



**WWF** *for a living planet*

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L McNeil  
The Scottish Government,  
Energy Consents Unit,  
4th floor,  
5 Atlantic Quay,  
150 Broomielaw,  
Glasgow G2 8LU

August 2010

Dear Ms McNeil

**Planning Application No. N/10/00369/CON  
Erection of a multi-fuel power station at site to south west of Hunterston Coal Yard,  
Farlie, Largs, Ayrshire**

Please find attached WWF Scotland's response to the above application. We hope the Scottish Government find these comments useful when considering this application.

WWF Scotland wishes to **object** to this application for the following reasons.

**1. New coal plant is not needed in Scotland or Britain**

We do not consider there is a genuine need for a new coal plant – either in Scotland or in Britain. In Scotland, recent research undertaken by independent energy analysts Garrad Hassan for WWF has shown that Scotland can meet or exceed its electricity needs without additional fossil fuel power stations. Indeed by 2030 it shows that renewable energy can meet between 60% and 143% of Scotland's projected annual electricity demand<sup>1</sup>.

Ayrshire Power Limited (APL) has acknowledged that the plant will only be likely to generate electricity for demand from England and Wales. It would seem a peculiarly contradictory decision to consent a new polluting coal power station to simply export dirty electricity out of Scotland given our world leading climate ambitions, our opportunity to test CCS on existing power stations and our recognised capacity to far exceed our own electricity needs through Scotland's huge renewables potential.

**2. Climate change impacts**

The Climate Change (Scotland) Act 2009 established a greenhouse gas reduction target of at least an 80% cut below 1990 levels by 2050 with a 42% reduction being delivered by 2020. In order to meet these targets, the Committee on Climate Change (CCC) has repeatedly recommended that the power sector should be almost completely decarbonised by 2030<sup>2</sup> - a

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<sup>1</sup> WDM, Friends of the Earth Scotland, WWF and RSPB jointly published the report 'Power of Scotland Renewed' in July 2009.

This is based on independent energy analysis by consultants Garrad Hassan. The summary report is here:

[http://assets.wwf.org.uk/downloads/powerofscotland\\_renewed.pdf](http://assets.wwf.org.uk/downloads/powerofscotland_renewed.pdf) , and the full report is here:

[http://assets.wwf.org.uk/downloads/powerofscotlandrenewed\\_full.pdf](http://assets.wwf.org.uk/downloads/powerofscotlandrenewed_full.pdf).

<sup>2</sup> For example - pg xviii - <http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf> and pg 18 -

<http://hmccc.s3.amazonaws.com/21667%20CCC%20Report%20AW%20WEB.pdf>



INVESTOR IN PEOPLE

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recommendation that the Scottish Government adopted in June 2009<sup>3</sup>. In the absence of regulation which places an appropriately robust limit on CO<sub>2</sub> from new power stations today, the Hunterston proposal presents an unacceptable risk to the climate and undermines the ambition of the Climate Change Act.

### **3. Ability to demonstrate full CCS chain**

It is WWF Scotland's view that CCS has potential to be an important bridging technology towards a globally decarbonised power sector. Scotland has the opportunity to test this new technology on an existing coal plant and an existing gas plant. In both cases, such a demonstration would deliver real reductions to our current emissions. On the other hand, the proposal for Hunterston would result in increased emissions. The proposal to build a partially abated coal plant at Hunterston does not describe a credible package that gives confidence that full integration of all aspects of CCS would follow Section 36 planning consent. There is very limited information regarding both the transport and storage parts of the CCS chain and no consortium of operators in place to deliver all the technical aspects of this novel suite of technologies. Indeed, it remains unclear from the application if the developer is actually seeking consent for the capture technology or not. Across all three stages of CCS, capture, transport and storage the application leaves many questions unanswered.

### **4. Unacceptable biodiversity impacts**

The proposal would result in the loss of over 30ha of intertidal habitat. The lost habitat is regionally uncommon and this site has the largest area of sandflat, eelgrass bed and mussel beds on the Ayrshire coast. The loss of habitat would result in a significant impact on the integrity of the Portencross Coast SSSI.

### **5. No use of waste heat**

If built the power station at Hunterston would probably be the third largest artificial source of heat in Scotland, and most of it would be wasted. The application by APL includes a summary assessment of possible heat use from the proposed power plant. However, despite describing the plant as technically capable of heat provision and identifying significant local heat demand the application makes no commitment to provide and distribute heat. Instead the application simply states that it is "*beyond the scope of this assessment to provide estimates of full capital expenditure*"<sup>4</sup>. This is not acceptable since the Scottish Government guidance clearly states that it "*expects developers to demonstrate that they have seriously considered how waste heat could be utilised*"<sup>5</sup>. The same guidance also states that "*if an application considers that heat will not be utilised, then a full assessment as to why utilisation is not feasible should be stated as part of the application*". The application does not provide this, instead just concluding that the developer "*might consider, in the future, the development of a heat network to serve a specific new development*". The failure to commit to use of waste heat and the incomplete assessment of costs should be further reasons for the Scottish Government to reject this application.

### **6. Sustainability of biomass fuel**

The use of biomass will have an important role to play in achieving the 20% by 2020 renewable energy target for Scotland and in turn meeting the targets under the Climate Change (Scotland) Act 2009. Although biofuels are a renewable source of energy, depending on where and how they are produced their carbon payback can be very lengthy and, if particularly badly sourced may result in a net increase in emissions. This is especially true if the biomass is sourced from

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<sup>3</sup> Scottish Government Climate Change Delivery Plan, June 2009 -

<http://www.scotland.gov.uk/Resource/Doc/276273/0082934.pdf>

<sup>4</sup> Page 31 "Assessment of Opportunities for Supply of Waste Heat from Proposed Power Station at Hunterston Terminal" A report for Ayrshire Power Ltd, Eunomia

<sup>5</sup> See <http://www.scotland.gov.uk/Resource/Doc/917/0095764.doc>

forest or peat soils that are cleared to make way for production. WWF believes that effective, robust and strict sustainability criteria and standards which minimize the direct and indirect impacts of biomass use are essential and need to be applied across the board for all types of biomass, including uses for heat and power production.

