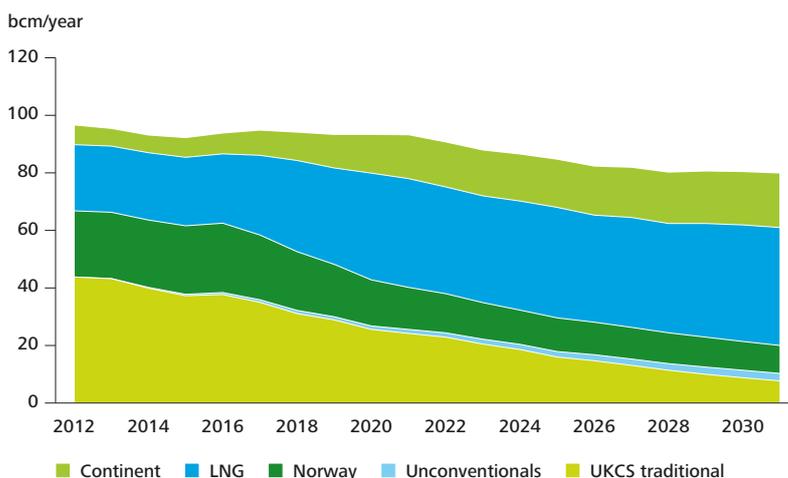
Figure 4. Cumulative Norwegian production and reserves



Source: National Grid

The combined effect of declining UKCS production and falling imports from Norway will increase UK reliance on imported gas from other sources. This is currently expected to be met by a combination of LNG and imports through pipelines linking the UK to the continent. However, there will also be exports of gas to the continent. The recent growth in the UK's LNG import capability has led to the UK importing LNG and then 'wheeling' this across to the Continent. This wheeling activity and associated export volume does not alter the underlying picture that UK gas demand is being met by imports. The potential scale of these imports is illustrated by the National Grid Slow Progression scenario (the National Grid scenario with higher GB gas consumption).

Figure 5. Future gas mix for GB under National Grid Slow Progression scenario



Source: National Grid

Potential UK tax payments

Given the uncertainty on key input assumptions, there is a wide range of possible projected tax revenues from profits on Bowland Basin shale gas production. Under most scenarios there is a substantial potential contribution to UK tax revenues that can mitigate some of the decline in revenue anticipated without shale gas development.

Under the Cuadrilla cost and volume assumptions for shale gas production, combined with the DECC central wholesale gas price assumptions, Bowland Basin shale gas production is projected to generate tax revenues of around £580 million per annum by 2020.

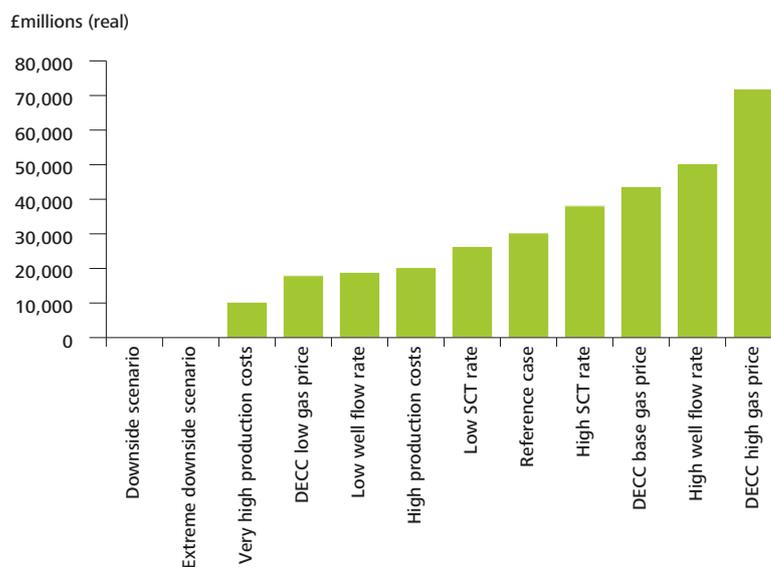
As shale gas production increases, it makes a substantial contribution to maintaining UK oil and gas tax revenues, which are otherwise expected to tail off rapidly.

