

## **Executive Summary**

This positioning paper was jointly drafted by the participants of the SiteChar Focus Conference held in the Moray area of Scotland in spring 2012. The conference was organised to gather the opinions of members of the Moray public towards the development of carbon dioxide capture and storage (CCS). The conference was held over two weekends, and was attended in its entirety by eleven members of the public.

Over the two weekends the participants were presented with a detailed description of climate change and CCS by speakers from the Scottish Government, industry and academia. A range of stances towards CCS emerged within the group as discussions unfolded. This report attempts to encompass all of these viewpoints and allows them to sit alongside one another.

One of the key things to note is that all the participants agreed that something must be done to reduce carbon emissions and curb climate change, and that doing nothing is not an option. However, at the end of the process, the participants expressed a range of views on CCS. Some participants concluded that CCS should be one of a suite of options that could help to achieve carbon reduction, whereas others were opposed to the development of the technology. Still other participants indicated that they wished to reserve judgment until more detailed information was available.

The main reasons for supporting CCS were the potential for climate change mitigation and the potential boost for Scottish jobs and the economy. The main concerns with CCS were that it could divert attention from renewable energy technologies, and energy efficiency measures, which were viewed as the preferred long-term solutions. There was also concern within the group about the potential unknown risks of CCS.

The timescales involved with developing CCS were considered by the group. There was concern that if CCS is considered to be a viable solution for meeting climate change targets, then it must be developed faster to ensure that the targets are met. The group argued that it is crucial to remember that CCS is a short-term option that would buy us breathing space while other more permanent low-carbon solutions are explored. There was also active interest amongst the group in other potential uses of carbon dioxide aside from geological storage. Potential applications in the chemical, construction, and agricultural industries were all explored.

Risks regarding CCS were conceptualised by the group in a number of different ways including: geological; health; economic; safety; environmental; and socio-political risks, as well as the psychological impact of risk information itself. Due to the number of questions raised and uncertainties acknowledged, some participants found the amount of yet unknown risks to be too great in order to support CCS.

Perceptions within the group also varied as to whether CCS was a good thing for Scotland. There was an acknowledgment of the economic benefits of the technology and of the opportunity for Scotland to become a world leader in the field. At the same time, however, questions were also asked of whether CCS was simply being developed as it is a politically attractive solution, one that could deliver on short-term targets.

The group agreed that it was important for governments and policy makers to fully involve the public in climate change mitigation decisions and actions, and to take seriously the views of the public. In order to do this, it is suggested that public consultation begins early, and that the public are provided with information that they can trust. As for the role of world governments, institutions and organisations in changing behaviour, the sharing of knowledge and experience is vital. Where CCS research, development and demonstration is being wholly or mostly publicly-funded, then there should be an obligation for the findings and information obtained to be made available in the public domain. At the minimum, the public should be consulted about whether they would like such information to be shared and how.

On the final day of the process, the eleven participants voted on their stance at that moment towards CCS. The results of this vote were as follows:

Actually, on balance, we:

Want CCS along with other measures: 5

Don't want CCS but prefer other measures: 2

Are undecided as to whether we want CCS: 3

Abstention: 1

## Introduction

This positioning paper summarises the discussions, perceptions and findings of the Focus Conference conducted in Moray, Scotland for the SiteChar research project. The intended outcome of the Focus Conference process was that the participants (11 members of the public) together would produce a positioning paper on carbon dioxide capture and storage (CCS).<sup>i</sup> The positioning paper reflects the group's views on the technology in light of the information received during the conference from CCS experts, and the discussions held with the experts and each other. The participants did not need to reach agreement on all issues, different viewpoints are acknowledged alongside one another in the paper. The report writing process is described in detail in the Appendix.

The Focus Conference was convened as part of Task 8.2 for the European Union-funded SiteChar project – a parallel Focus Conference was held at the same time in Poland. What SiteChar aims to do is to characterise sites that are potentially suitable for the geological storage of carbon dioxide (CO<sub>2</sub>). This characterisation involves looking at the geological, infrastructural, legal and social characteristics of sites that are possibly suitable for the geological storage of CO<sub>2</sub>. Whilst there are at present no actual plans for storage in the geological structures under the inner Moray Firth, the area's geology has been identified as being potentially suitable for CO<sub>2</sub> storage.

The Focus Conference took place in local hotels on two weekends (30-31 March and 22-22 April 2012). Over the two weekends the participants received information on CCS, which encompassed a general overview of CCS technology, the economic aspects of CCS, information on the policy elements of CCS in Scotland, and a detailed look at one developer's particular role in CCS. Participants had the chance to ask the expert presenters questions, and to discuss the information they received among themselves.

The positioning paper takes the form of seven questions which were formulated by the conference participants. The group believes that these questions encapsulate all of our ideas, opinions and concerns in relation to CCS.

