



**Friends of  
the Earth  
Scotland**

## **Friends of the Earth Scotland**

### **Rebuttal of Precognitions in Planning Permission Appeal PPA-240-2032**

#### **COAL BED METHANE PRODUCTION, INCLUDING DRILLING, WELL SITE ESTABLISHMENT AT 14 LOCATIONS AND ASSOCIATED INFRASTRUCTURE AT LETHAM MOSS, FALKIRK FK2 8RT Falkirk (P-12-0521-FUL) and Stirling (12/00576/FUL)**

This statement is submitted on behalf of FoE Scotland; FoE Falkirk; FoE Stirling; and supported by Transition Stirling (**referred to as FoE Scotland**).

### **1.Precognition on Fugitive Methane by Dr Cuff**

1.1.We note that definition used by Dr Cuff of fugitive emission differs to that used in the precognitions of Professor Christopher Hilson and Dan Smyth.

1.2.We refer to Professor David Smythe and Dr Mariann Lloyd-Smith's rebuttals.

### **2.Precognition on GDWTF by John Speirs**

2.1. We note that Mr Speirs relies on a PPC permit which we do not appear to have sight of. We therefore cannot comment on at 3.2.5, 3.3.3, 3.4.8.

2.2. At 3.3.4 and 3.4.4 Mr Speirs asserts venting is a one in ten year occurrence lasting for 15 minutes maximum, but fails to produce any evidence as to what this assumption is based on. We note that this assumption represents a gross difference between what Dart's PEDL license permits.

2.3. At 3.3.2-3.3.3 and 3.4.5 Mr Speirs discusses the flare, but fails in his precognition to detail its technical capacity and actual anticipated levels of flaring.

2.4. At 3.7.6 Mr Speirs comments briefly on the possibility of the quality of gas extracted being of too low a standard to meet Scottish Gas Networks specifications, but does not explain what would happen to the gas if this were the case. An investigation by the Sunday Herald revealed that independent consultants have warned Dart Energy about the problem of low calorific value of gas from the Airth site.<sup>1</sup> A potential solution would be to enrich the gas with propane, which would involve 3 tanker load deliveries to the site per day, and for part of the site to be regulated by HSE as a 'major accident hazard'. Alternatively, the gas could be blended with higher value gas in the grid, with associated cost implications for the operator.

### **3.Precognition on Drilling and Wells by Andy Sloan**

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<sup>1</sup> <http://www.robedwards.com/2013/04/revealed-the-problem-that-could-hamper-gas-development.html>

- 3.1. We note that Mr Sloan's precognition is scant on detail of the appellant's own safety management processes (at 3) which, as the Deepwater Horizon and Piper Alpha disasters have demonstrated, are crucially important. Further, an anecdotal report of one visit by the Health and Safety Executive, for a site that has been operational for around 20 years, is not particularly reassuring, particularly in the context of cuts to HSE funding.
- 3.2. At 4.6 Mr Sloan notes that:
- 3.3. "it has been clearly demonstrated that it is *possible* for the specialist Measurement Whilst Drilling (MWD) tools used to detect the coal seam boundaries ahead of the drill bit and ensure a wellbore is drilled tracking the coal seams." (FoES emphasis)
- 3.4. We note the use of the word 'possible' denotes a worrying low level of certainty as to whether the wellbore will stay inside the coal seam, and lack of discussion of the consequences of the drill bit deviating from the seam.
- 3.5. At section 6 Mr Sloan describes the vertical and horizontal drilling method and uses the example of Airth-12. Sixteen wells have been drilled at Airth: it would be reassuring to see the data for these too.
- 3.6. We note that 4.10 is misleading as cement plugs in boreholes will only provide a barrier between part of the vertical well and the surface, not between the horizontal bore and the surface, which as Professor David Smythe's pre-cognition demonstrates is by no means impermeable. Further, the plugging of wells presumably reverses any hydrostatic pressure towards borehole.
- 3.7. While the slim-hole design is incompatible with the use of hydraulic fracturing it is our understanding that the boreholes could be widened in the future if the technique were required.
- 3.8. At 7.2 Mr Sloan confirms that there were no methane releases during drilling operations at Airth 13 and 14, but it does not appear that this monitoring data has been made available.

