

Select Committee on Communications,
Climate Action and Environment
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Re: Detailed Scrutiny of the Petroleum and Other Minerals Development (Amendment)
(Climate Emergency Measures) Bill 2018 [PMB]

Dear Anita Gibbons,

Thank you for the invitation to give evidence at the committee hearing on July 3rd.
Unfortunately, I find myself unable to travel to give evidence in person and understand that it will not be possible to give evidence by video conference on this occasion. However, I would like the attached briefing to be considered by the committee.

Kind regards

J. Broderick

Re: Detailed Scrutiny of the Petroleum and Other Minerals Development (Amendment) (Climate Emergency Measures) Bill 2018 [PMB]

Dr John Broderick, School of Mechanical, Aerospace and Civil Engineering, University of Manchester

I am a member of academic staff at the University of Manchester, based in the Tyndall Centre for Climate Change Research since 2006. My research is in the field of carbon accounting, recently considering smart grid interventions, aviation and unconventional gas production (shale gas and coal bed methane). I have given evidence to the UK House of Commons Environmental Audit Committee, acted as a reviewer for DECC, IEA and IPCC reports and been commissioned by the European Parliament to provide a research summary on unconventional fossil fuels. I hold a BA(hons) degree in natural science from the University of Cambridge and a PhD in climate policy from Manchester Business School. All views contained with this document are attributable solely to myself and do not necessarily reflect the views of my institution.

1. The UN's 2015 Paris Agreement, builds on decades of climate diplomacy and previous international commitments. It has the status of a treaty, as defined by the Vienna Convention on the Law of Treaties. Article 2 sets out common goals to keep "the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels". It notes that the Agreement is to be implemented "to reflect equity and the principle of common but differentiated responsibilities and respective capabilities", and that developed countries should "continue taking the lead by undertaking economy-wide absolute emissions reduction targets". In the terms of Article 4, this should be "in accordance with the best available science".
2. Rising temperatures relate closely to the total quantity of carbon dioxide emitted, much of which remains in the atmosphere for many centuries. Temperature targets, as articulated in the Paris Agreement, can therefore be translated to cumulative emissions budgets and associated emissions pathways.
3. With Prof Anderson at the University of Manchester, I have researched such pathways based upon the Intergovernmental Panel on Climate Change cumulative emissions budgets.¹ Even with a rapid decline in global deforestation and prompt reductions in process emissions from cement production, the post-2017 energy-only global carbon budget necessary to deliver on the Paris temperature commitments will be exhausted in between 14 years and 18 years at current rates of emissions.
4. All countries in the EU face a profound climate change mitigation challenge when the Paris equity criteria is combined with the small, and fast dwindling, global carbon budget

¹ Anderson, K., & Broderick, J. (2017). Natural gas and climate change. University of Manchester. [https://www.research.manchester.ac.uk/portal/en/publications/natural-gas-and-climate-change\(c82adf1f-17fd-4842-abeb-f16c4ab83605\).html](https://www.research.manchester.ac.uk/portal/en/publications/natural-gas-and-climate-change(c82adf1f-17fd-4842-abeb-f16c4ab83605).html)

for 2°C. For the EU, as a whole to make a minimum “fair” contribution to the Paris “well below 2°C” commitment, its post-2017 energy-only carbon budgets would be consumed entirely by six to nine years of current emissions. This conclusion would also depend on a successful and highly ambitious mitigation agenda for poorer, non-OECD nations, i.e. an aggregate peak in non-OECD emissions between 2022 and 2023 rising to 10% reduction in emissions each year by 2045.