1. How convinced are we that CCS is worth pursuing in order to meet carbon reduction targets and stay within 2 degrees warming?
2. If CCS is a solution – is it developing fast enough, and how can we make it work in time?
3. Is CCS the only solution to meeting the carbon reduction targets?
4. What are the risks? Are these risks acceptable? What about the risks we don't yet know? Are we being told all the risks?
5. Is it good for Scotland? What is the *real* motivation? (jobs, skills, economy, carbon reduction, international profile etc.) Is it good for the rest of the world? Is it viable in the rest of the world?
6. How do we ensure the public are involved in climate change mitigation decisions and actions? Is public opinion really acted on? How do we ensure representatives of civil society organisations are involved in a positive manner?
7. What about the roles of world governments / institutions / organisations in changing behaviour? Is there the will to share knowledge and experience?

## Background context to the Focus Conference

It has been envisaged that CCS demonstration projects would be in place by around 2015, with lead rollout around 2020 and global deployment around 2025 (see figure 1). It is important to note, however, that technical, political and social challenges – not to mention a tough economic climate – mean these targets are unlikely to be met.

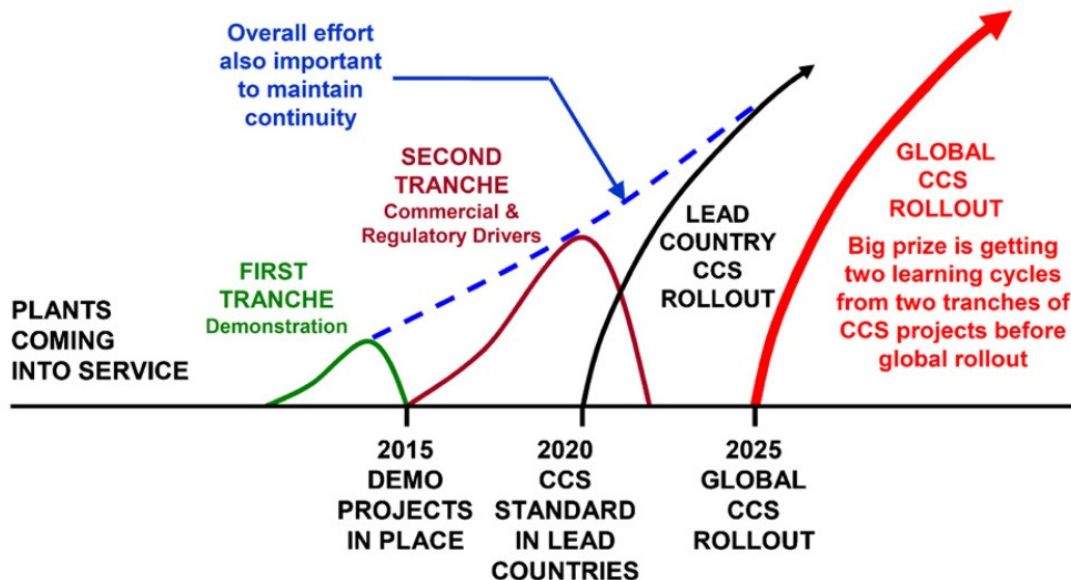


Figure 1: Timeline for anticipated CCS rollout (Source: Gibbins and Chalmers, 2008).<sup>ii</sup>

This timeline, and indeed the timelines for all forms of low-carbon energy, relate to the targets set by governments in order to avoid catastrophic climate change. For instance, the 2009 Copenhagen Accord agrees on the goal of limiting warming to two degrees Celsius globally, and it is widely acknowledged that deep cuts in anthropogenic CO<sub>2</sub> emissions will be required to achieve this. Scotland has set itself the target of a 42% reduction in greenhouse gas emissions by 2020 (relative to 1990 levels), and also that of producing 80% of its required energy from renewable sources by 2020.

### Box 1: A Short History of Social Science Research on CCS

Social science research on CCS has been going on for nearly ten years now, starting with early studies into the general potential of the technology carried out by the Tyndall Centre in Manchester. As the technology develops and demonstration projects get nearer to rolling out, more social science work has been done. This has taken several forms including surveys and questionnaires (for instance in Holland and Japan), interviews with developers (Italy, UK), and discussion groups among members of the public (Australia, USA).

As CCS is still at an early stage, however, it is important to note that there is only a relatively small amount of work that deals with people's perceptions of actual CCS projects. Nevertheless, with projects such as Barendrecht in the Netherlands demonstrating the power of public opposition to stall or stop CCS, awareness of the importance of effective public consultation is starting to spread beyond the academic social science community. (The Barendrecht case refers to a large-scale CCS demonstration project that was proposed by Shell in 2006 with the support of the Dutch Government. The CO<sub>2</sub> was to be stored more than 1.7 km below the town of Barendrecht. The project was cancelled in late 2010, in large part because of public opposition (see Hammond & Shackley, 2010).

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## **1. How convinced are we that CCS is worth pursuing in order to meet carbon reduction targets and stay within 2°C of warming?**

All of the participants agreed that we must do something to address the current situation of climate change being brought about by excessive levels of atmospheric CO<sub>2</sub>. All participants agreed that doing nothing is not an option.