#### **4. Precognition on Air Quality and Climate Change by Dan Smyth**

- 4.1. The table at 3.5 mentions two PM<sub>10</sub> standards: 40µg/m<sup>3</sup> and 18µg/m<sup>3</sup>. The Scottish standard of 18µg/m<sup>3</sup> is the relevant one, pursuant to the Air Quality (Scotland) Amendment Regulations 2002, the UK is not relevant. The footnotes to tables 1 and 6 are the wrong way around.
- 4.2. Paragraph 6.8 is titled 'Qualitative Assessment of Nuisance Dusts' but deals with PM<sub>10</sub>, more usually termed "suspended particulate matter." This paragraph uses "professional judgement" to dismiss the need for further consideration of PM<sub>10</sub>. The background concentration of 13µg/m<sup>3</sup> is a rough estimate derived from widescale mapping rather than real data from a monitoring station, the appropriate standard is 18µg/m<sup>3</sup>, and the HGV and process operations are major sources of PM<sub>10</sub>. The estimated background is not "well below" the Scottish standard as stated in 10.6. These factors mean that on-site monitoring and modelling should have been carried out.
- 4.3. Mr Smyth makes no mention of the PM<sub>2.5</sub> standards for Scotland. The EIA for the project mentions background level estimates but has no discussion on why no further consideration is given to this pollutant. PM<sub>2.5</sub> is the pollutant where there is the greatest evidence of adverse health impacts, and diesel engines, gas burning and road traffic are major sources. The current objective on PM<sub>2.5</sub> is for an annual mean limit of 12µg/m<sup>3</sup> (the Government has

confirmed in its review of Local Air Quality Management that it intends to extend local authority responsibility to include this limit value at the earliest opportunity).<sup>2</sup>

- 4.4. PM<sub>2.5</sub> modelling carried out for SEPA<sup>3</sup> in 2012 suggests the background levels in the area of the development are in the range 6-9µg/m<sup>3</sup>, the EIA for the project says 8.1µg/m<sup>3</sup>. As with PM<sub>10</sub>, with the background level only approximate and the level close to the limit value, modelling should have been carried out to establish whether the development would cause the standard to be breached.
- 4.5. Paragraph 4.6 mentions groundwater monitoring as an early warning of methane migration. While monitoring for methane in groundwater is important it should be in addition to air monitoring above ground.
- 4.6. Paragraphs 6.3 and 6.6 do not indicate the impact of vehicle trips during workovers.
- 4.7. At 8.2 Mr Smyth misses the point that opening up a new fossil fuel frontier such as unconventional gas risks delaying the transition to a low carbon economy. This point was emphasized by Achim Steiner the head of the United Nations Environment Programme in late February 2014 when he described the dash for unconventional gas as “a liability in our struggle to meet climate change targets over this century,” “if it is used as a means of not investing in the transition to a renewable energy economy.”<sup>4</sup>
- 4.8. Mr Steiner further noted that “If it turns into a 20 to 30-year delay to making the transition towards real low-carbon and zero-emission energy matrixes then I think it could actually become a distraction and in that sense slow down our efforts.” The applicant envisages the lifespan of the Airth development to be 20-30 years. 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.”<sup>5</sup> This same logic applies to coal-bed methane.
- 4.9. At 8.5 Mr Smyth indicates that the Scottish responsibility for negative externalities of shale gas extraction reported in the US by way of importing that gas could be avoided by indigenous CBM. Mr Smyth fails to note that the moral responsibility for negative externalities in the US could simply be replaced by responsibility for any negative externalities in Scotland from indigenous CBM. Further, it is inaccurate to suggest that indigenous gas will be consumed in Scotland. The UK is part of a well connected European regional gas network which means gas is sold to the highest bidder, and, as noted above, Scotland already has a multiple overabundance of fossil fuels.
- 4.10. We note that the jury is still out on the leakage rates of methane from shale gas exploitation (8.6) with studies indicating up to 9% in the worst cases,<sup>6</sup> wiping out any climate advantages. We also note the very significant lack of data on this point regarding coalbed methane operations, as summarised by the FoES Inquiry document no 4 (Broderick and Sharmina 2014).

