Friends of the Earth Scotland

Friends of the Earth Scotland evidence to the Scottish Government's Expert Independent Scientific Panel on Unconventional Oil & Gas

4th February 2014

'UG [Unconventional gas] exploitation and production may have unavoidable environmental impacts. Some risks result if the technology is not used adequately, but others will occur despite proper use of technology. UG production has the potential to generate considerable GHG emissions, can strain water resources, result in water contamination, may have negative impacts on public health (through air and soil contaminants; noise pollution), on biodiversity (through land clearance), food supply (through competition for land and water resources), as well as on soil (pollution, crusting).'

UNEP Global Environmental Alert System 2012[1]

1. Introduction

Friends of the Earth Scotland is an independent Scottish charity with a network of thousands of supporters, and active local groups across Scotland. We are part of Friends of the Earth International, the largest grassroots environmental network in the world, uniting over 2 million supporters, 76 national member groups, and some 5,000 local activist groups.

FoE Scotland was actively involved in helping create the Climate Change (Scotland) Act 2009 and continues to press the Scottish Government to deliver on the commitments therein, as well as working on urban air pollution, community renewables and the role of communities in environmental decision making. We are working with community interests to oppose the current proposal for coal-bed methane production near Falkirk and pressing the Scottish Government and political parties to ban unconventional fossil fuel in Scotland.

In this submission we will cover our principal concern – the incompatibility of exploiting unconventional fossil fuels with Scotland's climate targets and the global imperative to reduce emissions. We will also touch on concerns over health impacts, the regulatory regime and the impact on Scotland's energy system. We also touch on planning issues, including buffer zones and restoration guarantees, if any unconventional fossil fuel extraction is consented, and summarise the current situation with the live Dart Energy application in an appendix.

[1] UNEP Global Environmental Alert System 2012, Can we safely squeeze the rocks? http://www.unep.org/pdf/UNEP-GEAS_NOV_2012.pdf

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2. Climate change

Climate change is the greatest threat humankind has ever faced. The Intergovernmental Panel on Climate Change has reported with greater certainty and scientific consensus than ever before that "warming of the climate system is unequivocal" and that "human influence has been the dominant cause of the observed warming since the mid-20th century".[2] Global warming of 2°C or more will cause devastating impacts, including an increase in extreme weather events, sea level rises, and the destruction of livelihoods of communities and even entire countries.[3] The world's nations agreed in the Copenhagen Accord to keep climate change below 2ºC in order to prevent dangerous interference with the climate system.[4]

The primary human driver of climate change is the combustion of fossil fuels and analysis by the Carbon Tracker Initiative[5], an NGO which aims to improve the transparency of embedded carbon in equity markets, shows that in order to have a reasonable chance of staying below 2°C warming, 80% of the world's proven fossil fuel reserves must not be burned unabated.[6]

Using a conservative estimate of additional emissions, the International Energy Agency's (IEA) 'Golden Age of Gas' scenario – which assumes increased exploitation of global unconventional gas reserves – puts global emissions on a trajectory for 3.5ºC warming.[7] The IEA admits "we are not saying that it will be a golden age for humanity - we are saying it will be a golden age for gas."[8]

2.1 Fugitive emissions

The impact of 'fugitive emissions' through leakage, in addition to flaring and venting has led scientists to argue that the climate impact of unconventional gas is greater than that of conventional natural gas, and some to suggest it could be as bad as coal. Methane is a much more powerful greenhouse gas than carbon dioxide, with a global warming impact 86 times that of carbon dioxide over 20 years, and 34 over 100 years, according to the latest IPCC report.[9] The important point with methane is that while it has a relatively short lifespan, its potency in the short term makes necessary overall greenhouse gas emissions reduction targets harder to meet.

As with conventional oil and gas operations, leaks can occur at wellheads, pumps, pipelines and associated gas treatment infrastructure. Evidence from around the world indicates that a certain amount of leakage via these routes is practically inherent to the industry, and in theory, these sources of leakage can be identified and mitigated through monitoring and industry best practice to a greater or lesser extent.[10] However, one of the key areas of contention in general, and specifically in relation to Dart Energy's current application, is the issue of methane migration leading to fugitive emissions through high permeability strata, faults and old coal mine working.[11]

Researchers from Princeton University and the Environmental Defence Fund calculate that if fugitive

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[2] IPCC Fifth Assessment Report: Climate Change 2013 Working Group I Report "The Physical Science Basis" http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf

[3] IPCC Fourth Assessment Report: Climate Change 2007 Working Group II Report "Impacts, Adaptation and Vulnerability" http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html

[4] UNFCCC Copenhagen Accord, Dec 2009 http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf

[5] http://www.carbontracker.org/team/about-us

[6] Carbon Tracker Initiative 'Unburnable Carbon – Are the world's financial markets carrying a carbon bubble?' 2011 http://www.carbontracker.org/wp-content/uploads/downloads/2011/07/Unburnable-Carbon-Full-rev2.pdf

[7] International Energy Agency, Are We Entering a Golden Age of Gas? 2011 http://www.worldenergyoutlook.org/goldenageofgas/

[8] BBC, Campaigners' anger over agency's shale gas report 29th May 2012

[9] IPCC Working Group 1, Fifth Assessment Report, 2013. 20 and 100 years are commonly used timescales for calculating the carbon dioxide equivalent of other greenhouse gases.