Positive factors raised for going ahead with CCS included: it can in a relatively short time, show significant progress towards achieving our carbon reduction targets; in Scotland there is an oil and gas infrastructure already in place that could be used for CCS; it could create jobs as well as income at a time where other energy industries may be coming to an end in Scotland; Scotland could take a lead in the CCS industry and be an example to other larger carbon emitters; we would be doing something to help the global challenge of CO<sub>2</sub> emissions.

Nevertheless, a number of concerns and questions were raised regarding CCS: is it tried and tested enough? (scientific studies appear convincing but there are still major uncertainties which as we speak are being researched regarding the effect on human/marine life); globally, can it be rolled out in time?; it could divert from investment in renewables; it would maintain the status quo of high energy usage/wastage; even if a time limit for CCS were put in place (whilst other sources/projects are developed) the Government would have little/no power to stop private industry from continuing with CCS once it begins; and CCS seems to be incompatible with permaculture principles.<sup>iii</sup>

Among those participants convinced of the use of CCS, it was agreed that it should only be undertaken as part of a package of measures and be time-limited. The group wished to see more investment in re-utilisation of CO<sub>2</sub> as opposed to CO<sub>2</sub> storage, as well as in renewable energies. Some concern was expressed that the Scottish Government have been seduced by the 'quick fix' option that CCS promises.

Looking at the bigger picture, this 'crisis' could be seen as an opportunity to invest in creative solutions for the benefit of the human race and the planet as a whole. Questions need to be addressed as to how to encourage, motivate or force the change which needs to happen on a micro and macro level.

## **2. If CCS is a solution – is it developing fast enough, and how can we make it work in time?**

To answer this question we must firstly assume that we agree with the statement that we believe CCS to be a solution. This is not the case for all members of the group.

Having said that, it is clear that the process of CCS has already started at different speeds in different parts of the world. For example, Norway has been capturing and storing carbon under the North Sea since 1996.

It seems apparent that by utilising and developing the existing infrastructure within Scotland it would be possible to successfully meet the Scottish carbon reduction targets, but the group wishes to stress that the development of CCS must also be ‘fast enough’ globally to make it worthwhile to undertake, i.e. not just to be developed and implemented within Scotland.

It is also important to stress that ‘fast enough’ does not necessarily mean ‘as fast as possible’ or ‘at all costs’. We believe that whatever happens with CCS technology that it should be developed on a parallel track basis with the development of other renewable technologies which will more effectively address the underlying core issue of CO<sub>2</sub> emission reduction in the first place.

In line with this parallel track approach we believe it important that an exit strategy should be developed at the outset within Scotland to address how to scale down and then ultimately exit the CCS industry completely at a later point in the future.

In the short to medium term, the group considers that the following action points will encourage the significant levels of investment required to develop and implement CCS technology within Scotland in a timely and effective manner.

### *Recommendations:*

1. A higher price for carbon under the EU Emissions Trading Scheme from its current level of c. £7/tonne to £70/tonne.
2. We encourage the additional introduction of a carbon levy across the economy.
3. The use of ‘Contract for Difference’ type contracts where the Government guarantees an income to the Energy company who is producing the carbon to incentivise them to capture and store the carbon, thereby developing a critical mass in this area, or where the government pays the difference between least cost production and the cost for CCS.
4. The use of grant aid which can already be evidenced by the recent re-launch by the UK Government of the £1 Billion CCS competition.

In addition to these specific action points, and in line with the parallel track approach outlined above, the group also believes that some sort of levy should be made on energy companies to be used to contribute towards the ongoing development of renewable energy technologies, together with other means of carbon recycling.

In summary therefore it appears that the development of CCS technology could help to provide a fairly lengthy 'breathing space' i.e. at current levels of CO<sub>2</sub> emissions CCS could provide up to 100 years of CO<sub>2</sub> storage capacity in the North Sea for the 27 EU member states (Gilfillan, 2012). However in geological and planetary terms this is not that long a time period and the group feels that it is essential to continue to highlight from the outset that CCS is only one short-term strand within what will need to be an overall global strategy for dealing with climate change issues.

### **3. Is CCS the only solution to meeting the carbon reduction targets?**

CCS should not be viewed as the only solution, but could be one solution that can, in a relatively short time, show significant progress towards achieving our carbon reduction targets and staying within 2°C warming.

If we are to undertake a holistic solution then this must also include increased efficiency in both production and consumption of energy and a greater contribution from the emerging renewable energy sources, e.g. wind, solar, wave, hydrogen fuel cells.

A greater understanding of the global impacts of our current lifestyle must also be developed within the general population, therefore education, from an early age, should be viewed as a useful tool for change in the context of reducing the amount of CO<sub>2</sub> emitted in the first place.

By accepting that CO<sub>2</sub> is released by the burning of fossil fuels it follows that we must also consider ways in which we can trap some of what has already been released through garden/woodland/forest planting schemes worldwide.

If we are to attempt to solve this most significant problem before global warming exceeds a safe level (2°C) then the group believe that CCS alone cannot achieve this. However, if we undertake CCS in association with greater efficiency in current energy production methods, alternative means of transportation i.e. electric/hydrogen vehicles, increased renewable energies, changes in lifestyle, controls over acceptable construction methods i.e. magnesium based concrete, better education, and an increase in global arboriculture we can expect a greater impact.