5. Such stark conclusions are masked in many climate scenarios produced by business, government and academia. They are predicated on the assumption that substantial “negative emissions” will occur in the latter half of the 21st century. Negative emissions technologies (NETs), such as direct air capture of CO₂ and bioenergy with carbon capture and storage, are currently still in technical development. Whilst I support such research & development, there is wide recognition that the efficacy and global rollout of such technologies is highly speculative. There is a non-trivial risk of failing to deliver at, or even approaching, the scales typically assumed.² The ubiquitous inclusion of NETs in mitigation scenarios dangerously weights the policy-terrain in favour of technocratic-only responses. This endemic bias unreasonably lends support for the continued and long-term use of gas and oil whilst effectively closing down more challenging but essential debates over lifestyle, profound social-economic change and deeper penetration of a genuinely decarbonised energy supply.
6. A highly optimistic mitigation agenda for the EU to deliver on its 2°C commitment needs to begin with an immediate programme of profound mitigation, at a minimum rate of approximately 12% p.a. in absolute emissions. Such mitigation would require a focus on demand side measures first before low carbon supply are delivered to sufficient scale. Any delay in starting, or pursuing a rate of change below this, will either put a “likely” chance of 2°C maximum warming beyond reach, require poorer nations to make unfair reductions, or create the need for still more fundamental mitigation over the following years.
7. Natural gas has been presented by some as a “bridging fuel” that can play an important role in facilitating the transition to a low carbon economy, complementing a significant increase in the utilisation of renewable energy sources. The time scale where this argument is applicable is very limited. Fundamentally, natural gas is a fossil fuel that is transformed to carbon dioxide (CO₂) and water when combusted in air. Lower quantities of CO₂ are emitted per unit of energy released than from other fossil fuel sources, such as oil and coal. Its gaseous nature means that it can be combusted in more efficient heating and electricity generating technologies than other hydrocarbons. However, different gas supply chains result in different CO₂ and methane releases, LNG most likely having the greatest climate impact. However, the differences between gas supply chains are not of

² Larkin, A., Kuriakose, J., Sharmina, M., & Anderson, K. (2017). What if negative emission technologies fail at scale? Implications of the Paris Agreement for big emitting nations. *Climate Policy*, 1-25. DOI: 10.1080/14693062.2017.1346498

the same order of magnitude as between all fossil fuels and nuclear, wind and solar energy production.

8. As outlined in paragraph 3, within two decades fossil fuel use, including gas, must have all but ceased, with complete decarbonisation following soon after. Other research has shown that such a programme of mitigation would require at least a half of existing global gas reserves to remain in the ground.³ In this context, and assuming an immediate 12% p.a. mitigation path or rising mitigation to around 18% by 2023, bringing additional fossil fuel reserves into production is problematic.
9. This conclusion is not significantly affected by the prospect of carbon capture and storage, where the limitations on deployment rates and anticipated supply chain emissions substantially restrict its potential⁴. Even under a conservative reading of the Paris 2°C commitment, a rejection of 1.5°C and a weak interpretation of equity. An urgent programme to phase out existing natural gas and other fossil fuel use is imperative for any scientifically informed and equity-based policies designed to deliver on the Paris Agreement.
10. In conclusion, the proposed Amendment of Petroleum and Other Minerals Development Act 1960, requiring the Minister to consider the state of climate change prior to granting fossil fuel production licences is prudent. The Paris Agreement provides internationally agreed objectives for climate action and our research finds that developed economies wishing to abide by these should plan for very substantial emissions reductions. New fossil fuel developments are not necessary to fulfil the energy needs of an economy following this path.

³ McGlade, C., & Ekins, P. (2015). The geographical distribution of fossil fuels unused when limiting global warming to 2 C. *Nature*, 517(7533), 187. <https://www.nature.com/articles/nature14016>

⁴ Gibon, T. et al. Life cycle assessment demonstrates environmental co-benefits and trade-offs of low-carbon electricity supply options. *Renewable and Sustainable Energy Reviews* 76, 1283-1290 (2017); Cuellar Franca, R., & Azapagic, A. (2015). Carbon capture, storage and utilisation of technologies: A critical analysis and comparison of their life cycle environmental impacts. *Journal of CO2 Utilization*, 9, 82-102. DOI: 10.1016/j.jcou.2014.12.001