With decarbonisation firmly on the agenda, is fracking over?

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The shale gas moratorium in England has been in effect since November 2019. In mid-June 2020, speaking on BBC's North West Tonight, energy minister Kwasi Kwarteng stated that 'fracking is over' and the government has 'moved on'. Kwarteng clarified that the issue remained evidence-backed and they would be open to scientific evidence which could change their minds.

In response, A J Lucas — owners of Cuadrilla — issued a statement including the claim that UK-produced natural gas 'is likely to produce less than half the pre-combustion carbon emissions of gas imported by ship', the latter referring to liquefied natural gas (LNG). This claim is based on analysis carried out by the UK Oil and Gas Authority (OGA), which compared natural gas produced from the UK continental shelf (UKCS) with imported LNG. The OGA made no mention of UK shale gas.

This week, the UKUH programme is releasing its latest briefing, on *Shale Gas and the UK's Low Carbon Transition*, which details the emissions associated with shale gas and the implications for its potential role in the UK's future economy. So, what is the truth behind the statements above?

As detailed in the briefing, shale gas has been the topic of much life cycle assessment work over the past decade, including estimates of cradle-to-grave greenhouse gas emissions and comparison with other types of fuel and energy options. Many of these studies have looked at using shale gas for electricity generation, finding an average carbon footprint of about 500 g CO_2-equivalent per kWh – or, per unit of energy contained in the gas, about 67 g CO_2-e per MJ. In contrast, imported LNG is typically found to be about 10% worse, while conventional gas (e.g. from the UKCS) is a few percent better than either.

The reason for LNG's higher carbon footprint is that liquefaction, transportation by sea, and regasification at the destination together account for approximately 15-20% of total emissions. As these stages are not required for either shale gas or UKCS gas, both have lower pre-combustion emissions. This supports the statements from Lucas and the OGA that LNG's pre-combustion emissions are approximately double that of UKCS gas. However, since the combustion emissions are the same for all processed natural gas, the emissions from the overall life cycle differ by far less than 50%. Moreover, Lucas cannot reasonably assume that shale gas produced in the UK will have the same impact as UKCS gas: in fact, all life cycle assessment shows that it will not.

North Sea wells operate unstimulated at high flow rates for many years and therefore the impact of initial exploration and drilling become negligible across its operating life. However, shale gas wells have uncertain and lower production rates, meaning that the drilling, fracturing and well completion operations contribute more emissions for a given amount of gas produced. Current estimates suggest the pre-combustion emissions of shale gas will definitely be greater than UKCS gas but lower than LNG. Therefore, if the UK developed a shale gas industry to replace declining supplies of North Sea gas, overall carbon emissions would increase slightly; conversely, if shale gas exclusively replaced imported LNG, emissions would fall slightly.

More important, perhaps, is the role of natural gas in general – from any source – as the UK moves towards a net-zero future. As discussed in the briefing document, scenario analysis suggests that this role is much more limited than it is today. Overall demand for natural gas is set to fall. Currently, the greatest demand for natural gas is for domestic and industrial heat generation and for electricity generation. In the coming years, the electricity mix will greatly reduce its use of natural gas, while

electrification of heating through heat pumps may drastically reduce the gas demand for heating. A more likely future use for natural gas is hydrogen generation through steam methane reforming (SMR) with carbon capture and storage. With up to 90% of the process CO_2 emissions theoretically captured, the *pre-combustion* (or more precisely, pre-SMR) emissions become more significant. In that case, in the absence of sufficient North Sea gas either from the UKCS or Norwegian pipeline imports, UK shale gas could be slightly preferable to increasing LNG imports. This is, of course, only in reference to greenhouse gas emissions; other environmental and social impacts, both local to the extraction site and further afield, should also be considered to reach a balanced conclusion.