#### **3.1. What can be done with CO<sub>2</sub> that demonstrates a significant climate mitigation impact other than storage?**

It is very hard to define what 'significant' means in the context of emerging technologies. Although CCS may be considered as a primary contributor to both achieving the Government's carbon reduction targets and thus helping to combat global warming, it may be foolish to believe that this technology alone can address this most important of issues.

Across the world there is a lot of interest in addressing the problem by means other than simply burying it under the ground or sea. One common strand that runs through many



of these schemes appears to be that the developer of the technology, through a simple change of paradigm, views CO<sub>2</sub> not as a 'problem' or pollutant, but as raw material and as such, of value. Perhaps this is not an issue of removal but of recycle.

*Recommendations:*

1. Develop an education curriculum related to CO<sub>2</sub> awareness for integration into main stream education.
2. Secure significant funding to ensure continued research, development and innovation in low and zero CO<sub>2</sub> energy production technologies.
3. Incentivise the continued development and usage of renewable forms of energy.
4. Continue to develop technologies related to the usage/conversion of CO<sub>2</sub> into source materials i.e. fuel, chemicals, pharmaceuticals, building materials.
5. Promote CO<sub>2</sub> capture through land management/arboriculture schemes.
6. Investment in small scale CO<sub>2</sub> reduction/usage projects and technologies.
7. Include on all packaging an estimate of carbon emissions to point of initial sale within the UK.

**Box 2: A summary of potential alternative uses for CO<sub>2</sub>**

***Chemical industry***

The global chemical industry currently uses about 115 - 120 million tons of CO<sub>2</sub> each year as a raw material to manufacture other chemicals and products ranging from Aspirin through to fertilisers.

Although a significant increase in usage for this purpose may be viewed as slight against a global CO<sub>2</sub> emission total of an estimated 30 billion tons annually, any technology utilising CO<sub>2</sub> must receive serious consideration.

***Construction industries – contribute about 10% world CO<sub>2</sub> emissions***

Currently the building industries contribute around 10% of the world's annual CO<sub>2</sub> production (6 billion tonnes). Most of this is as a result of the production of cheap cement based concretes to be used in roads and buildings.

If we were to change the chemical composition of the concrete and use magnesium instead of Portland cement, then this simple act would not only reduce significantly the level of CO<sub>2</sub> production in manufacturing but also continue to leach CO<sub>2</sub> out of the atmosphere locking it into the concrete for many thousand of years.

For every ton of cement made we would be sequestering half a ton of CO<sub>2</sub>.

Most power stations burn coal, oil or natural gas to produce the heat necessary to generate electricity releasing both the CO<sub>2</sub> and surplus heat to the atmosphere. If these gases were passed through seawater then it is possible to use up to 90% of the extracted CO<sub>2</sub> in the production of cement.

By incentivising this process it may encourage this 'second stage' of the energy process to be developed thus reducing global CO<sub>2</sub> production levels by 6bn tonnes per year.

One company, Calera, has set up a pilot plant at Moss Landing because California is soon to adopt regulations limiting the amount of CO<sub>2</sub> power plants and other sources can emit, and natural gas is the primary fuel of power plants in that state. According to a Calera company representative Constantz, some flue gas is already running through the company's process. "We are using emissions from gas-fired generation as our CO<sub>2</sub> source at the pilot plant where we are making up to 10 tons a day," he says. "That material will be used for evaluations" said Constantz

<http://www.scientificamerican.com/article.cfm?id=cement-from-carbon-dioxide>

### ***Plastics from CO<sub>2</sub>***

Although still in early stages of development we understand one promising process being developed in the United States involves making polycarbonate plastics that contain up to 50 percent CO<sub>2</sub> by weight. In a world that relies so heavily of the usage of plastics in almost every walk of life, this could represent a technology worthy of major investment.

### ***Producing fuel from CO<sub>2</sub>***

This can be done by extracting CO<sub>2</sub> from seawater, then combining it with hydrogen over a catalyst to produce ethanol, methanol, butanol and even ethylene. If further processing can result in biodiesel and petrol then it is fair to believe that as the demand for transportation increases so too will the usage of CO<sub>2</sub>.

<http://video.google.com/videoplay?docid=-8408267073497670096#docid=6979512017110280792>

### ***Reverse combustion***

A Princeton University lab of chemists is developing a process where CO<sub>2</sub> interacts with the charged metal plates and with the help of a catalyst, begins to form bigger molecules that combine carbon, hydrogen, and oxygen atoms otherwise known as hydrocarbons. These are the molecules that make up the fuels that power the modern world — coal, natural gas and oil all fuels suitable for burning and thus generating energy.

[http://e360.yale.edu/feature/using\\_co2\\_to\\_make\\_fuel\\_a\\_long\\_shot\\_for\\_green\\_energy/2405/](http://e360.yale.edu/feature/using_co2_to_make_fuel_a_long_shot_for_green_energy/2405/)

### ***Agricultural benefits***

It has long been known that increased CO<sub>2</sub> levels in greenhouses promotes higher growth levels in plants and flowers even where growing conditions are not perfect. As human needs for food continue to grow it would be fair to expect that this technology may be viewed as essential in feeding both people and animals alike.