The level of tax generated varies materially across scenarios given variations in assumptions on wholesale gas prices and the cost of production, which together drive project profitability.

Under pessimistic assumptions regarding achievable revenues and costs, and under the current UK fiscal regime for gas production, shale gas production from the Bowland Basin project would not be viable. Given that costs will not be known with any level of certainty until the project matures, and learning effects and economies of scale are captured, this highlights a level of development uncertainty.

Figure 6 shows potential tax contributions across a range of scenarios, assuming that the project proceeds. There is no tax under the most pessimistic combinations of assumptions because the project cannot cover costs. In some of the other scenarios the Internal Rate of Return (IRR) of the investment may not be sufficient to attract the necessary investment, particularly given the back-ended profile of investor returns from the project.

Figure 6. Range of tax contributions across all scenarios – sum of real undiscounted cash flows (January 2012 prices)



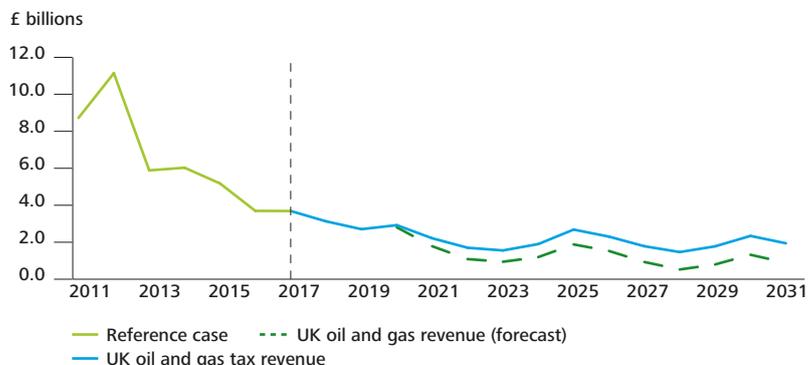
Source: Deloitte analysis

Given the uncertainty surrounding some of the key drivers of the potential profitability of shale gas in the UK, it is appropriate for the UK government to consider introducing additional tax allowances to encourage investment. The Budget 2013 announced that a new tax regime to support shale gas would be developed for consultation later this year. This will include the introduction of a new shale gas field allowance and the extension of the ring-fence expenditure supplement from six to ten years. Accordingly, the positive impact on tax revenues from the Bowland Basin under each market and production scenario will depend on the scale and duration of the associated tax regime.

In any event, tax revenues from the Bowland Basin and potentially other UK shale gas developments could mitigate some of the significant fall in future UK oil and gas revenues that is expected in the absence of unconventional field development. Figure 7 shows the possible impact of Bowland Basin tax revenues (estimated under the current tax provisions) under the Reference Case modelled in the context of the otherwise expected decline in UK oil and gas revenues.

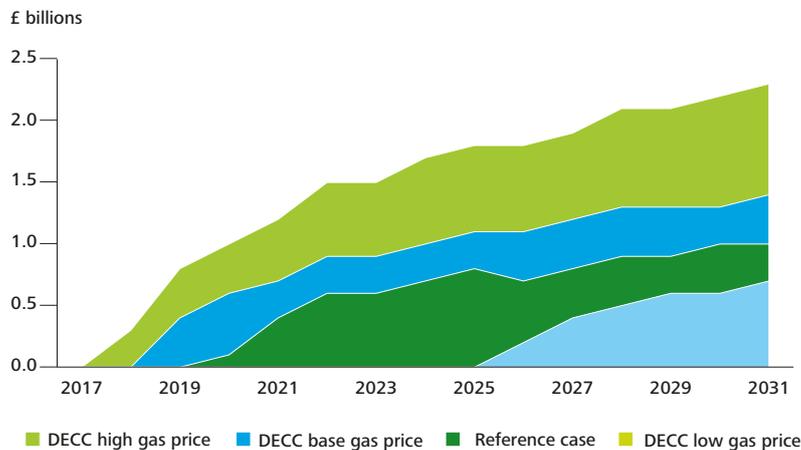
This tax revenue is strongly correlated with gas prices.