[10] e.g. 'Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use' DECC, 2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/237330/MacKay_Stone_shale_study_report_09092013.pdf

[11] Joint Statement of Common Understanding between Falkirk Council and Stirling Council (of the first part) and Dart Energy (Forth Valley) Limited (of the second part) regarding the matters on which the parties are agreed in relation to the appealed applications for planning permission to construct a coal bed methane ("CBM") production facility at Letham Moss and Powdrake Farm near Falkirk, 17 December 2013

emissions are below about 3.2% of total well production then natural gas has a lower climate impact than coal.[12] The US EPA estimates that fugitive emissions are below this, but recent US monitoring suggests that fugitive emissions could be over 4% and up to 9% in some cases,[13] wiping out any climate advantages in comparison to coal. One recent Australian study found that coal seam gas might be nearly as high carbon as coal or electricity generation, with a leakage rate up to 4.38%.[14] A Queensland Government study found almost half the wells in coal seam gas fields in the Tara region to be leaking.[15]

If shale gas does have lower climate impact than coal, then any climate benefit depends on shale gas being burned instead of coal. The industry points to shale gas replacing coal in the US helping cut carbon emissions, but analysis from the Tyndall Centre shows that much of the coal not used in the US was exported, meaning that half the emissions benefit was lost. Coal use for electricity generation in the UK rose from 22.9% in the 3rd quarter of 2011 to 35.4% in the 3rd quarter of 2012.[16] In a world with a growing demand for energy, and without a global climate deal, shale gas will probably be used as well as coal.

We have commissioned a review from the Tyndall Centre on the state of current knowledge on the life-cycle greenhouse gas emissions of coalbed methane. This concludes that there is very limited research so far but that gas from coalbed methane schemes will have similar total emissions to that from shale gas production (see chart below), and greater emissions if leakage rates are at the upper end of the range (conservatively in the range 230-320 $gCO_2e/kWh(th)$). We will provide this paper to the Expert Panel.[17]

[12] Alvarez, Pacala et al, Feb 2012 Greater focus needed on methane leakage from natural gas infrastructure, http://www.pnas.org/content/109/17/6435.full

[13] Nature, 2nd January 2013 'Methane leaks erode green credentials of natural gas' http://www.nature.com/news/methane-leaks-erode-green-credentials-of-natural-gas-1.12123, Howarth and Ingraffea, Methane and the greenhouse-gas footprint of natural gas from shale formations, Cornell University http://www.sustainablefuture.cornell.edu/news/attachments/Howarth-EtAl-2011.pdf, & Venting and Leaking of Methane from Shale Gas Development: Response to Cathles et al. 2012 http://www.eeb.cornell.edu/howarth/Howarthetal2012_Final.pdf

[14] Hardisty, P. E., Clark, T. S., Hynes, R. G., 2012. 'Life Cycle Greenhouse Gas Emissions from Electricity Generation: A Comparative Analysis of Australian Energy Sources.' Energies 5, 872897

[15] Queensland Government Investigation Report 2010, Leakage testing of coal seam gas wells in the Tara 'rural residential estates' vicinity http://mines.industry.qld.gov.au/assets/petroleum-pdf/tara_leaking_well_investigation_report.pdf

[16] DECC 'Energy Trends December 2012' Section 5 https://www.gov.uk/government/uploads/system/uploads/attachmentdata/file/65835/3945-energy-trends-section-4-electricity.pdf

[17] Broderick & Sharmina, 'The Greenhouse Gas Emissions Profile of Coal Bed Methane (CBM) Production: A Review of Existing Research", Tyndall Manchester, 2014