This content of this box has been researched and developed by Paul Johnson, one of the members of the group.

#### **4: What are the risks? Are these risks acceptable? What about the risks we don't yet know? Are we being told all the risks?**

Risks regarding CCS were conceptualised by the group in a number of different ways including: geological; health; economic; safety; environmental; and socio-political; as well as the nature of risk information itself.

Much discussion within the group concerned the unknown, and hence seemed to raise more questions than answers. For example, in terms of potential corrosion of pipelines and a sudden eruption of CO<sub>2</sub>, what area would be affected? What would happen if there were to be an eruption from a pipeline in a densely-populated area? What risks are associated with the gasification, liquefaction, transportation and storage of CO<sub>2</sub>? What are the risks associated with the chemical transformation of the rock injected? Has anyone undertaken a projection of a worst-case scenario? How much CO<sub>2</sub> would escape? What would the risks be? Has the risk of a terrorist threat to aspects of the CCS process been considered? How much does it cost to control or manage these risks? Alongside these questions was the recognition that research being undertaken into some of the effects of CCS on the seabed (QICS project at Oban<sup>iv</sup>) were yet to be published.

Due to the number of questions raised and uncertainties acknowledged, some participants found the amount of yet unknown risks to be too great in order to support CCS. According to the permaculture principle of looking at the effects of an activity seven generations down the line, CCS may not be a sustainable option if we, as a species, were to create an industry with such significant impact that our future generations may not have the technical capability to cope with it.

Essentially CCS is going against nature rather than working with it, so the potential of unknown risks could be immense. There are assumptions that the risks are low and that the CO<sub>2</sub> is inert. Thus far, industry liability has been spoken about in terms of thirty years post last injection to a site (with liability transferring to government, and therefore the public purse, thereafter). However, this figure of thirty years, whilst commonplace in business planning, is insignificant in geological terms, and in terms of the amount of time for significant chemical and structural changes to become apparent.

Specific known safety risks of concern related to the increased use of coal and water in the various CCS processes were summarised as 'side-effect' risks. For example, the known safety risks associated with coal mining were only going to increase since more coal would be needed to create the same amount of energy at coal-fuelled power stations with CCS in place. There was also the associated risk of encouraging more coal production and water use when we are already aware that these resources are diminishing.

Risks considered at a more macro level included the risk of CCS becoming an end in itself; rather than the currently envisaged 'stop gap' to help reduce our carbon emissions. The group recognised that once the industry becomes established it would be difficult to stop it. The risk of its continuation may well be levelled with counter claims

of the risk of losing jobs within the CCS industry, or destroying communities built around such employment. In such a scenario CCS contributes to society being 'locked in' to a dependency on fossil fuels and the associated industry of CCS processes.

Akin to this risk of CCS becoming permanent is the risk of associated complacency. If CCS becomes part of the status quo then there is a risk that society stops looking for alternatives, or at least reduces the importance placed on finding more sustainable options as quickly as possible – not least of which is the need to reduce our reliance on fossil fuels and energy.

The group also recognised that the perspective of risk is likely to be different depending on the vested interests of the individual, organisation, or industry involved. For example, some may advocate an 'acceptable' rate of leakage of CO<sub>2</sub> into the sea. For others, any rate of leakage (over time) would negate the proposed benefits of CCS. Some risks associated with leakage - accidental or deliberate – (such as the creation of an acidic environment) in conjunction with other occurrences (such as freak meteorological conditions) might seem so low that they are not worth planning for. However, 'perfect storms' do occur, as was seen with the unlikely combination of risk factors at Fukushima in Japan.

Beyond the micro and macro risks outlined, primarily of a physical, sociopolitical or fiscal nature, there was also mention of the psychological risks associated with burying CO<sub>2</sub>, or metaphorically 'sweeping it under the carpet'. How much damage are we doing to ourselves by internalising the knowledge that we are hiding CO<sub>2</sub> out of view? In the same way that buried personal emotional issues tend to resurface with upset (until acknowledged, processed and resolved); so burying rather than dealing with the cause of excessive CO<sub>2</sub> may be damaging to our collective psychological wellbeing. How this sort of risk might be assessed would be a question perhaps not usually encountered by the Health and Safety Executive or other agencies.

*Recommendation:*

1. Complete a wide-ranging and thorough risk analysis to evaluate what possible eventualities are high- and low-risk and from this compile a comprehensive disaster management plan.

**5. Is it good for Scotland? What is the *real* motivation? (jobs, skills, economy, carbon reduction, international profile etc.) Is it good for the rest of the world? Is it viable in the rest of the world?**

As previously stated in this report, group perceptions varied as to whether or not CCS is a good thing for Scotland or indeed good *per se*. In terms of why CCS might be good for Scotland, the group identified several arguments. One clear advantage is the potential for economic benefits and job creation. Another benefit could be the potential to draw on existing academic and industrial expertise in Scotland, especially from the oil and gas industry. This could give Scotland the opportunity to export CCS to other countries, for example by exporting technology, consultants and experts, or helping to build power plants, pipelines and storage capacity.