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<sup>2</sup> <http://www.scotland.gov.uk/Resource/0044/00440953.pdf>

<sup>3</sup> <http://www.sepa.org.uk/air/idoc.ashx?docid=56d39371-fccd-4a80-8389-30e109d22c01&version=-1>

<sup>4</sup> <http://www.theguardian.com/environment/2014/feb/26/achim-steiner-shale-gas-rush-climate-change-energy>

<sup>5</sup> Official Report, Scottish Parliament, 19<sup>th</sup> December 2013, <http://www.scottish.parliament.uk/parliamentarybusiness/28862.aspx?r=8720&mode=pdf>

<sup>6</sup> 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](http://www.eeb.cornell.edu/howarth/Howarthetal2012_Final.pdf)

- 4.11. The figures that Mr Smyth uses for the Global Warming Potential (GWP) of methane at 8.7 are out of date. As per our Inquiry Statement, according to the latest Intergovernmental Panel on Climate Change report the GWP of methane is 86 times that of carbon dioxide over 20 years, and 34 over 100 years,<sup>7</sup> nearly 40% higher in the case of the 100-year figure used by Mr Smyth. There is no justification for using the out of date figures in discussing the climate impact of the development (it would only be acceptable for the purposes of comparison with previous studies). Further, the increased GWP of methane means that Scotland's climate targets will be harder to meet and particular scrutiny of any developments increasing methane emissions will be required in this context.
- 4.12. Regarding Mr Smyth's comments at 8.11, we note again the lack of scientific studies which distinguish between the impacts of fracked and non-fracked gas operations. Lack of evidence for harm does not equate to an actual lack of harm. Further we note that there are serious questions raised about the stringency of the Scottish regulatory regime as part of this process, as summarised in Professor Hilson's precognition.
- 4.13. Again, we note the lack of evidence to support the assertion at 8.12 that methane release is highly improbable.
- 4.14. We note that the testing for methane leakage at Dart's Canonbie site referred to at 8.13 was carried out during the course of a single day.
- 4.15. We note re Mr Smyth's point at 8.15 that SEPA is unable to confirm that it will be able to regulate fugitive emissions from wellheads under the PPC regime.
- 4.16. Mr Smyth claims at 8.16 that venting will be minimised but under the license from DECC it would be perfectly legal for the development to vent over 6,000 tonnes of CO<sub>2</sub> equivalent a year, the same as adding around 2,500 new cars to Scotland's roads.
- 4.17. We note that Mr Symth's assertions at 8.19 are disputed, in particular by the precognition of Professor David Smythe.
- 4.18. At 8.20 Mr Smyth refers to a methane monitoring plan but again it does not appear that this has been made available to the Inquiry.
- 4.19. Mr Smyth's response to FoES Inquiry Statement at 9.8 focuses only on methane and ignores the issue we raised of monitoring for drilling chemicals, naturally occurring chemicals and radioactive substances. Further, Mr Smyth indicates that it would only be possible to establish the impacts on ambient air quality of fugitive methane after the operational stage, i.e. when the damage is done.
- 4.20. At 9.9 Mr Smyth fails to take account of SEPA's uncertainty regarding the use of PPC permits to regulate wellheads. Further, SEPA have confirmed that fugitive emissions from pipelines to the GDWTF will not be regulated under PPC. This has been discussed in the precognition of Professor Christopher Hilson. Finally, the potential for fugitive emissions through geological and hydrological pathways has been clearly demonstrated by Professor David Smythe, and these will not be regulated by SEPA, and mitigation would be very difficult.
- 4.21. As Mr Smyth notes at 9.13 is the case for Dart's Airth operation, we would suggest that the primary purpose of unconventional gas operations generally is to capture the methane and avoid leakage, yet this does not detract from the fact that the jury is still out as to the lifecycle carbon footprint of both shale gas and coalbed methane operations, in the case of the latter in particular due to a lack of data.

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<sup>7</sup> 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.