The EIA should set out the sustainability criteria applied to sourcing the biofuel and the guarantees in place to ensure these criteria are met. As a minimum, the developer should satisfy the proposed EU sustainability criteria<sup>6</sup> and ensure any woody biomass has achieved Forestry Stewardship Council (FSC) certification.

## **7. Quality of the application**

There are numerous contradictions and information gaps in the information provided by Ayrshire Power Limited. Some of these are summarised in Annex 1 but a key example is the different claims made over something which is fundamentally important and should be straight forward to calculate – the percentage of the station's CO<sub>2</sub> emissions which will be captured in the plant's initial configuration. In their Non-Technical Summary the company say this is 15%. However, when questioned they told the press that this was a misprint and it should say 25%, but the provided supporting numbers come to 22%, while a generous interpretation of the numbers in EIA comes to 20%.<sup>7</sup> The provisional analysis carried out for us by Element Energy arrives at the figure of 17%.

The poor quality of this application calls into question the company's suitability to undertake this kind of large and complex project.

Finally, WWF Scotland has commissioned independent consultants Element Energy to provide quantitative assessment of the different possible CO<sub>2</sub> emissions scenarios resulting from the proposed power station. Initial results are provided in the Annex 2 alongside further detail to support the position set out in this letter.

Please do not hesitate to contact me if you have any questions regarding any aspect of this letter and the attached information.

Yours sincerely



Richard Dixon  
Director WWF Scotland

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<sup>6</sup> See [http://ec.europa.eu/energy/renewables/bioenergy/sustainability\\_criteria\\_en.htm](http://ec.europa.eu/energy/renewables/bioenergy/sustainability_criteria_en.htm)

<sup>7</sup> Power firm accused of 'greenwashing' on 'pathetic' claims, Scotsman, 5/6/10, <http://thescotsman.scotsman.com/news/Power-firm-accused-of-6342819.jp>

# Annex 1 - WWF Scotland's comments on s.36 application by Ayrshire Power for a multi-fuel power station at Hunterston, North Ayrshire

August 2010

WWF recommend that the Scottish Government reject Ayrshire Power's application for planning permission to construct a 1852MW multi-fuel (coal/biomass) power station at Hunterston in North Ayrshire. We object to the application for the following key reasons:

## **1. The development is not needed to meet Scotland or Britain's future requirements for electricity**

We do not consider there is a genuine need for a new coal plant in order to 'keep the lights on' in either Scotland or in Britain.

In Scotland, recent research undertaken by independent energy analysts Garrad Hassan has shown that Scotland can meet or exceed its electricity needs without additional fossil fuel power stations. Indeed, by 2030, it shows that renewable energy can meet between 60% and 143% of Scotland's projected annual electricity demand<sup>8</sup>. This conclusion is reinforced by the recent announcements regarding Scotland's offshore renewable capacity. For instance, in 2009 and 2010, 11.2 GW of offshore wind capacity has been earmarked for development off Scottish shores. Further confirmation is provided by the respected Offshore Valuation Study published in July 2010 that describes Scotland's total practical offshore resource as an estimated 206 GWs<sup>9</sup>. As well as addressing greenhouse gas emissions, the shift to a sustainable zero carbon power sector and a massive scale up in energy efficiency measures presents an enormous opportunity for Scotland to reinvigorate its industries, create new jobs, and reduce dependency on imported fuels. In short, new fossil fuel plant with or without CCS is not needed in Scotland to 'keep the lights on'.

Ayrshire Power Limited appear to support this position by attempting to make the case for Hunterston in the context of the British power sector rather than describing it as necessary to meet Scotland's future electricity demand.

However, this attempt to justify the new power plant in a broader national context presents a weak case. In contrast to the Poyry report submitted as part of the Hunterston application (see overleaf), a report from the same consultancy published in 2008 showed that there would be no 'energy gap' in the middle of the next decade if the renewable energy and energy efficiency targets we have already committed to were met<sup>10</sup>. Indeed, this assumed no new fossil fuel plants were built other than those under construction by July 2008. Since the report was published, the UK Government has consented several additional new gas-fired power stations further reducing the likelihood of an energy or 'capacity' gap emerging. The UK's Low Carbon

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<sup>8</sup> WDM, Friends of the Earth Scotland, WWF and RSPB jointly published the report 'Power of Scotland Renewed' in July 2009. This is based on independent energy analysis by consultants Garrad Hassan. The summary report is here: [http://assets.wwf.org.uk/downloads/powerofscotland\\_renewed.pdf](http://assets.wwf.org.uk/downloads/powerofscotland_renewed.pdf), and the full report is here: [http://assets.wwf.org.uk/downloads/powerofscotlandrenewed\\_full.pdf](http://assets.wwf.org.uk/downloads/powerofscotlandrenewed_full.pdf).

<sup>9</sup> <http://www.offshorevaluation.org>

<sup>10</sup> [http://www.ilxenergy.com/pages/Documents/Reports/Renewables/July08\\_2020RenewablesTarget.pdf](http://www.ilxenergy.com/pages/Documents/Reports/Renewables/July08_2020RenewablesTarget.pdf)

Transition Plan released in mid 2009 also stated that “*The UK is likely to have sufficient generating capacity in the mid-teens despite power station closures.*”<sup>11</sup>

The Poyry report, entitled “*The case for clean coal generation in Scotland*”, which accompanies the Hunterston application however, states that “*Based on Poyry’s Central scenario for electricity demand growth in Britain, known plans for the decommissioning of existing power stations, and **new stations under construction** there will be a shortage of capacity after 2015 unless new thermal projects are constructed. By 2025, we estimate the ‘capacity gap’ would be 15GW without additional new build*” (emphasis added).

Unfortunately, the report fails to explicitly mention that around 10.5GW of power plant has received s.36 approval and agreement to connect to the grid but *has yet to move to construction* (this includes around 7.5GW of proposed new thermal plant). In addition, the 2009 Low Carbon Transition Plan cites a further 7.5GW of plant which has applied for consent and since the beginning of 2010 another 2.4GW of gas plant have also submitted s.36 applications<sup>12</sup>. Whilst we acknowledge that there is no guarantee that all of these plants will be constructed (and in particular we do not support the s.36 application for a 1.6GW coal plant at Kingsnorth), we would expect these proposals to be considered in any assessment of a potential ‘capacity gap’.