A similar parallel might be seen in the case of Scotland (in particular Aberdeen) with the oil and gas industry. Whilst the oil and gas industry was originally run out of Houston in the USA, Aberdeen now transfers skills and ideas back out as a result of the North Sea oil boom. As the oil and gas industry declines, there is perhaps a chance for Scotland to follow the same path with CCS. If CCS passes the safety case, Scotland could itself also be a major storer of CO<sub>2</sub>, with profits to come from importing and storing CO<sub>2</sub>. Finally, there is the possibility for CCS to put Scotland 'on the map' or even act as a source of pride. It could raise the profile of Scotland as a CCS leader within the UK.

The group also questioned, however, what the *real* motivation for doing CCS might be. It could be seen as a seductive solution, one that appeals to politicians as it can help to achieve Scotland's targets for carbon emission reductions, provide jobs and opportunities and make the country a world leader in the field. There is also the possibility that CCS could be seen as a 'quick fix' that allows for emission reductions without a change in mindset, however this is perhaps too much of an over-simplification. Given that storage in Scotland is planned to be offshore, there might also be the idea that there would be less public opposition due to the offshore nature of the storage (as opposed to onshore storage in, say, the Netherlands and Germany which has been met with fierce public opposition). Above all, CCS could be seen as a 'vote winner', in that it may be perceived as 'ticking the boxes' of job creation, energy security and allowing living standards to be maintained.

To return to the question of whether CCS is a good thing for Scotland, it is also important to think about why CCS might *not* be a good thing for Scotland. A number of group members felt that they just do not know whether CCS will be a good thing or not, as the assessment of the risks associated with CCS is an ongoing process that still needs to be carried out fully.

If CCS were to reduce the motivation to become more energy efficient, this could be a bad thing for Scotland. In terms of infrastructure, there is concern that CCS could leave a legacy similar to the legacy left in many cities and countries by the Olympic Games. That is, a legacy of debt, unused facilities and unnecessary or useless infrastructure. The group also had some concerns about whether the institutions and organisations behind CCS will really be good for Scotland – there is not enough public engagement,

so industry is at the foreground of CCS discussions. The group believed that there will naturally be vested interests (for example industry) involved in the CCS process.

Lastly, there is some concern over who owns the water and land in which CO<sub>2</sub> will be stored. Offshore waters are owned by the Crown Estate, not Scotland, an issue that would be further complicated if Scotland were to gain independence from the rest of the UK in 2014. The concern here is that profit would flow to the Crown Estate and not Scotland, leaving Scotland as a dumping ground for the rest of Europe's CO<sub>2</sub> without any financial reward. It must be remembered, however, that there could still be significant economic benefit from the people and industries working onshore in Scotland, regardless of the offshore seabed ownership situation.

Outside of Scotland, is CCS good for the rest of the world? First and foremost, if CCS reduces Scotland's CO<sub>2</sub> emissions then this means that global CO<sub>2</sub> emissions are reduced. There is also the possibility that the export of CCS technology from Scotland to other countries could allow their low-carbon energy to take off – the end result being that global climate change is mitigated. The majority of the group believed that the world needs CCS as part of a range of options to mitigate climate change, however in this is the proviso that CCS does not stall people's pro-environmental behaviours. In other words, we need to make sure that emitting and storing CO<sub>2</sub> does not stop people from taking actions to reduce their environmental impact in the first place.

Finally, there is the chance that carbon storage in the geologically suitable areas under Scotland's seas could benefit the whole world. There are other countries that have their own high-carbon industries but are in unsuitable geological areas. These nations still have their own CO<sub>2</sub> problems and targets to meet, so again if Scotland could store the CO<sub>2</sub> of other nations there is the potential for the global CO<sub>2</sub> level to be managed.

It is worth noting here that although the group received a lot of information on the role of CCS at the global level and at the Scottish level, we have not really spoken about whether or not CCS is a good thing for the Moray area. Given that the Moray area has suitable geology for carbon storage, and thus that there is the possibility for CCS to be happening here, it would be essential for a CCS project to be discussed at the local level.

**6. How do we ensure the public are involved in climate change mitigation decisions and actions? Is public opinion really acted on? How do we ensure representatives of civil society organisations are involved in a positive manner?**

We believe that it is important for governments and policy makers to fully involve the public in climate change mitigation decisions and actions, and to take seriously the views of the public. This is important because the effects of climate change will be felt by everybody, and therefore as previously stated it is imperative that we take action to mitigate climate change. In addition, the policies and mechanisms that are implemented to reduce carbon emissions will affect us all. Every one of us needs to be involved in this collective change in order to make it happen.

In order to meaningfully involve the public in decision making, we believe that public consultation should happen early in the planning process. This will give the public the chance to help develop policy, rather than simply consider existing plans. This consultation should be genuine, in that the results are listened to and considered. There should also be a feedback mechanism so that the public can see how the results of the consultation have been incorporated into the decision making process. We recommend that readers of this positioning paper provide feedback to the project team and the group, through the contact details at the end of the report.