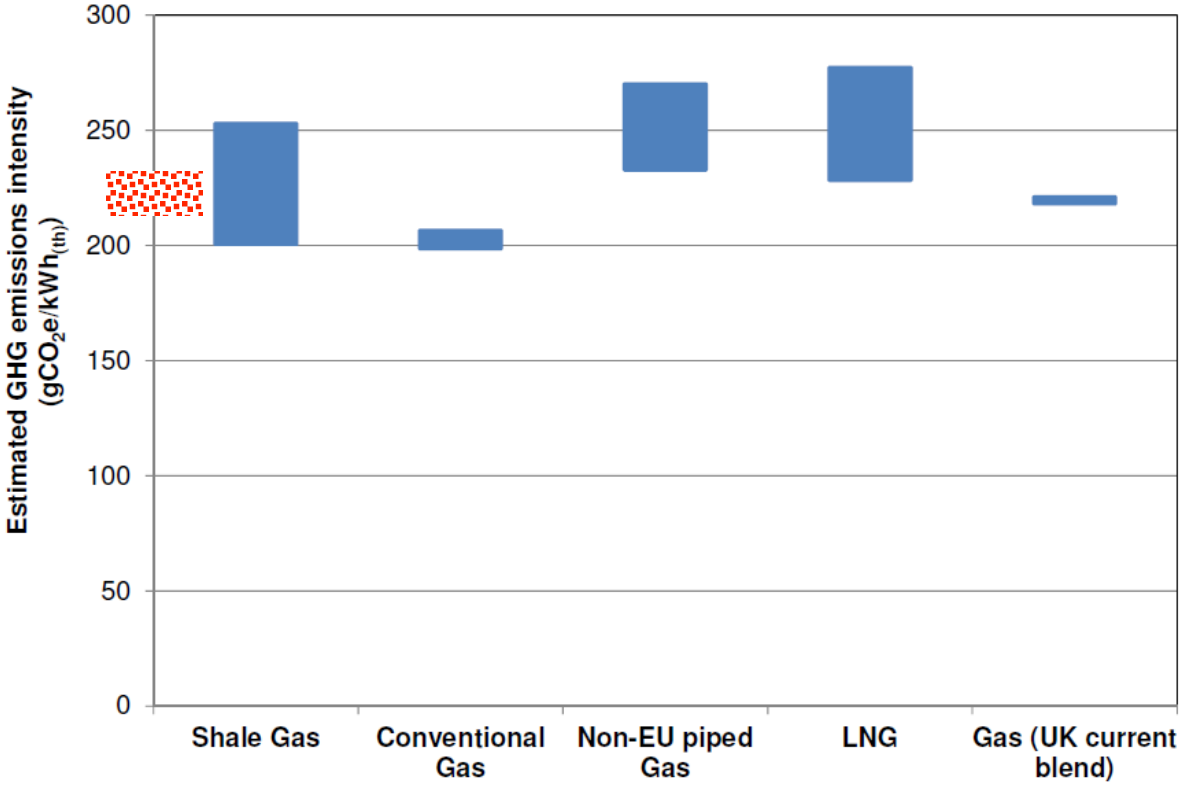

Figure 1 Emissions intensity of UK gas sources (reproduced from MacKay & Stone 2013), red shading indicates approximate range given by Skone & Littlefield (2013)

2.1 Climate change law

The Scottish Government and Parliament have recognised the urgency of tackling climate change, and the historic responsibility of developed nations to drastically curb greenhouse gas emissions, in the Climate Change (Scotland) Act 2009, which introduced annual legally binding targets requiring a reduction of around 1.5MtCO_2 a year.[18]

By comparison, in just one development, the deal to supply SSE from the proposed Dart Energy development would increase emissions by 4.5MtCO_{2e} including fugitive emissions from the site.[19] In just one licence area, if all Dart Energy's CBM and shale gas assets in the PEDL133 licence area were burnt they would create at least 42MtCO_{2e} – more than Scotland's total carbon target from all sources in 2020.

The Act also imposes duties on public bodies, both in relation to climate targets and sustainability. Any planning authority, or the Scottish Government's appeal system, which gives the go ahead to an unconventional fossil fuel development would be in contravention of its duty to help Scotland deliver on its climate targets. Work we have commissioned looks at the possiblity of legal challenge to decisions that invoke the public duty, and finds that the Courts would be very unlikely to overturn a planning refusal on this basis.[20]

3. Public health

Drilling for coalbed methane carries the risk of mobilising naturally occurring chemicals and leaving

[18] Climate Change (Scotland) Act 2009 section 3. The Act does not set out the level of each annual target, but the overall target equates to roughly 3% a year http://www.legislation.gov.uk/asp/2009/12/section/3
[19] Calculations assume a conservative leakage rate of 4.5% based on real world observations as per quoted in paragraph 3.6 rather than industry inventories, and using the IPPC's latest calculations of global warming potential expressed over 100 years. Delivery of the maximum volume under the gas sales deal with SSE would require additional field development.
[20] Chris Hilson, Precognition on climate law for Dart Energy PLI, 2014.

introduced chemicals behind deep underground from where they can migrate into and contaminate soil, water and air. Indicative research from Southern Cross University suggests that de-pressurisation of coal seams through de-watering and hydraulic fracturing can permanently alter soil structures and increase pollutant pathways for naturally occurring, drilling and fracking chemicals into soil and water systems.[21] The authors of a study from Cornell University warn that the gas boom is an uncontrolled health experiment on an enormous scale and make a plea for badly needed research on the likelihood and impact of these chemicals entering the food chain via animal products.[22]

We note that while there is a lack of peer reviewed studies into the health impacts of unconventional gas extraction and specifically regarding coalbed methane extraction, indicative findings point to potentially very serious public health impacts for communities living in and near gas fields. While studies often fail to distinguish between the impacts of drilling and fracking chemicals on human health, a recent peer-reviewed study found that non-methane hydrocarbon emissions from unconventional gas sites were higher during drilling stages than during fracking stages[23], hence key public health concerns apply to coalbed methane operations whether or not they are fracked, as much as they do to shale gas developments.