Furthermore, we would question some of the assumptions in the Poyry report around dates for closure of thermal plant which are covered by the Industrial Emissions Directive (IED) and hence their assessment of available capacity. The report states:

“*The AEP [Association of Electricity Producers] estimate that the IED in its current form would lead to closure of:*

- *6-13GW of CCGT capacity in 2020 which are unable to meet new NOx emission limits, with 10,000 hour derogation over 2016-2019.*
- *Most existing coal plant capacity in 2020 (as it is not viable to fit SCR equipment), with 10,000 hour derogation over 2016-2019.”*

Since this report was written the IED has been finalised. Plant opted out of meeting NOx limits are now allowed to operate for a maximum of 17,500 hours (equivalent to around two years) until the end of 2023<sup>13</sup>.

## **2. It is unlikely that the proposed development will provide the flexible power generation needed**

Given the very high capital cost of a new advanced supercritical coal plant, it is likely that from an economic point of view this type of plant will only make investment sense if there is a commitment to be able to run it at high load factors. Indeed, Poyry’s “*Impact of intermittency*” report shows coal plants with CCS operating at 70-75% load factors during the 2020s<sup>14</sup>.

This is concerning for two reasons:

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<sup>11</sup> Page 73 – The UK Low Carbon Transition Plan - [http://www.decc.gov.uk/assets/decc/White%20Papers/UK%20Low%20Carbon%20Transition%20Plan%20WP09/1\\_20090724153238\\_e\\_@@\\_lowcarbontransitionplan.pdf](http://www.decc.gov.uk/assets/decc/White%20Papers/UK%20Low%20Carbon%20Transition%20Plan%20WP09/1_20090724153238_e_@@_lowcarbontransitionplan.pdf)

<sup>12</sup> The UK Low Carbon Transition Plan - [http://www.decc.gov.uk/assets/decc/White%20Papers/UK%20Low%20Carbon%20Transition%20Plan%20WP09/1\\_20090724153238\\_e\\_@@\\_lowcarbontransitionplan.pdf](http://www.decc.gov.uk/assets/decc/White%20Papers/UK%20Low%20Carbon%20Transition%20Plan%20WP09/1_20090724153238_e_@@_lowcarbontransitionplan.pdf), and ENDS report 424, pg 15, May 2010

<sup>13</sup> “Agreement struck on Industrial Emissions Directive” - endsreport.com, 22 June 2010

<sup>14</sup> Page 10, “Impact of Intermittency” Poyry, July 2009, <http://www.poyry.com/linked/group/study>

- As there is no regulation yet in place to ensure CCS is fitted to the full generating capacity of coal plant by the mid 2020s, there is a substantial risk, given the cost of building new coal, that any new plant may be allowed to operate unabated at high load factors during the 2020s and beyond. This presents an unacceptable threat to meeting emission reduction targets under the Climate Change Act and delivering a substantially decarbonised power sector by 2030 as recommended by the CCC (see section 4 in this response).
- In a UK powered progressively by renewable energy, any fossil fuel plant on the system will increasingly be required to operate on a flexible basis at varying and low load factors<sup>15</sup>. We would therefore question whether new baseload coal power plant (even if it is fully abated) has any place in this future world.

Indeed, as the CCC recently noted, gas-fired power stations equipped with CCS are actually more cut out for operating at lower load factors due to lower capital costs: “*The relative cost advantage of gas CCS improves at lower load factors, as it is less capital-intensive than coal CCS. This is likely to make gas CCS well-suited to a more flexible role in a power system that includes high proportions of intermittent renewables and in which the electrification of heat means that electricity demand has a significant seasonal component*”<sup>16</sup>.

### **3. The status of the development as designated in the National Planning Framework is uncertain**

In July 2009, a proposed coal plant at Hunterston was designated as a National Development in Scotland’s second National Planning Framework (NPF2). However, this designation which established the need for the development in planning terms is currently subject to a legal challenge<sup>17</sup>. Without prejudice to the final decision of the Court, it is possible that the national development status of Hunterston could be overturned.

It now also appears that a further material consideration could supersede the need established in NPF2. The following written Parliamentary Answer was recently provided by Energy Minister, Jim Mather, in response to Parliamentary Question S3W-34742:

*“The Scottish Government’s Climate Change Delivery Plan, published on 17 June 2009 sets out at a high level the options available to meet the statutory targets in the Climate Change (Scotland) Act 2009. This includes a largely decarbonised electricity generation sector by 2030 using renewables complemented by fossil fuelled plants with carbon capture and storage. As part of their obligations under s.38 of the Climate Change (Scotland) Act (2009), Scottish Ministers are required to lay a report outlining the impact on emissions of the exercise of their electricity generation related functions. To fulfil this obligation, and in light of recent developments in our renewables potential, the Scottish Government is currently conducting an internal study on the extent of the need for new thermal generation. This will take account of our clear policy on CCS and CCS retrofit which requires demonstration of CCS for new coal*

<sup>15</sup> In their recent letter to Chris Huhne regarding approach to investment in fossil fuel power generation the CCC note “*Flexible (i.e. low load factor) low-carbon generation plant will be required in the UK and other countries particularly to support seasonal demand for electric heating from the 2020s.*” 17<sup>th</sup> June 2010.

<sup>16</sup> Page 68, “Meeting Carbon Budgets – ensuring a low-carbon recovery, 2nd Progress Report to Parliament, Committee on Climate Change” June 2010 - [http://downloads.theccc.org.uk/s3.amazonaws.com/0610/CCC-Progress-Report-web-version\\_3.pdf](http://downloads.theccc.org.uk/s3.amazonaws.com/0610/CCC-Progress-Report-web-version_3.pdf). In addition the CCC have also specifically noted, in their recent letter to Chris Huhne that “*The cost advantage of gas increases at lower load factors, given that it has relatively low capital costs (e.g. our analysis suggests that gas CCS could have a £35/MWh advantage over coal CCS operating at a 50% load factor in DECC’s central gas price scenario).*” <http://hmccc.s3.amazonaws.com/gas%20CCS%20letter%20-%20final.pdf>

<sup>17</sup> As also stated previously in this response we do not consider that this plant is needed in order for the electricity needs of Scotland to be met.

plants on a minimum of 300MW net from day one, retrofitting by 2018 following a review of the technical and economic viability of CCS, and full CCS on new builds from 2020, and will reflect the competitive and dynamic nature of the electricity market. The report will include an assessment of energy demand and supply projections – including the current electricity supply base, projected rates of renewables deployment and planned retirement of existing baseload plants. It will also be informed by the energy storage and demand management study. **The outcome of the study will provide a high level assessment on the extent of need for new thermal generation capacity** and an evaluation of the potential security of supply issues that may occur in Scotland during the expected transformation towards a decarbonised electricity supply sector by 2030. This assessment will be one of the factors taken into account in considering policy on future generation options, alongside environmental, social and economic criteria. The initial findings will be presented to the Thermal Generation and CCS Industry Advisory Group for its consideration and advice before the report is published in the autumn” (emphasis added).