Figure 7. Projected Bowland Basin contribution to UK oil and gas tax revenues under the Reference Case (real prices as at 1 January 2012)



Source: Tax revenue to 2017 was taken from the UK Government budget. The annual change in tax revenue from 2018 onwards was estimated by combining the forecast increase in GDP from the Office for National Statistics (ONS) and the forecast tax contribution of the UK oil and gas industry as a per cent of GDP from the OBR. All figures have been converted from nominal to real (as at 1 January 2012) using an inflation rate of 2.5 per cent. Reference Case tax revenue is from Deloitte UK analysis.

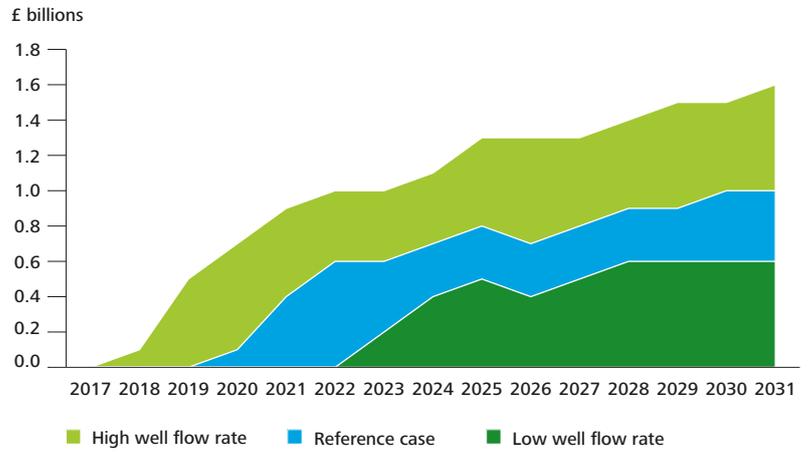
Figure 8. Annual UK government Bowland Basin tax revenues under Reference Case and DECC gas price sensitivities (real prices as at 1 January 2012)



Source: Deloitte UK analysis

Tax revenues vary significantly across different assumptions for the per well flow rate. Changing this parameter affects both the volume of gas produced and the cost per unit of the gas and hence the profitability of the project.

Figure 9. Annual UK government Bowland Basin tax revenues under Reference Case and per well production sensitivities (real prices as at 1 January 2012)



Source: Deloitte UK analysis

The impact on UK gas imports

Bowland Basin production could substantially reduce the volume of gas that the UK must import.

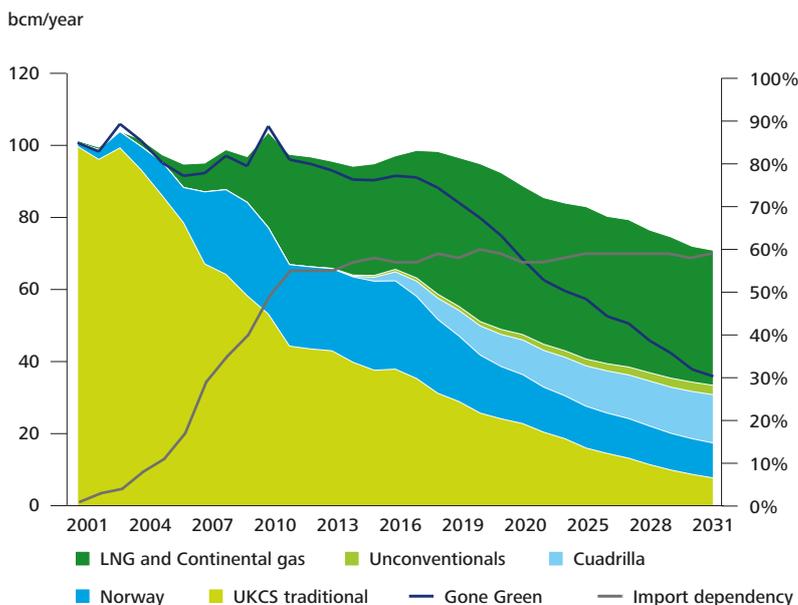
Projections by National Grid show an increasing reliance on imported gas for the UK. Under the National Grid *Gone Green* scenario, by 2020 some 69 per cent of gas consumed in the UK will be imported, equivalent to 21.2 billion therms.