The following polycyclic aromatic hydrocarbons (PAHs) – naturally occurring in coal – were detected in air samples taken at a fixed sampling station near a natural gas well pad that used a closed loop system in Colorado.[24] Sixteen directional wells were drilled and fracked during the study period, however samples of PAHs were highest during drilling stages. The health effects of exposure to these chemicals can include impact on: skin, eye and sensory organ; respiratory system; gastrointestinal; brain and nervous system; immune system; kidney function; cardiovascular and blood; cancer, tumorgenesis; genotoxic; endocrine system; liver and metabolic. The same study also detected a large number of volatile organic compounds including high levels of methane and methylene chloride.

Table 3. PAHs detected in air samples in western Colorado from October, 2010 to March, 2011.

Chemical name	CAS #	*n* Detects	% Detects	Mean pptv	Range pptv	Std Dev pptv	*n* Spikes
naphthalene	91-20-3	21	100	3.01	0.81-6.08	1.44	4
phenanthrene	85-01-8	16	76	0.36	0.21-0.61	0.14	4
fluorene	86-73-7	11	52	0.20	0.15-0.32	0.06	2
indeno(1,2,3-cd)pyrene	193-39-5	8	38	0.18	0.09-0.49	0.13	1
benzo(g,h,i)perylene	191-24-2	7	33	0.22	0.09-0.45	0.13	1
dibenzo(a,h)anthracene	53-70-3	7	33	0.20	0.11-0.51	0.15	1
benzo(a)pyrene	50-32-8	5	24	0.21	0.13-0.36	0.09	1
benzo(b)fluoranthene	205-99-2	5	24	0.20	0.13-0.26	0.05	1
benzo(k)fluoranthene	207-08-9	5	24	0.18	0.13-0.25	0.05	1
benzo(a)anthracene	56-55-3	2	10	na	0.13-0.16	na	0
chrysene	218-01-9	2	10	na	0.12-0.16	na	0
acenaphthylene	208-96-8	1	5	na	0.20	na	0

na = not applicable. Statistics were not calculated for chemicals in which there were fewer than three detections.

From Colburn et al, An Exploratory Study of Air Quality near Natural Gas Operations, 2012

Communities living near gas fields in Australia complain of respiratory problems, rashes and irritated eyes. An investigation by a concerned GP in early 2013 of 38 households in close proximity to

[21] Santos and Maher, Southern Cross University, Fugitive emissions from coal seam gas http://www.scu.edu.au/coastal-biogeochemistry/index.php/70/ ; Tait, Santos et al, Southern Cross University 2013 Enrichment of Radon and Carbon Dioxide in the Open Atmosphere of an Australian Coal Seam Gas Field http://pubs.acs.org/doi/full/10.1021/es304538g

[22] Bamberger and Oswald, Impacts of Gas Drilling on Human and Animal Health, 2012, *NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy* http://baywood.metapress.com/link.asp?id=661442p346j5387t

[23] Colburn et al, An Exploratory Study of Air Quality near Natural Gas Operations, 2012 http://endocrinedisruption.org/assets/media/documents/HERA12-137NGAirQualityManuscriptforwebwithfigures.pdf

[24] Ibid

coalbed methane wells in Tara, Queensland, found that 58% of residents reported definite adverse health effects related to gas drilling and a further 19% were uncertain.[25] Symptoms include breathing difficulties, rashes, joint and muscle pains, nausea and vomiting, and spontaneous nosebleeds, and are consistent with exposure to naturally occurring and common drilling and fracking chemicals in the unconventional gas industry.[26]

Researchers from the National Oceanic and Atmospheric Administration (NOAA) and the University of Colorado, Boulder found that gas operations were leaking highly toxic and carcinogenic benzene into the air, and inferred from this pilot study that both methane and non-methane emissions are highly likely to be under estimated in inventories.[27]

A working paper from Cornell University suggests that air and water pollution from unconventional gas activities can have a profoundly damaging effect on infant health. The study looked at birth weight outcomes in pregnant mothers living within 2.5 km of a gas well and found that the incidence of low birth weight increased by 25%.[28] A subsequent study building on this work by examining birth record in Pennsylvania between 2004-2011 (but yet to be peer-reviewed) backs up the Cornell findings, and finds that the risk of low-birth weight is doubled in infants born within a 2.5km radius of gas drilling sites.[29]

4. Energy Policy

In a recent Parliamentary Answer the First Minister stressed Scotland's over-abundance of fossil fuels, saying "We are a country that produces seven times the hydrocarbons that we consume. We should therefore proceed cautiously on the undoubted opportunities that there are for shale gas in Scotland." [30] This same logic applies to coal-bed methane.