Clearly, the findings of this study on the extent of need for new thermal generation capacity could further effect whether the need for a new coal plant at Hunterston remains confirmed. This should therefore be a material consideration in the determination of the current application.

NPF2 also makes it clear that there are a wide range of issues that must be addressed when consent is sought and that these should be taken into account when the proposals are assessed. Included within this are the siting, design and layout of the power station and associated infrastructure, transport, grid connections, carbon impact, CCS provision, ash management, heat utilisation, landscape and visual impacts, effects on cultural and natural heritage (including on the SSSI), effects on coastal processes and measures to minimise, mitigate or compensate for adverse effects on the environment. Even if it assumed the need for the development is established in principle, there are therefore several important material considerations against which this proposed development could be deemed inappropriate and refused consent.

#### **4. The proposed development presents unacceptable risks to the climate**

##### **a) CO<sub>2</sub> emissions**

The Climate Change (Scotland) Act 2010 established a greenhouse gas reduction target of at least an 80% cut below 1990 levels by 2050 with a 42% reduction being delivered by 2020. In order to meet these targets the Committee on Climate Change (CCC) has repeatedly recommended that the power sector should be almost completely decarbonised by 2030<sup>18</sup> - a recommendation that the Scottish Government adopted in June 2009<sup>19</sup>. In line with this position the CCC has also made clear that new coal plants should not be allowed to operate unabated beyond the early 2020s<sup>20</sup>.

Current Westminster and Scottish Government policy requires the demonstration of at least 300MW net of CCS on new coal plant. Westminster and Scotland have also expressed their intention that any new coal-fired plants should be fitted with 100% CCS by 2025. However,

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**18** For example - pg xviii - <http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf> and pg 18 - <http://hmccc.s3.amazonaws.com/21667%20CCC%20Report%20AW%20WEB.pdf>

**19** Scottish Government Climate Change Delivery Plan, June 2009 - <http://www.scotland.gov.uk/Resource/Doc/276273/0082934.pdf>

**20** "...there is a danger that uncertainties about future carbon prices could result in investments that lock the UK in to carbon intense generating plant. There is therefore a strong case for buttressing the carbon price lever by establishing a clear and publicly stated expectation that coal-fired power stations will not be able to generate unabated beyond the early 2020s" -. See page xxiv of "Building a Low Carbon Economy – the UK's contribution to tackling climate change" – Committee on Climate Change, December 2008, <http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf>

there is currently no legally binding guarantee in place that companies will be required to comply with the 2025 deadline, close or be obliged to operate at very limited running hours.

In the absence of regulation which places a robust limit on CO<sub>2</sub> from new power stations today, the Hunterston proposal presents an unacceptable risk to the climate, to meeting GHG targets and the 2030 recommendation. This risk is clearly downplayed in the supporting documentation submitted with Ayrshire Power's application which presents a misleading impression of the likely CO<sub>2</sub> emissions from operating the proposed plant under current Government policy.

**For example:** the report entitled "*Analysis of CO<sub>2</sub> emissions from Hunterston*" states the following:

*"Under the full load, full-scale CCS scenario detailed in section 3.2, emissions of CO<sub>2</sub> from the proposed power station will be 42MtCO<sub>2</sub> over its likely 40 year lifetime.....To generate the same amount of power as the proposed power station at Hunterston use of CCGT over a similar 40 year timeframe would therefore result in emissions of 135MtCO<sub>2</sub>. The potential CO<sub>2</sub> reduction offered by the proposed power station at Hunterston (assuming installation of full-scale CCS) therefore, is around 93MtCO<sub>2</sub>."*

This is misleading on several accounts:

1. "*Under the full load, full-scale CCS scenario detailed in section 3.2, emissions of CO<sub>2</sub> from the proposed power station will be 42MtCO<sub>2</sub> over its likely 40 year lifetime*" - There is currently no legal requirement to fit CCS to the full generating capacity of new coal plant from day one. Calculating the lifetime emissions from the plant on this basis is therefore disingenuous. At best, and based on an extrapolation of the figures in the CO<sub>2</sub> report, if CCS was fitted to the full capacity of the plant in 2025, lifetime emissions would be somewhere in the region of **100MtCO<sub>2</sub>**.

It is actually more appropriate to consider the lifetime CO<sub>2</sub> emissions of the plant should CCS never be fitted and operated on the full generating capacity given that, as previously mentioned, there is no guarantee in place to ensure a full scale retrofit takes place. Under such a scenario and again based on an extrapolation of the figures in the CO<sub>2</sub> report the plant would emit around **333 MtCO<sub>2</sub>** over 40 years.

The Non-Technical Summary of the Environmental Statement states that "*....about 15% of the Carbon Dioxide (CO<sub>2</sub>) would be removed from the start of operations*"<sup>21</sup>. If this estimate is in anyway accurate then during the lifetime of the plant, if a full scale retrofit of CCS never took place, around 85% of the CO<sub>2</sub> would be vented to the atmosphere.

2. By comparing the emissions from a fully abated coal plant with the emissions from a fully unabated gas plant, the CO<sub>2</sub> report calculates that the proposed plant at Hunterston would make an emissions saving of around 93MtCO<sub>2</sub> over its lifetime. For the reasons mentioned above, this is again a disingenuous comparison given that new coal plants are not required to fit CCS to their full generating capacity from day one.

