Socio-economic impact of unconventional gas in Wales

Revisiting the economic impact scenarios in the original Regeneris, AMEC, Cardiff University (2015) report in the context of new information on current planning applications and environmental permits

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1 Objective

This note briefly revisits the report undertaken by Regeneris, AMEC and Cardiff University (2015) *Socio-economic Impact of Unconventional Gas in Wales*. The objective is to consider whether the findings of the report, particularly in connection with the different development scenarios around potential coal bed methane and shale gas production are still tenable given the elapsed time following the initial report, and that since July 2015, new information has become available relating to applications to produce coal bed methane in Wales.

The analysis of 2015 examined the potential regional economic benefits of the development of unconventional gas.[1] The 2015 report comprised a literature review examining economic impact evidence on unconventional gas, particularly as it related to local economic effects associated with operational and capital spending, a review of the UK policy and planning framework, an appreciation of the issues in estimating the size of the hydrocarbon resource, and the development of a series of scenarios, which were then examined to estimate direct and indirect economic effects associated with three different scales of unconventional gas activity. The focus in the economic modelling was on more local effects in terms of employment and income support.

The initial research revealed how constraints in the regional supply side placed limits on how the expansion of unconventional gas capacity might create new economic opportunities in the case of the Welsh economy.

Having reviewed the original report in relation to issues of expected Welsh economic effects from the developed scenarios of CBM and shale gas development, we believe that little has actually changed in the period July 2015-July 2017 which takes away from the economic impact estimates developed in the 2015 report.

[1] We take unconventional gas here to cover shale gas (although oil is also relevant but less common in Wales), coalbed methane (CBM) and gasification. Whilst shale gas and CBM refer to specific fossil fuels, gasification refers to one particular technique for extracting product gas including methane.

2 The development scenarios in the 2015 report

The research underlying the initial analysis took 2015 as the base year of the scenarios developed. The original scenarios developed were specific to Wales, but were made to be broadly consistent with the development activity which may occur elsewhere in the UK. The scenarios were constructed on the basis of different levels of investment activity and hence exploration and production occurring within Wales. There was a more extensive economic impact evidence base for shale gas than for coal bed methane. There was sufficient information to differentiate scenarios based on the extraction of both shale gas and CBM separately.

The basis of the three scenarios are set out in Table 1 at the end of the document. In summary these were:

- Low Scenario. A focus on coal bed methane development. Uncertainties and other barriers to widespread development remain. Global energy prices continue to provide limited incentives to invest in unconventional gas in the UK.
- Medium Scenario – Step Up in Exploration and Production in Wales. A number of the barriers and aspects of uncertainty affecting the industry are lessened or removed. Global energy prices provide a greater incentive in developing extraction in the UK compared to the low scenario.
- High Scenario - Significant Step Change. Uncertainty affecting the industry is greatly reduced stimulating significantly higher investment activity across the UK. Although not as rapid as in other parts of the UK, the increase in shale gas activity also occurs in Wales. This increase may also be stimulated by market factors such as a much higher increase in energy prices in the medium (e.g. 2-5 years) to long term (over 5 years). The likelihood of this scenario occurring is judged to be fairly low.

The proposed scenarios allowed for a number of aspects of uncertainty. The analysis focused on potential activity in a period 2015 - 2030, up to the decommissioning of this activity. Consequently all of the expenditure associated with the lifecycle of the additional activity is captured and expenditure could feasibly have occurred up to 2045. In terms of the expected duration of activity existing UK studies reviewed made varying assumptions for the duration of lifetime activity per well and the proportion of this accounted for actual production activity (ranging between 15 and 20 years productive life). The developed scenarios did not factor in assumptions about future policy decisions by UK or Welsh Governments.

Data sources to produce an estimate of the cost per well for the UK shale gas and coal bed methane were described in the 2015 report. We showed in the 2015 report that there was far less information available for the extraction costs of CBM although the available evidence pointed at the time to it being typically much lower than the shale gas case. On the basis of the available information we developed assumptions on lifetime capital expenditure (capex) and operational expenditure (opex) costs per well. These assumptions might usefully be revisited.

The per-well estimates of new economic activity were used as an input to the Input-Output Tables for Wales to estimate the direct, indirect and induced levels of gross value added and employment. Then these impacts were aggregated to produce the scenario estimates based on numbers of bores, wells and pads. The original assessment, in estimating regional economic effects, made a series of assumptions about the local supply side to support such developments and these are still considered reasonable. Furthermore the original report dealt only with the positive economic impact associated with unconventional gas extraction. It made no comment on the likelihood or viability of such investments given wider economic, energy cost, environmental and social contexts.