- 4.22. At 9.15 Smyth suggests that “The adequacy and stringency of adopted national policy in relation to international climate change agreements is not a matter for this planning inquiry.” However the Climate Change (Scotland) Act 2009 states that “a public body must, in exercising its functions, act in the way best calculated to contribute to the delivery of the targets set in or under Part 1 of this Act.” As Professor Hilson’s precognition argues, this applies to the planning functions of local authorities, so the issue of climate targets is for this inquiry to consider.
- 4.23. Mr Smyth’s claim at 9.16 that there is an extensive body of literature regarding the carbon impact of unconventional gas operations contradicts his statement at 8.11, that studies of the fugitive emissions from hydraulically fractured shale gas operations cannot be relied upon to determine the impact of a CBM development where no fracking takes place. While we have argued (and continue to) that such studies do raise important considerations for coalbed methane operations – whether hydraulic fracturing is used or not – in regards to fugitive emissions of methane and the air pollutants discussed in Dr Lloyd-Smith’s precognition, we also point to a serious lack of studies into fugitive methane emissions from coalbed methane,<sup>8</sup> therefore what Mr Smyth’s certainty is founded on is not clear. Further, as per above, the monitoring plan, as described by Mr Smyth will only demonstrate evidence of harm long after the fact.
- 4.24. The difference in FoES figures highlighted by Mr Smyth at 9.17 is due to a recalculation using the new methane Global Warming Potential figures released by the IPPC in September 2013. As our Inquiry statement explained, the calculations assume a leakage rate of 4.5% based on real world observations as quoted in paragraph 3.6 rather than industry inventories; used the IPPC’s latest calculations of global warming potential expressed over 100 years; and were based on delivery of the maximum volume under the gas sales deal with SSE, which we acknowledged would require field development beyond that proposed in this application.
- 4.25. The assertion in 9.17 that exploiting unconventional gas reserves in Scotland will not increase global emissions is flawed. Having missed the first two targets of the Climate Change (Scotland) Act and being almost certain to have missed the third, it is clear that carbon targets are not currently providing the balancing mechanism that is suggested. Even if they were, the lack of a global budget means that new fossil fuels produced in Scotland will increase the affordability and therefore use of other fossil fuels elsewhere, just as cheap US shale gas has meant more burning of cheap US coal in Europe recently.<sup>9</sup>

## 5. Precognition on Policy by Alan Pollock, RPS

- 5.1. The Climate Change (Scotland) Act introduced targets in line with the United Nations Framework Convention on Climate Change and advice from the UK Committee on Climate Change on the level of emissions reductions necessary to avoid *catastrophic* climate change, which is in turn based on the work of the Intergovernmental Panel on Climate Change. The Climate Act also introduces a duty on the Public Sector to exercise their functions “in the way best calculated to contribute to the delivery of the targets set in or under Part 1 of this Act<sup>10</sup>”. We have missed the first two targets set by the Climate Act and are likely to have missed the third (based on UK figures). Global combustion of fossil fuels is the key driver of climate change, and as Dr John Broderick made clear in his precognition there simply isn’t enough space in global carbon budgets for unconventional gas. In this

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<sup>8</sup> See Broderick and Sharmina

<sup>9</sup> See Broderick and Sharmina

<sup>10</sup> s44 (1)

context it is not consistent with the public sector duty for a local authority in Scotland to approve a development that opens up a new frontier of fossil fuels.