Indeed, if the proposed Hunterston plant operated with only the intended 327MW of CCS for the whole of its life, this would result (again based on the numbers in the CO<sub>2</sub> report submitted as part of the application) in a net **increase** in emissions in comparison to investment in a fully unabated gas plant of around **198MtCO<sub>2</sub>**.

In summary, the risk of the proposed plant running largely unabated for the whole of its life must be taken into account when considering this application. This is particularly crucial given that Scottish Planning policy explicitly requires that the contribution to the reduction of greenhouse gas emissions by 42% by 2020 and 80% by 2050 should be taken into account in the decision making process<sup>22</sup>.

WWF Scotland, with Friends of the Earth Scotland and RSPB Scotland have commissioned Element Energy to undertake an independent analysis of the potential carbon intensity and CO<sub>2</sub> emissions from the proposed Hunterston coal plant under different levels of CCS and two future operating regimes. The initial provisional analysis is presented in Annex 2 enclosed with this submission.

### **b) Ayrshire Power's ability to deliver full CCS demonstration**

As already stated, the UK and Scottish Government both require the demonstration of at least 300MW of CCS on any new coal plant from the start of operation. We are very concerned about Ayrshire Power's commitment and technical ability to deliver this scale of demonstration. Whilst DONG Energy remains a design partner and has been providing technical input on the power station design (they withdrew their financial support for this project in late 2009<sup>23</sup>), there is little specific information about the transport or storage aspects of the proposal in particular. Indeed, whilst Scottish Power, as part of their application to the first CCS competition, have put together a consortium of companies which cover the different aspects of the CCS chain (that includes Shell, National Grid and others<sup>24</sup>) there is no indication that Ayrshire Power has done the same.

Ayrshire Power propose to capture the equivalent 327MW of CO<sub>2</sub> from the outset of operation. However, it is not at all certain whether the s.36 application actually includes the infrastructure for the demonstration scale CCS unit or not. For example, the CCR report accompanying the application states that: "*The design of the full-scale CCS infrastructure to be located at the proposed power station is provided in Figure 3-4. Planning consent for around 25% of the capacity of this infrastructure (327MW equivalent net CO<sub>2</sub> capture) is being sought as part of the Section 36 submission for the proposed power station to Scottish Ministers, with which this document is associated.*"<sup>25</sup> However, section 1.3.4 of the Environmental Statement states: "*The power station has been designed to be Carbon Capture Ready but APL are not applying for the technology design of the CCS infrastructure within this application. Planning permission for around 25% of the capacity of this infrastructure (around 400MW equivalent net CO<sub>2</sub> capture) will be sought as part of a future section 36 CCS submission to Scottish Ministers, if this Section 36 submission for the power station is successful.*"<sup>26</sup>

These two apparently contradictory statements introduce real ambiguity into the intention of the application that risks leaving the consenting authority unclear on what it is deciding.

In addition the absence of the necessary connection to the transmissions network further highlights the high risks attached to this proposal. The need for substantial connection to the

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<sup>22</sup> Indeed this is acknowledged in the Planning policy statement which accompanies the Hunterston application which states that "*Sustainable development is considered a core topic in the Scottish Planning Policy.....Paragraph 37 states that the planning system has an important role in achieving sustainable development and then sets out a number of issues which the decision making process within the planning system needs to address including: - contributing to the reduction of green house gas emissions by 42% by 2020 and 80% by 2050.*"

<sup>23</sup> <http://www.peelenergy.co.uk/ayrshire-power-limited-and-dong-energy>

<sup>24</sup> [http://www.scottishpower.com/PressReleases\\_1908.htm](http://www.scottishpower.com/PressReleases_1908.htm)

<sup>25</sup> Page 7, Assessment of Carbon Capture Readiness, A report for Ayrshire Power Ltd, March 2010.

<sup>26</sup> Page 2, Environmental Statement.

transmission network was highlighted by Scottish Power in their comments on candidate national developments as part of the NPF2 consultation. They went on to say that "*if the project does not intend to use existing asset connections, it is important to emphasise that any new thermal power station will require potential reinforcement to the electricity transmission grid or may require entirely new infrastructure connection*"<sup>27</sup>. So, in addition to an incomplete presentation of the necessary guarantees to ensure the full implementation of the CCS chain, the proposal does not provide assurance that it could even export its electricity to the grid.

### **c) Credibility of carbon capture readiness**

We would question whether the application meets the carbon capture readiness requirements laid out in the Scottish Government's Guidance on Section 36 applications<sup>28</sup>. Specifically:

The carbon capture readiness report accompanying the application notes that "*At this stage of demonstrating CCR, the initial analysis indicates that storage of CO<sub>2</sub> in a depleted oil or gas field in the East Irish Sea is the preferred option*". The sites considered in the East Irish Sea are the Liverpool Bay Gas Fields which are due to close production in 2016, and the Morecambe Bay Gas Fields which are not due to end production until 2023. The estimated lifetime CO<sub>2</sub> emissions from the proposed plant at Hunterston are given as 320MtCO<sub>2</sub> in the CCR report but this storage option is dependant on the plant having access to the biggest storage site in this area – Morecambe South field with an estimated capacity of 820MtCO<sub>2</sub>. Should Morecambe South not be technically or economically available, the other sites considered in the East Irish Sea would together not provide sufficient storage space for the estimated lifetime CO<sub>2</sub> emissions from the plant (should CCS be fitted to the full generating capacity of the plant).

In addition, if CCS is ever applied to installations in Merseyside (one of the largest areas of heavy industry in the UK), there is a distinct possibility that CO<sub>2</sub> storage sites in the East Irish Sea would be their preferred option given their proximity to Liverpool. This raises potential future issues of priority access which would be sensible to consider now.