3 Current Consented Onshore Developments in Wales

The information received from Natural Resources Wales regarding planning applications reveals a level of current activity most closely associated with the Low Scenario in the 2015 report. Our reasoning here relates to the fact that:

- In August 2017 there are four proposed developments with planning consent (approved 2012-16) and environmental permits (granted 2015-16), but with a focus on exploratory drilling as opposed to production. One of these developments relates to crude oil with the remainder focused largely on CBM.
- Two additional CBM sites have gained planning permissions but are without environmental permits in August 2017. One site is for CBM exploration (approved in 2015), the other for Abandoned Mine Methane production (approved in 2013).
- One site (Margam) could involve a larger scale of CBM production, and is expected to develop planning and environmental permit applications later in 2017. This development would likely comprise 3-5 production CBM boreholes.

To summarise this level of activity expected, **and resulting economic effects in Wales** are not inconsistent with a Low Development Scenario in the 2015 report (see Table 2). Alignment with the Low Development Scenario is based on the fact that:

- As at August 2017 there has been no exploratory drilling associated with the above.
- The focus of planning applications is overwhelmingly on CBM as opposed to shale gas.
- Even were all applications and consents related to current developments to be in place by the early 2020s, this would result only in an estimated 11-13 CBM production boreholes.
- It is unlikely that all of the proposed developments will result in production. Even if they were this results in a total of 7 production facilities which could be operational in a period 2020-2021 for a period of around 20 years.

4 Conclusion

In closing it is important to recognise that key conclusions relating to the 2015 report are still relevant. In particular:

- The 2015 economic impact analysis was focused around developed scenarios and with, still, very limited evidence on the cost structure of shale gas and coal bed methane operations in the UK, and limited information on the expected revenues associated.
- That policymakers need to understand that with unconventional gas economic impacts are likely to be transitory with much of the regional economic activity supported during early stage operations, and with drilling crews expected to be highly mobile. Activity around shale gas and coal bed methane is unlikely to be an activity that is well embedded in the local economy, and with this conclusion more evident in cases where developments are undertaken by out of region firms, which have established supply chains elsewhere.
- That unconventional gas in Wales is unlikely to be of the scale and nature to create any longer term transformative economic effects for the region.

Table 1: Unconventional gas in Wales: Development Scenarios Summary from 2015 Regneneris, AMEC and Cardiff University report

Scenarios	Fuel Type	Exploration (bores drilled)	Pads	Well Intensity	Total Wells
Low. Uncertainties and other barriers to development. Energy prices continue to increase steadily. Consequently, on-going but limited exploration continues, leading to some small scale production later in the period. Exploration is initially focused on CBM and SG later in the period. Production activity is restricted to CBM in the period.	CBM	25.5	3	Low 4 to High 6	Low 12 to High 18
	Assumes 17 existing licences and similar number through 14th licensing round. Average 0.75 bore holes per licence		Three CBM pads with production first coming on stream early 2020	Use of range allows for different potential intensity of drilling and well activity given the uncertainty about the resource.	
MEDIUM A number of the barriers and aspects of uncertainty affecting the industry are lessened or removed and possibly a higher increase in energy prices than under the low scenario. A number of pads are developed in South East and North East Wales, with CBM development occurring sooner in the period, given the greater knowledge of the resource. Shale gas production comes on stream later in the period (2025), given the greater time needed to establish the nature of the resource.	CBM	61	4	Low 4 to High 6	Low 16 to High 24
	Shale Gas	41	1	Low 10 to High 24	Low 10 to High 24
	Assumes 17 existing licences and similar number through 14th Rd. Average 3 bore holes per licence		Four CBM pads with production coming on stream 2020 onwards (split between NE and S Wales). A single SG pad comes on stream 2025.		
HIGH Uncertainty affecting the industry is greatly reduced stimulating significantly higher investment activity across the UK. Although not as rapid as in other parts of the UK, the increase in SG activity also occurs in Wales. This increase may also be stimulated by other supply side considerations, such as a much higher increase in energy prices. The assumed scale of development and production represents a higher share of UK high scenarios in order to test the potential supply chain impacts.	CBM	109	12	Low 4 to High 6	Low 48 to High 72
	Shale Gas	231	8	Low 10 to High 24	Low 80 to High 192
	Assumes 17 existing licences and similar number through 14th Rd. Average 10 bore holes per licence		Assumes 12 CBM pads and 8 SG pads. SG development and production occurs on a slightly delayed timescale compared to CBM.		

Table 2 Total and Annual Economic and Employment Impacts – Low Scenario

	Low development scenario – Business as Usual 3 CBM pads in production with between 12-18 wells drilled and productive in total; no shale gas activity
Overall lifetime spending	£9.2-£13.1m
£m lifetime spending in Wales	£2.9-£4.2m
Total gross value added supported in Wales	£1.7m-£2.4m
Annual average GVA supported in Wales	£0.1m-£0.4m
Total employment (FTE years)	<100
Annual average employment (FTEs)	<10

Source: Regeneris Consulting et al (2015) report.