- 5.2. It is not accurate to state that “the continued use of gas as the primary source for home heating is not questioned” as Mr Pollock does at 3.5. The Scottish Government is due to publish an updated Heat Generation Policy Statement shortly and precursor documents (the Renewable Heat Action Plan, in the 2020 Routemap for Renewable Energy in Scotland and the draft Outline Heat Vision, both 2013) state the need to decarbonise heating. The Scottish Government currently has a target of 11% renewable heat by 2020 and an overall renewables energy target (including heat) of 20% by 2020. The second Report on Proposals and Policies spells out the measure the Scottish Government will use to meet our emissions reduction targets from 2013 to 2027.<sup>11</sup> It summarises action on decarbonising heat including policies which will reduce emissions by 99ktCO<sub>2</sub>e by 2020 and 609ktCO<sub>2</sub>e by 2030.
- 5.3. At 4.2 Mr Pollock quotes NPF2 about an imbalance between supply and demand for oil and gas. While it is FoES’ position that neither NPF2 nor the draft NPF3 go far enough in terms of addressing the scale of the challenge to de-carbonise our energy sector, Mr Pollock quotes NPF2 grossly out of context. The rest of paragraph 7 discusses the finite nature of fossil fuels, climate change and a strategy of reducing dependency on fossil fuels. Mr Pollock’s line of reasoning is also at odds with the First Minister’s recent statement that “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.”<sup>12</sup>
- 5.4. 5.3 mentions unconventional gas reserves but the draft National Planning Framework 3 and the Scottish Government’s Energy Policy Generation Statement make provision for gas-fired power stations only if fitted with Carbon Capture and Storage, a technology which remains unproven on a commercial scale.
- 5.5. As Professor Christopher Hilson makes clear in his precognition, the onshore oil and gas regulatory framework has been developed piecemeal and with a view to maximising resource exploitation rather than environmental protection, and as such is not fit for purpose.
- 5.6. Mr Pollock quotes from paragraph 17 in NPF2 that “a growing imbalance between supply and demand for oil and gas products has profound implications for the future of transport and the global economy.” While it is FoES’ position that neither NPF2 nor the draft NPF3 go far enough in terms of addressing the scale of the challenge to decarbonise our energy sector, Mr Pollock quotes the NPF2 grossly out of context in this respect. The rest of this paragraph discusses the finite nature of fossil fuels, climate change and a strategy of reducing dependency on fossil fuels.
- 5.7. We note that while, as Mr Pollock states at 6.4, SPP makes a distinction between oil and gas development and minerals development, its successor document groups onshore oil and gas and minerals extraction, including opencast coal together under a single section ‘Promoting Responsible Extraction of Resources’. The draft SPP not only sets out issues to be addressed in Local Development Plans in more detail than its predecessor, including introducing a requirement for buffer zones between sites and settlements (as per FoES’s Hearing Statement), but crucially, no longer talks about ‘maximising’ onshore oil and gas.
- 5.8. As per FoES Hearing Statement at para 16, we note that the Scottish Government’s position statement has adopted erroneous language from the independent analysis of responses to

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<sup>11</sup> Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013-2027. The Second Report on Proposals and Policies, 2013, <http://www.scotland.gov.uk/Resource/0042/00426134.pdf>, p.125

<sup>12</sup> Official Report, Scottish Parliament, 19<sup>th</sup> December 2013, <http://www.scottish.parliament.uk/parliamentarybusiness/28862.aspx?r=8720&mode=pdf>

the SPP in relation to input on unconventional gas extraction.<sup>13</sup> The statement under Key Issue 9 that "A campaign comprising 364 responses and a petition of 245 signatures opposed the potential extraction of coal bed methane by hydraulic fracturing (fracking)" misrepresents what the petition called for and campaign responses<sup>14</sup> said. Neither mentioned hydraulic fracturing (commonly referred to as fracking) but rather call for 'a ban on the unconventional gas industry' and buffer zones 'between communities and onshore gas drilling sites.'

5.9. The Scottish Government have acknowledged this error in correspondence with FoES (See Hearing Doc no 37):

"I agree that, in this instance, the issues raised concerning unconventional gas in some of the research outcomes have erroneously been interpreted as applying to the more limited process of hydraulic fracturing.

"You will note that Key Issue 9 of the Position Statement is headed "Onshore Gas Extraction" and that the two bullet points that confirm the Government's Position both refer to onshore/unconventional oil and gas. The original wording in Draft SPP also refers to "Onshore Oil and Gas" extraction.

"I confirm that it is our intention to continue to use the existing terminology in Draft SPP and that the SPP Team are aware that the issues raised by Friends of the Earth Scotland and those who supported its campaign/petition relate to unconventional gas extraction as a whole. In reviewing the SPP, responses are being considered on this basis."

5.10. We would also draw attention to FoES Inquiry Document 40, a letter from Planning Minister Derek McKay to Richard Dixon, FoES Director, confirming that he is minded that proposed changes in the draft SPP regarding unconventional gas will go ahead into the final version.

5.11. We note that the remit of the Scottish Government's Expert Scientific Panel on Unconventional Gas is to produce a final report that will evidence:

5.12. The potential magnitude of unconventional oil and gas reserves in Scotland and their commercial potential;

- Whether the technology exists to allow their safe extraction;
- The key environmental challenges relating to unconventional oil & gas;
- Whether the current regulatory framework is adequate;
- How the potential use of unconventional oil and gas resources in Scotland would sit with the Scottish Government's commitment to reduce greenhouse gases;
- How to successfully and constructively engage with communities and environmental groups in a meaningful, constructive and fact based debate on the merits or otherwise of the development of unconventional oil and gas reserves.