The CCR report also considers storage in the British Sector of the North Sea "*In the event that the Morecambe and Liverpool bay opportunities prove not to be technically viable.*" No specific sites are identified and although this option would require an onshore 'trans-Scotland' pipeline route to take the CO<sub>2</sub> from the station on the West coast to the East coast no detail is given as to the route this would take. This is not acceptable given that for onshore pipelines the Scottish Government requires that:

*"Applicants must demonstrate that a feasible route exists from the site to the storage area. In particular, it is important that applicants for Section 36 consent demonstrate that a feasible "way-out" exists from the power station site for the CO<sub>2</sub> pipeline. In order to do this, for the first 10km surrounding the power station applicants are asked to identify a favoured route for their pipeline, within a 1km wide corridor, and in addition are asked to identify major pre-existing obstacles (arising because of safety or environmental concerns) within a 10km radius of the station.....After the first 10km from the power station, because of the greater availability of alternative routes, applicants are asked to identify a 10km wide corridor to the point(s) on the coast where they envisage either a pipeline going offshore or CO<sub>2</sub> going onboard ship."*<sup>29</sup>

WWF UK commissioned the leading UK academic centre for CCS technology at Edinburgh University to review the assumptions behind the term capture ready<sup>30</sup>. This same report

<sup>27</sup> <http://www.scotland.gov.uk/Publications/2009/01/081500277>

<sup>28</sup> <http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Thermal-Guidance/Thermal-2010>

<sup>29</sup> <http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Thermal-Guidance/Thermal-2010>

<sup>30</sup> [http://www.wwf.org.uk/filelibrary/pdf/capture\\_ready\\_ccs.pdf](http://www.wwf.org.uk/filelibrary/pdf/capture_ready_ccs.pdf)

provides a valuable insight into the lack of information submitted as part of this application to support the demonstration and then full retrofitting of the complete CCS chain. Of particular importance is the lack of detail regarding the necessary guarantees to both sufficient storage capacity and the technical skills to access it.

A range of estimates are given as to when retrofitting carbon capture technology to the full generating capacity of the plant may become economically viable with one estimate showing that this may not be the case until around 2035. Given that “...it is the Government’s expectation that new conventional coal-fired generating stations (consented under the policy framework described here) will retrofit CCS to their full capacity by 2025.....it is the Government’s expectation that new coal-fired generating stations will be fully CCS from day one once CCS has been shown to be economically and technically viable, and that this could be possible from 2020.”<sup>31</sup> this is particularly worrying and begs the question as to why additional measures for managing emissions such as an emissions performance standard are not being considered now.

The Energy Act 2010 provides that the funding mechanism for CCS demonstration<sup>32</sup> could also be used to pay for the future retrofit of CCS to the full generating capacity of **new** demonstration plant (presumably should the technologies be technically but not economically viable by around 2020). If the proposed plant at Hunterston was consented and built under the current coal policy there is therefore a risk that the public may end up footing the bill to pay for carbon capture to be fitted to the rest of the large plant. This level of public liability risk is unacceptable, particularly in the current economic conditions. Indeed, there are more sensible ways to demonstrate CCS which do not present such risks to either the public purse or to the climate<sup>33</sup>. WWF recommends the demonstration of post-combustion CCS technology on existing coal and gas plants<sup>34</sup>, and that any pre-combustion demonstrations cover the full generating capacity of any new gasification plant from day one.

It is also worth noting that from a purely cost point of view, the CCC recently observed that the cost to demonstrate CCS on gas plants (in terms of £/MWh) will actually be cheaper than for CCS coal demonstrations<sup>35</sup>.

## **5. Impact on biodiversity**

The proposal would result in the loss of over 30ha of intertidal habitat. The lost habitat is regionally uncommon and this site has the largest area of sandflat, eelgrass bed and mussel beds on the Ayrshire coast. The loss of habitat would result in a significant impact on the integrity of the Portencross Coast SSSI. The proposed site is also of particular importance for wintering birds including curlew, shelduck and redshank. These species and others are likely to be significantly affected by loss of feeding habitat, loss of roost sites and disturbance.

Construction and operation of the proposed power station will negatively impact on the UK Biodiversity Action Plan’s priority habitat of eelgrass and the Scottish Biodiversity List’s recognised habitat of saltmarsh, both of which will be lost at Southannan sands. Such impacts

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**31** <http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Thermal-Guidance/Thermal-2010>

**32** Currently estimated to be worth around £10 billion over 15 years.

**33** [http://assets.wwf.org.uk/downloads/value\\_for\\_money.pdf](http://assets.wwf.org.uk/downloads/value_for_money.pdf)

**34** For example – Scottish Power’s existing coal plant at Longannet (which is competing for funds from the first CCS demonstration competition) and potentially Scottish and Southern Energy’s existing gas plant at Peterhead in Aberdeenshire. See [Carbon Choices - options for demonstrating carbon capture and storage in the UK power sector](http://assets.wwf.org.uk/downloads/carbon_choices_final_.pdf), WWF, 2009, [http://assets.wwf.org.uk/downloads/carbon\\_choices\\_final\\_.pdf](http://assets.wwf.org.uk/downloads/carbon_choices_final_.pdf)

**35** Attachment: Relative costs of CCS on gas and coal plants – sent with letter to Chris Huhne, June 2010, <http://hmccc.s3.amazonaws.com/gas%20CCS%20letter%20-%20final.pdf>

and those on the wider flora and fauna will prevent Scotland from achieving its stated aim of halting the loss of biodiversity by 2010.

## **6. No use of waste heat**

The application by APL includes a summary assessment of possible heat use from the proposed power plant. However, despite describing the plant as technically capable of heat provision and identifying significant local heat demand the application makes no commitment to provide and distribute heat. Instead the application simply states that it is “*beyond the scope of this assessment’ to provide estimates of full capital expenditure*”. This is particularly disappointing as the Scottish Government guidance clearly states that it “*expects developers to demonstrate that they have seriously considered how waste heat could be utilised*”<sup>36</sup>. The same guidance also states that “*if an application considers that heat will not be utilised, then a full assessment as to why utilisation is not feasible should be stated as part of the application*”. The application does not provide this, instead just concluding that the developer “*might consider, in the future, the development of a heat network to serve a specific new development*”. The failure to commit to use of waste heat and the incomplete assessment of costs should be further reasons for the Scottish Government to reject this application.

## **7. Sustainability of biomass fuel**

The proposal from APL suggests that the plant may be fuelled by up to 14% biomass. The use of biomass will have an important role to play in achieving the 20% renewable energy target for Scotland and in turn meeting the targets under the Climate Change (Scotland) Act 2009. Although biofuels are a renewable source of energy, depending on where and how they are produced their carbon payback can be very lengthy and, if sourced in a particularly unsustainable manner may result in a net increase in emissions. This is especially true if the biomass is sourced from forest or peat soils that are cleared to make way for production. WWF believes that effective robust and strict sustainability criteria and standards which minimize the direct and indirect impacts of biomass use are essential and need to be applied across the board for all types of biomass, including uses for heat and power production.