Any proposal for unconventional gas could still be producing in the late 2040s. The main uses of natural gas are in electricity generation and for heating. In both areas Scottish Government policy is moving away from the use of all fossil fuels, leaving little or no market for unconventional gas in the future.

The Scottish Government's Electricity Generation Policy Statement[31] sets out the Government's commitment to delivering 100% of Scotland's electricity consumption from renewable energy sources by 2020 and of largely decarbonising the electricity sector by 2030. The document suggests that fossil-fuelled electricity generation will still play a part as long power stations can be fitted with Carbon Capture and Storage (CCS), a technology which is in its infancy. There is a possibility of CCS being installed at small scale at Peterhead gas-fired power station, although the station itself is likely to shut around 2030. There are no other proposals for gas-fired power stations in Scotland and the only existing planning consent, for a new station at Cockenzie, is on hold and does not require CCS to be fitted.

The Electricity Generation Policy Statement also repeats the Scottish Government's commitment to sourcing 11% of heat demand from renewables by 2020 and the target to reduce total final energy consumption in Scotland over the period to 2020 by 12%.

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[25] Symptomatology of a gas field - An independent health survey in the Tara rural residential estates and environs, Geralyn McCarron, April 2013 http://d3n8a8pro7vhmx.cloudfront.net/lockthegate/pages/49/attachments/original/1367333672/2013-04-symptomatology_of_a_gas_field_Geralyn_McCarron.pdf?1367333672

[26] Colburn et al, 2012

[27] Petron et al Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study Journal of Geophysical Research: Atmospheres Volume 117, Issue D4, 27 February 2012, http://onlinelibrary.wiley.com/doi/10.1029/2011JD016360/abstract

[28] Elaine L. Hill 'Shale Gas Development and Infant Health: Evidence from Pennsylvania' Working Paper Revision December 2013, Cornell University http://dyson.cornell.edu/research/researchpdf/wp/2012/Cornell-Dyson-wp1212.pdf

[29] The study is yet to be published online, but was presented to the American Economic Association in Philadelphia on 4 January 2014 by authors Janet Currie of Princeton University, Katherine Meckel of Columbia University, and John Deutch and Michael Greenstone of the Massachusetts Institute of Technology http://www.bloomberg.com/news/2014-01-04/study-shows-fracking-is-bad-for-babies.html

[30] Official Report, Scottish Parliament, 19th December 2013, http://www.scottish.parliament.uk/parliamentarybusiness/28862.aspx?r=8720&mode=pdf

[31] Electricity Generation Policy Statement 2013, http://www.scotland.gov.uk/Resource/0042/00427293.pdf

The Scottish Government will shortly publish a Heat Generation Policy Statement. The Draft Outline Heat Vision and Draft Heat Deployment Options Guidance from January 2013 reinforces the government's existing commitment to "achieve a largely de-carbonised heat sector by 2050 with significant progress by 2030 through a combination of reduced demand and energy efficiency, together with a massive increase in the use of renewable or low carbon heating."

Research by leading renewable energy consultants Garrard Hassan demonstrates that Scotland can phase out all fossil fuel and nuclear power by 2030, maintain a secure supply and generate additional electricity for export.[32]

4.1 Economics

Extravagant claims have been made of cheap energy coming from unconventional gas production but experts from Lord Stern to Lord Browne have stated that there will be no significant reduction in energy prices. Stern described the UK's dash for gas as founded on 'baseless economics,[33] while Browne, chairman of Cuadrilla Resources has said that shale gas won't have a 'material impact' on gas prices.[34]

It is self-evident that the limited pot of energy investment will be spread more thinly if unconventional gas is competing with renewables for investment. In England the UK Government's enthusiasm for both shale gas and nuclear power have resulted in low renewables targets, lack of political support for renewables and no decarbonisation target for the electricity sector. On the other hand the Scottish Government has given strong signals to the industry and market that renewables is the priority.

In it's 2012 report 'Golden Rules for a Golden Age of Gas' the International Energy Agency found "*an abundance of natural gas might diminish the resolve of governments to support low and zero-carbon sources of energy: lower gas prices (and therefore lower electricity prices) can postpone the moment at which renewable sources of energy become competitive without subsidies and, all else being equal, therefore make renewables more costly in terms of the required levels of support.*"[35]

PriceWaterhouseCoopers issue a similar warning at the global scale in their 'PwC Low Carbon Economy Index', that while shale gas may 'buy some time':*"it reduces the incentive for investment in lower carbon technologies such as nuclear and renewables, and could lock in emerging economies with high energy demand to a dependence on fossil fuels."* [36]