The public are often cynical of the planning process as there is a lack of trust in the decision-making system and the information that they are provided with. In order to overcome this, the public needs to be able to believe the information that they are provided with, and to trust that this information is provided in good faith. One way to address this could be information provision from a variety of sources, e.g. government, non-governmental organisations, charitable trusts, international organisations, etc. This is a two-way process and policy makers need to respect the public, listen to their opinions, and trust that they are provided in good faith.

There are new technologies in development now that will not be available for several years, such as some of the novel use of CO<sub>2</sub> technologies mentioned above. Consultation on the use of these technologies should begin now, and not when it comes time to deploying them.

In order to engage the public and get them interested in the consultation process it is necessary to make the issue relevant and personal to the public, as the public will often only take an interest in an issue when it becomes personal to them. There must also be more opportunities for the public to engage in the debate.

In order to raise awareness of the issue we would welcome a series of advertising campaigns highlighting the issue and encouraging us all to get involved. These campaigns could build on the success of previous campaigns that have increased recycling. We would also welcome storylines in well known national soap operas that deal with climate change, CCS, and public consultation on these issues. It is also important to get school children involved in the discussion.

We think that there is a very delicate balance to be struck between civil freedom and a 'nanny state'. On the whole we would welcome more legislation from government to outlaw environmentally-damaging behaviours, such as using incandescent light bulbs; in the same way that legislation previously outlawed unsafe behaviour such as driving without seatbelts. However, we are also cautious of government imposing itself upon the public. Consultation is key to striking this balance appropriately.

We further recognise that there is a balance between policy makers pulling an unenthusiastic public forward towards a low carbon future, and the public pushing a traditional establishment away from the status quo and into a different future. Again consultation is central to this balance.

One possibility for ensuring as wide a range of perspectives as possible are drawn in to the discussion could be something similar to the focus conference. This could involve different sections of the public, decision makers, civil society representatives and those coming from a more spiritual angle. Key in this would be to share viewpoints and make sure different stakeholders are aware of the ideas of others.

*Recommendations:*

1. Organise a Focus Conference which brings together Government, NGOs, civil society, spiritual organisations etc. to share and hear each other.
2. A series of advertising campaigns aimed at engaging the public on climate change and encouraging carbon mitigation activities and behaviour.

**7. What about the roles of world governments/ institutions/ organisations in changing behaviour? Is there the will to share knowledge and experience?**

If we pursue CCS, will it be embraced worldwide? The group cannot answer this question but the intention is that it should be.

The group believes that the EU holds an overview beyond ordinary party and national politics and needs to step up as a good example of how to listen to different groups' perspectives, and how to provide high quality, 'neutral' information. We felt that it is important for the EU (including the Commission, Parliament, etc.) to be collecting and monitoring public opinion on CCS but also on other carbon reduction technologies through focus groups, public forums, etc. in order to inform policy decisions. One instrument that could be used for this purpose is the EuroBarometer survey<sup>v</sup>, though we did not agree on the 'appropriate factors' which needed to be measured consistently throughout the EU. Since we do not believe that the problem of climate change and carbon reduction can be solved by technologies such as CCS alone, and that wider social change is required for this purpose, we recommend that each member state set targets for investment into social research on behavioural change. Public behaviour needs to change significantly before climate change becomes irreversible.



The current interest in public consultation and engagement appears to stem from the failures of the proposed CCS demonstration project at Barendrecht in the Netherlands several years ago. The EU and member state governments seem now to be recognising, rather late in the day, the need to listen to and engage with the public. It came as a surprise to many of us that the Scottish Government developed a CCS Roadmap three years ago, but apparently with no public consultation or discussion. What with the Government's plans and priorities, this gives the impression that CCS in Scotland is a *fait accompli*, in which case what is the purpose of public engagement – just to rubber-stamp the existing strategy?

We recommend that, in the future, public engagement needs to be built-in to CCS project development from the start – and not just CCS but also other low carbon technologies. In tandem to this, a proactive strategy to disseminating information to the public and stakeholders needs to be developed.

A related issue is the sharing of knowledge and experience. This appears to occur only where the research is publicly-funded, and not when privately-funded. Intellectual property rights and the commercially sensitive know-how of companies appear to limit the sharing of information on CCS that is being funded by companies. We feel that where CCS research, development and demonstration is being wholly or mostly publicly-funded, then there should be an obligation for the findings and information obtained to be made available in the public domain. At the minimum, the public should be consulted about whether they would like such information to be shared and how.

A further role, identified by some participants, was for governments to ensure that funding is ring-fenced for continuing CCS research, development and demonstration. A key dimension of this is also effective project monitoring, review and evaluation. As part of its general role, Government also needs to review its climate change and carbon reduction targets in response to new information.

A specific role for the EU and its Member State Governments relates to the EU Emissions Trading Scheme (EU ETS). The initial phases of the EU ETS have been mired in politics with over-allocation of allowances and the recent collapse of the carbon price. This is counter to the overall objectives of the EU ETS to cap carbon emissions and provide strong incentives for carbon reduction through a high carbon price. The EU institutions now need to work to ensure that the EU ETS actually functions as it is supposed to.