## **8. Credibility of the application**

There are errors, contradictions and significant gaps in the application from Ayrshire Power Limited which cast serious doubt on their technical competence and on the credibility of the application as a whole.

- The EIA says that the proposed station will have a total gross output of 1,852 MW and a total net output of 1,724 MW. It also states that capturing 327MWe of CO<sub>2</sub> from the power station will require 99MWe of electrical power and so the total net output of the power station will be reduced to 1,625 MW when the carbon capture unit is operational. So the most generous possible interpretation of these figures, ignoring the fact that the CCS plant is likely to capture only 90% of the CO<sub>2</sub> passing through, is that, only 20.1% of the CO<sub>2</sub> will be captured. However the Non-Technical Summary gives a figure of 15% and the company have since claimed that this is a misprint and should say 25%.<sup>37</sup> In support of this claim the company told the Scotsman newspaper “*Regrettably the figure of 15% Carbon Dioxide removal specified in the Non Technical Summary is incorrect and should read 25% as indicated in our press release. ... In line with current legislative requirements, the Demonstration CCS unit will treat 400MWe of the 1852MWe gross capacity of the proposed power station from start up.*” In fact the 25% figure was not mentioned in the press release

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<sup>36</sup> See <http://www.scotland.gov.uk/Resource/Doc/917/0095764.doc>

<sup>37</sup> Power firm accused of 'greenwashing' on 'pathetic' claims, Scotsman, 5/6/10, <http://thescotsman.scotsman.com/news/Power-firm-accused-of-.6342819.jp>

and even ignoring the technical inaccuracy of using the quoted figures, they would still only come to 22%. The analysis carried out for us by Element Energy arrives at the figure of ca. 17%. The company have made a public assertion of 25% capture that they cannot in any way substantiate.

- On page 21 of the Planning Policy Statement, it states that: “*The Climate Change Act puts in place legislative powers required to address climate change in the UK. It sets targets for the reduction of carbon dioxide emissions in the UK, through domestic and international action, of a 26 percent reduction by 2020 and 60 percent by 2050 (based on 1990 levels)*”. This is incorrect. The UK Climate Change Act states that “*It is the duty of the Secretary of State to ensure that the net UK carbon account for the year 2050 is at least 80% lower than the 1990 baseline.*”<sup>38</sup> and the Climate Change (Scotland) Act 2009, which is not even mentioned specifies targets of at least 42% reductions by 2020 and at least 80% by 2050<sup>39</sup>.
- The applicant’s Planning Policy Statement in reviewing energy and climate change policy fails completely to mention the EU’s climate and energy package of measures which came out of Europe in 2008.
- Page 32 of the Planning Policy Statement submitted with the application states that Scottish Power’s coal plant at Longannet in Scotland is opted out of the Large Combustion Plant Directive and will therefore close by end of 2015. This is incorrect Longannet has not opted out of the LCPD.
- Page 6 of the Waste Heat study states that “...capturing 317MWe of CO<sub>2</sub> from the power station will require 99MWe of electrical power.” Elsewhere in the supporting documents it is stated that the size of the carbon capture unit proposed for Hunterston is 327Mwe<sup>40</sup>.
- In the CO<sub>2</sub> report it states the CO<sub>2</sub> intensity of the UK power sector today as 560KgCO<sub>2</sub>/kWh rather than 560g.
- In the EIA table 4.5 it says there will be a maximum of 35-40 ships a year to bring the coal in and 40 for the biomass. In section 4.6.15 it says up to 75 extra shipping movements for the coal. And in 4.6.26 it says 40 shipping movements a year for the biomass. So for coal 40 ships a year is 80 shipping movements so 'up to 75' is wrong and for biomass 40 ships a year is 80 shipping movements not the 40 in 4.6.26. And of course there is no mention at all of the potential shipping movements that could result from the removal of CO<sub>2</sub> (if this was the transport mechanism opted for).
- Page 32 and 33 of the Planning Policy Statement submitted with this application refers to a British Energy submission from 2004 which is based on meeting a 40% renewable electricity target and states that the closure of Scotland’s existing nuclear and coal plant will lead to a supply gap in Scotland. This is an old reference and ignores the fact that the renewable electricity target for Scotland has now been increased to 50% by 2020, the impact of recession on demand for energy, and the plant which have been consented and begun construction since this date.

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38 [http://www.opsi.gov.uk/acts/acts2008/pdf/ukpga\\_20080027\\_en.pdf](http://www.opsi.gov.uk/acts/acts2008/pdf/ukpga_20080027_en.pdf)

39 [http://www.legislation.gov.uk/asp/2009/12/pdfs/asp\\_20090012\\_en.pdf](http://www.legislation.gov.uk/asp/2009/12/pdfs/asp_20090012_en.pdf)

40 E.g. pg 12 CCS Design Concept Report.

## Annex 2 – provisional analysis from Element Energy regarding CO<sub>2</sub> emissions and intensity from the proposed coal plant at Hunterston

WWF Scotland, together with Friends of the Earth Scotland and RSPB Scotland have commissioned Element Energy to undertake an independent high level brief analysis of the likely potential carbon intensity and CO<sub>2</sub> emissions from plants comparable to the proposed Hunterston coal plant under different levels of CCS, drawing on published estimates for coal/CCS plant performance. A selection of the provisional analysis (as interpreted by WWF) is presented here:

### Provisional assessment of CO<sub>2</sub> emissions from operating the proposed plant with demonstration scale CCS

There is an expectation (but no legal requirement) that CCS will be fitted to the full generating capacity of any new coal plant by 2025. However, between 2017 and the end of 2024 the proposed plant at Hunterston with only 327MW of CCS operating would still emit (according to provisional Element Energy analysis and based on eight years of operation at a load factor of 83%) **55.4-63.8MtCO<sub>2</sub><sup>41</sup>** capturing ca. 17% of its emissions. If this is compared to emissions from an equivalent new CCGT gas plant this would lead to higher net emissions from the power sector of between **21.8 and 30.2MtCO<sub>2</sub>**.