At a UK level, exploitation of unconventional gas could also have a major impact on investment in renewable energy. Professor Paul Stevens of Chatham House has written: "*There is a real fear among many analysts that shale gas may substitute not for coal but for renewables"* and "*the anticipation of cheap natural gas could inhibit investment in renewables. But again, if the revolution fails to deliver a lot of cheap gas, by the time this is realized it could well be too late to revert to a solution to climate change based upon renewables."* [37]

The Committee on Climate Change have also written of the dangers of a dash for gas: "*The apparently ambivalent position of the Government about whether it is trying to build a low-carbon or a gas-based power system weakens the signal provided by carbon budgets to investors [is]*

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[32] Power of Scotland Secured: Summary for Policy Makers and Options for Coping with High Renewables Penetration in Scotland http://www.foe-scotland.org.uk/power-secured

[33] http://www.independent.co.uk/news/uk/politics/baseless-economics-lord-stern-on-david-camerons-claims-that-a-uk-fracking-boom-can-bring-down-price-of-gas-8796758.html

[34] http://www.theguardian.com/environment/2013/nov/29/browne-fracking-not-reduce-uk-gas-prices-shale-energy-bills

[35] http://www.worldenergyoutlook.org/media/weowebsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf

[36] http://press.pwc.com/GLOBAL/News-releases/current-rates-of-decarbonisation-pointing-to-6oc-of-warming/s/47302a6d-efb5-478f-b0e4-19d8801da855

[37] Chatham House August 2012 'The 'Shale Gas Revolution': Developments and Changes' http://www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/bp0812stevens.pdf

damaging prospects for required low-carbon investments".[38]

The UK Government's relentless pursuit of the shale gas industry includes offering tax breaks to onshore unconventional gas operators, which will of course be open to any companies taking up licenses in Scotland. DECC plan to tender for the 14th round of onshore oil and gas licensing in Autumn 2014, when a vast swathe of central and southern Scotland will be offered for shale gas and coalbed methane exploitation. Dart Energy has recently gone into partnership with GdF Suez and Total to exploit shale gas reserves in England. Although the resource is likely smaller in Scotland, the company now has partnerships capable of taking forward applications to frack for shale gas in Scotland whenever they wish. We welcome the Scottish Government's more cautious approach to the industry, but this may well be overtaken by actions flowing from the UK Government unless decisive action is taken to implement an immediate ban.

With its over-abundance of fossil fuels, strong targets on climate change, energy demand and the transition to low and zero-carbon energy, Scotland has no need of the distraction of unconventional gas.

5. Regulation

In relation to the application for CBM at Letham Moss by Dart Energy, SEPA have outlined some of the uncertainty in the regulatory regime: "this is a novel process, and one on which SEPA is still working to develop its regulatory position. The scope of the 2012 Regulations to regulate the various aspects of process is not yet completely clear. As such, we would like to clarify that although it is our intention to regulate the central gas processing and water treatment facility and the fugitive methane emissions in the manner stated above [PPC requirement of monitoring of fugitive emissions around the well heads and the central gas processing facility], having reviewed our position, we are unable to state definitively at this point that we will regulate the fugitive methane emissions from the well heads."[39]

For the Public Local Inquiry we have commissioned a paper on the adequacy of regulation from Chris Hilson, Professor of Law and Head of the School of Law at the University of Reading, which we will provide to the Expert Panel. This reviews the complex regulatory landscape for unconventional gas and highlights a number of deficiencies including:

- the Waste Management Plan for a development is regulated by the local authority rather than by SEPA, while in England this responsibility is with the Environment Agency.[40]
- the lack of powers to regulate methane emissions including a weaker regime which allows venting and flaring to go unregulated during the exploration stage, unlike the system in place in England.[41]
- the Pollution and Prevention and Control (Scotland) Regulations 2012 fail to correctly implement the Industrial Emissions Directive 2010/75/EU, allowing flaring of gas to go unregulated.[42]
- SEPA's proposals to 'flex' PPC permitting to allow for some control of air emissions is limited, and notes that the regulator now appears to be questioning its ability to adequately regulate fugitive emissions.[43]

The paper concludes that "as things stand, it is difficult to have full confidence in the regime on paper, let alone its implementation in practice."[44]

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[38] Committee on Climate Change 13th September 2012 'The need for a carbon intensity target in the power sector' http://www.theccc.org.uk/wp-content/uploads/2013/02/EMR-letter-September-12.pdf
[39] Email from SEPA in response to PLI Joint Statement paras 2.3-2.4.
[40] Chris Hilson, precognition on regulatory regimes for Dart Energy PLI, 2014, §21
[41] Ibid, §23
[42] Ibid, §24
[43] Ibid, §25-26, and SEPA letter to DPEA 24 January 2014
[44] Ibid, §36

6. Scottish Planning Policy

The new draft Scottish Planning Policy (SPP) has removed any presumption in favour of unconventional gas that could have been read into the previous SPP, introduced more stringent guidelines for how Local Development Plans should deal with the industry, and introduced the need for buffer zones between sites and communities.