Finally, there needs to be more emphasis on cooperation and sharing – information, standards, expertise, know-how, knowledge, information about major projects, etc. While there are some international bodies undertaking this already (e.g. Global CCS Institute) it is not obvious that they are entirely neutral and cooperating to the extent that is desirable.

#### *Recommendations:*

1. These types of consultative and deliberative processes should be continued as CCS and other low-carbon projects are further developed. Support should be

- given to further extend the public communication and dialogue to the wider community, e.g. help in setting up exhibitions, public talks, etc.
2. A joint meeting should be held with the Climate Change Committee of the Parliament involving members of the group and MSPs and officials.

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<sup>i</sup> The intention was to involve 16 people and an agency was employed to undertake the recruitment. Two people did not show up at the first weekend, resulting in 14 participants. After the first weekend, two of the first weekend participants chose not to attend the second weekend, as they found the meeting to be too technical and hard to follow. One further participant was unable to attend the second weekend due to unexpected personal circumstances. Hence, 11 participants took part in both weekends.

<sup>ii</sup> This figure was not shown to the participants on either of the Focus Conference weekends. In the absence of an appropriate graphic being readily available during the Focus Conference to illustrate a timeline for CCS rollout, one of the section writers (with full agreement from the other participants) requested that the organisers source a suitable diagram as part of the post-conference editing process. The group was given the chance to view and comment on this graphic when the document was e-mailed out for review.

<sup>iii</sup> See for example - [http://earth-ways.co.uk/?page\\_id=151](http://earth-ways.co.uk/?page_id=151)  
<http://www.permaculture.org.uk/knowledge-base/principles>

<sup>iv</sup> See <http://www.bgs.ac.uk/qics/home.html>

<sup>v</sup> [http://ec.europa.eu/public\\_opinion/index\\_en.htm](http://ec.europa.eu/public_opinion/index_en.htm)

### **Appendix: The Positioning Paper Writing Process**

In this appendix, we explain the process through which this positioning paper was written. The aim of the Focus Conference was that the participants would write the positioning paper and the Scottish event organisers had devised a methodology to facilitate this process. Following on from the presentations and discussions, the participants were tasked with developing a series of questions that covered all of their key concerns about CCS. These questions were then discussed by the group in turn with all of the points raised being recorded almost verbatim onto a PowerPoint slide. After discussion of each question, one volunteer went away to collate all of this information into a piece of text for the positioning paper. The job of the writer here was merely one of ordering the existing points and adding words to make the bullet points flow as a coherent set of text.

It was originally envisaged that a different participant would volunteer to write each of the various sections (or that some would write two), with no input at all from the facilitating team. However, this process was modified slightly in response to input from the participants themselves over the course of the Focus Conference.

After the first four questions had been written up (or were in the process of being written up), no volunteers were forthcoming to write up the remaining three sections. Attempts at gentle coercion from the facilitators failed to encourage any further participants to write, however the participants indicated they were keen for the sections that had not yet been written to remain in the report, even in the absence of further writers. It was thus suggested that three of the organisers each collate the information for one section and convert this from note to prose form. The group all agreed that this was an agreeable and effective solution.

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When this work of writing the text had been completed, the participants in plenary reviewed the collated text word for word, suggesting structural and grammatical changes along the way to ensure clarity of meaning. In a few instances, additional points came up during the plenary session and individual participants came up with an appropriate formulation to add to the existing text. This process continued until everyone was happy to accept the text.

In addition, the report also contains some material that was added by the facilitators at the request of the participants. The group asked the facilitators to write an introduction and executive summary for the report – the participants felt this would give the report a more comprehensive and professional feel, and suggested that the ‘overview’ the facilitators had of the whole process made them the most appropriate people to do this. During the third day of the second weekend, one of the facilitators thus drafted an introduction and executive summary to be placed as a preface to the positioning paper. This draft text was then reviewed by all participants during a plenary session, with the group discussing and agreeing on content and structural and grammatical changes. Again, this process continued until all the participants were satisfied that the introduction and executive summary were a fair and accurate representation of their work.

Some of the writers also explicitly asked the organisers to check facts and/or add figures to the report. They were keen for the organising team to do this, as the group felt that this factual accuracy would give their report more rigour and credibility. For example, it was requested that a brief paragraph was added explaining the history of social science research on CCS, and also that a figure be sourced after the weekend that could represent the ‘timeline’ for CCS rollout. Any material added in this way during the second weekend was reviewed in plenary and accepted verbatim, while material added after the second weekend was sent out for review via email.

It is crucial to register here that this additional element to the process comes at the request of the group itself. The addition of figures and facts at a later date and the writing of an introduction/executive summary during the course of the second weekend, were things that the participants explicitly asked the organisers to do for them. Any material collated or added by the facilitators was reviewed, discussed, revised and agreed word for word in plenary. All participants were in agreement with this process, and all agreed that to do so would make the whole process and its outcomes more valuable and worthwhile for them.

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