Even if it assumed that full scale CCS is fitted to the proposed Hunterston plant at the start of 2025, the net cumulative CO<sub>2</sub> emissions that are released to the atmosphere from the plant would still, according to Element Energy's provisional analysis, exceed those from a fully unabated gas plant until around 2034 (or a few years earlier depending on the level of biomass co-firing).

If such a station continued to operate with only 327MW of CCS capacity for the whole of its 40 year life, Element Energy estimate that it may emit a net **277-319MtCO<sub>2</sub>** into the atmosphere over this period. This would lead to a net increase in emissions from the power sector of between **109 and 151MtCO<sub>2</sub>** compared to emissions from an unabated CCGT<sup>42</sup>.

**Table 1: CO<sub>2</sub> emissions from new unabated CCGT compared to the proposed plant at Hunterston (with demonstration scale CCS and varying levels of biomass co-firing). Assumes an average load factor of 83%.**

	Annual net MtCO <sub>2</sub>	Cumulative MtCO <sub>2</sub> emissions for 40 years
Unabated new CCGT	4.2	168
Hunterston with only CCS demo for whole plant life	8.0	319
Hunterston with only CCS demo for whole plant life and 14% biomass** by energy	6.9	277
Hunterston with only CCS demo for whole plant life and 14% biomass** by weight	7.2	289

<sup>41</sup> Depending on the level of biomass co-firing.

<sup>42</sup> Clearly if renewable energy investments were made instead of new coal plant the CO<sub>2</sub> savings could be substantially greater (at 83% load factor, the lifetime emissions from the plant which over 40 years could amount to a total of 277-319 Mt CO<sub>2</sub>.)

\*\* Note - there is considerable uncertainty on life cycle CO<sub>2</sub> emissions for biomass. Use of specific values does not imply any endorsement by Element Energy or WWF.

If CCS is not fitted to the full generating capacity of the plant then only ca.17% of the lifetime CO<sub>2</sub> emissions may be captured leaving 83% pumped into the atmosphere. In the absence of any legally binding requirement for power plants to meet strict CO<sub>2</sub> emission limits now and in the 2020s, WWF consider this to be an all too plausible outcome<sup>43</sup>.

### **Assessment of the carbon intensity of the proposed plant with demonstration scale CCS**

Under a full load operating scenario the “*Analysis of CO<sub>2</sub> Emissions from Hunterston*” report by Eunomia (which accompanies APL’s application) states that the carbon intensity of the proposed Hunterston plant with demonstration scale CCS (at 327MW) would be **0.587kgCO<sub>2</sub>/kWh**. Table 3.2 on page 6 of this report appears to imply, by its absence, that this assessment does not take into account any co-firing with biomass. In contrast to this however, provisional analysis from Element Energy, which assumes a net output of 1700MW and a load factor of 83%, estimates that the carbon intensity of the plant with only demonstration CCS and zero biomass would deliver a carbon intensity of around **0.65kgCO<sub>2</sub>/kWh**. This is clearly significantly higher than the current average carbon intensity of the electricity grid which is around **0.54kgCO<sub>2</sub>/kWh** and far in excess of where the Committee on Climate Change suggest we need to be by 2020<sup>44</sup>.

With the inclusion of 14% biomass by weight Element Energy estimate that the carbon intensity of the plant running with 327MW capture may fall to **0.59kgCO<sub>2</sub>/kWh**<sup>45</sup>. However, it is only with the inclusion of 14% biomass by energy that the carbon intensity falls (to around **0.56kgCO<sub>2</sub>/kWh**) to approximately the current carbon intensity of the grid (but importantly still far higher than the carbon intensity of a new unabated CCGT which Element Energy assess as **0.32kgCO<sub>2</sub>/kWh**). Given that APL make no specific commitment to use this amount of biomass it is unrealistic to assume that the plant would operate at this carbon intensity for a significant proportion of the time.

### **Conclusions**

The proposed power station with only demonstration CCS would operate with a carbon intensity far greater than that of (i) the current average carbon intensity of the electricity grid, (ii) the carbon intensity of an equivalent new unabated CCGT, and (iii) the carbon intensity suggested by the UK Committee on Climate Change for 2020, which would be required in order to meet our ambitions to decarbonise electricity generation.

Hunterston as it is currently proposed could result in a net increase of CO<sub>2</sub> emissions from the power sector over its life of 319 MtCO<sub>2</sub>. This is equivalent to more than five times Scotland’s total greenhouse gas emissions in 2007<sup>46</sup>.

Increasing the use of biomass could marginally improve emissions from the plant but only if the feedstocks used are either wastes or from forestry or energy crops that are sustainably grown.

<sup>43</sup> [http://assets.wwf.org.uk/downloads/joint\\_public\\_ccs\\_statement\\_june\\_09.pdf](http://assets.wwf.org.uk/downloads/joint_public_ccs_statement_june_09.pdf)

<sup>44</sup> “Emissions from the power sector need to be reduced by 50% by 2020, which will require the carbon-intensity of the electricity we use to fall from 540gCO<sub>2</sub>/kWh today to less than 300gCO<sub>2</sub>/kWh in 2020” CCC, <http://www.theccc.org.uk/sectors/power>

<sup>45</sup> This assumes a constant net efficiency of 39.5% and the Biomass Energy Centre’s assumption of 15kgCO<sub>2</sub>/MWh for life cycle emissions for wood pellets. However, please note that there is considerable uncertainty on life cycle CO<sub>2</sub> emissions for biomass. For example the Environment Agency analysis suggests they should be about 3-4 times higher than this figure:

[http://www.environment-agency.gov.uk/static/documents/Leisure/Biomass\\_carbon\\_sink\\_or\\_carbon\\_sinner\\_summary\\_report.pdf](http://www.environment-agency.gov.uk/static/documents/Leisure/Biomass_carbon_sink_or_carbon_sinner_summary_report.pdf)

<sup>46</sup> <http://www.scotland.gov.uk/Publications/2009/09/07145629/1>

However, even with very significant biomass use, Hunterston would still result in a massive increase in greenhouse gas emissions.

Please note that the final summary report will be provided in due course.