In New South Wales 2-km Coal Seam Gas Exclusion Zones now cover 5.3 million hectares and protect communities and sensitive industries. An extension of this system protects areas which might be developed for housing in future. 95% of dwellings in NSW are now protected from CSG exploration and development.[45,46]

A similar level of protection should be afforded to people and agricultural land in Scotland. This would probably make the unconventional gas industry unviable.

6.1 Restoration guarantees

Should unconventional fossil fuel production be consented in Scotland, full restoration and protection of the environment after operations are finished are key issues to be discussed and agreed before any planning permission is granted. As well as the usual issues of removing surface installations, for a novel industry like unconventional gas, there are some important extra safeguards required, including the need for long-term monitoring and management of any pollution which may make its way to the surface or into water course long after the developer has left.

Recent events in the open-cast industry illustrate how not to proceed. The collapse of Scottish Coal and ATH has shown the failure of the current system of restoration bonds in the open-cast coal industry. This has resulted in the administrators trying to abandon a number of sites, to numerous sites where there is a large gap between available funds and what is needed to honour the restoration promises made when planning permission was granted, and to sites where potential or actual pollution hazards are going unmanaged. The Scottish Government is consulting on a range of options for replacing restoration bonds for the opencast industry in future.[47]

The current Scottish Planning Policy is clear that full restoration is required; it says for on-shore oil and gas developments: "Planning authorities should ensure that conditions requiring the removal of equipment and full restoration of sites following completion of exploration and extraction are attached to any planning consents granted." [48]

The draft of the new Scottish Planning Policy reinforces this requirement, adding a stipulation for a financial guarantee to ensure successful restoration; it says in the extractive industries section: “Proposals should ensure that restoration and aftercare will be to a high standard and undertaken at the earliest opportunity. Consents should be associated with an independent guarantee through a vehicle such as an escrow account to manage the operator’s exposure to costs; recognise landowner liability; ensure obligations transfer to successors in title; and ensure that site restoration and aftercare is fully funded.”[49]

The current Scottish Planning Policy also comments on future risk in the section on surface coal mining in terms which should reasonably also apply to unconventional gas extraction: “Restoration should be designed and implemented to the highest standards to avoid the occurrence of future public safety and environmental hazards, such as land instability and emissions of gas or water.”

The consultation on the future of opencast restoration states a main principle which should also apply to unconventional gas: “Effective regulation that makes provision for the restoration of any

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[45] http://www.planning.nsw.gov.au/coal-seam-gas-exclusion-zones
[46] http://www.planning.nsw.gov.au/DesktopModules/MediaCentre/getdocument.aspx?mid=1595
[47] http://www.scotland.gov.uk/Publications/2013/12/7688
[48] http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf §238
[49] http://www.scotland.gov.uk/Resource/0042/00421076.pdf §177

site is fundamental to potential future operations, community acceptability, the functioning and credibility of the planning system, environmental stewardship, public sector finances and corporate responsibility."[50]

However the funding of restoration and monitoring is unclear for unconventional fossil fuel developments. In their response to objections to their current proposal for CBM production, Dart Energy state that requiring them to put in place a restoration bond would "double-up the requirement placed on the operator as part of the PEDL licence and in its discussions with landowners."[51] The response to the SPP consultation submitted by RPS on behalf of Dart Energy similarly states that DECC "when granting a PEDL requires applicants to prove financial capacity."[52] Of course the financial health of a public listed company such as Dart Energy can change rapidly. For instance, when Dart took over PEDL133 from Composite Energy their share price was about AUS$1, at the time of writing it is 14 Australian cents. In addition DECC granted the PEDL licence before any discussions between Dart Energy and the local authorities could have established the necessary extent, and therefore cost, of restoration and aftercare.

In common with most Petroluem Exploration and Development Licences, the licence for PEDL133 contains no requirement to restore the site nor any provision for aftercare and these matters are not covered by the Petroleum Act 1998, under which the licences are granted. Nothing in the Act or the licences explicitly require Dart Energy to prove that they have the resources to carry out restoration or aftercare activities.

Dart Energy have not had to prove that they can afford to fund a restoration and aftercare programme, such a programme has not been agreed or even costed, and Dart Energy clearly cannot give any guarantee that they will be in sound financial health on an on-going basis.

In these circumstances the only approach which fits with Scottish Government planning policy is for a thorough restoration and aftercare programme to be negotiated between an company proposing an unconventional fossil fuel development and the relevant local authorities, and for this and a requirement for a sufficient restoration bond or similar financial arrangement to be written into the conditions of any grant of planning permission.

Conclusion

We conclude that because of concerns over climate change impacts, local health impacts, distortion of the the energy system and uncertainties over restoration, unconventional fossil fuel extraction should be prohibted in Scotland. Bans and moratoria are in place in numerous countries and regions, including France, the Netherlands, Ireland, Vermont, Quebec and New York State. Developments within 2km of settlements and sensitive industries are banned in New South Wales.