The Bowland Basin development, based on the Reference Case production assumptions, could offset around 14 per cent of this import requirement in 2020.

Figure 10 shows the impact of adding assumed Bowland Basin production to the supply mix envisaged for UK gas under National Grid projections.

The blue line is UK demand and this is compared to a build up of supply from a range of sources including Bowland Basin. The area above the blue line represents displaced imports that will no longer be required due to domestic production from the Bowland Basin.

Figure 10. Displaced UK gas import requirement due to Cuadrilla production



Source: National Grid and Deloitte Petroleum Services Group analysis

Creating employment

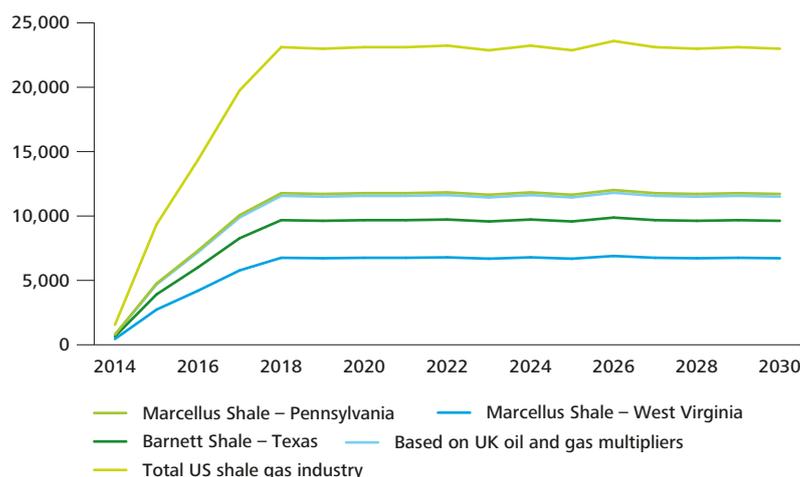
The Bowland Basin development could support up to a peak employment of between 6,900 and 23,600 jobs based on estimates from developed US shale gas fields.

The rolling drilling operations required for the Bowland Basin development will create direct employment that could reach as many as 5,700 jobs in 2026. It will also generate further employment indirectly in the supply chain supporting Bowland Basin production and create employment in the wider economy.

Using a range of employment multipliers drawn from US shale gas experience suggests total potential employment creation could reach a peak of between 6,900 and 23,600 jobs after 2025. The key factor that will determine actual UK employment creation is the extent to which UK manufacturers and service companies develop the skills and capacity to supply the UK shale gas sector.

There is a significant variation in the estimates of employment creation associated with US shale gas development depending on whether the estimates are for within a single state or across the US as a whole. This highlights the extent to which importing goods and services can dampen employment creation in a specific region.

Figure 11. Potential Bowland Basin employment effects under a range of benchmarks

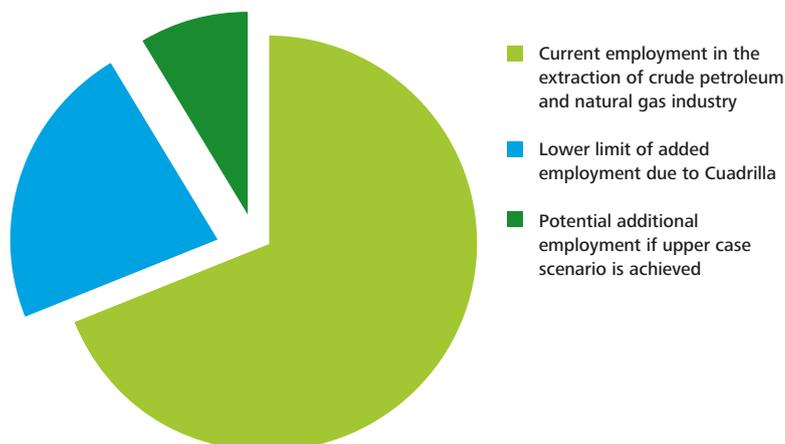


Source: Deloitte UK analysis

The lower estimate of incremental direct employment for the Bowland Basin development at 4,100 jobs is 46 per cent of current direct UK employment in the extraction of crude oil and natural gas industries. This increases to 63 per cent in the event the employment impact reaches the upper case scenario.