5.13. The report is expected to be published in May 2014. It would appear premature to decide an application of this nature and scale ahead of the findings of the Panel.

5.14. As set out in the precognition of Prof Christopher Hilson on Climate Duties, the planning and land-use functions of Local Authorities clearly falls under the duty on public bodies under the Climate Change (Scotland) Act 2008 to exercise their functions "in the way best calculated to contribute to the delivery of the [emissions reduction] targets." The increased GWP of methane means that Scotland's climate targets will be harder to meet and therefore particular scrutiny of any developments increasing methane emissions is required in this

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<sup>13</sup> Scottish Government Position Statement on Scottish Planning Policy January 2014 <http://www.scotland.gov.uk/Resource/0044/00441852.pdf> Key issue 9, page 8-9. See also emails between Friends of the Earth Scotland and the Scottish Government clarifying this error.

<sup>14</sup> <http://www.scotland.gov.uk/Resource/0043/00431251.pdf> and <http://www.scotland.gov.uk/Resource/0043/00431648.pdf>

context. Further, the fitness of the regulatory regime to adequately respond to this novel industry is challenged in Prof Hilson's precognition on the regulatory regime.

## **6. Precognition Benefits of the Proposal by Douglas Bain**

- 6.1. We refer to comments made in our Hearing Statement and rebuttals of Mr Smyth and Mr Pollock's precognitions in response to Mr Bain's comments at 3.1 and 3.4. Further, we note that to discuss gas supply and demand in this way without noting the context of rising global emissions, and the lack of space in global carbon budgets to safely absorb these, ignores the fundamental point that in order to avoid catastrophic climate change we need to see a dramatic global reduction in the use of production and combustion of fossil fuels. Therefore opening up new fossil fuel frontiers, such as unconventional gas, without national or global guarantees of closing down others, is to ignore the overwhelming consensus of climate scientists and global agreements, including the 2009 UN Copenhagen Accord, to keep climate change below 2 degrees centigrade.
- 6.2. At 3.2.4 Mr Bain suggests that wind energy is uneconomic without subsidy, yet those subsidies are about to be removed by the UK government while, globally, subsidies for fossil fuels outstrip those to renewables by 6 times.<sup>15</sup> He also suggests that hydro-power is limited, yet it provides over 10% of Scotland's electricity needs, a 2010 study for the Government suggested that there is potential for a further 1GW of small and medium sized schemes, and both SSE and ScottishPower recently committed to construct a total of another 1.2GW of pumped storage.
- 6.3. It is misleading to suggest (at 3.4) that should gas displace coal in Scotland that will lessen the impact of CO2 emissions. The impact of fossil fuel combustion on the climate is a global issue, so if burning gas in Scotland instead of coal means that more coal is burnt elsewhere, there is no gain in climate terms. We note as per our comment in our Inquiry Statement and above that the jury is still out on the matter of how the lifecycle carbon impact of unconventional gas compares to other fossil fuels. Further, as per our Inquiry Statement and written submissions, we note that experts have warned that gas might displace renewables, and that opening up a new frontier of fossil fuels risk delaying serious de-carbonisation of global energy systems.
- 6.4. At 3.7 Mr Bain gives 2011 job figures (30 for European activities employed at Stirling office) without updating to reflect the redundancies noted at 3.6.2.10. It is not clear whether the 20 new jobs generated will be full time or permanent. Nor is it clear over what timescale Mr Bain envisages local jobs linked to the presence of a drilling rig within central Scotland to be created, nor how much unconventional gas development within or beyond Dart's own license areas, would need to take place to support these jobs. It is not clear what the temporary employment figure of up to 100 staff during site construction relates to, and whether these are direct employees of Dart or local contractors etc.

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<sup>15</sup> <http://www.theguardian.com/environment/2013/nov/07/fossil-fuel-subsidies-green-energy> and <http://www.odi.org.uk/subsidies-change-the-game>