[50] http://www.scotland.gov.uk/Publications/2013/12/7688
[51] 2013.08.07 DLA Piper response to comments from interested parties A6538433 §15.53
[52] http://www.scotland.gov.uk/Resource/0043/00431502.pdf

Appendix A: Dart Energy's current application

Dart Energy's application for commercial coalbed methane at Letham Moss is the most advanced project of its kind, not just in Scotland, but in the UK. The application crosses local authority boundaries with 11 new well sites, water outflow pipe and further drilling at 2 existing well sites in the Falkirk area; and 3 new well sites plus a gas delivery and water treatment facility in the Stirling area. The application constitutes a major development and requires an EIA under Schedule 2 of the Environmental Impact Regulations (Scotland) 2011. Falkirk Council took a lead in determining the application, and both Councils now deem the application to have been refused.

Dart Energy submitted a pre-application notice on 26 April 2012 to Falkirk and Stirling Councils, held 5 community exhibitions that summer and submitted the planning application on 7 September of the same year. On 20 December 2012 Falkirk Council requested an extension to decide the application until 7 May 2013. On 4 January 2013 Dart agreed to an extension of 7 March 2013. On 1 March 2013 Falkirk Council returned to Dart to again request an extension until 7 May 2013, which Dart agreed to. On 14 March 2013 Falkirk Council commissioned environmental consultants AMEC to undertake a peer review of the environmental statement. Dart wrote to Falkirk Council on 3 April 2013 expressing concern at the timescale for determining the application. On 3 May 2013 Falkirk Council requested a further extension until 7 July 2013, to which Dart responded agreeing an extension until 31 May. On 20 May 2013 AMEC's initial review of the Environmental Statement and questions relating to it were sent to the applicant, and on 5 June 2013 Dart appealed to Scottish Ministers on the grounds of non-determination, enclosing a response to AMEC's review.

This current application is the latest in a number of related applications in the Letham Moss / Airth area and broader Petroleum Exploration and Development License ('PEDL') 133 area, which covers 330km^2 around the mouth of the Firth of Forth.

Australian Securities Exchange registered, Singapore headquartered Dart Energy bought out Stirling based Composite Energy (formerly Coal Bed Methane Ltd, formerly the Hillfarm Coal Company Ltd) in 2011, and inherited PEDL 133, 161 and 163. Composite Energy and its predecessors had already drilled 15 wells in the Airth area, and Dart drilled a further 1 following the takeover. Two existing well sites operated by Dart Energy are within the current application boundary. Together with the proposed 9 production and 5 surface to in seam (SIS) wells, the development could produce in the region of 10 to 15 billion cubic feet (bcf) of coalbed methane gas over the 25-30 year planned lifespan of the wells.

Dart Energy entered a 5-year gas sales agreement with Scottish and Southern Energy (SSE), which owns and operates the local gas grid infrastructure, in August 2011. The agreement was expanded in March 2012 to allow for the delivery of incremental volumes of gas up to a maximum of around 60 bcf, a figure which comes close to possible reserves[53] in PEDL 133, although the deal has no minimum delivery requirement.

We note that the method of extraction proposed by the applicant is de-pressuring the coal seams by de-watering, rather than the controversial hydraulic fracturing (or 'fracking') technique commonly used in unconventional gas operations.[54] In Australia around 40% of coalbed methane developments end up being fracked. We note that the most of key environmental impacts associated with coalbed methane extraction occur whether or not hydraulic fracturing is employed.[55] However, while the Joint Statement of Common Understanding between the appellant and Councils includes a proposed planning condition restricting the techniques to be employed under this

[53] Net CBM '3P' reserves in PEDL 133 are 72 bcf http://www.dartgas.com/page/Europe/United_Kingdom/PEDL133/. See http://www.spe.org/industry/docs/PRMS_Guidelines_Nov2011.pdf for definitions of oil and reserves.

[54] In Australia where coalbed methane (known there as coalseam gas) is more developed, the industry estimates that up to 40% of wells will end up being fracked. Australian National Greenhouse Accounts, Coal Seam Gas Estimation and Reporting of Greenhouse Gas Emissions 2012, http://www.climatechange.gov.au/climate-change/emissions/~/media/climate-change/emissions/factsheets/NGA-FactSheet-7-CoalSeamGas-20120430-PDF.pdf

[55] A key difference in environmental impacts where hydraulic fracturing is employed is regarding increased strain on water resources due to the use of large volumes of water injected into coal seams during the process.

application to de-watering, this does not rule out future applications to vary planning permission or for additional wells within the license area where hydraulic fracturing could be employed.

Airth is understood to be Dart Energy's global flagship project, and the most advanced unconventional gas development in the UK. If the application goes ahead, Dart indicate the site will be in operation over the next 25-30 years.