These levels of employment are likely to create continued opportunities in what would otherwise have been a declining UK industry.

Figure 12. Current and expected direct industry employment due to development of the Bowland Basin (after full ramp up in 2017)



Source: Office for National Statistics, Annual Survey of Hours and Earnings, March 2012. Deloitte analysis

Local benefits from shale gas production

Existing and proposed planning approval and business rate mechanisms will create material local benefits from the Bowland Basin development.

Planned changes to the business rates system in England and Wales will enable local authorities to retain a share of the business rates from new developments in their areas. This will create financial benefit to the local area as the Bowland Basin is developed.

Under arrangements currently proposed for renewable energy, local councils will retain 100 per cent of the related business rates paid. If this approach is extended to shale gas production, the financial benefit to the local area could be substantial.

Under the highest profitability case for the Bowland Basin project, and using an assumed two per cent of revenue level for business rates (no business rate or royalty rate exists for shale gas as yet but this level is comparable to that for other types of development), the local authority could receive in excess of £54.5 million per year, equivalent to three per cent of the current Lancashire council budget, or 13 per cent of the council tax charges to local residents.

Regardless of changes to the business rates, there is a requirement that the project provide community benefits to ameliorate any negative impact on the local community. This is embodied in section 106 of the Town and Country Planning Act 1990.

The novel nature of the development leaves significant scope to negotiate appropriate arrangements that align local stakeholder interests with the development of the Bowland Basin.

Success factors, benefits and policy implications

Success factors – Gaining public support is a critical success factor because shale gas development relies on the consent of planning authorities, local and national stakeholders.

At the same time, financial modelling has questioned the viability of shale gas development because of uncertain well flow rates, production costs and future gas price levels. Mitigating these risks will drive the successful development of shale gas production.

The success factors are also closely related. This is because planning restrictions could affect the economics of shale gas development if they limit the ability to capitalise on advantageous geology or the planning process for follow on well-pads interrupts drilling activities.

Potential benefits – This report has shown that under some scenarios Bowland Basin could deliver significant benefits. In the Reference Case some £580 million per year additional tax revenues could be generated by 2020 (if there are no additional tax allowances), 14 per cent of gas import requirements could be reduced by 2020 and up to 23,600 jobs could be created. Moreover, the local authority could receive in excess of £54.5 million per year additional income from business rates directly from shale gas production.

This highlights the importance of resolving the issues related to the critical success factors.

Policy implications – Tax incentives. It will be some time before the industry generates enough additional information to reduce the uncertainty regarding the economic viability of early projects in the UK.

In other industries, projects with the potential for long-term rewards but immediate development risks have attracted initial tax incentives.

These incentives could mitigate some of the upfront risks and so materially contribute to the successful development of shale gas.

Therefore the risk and reward profile of shale gas projects should be further analysed to assess the merits of specific tax-based investment incentives.

Business rates and local communities. Developing a local business rates regime for shale gas equivalent to that for renewable energy would provide material benefits to local communities.

Under such a regime, local authorities could retain 100 per cent of the business rates from shale gas projects.

Community fund. In addition to any incremental business rates, companies in the shale gas sector should develop community funds.

Such funds could be used to work with local communities and channel benefits from the potential Bowland shale gas development into local community projects.

Closer collaboration. The development of shale gas raises many issues – including environmental protection – which need to be adequately addressed. Resolving these issues could lead to significant benefits for all stakeholders but will involve closer collaboration between stakeholders.

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Notes

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