



SCCS response to consultation on the new Scottish Climate Change Bill

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Scottish Carbon Capture & Storage

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1 Identification

Scottish Carbon Capture & Storage¹ (SCCS) is a research partnership of British Geological Survey, Heriot-Watt University, the University of Aberdeen, the University of Edinburgh and the University of Strathclyde. Our researchers are engaged in high-level research into carbon capture and storage (CCS), including joint projects with industry. We act as a conduit between academia, industry and government, providing independent advice and policy guidance along with a variety of stakeholder events and knowledge exchange. We are currently funded by Scottish Government and through our specific project activities.

2 Consultation

Through a Consultation Paper² and online consultation process, the Scottish Government has invited views on its proposed new Climate Change Bill, which will update the Climate Change (Scotland) Act 2009,³ taking account of the independent advice received from the Committee on Climate Change (CCC).⁴

SCCS welcomes the opportunity to respond to this consultation and we are happy to clarify our response, or to answer any questions it raises. The section below reproduces our responses made through the online consultation process in September 2017.

3 Consultation questions and SCCS responses

1. Do you agree that the 2050 target should be made more ambitious by increasing it to 90% greenhouse gas emission reduction from baseline levels?

Yes – A more stretching target is appropriate given the success Scotland has had to date in achieving its targets, and given the international recognition of a need for deeper emission reductions to hold global temperature increase to well below 2°C. Scottish Carbon Capture &

¹ Scottish Carbon Capture & Storage: <http://www.sccs.org.uk/>

² Scottish Government, 2017: <http://www.gov.scot/Publications/2017/06/8208/downloads>

³ The National Archives: <http://www.legislation.gov.uk/asp/2009/12/contents>

⁴ Committee on Climate Change, 2017: <https://www.theccc.org.uk/wp-content/uploads/2017/03/Advice-to-Scottish-Government-on-Scottish-Climate-Change-Bill-Committee-on-Climate-Change-March-2017.pdf>

Storage (SCCS) supports the more ambitious target of 90% greenhouse gas (GHG) emission reduction by 2050.

2. Do you agree that the Climate Change Bill should contain provisions that allow for a net-zero greenhouse gas emission target to be set at a later date?

Yes – SCCS strongly agrees that the Scottish Government (SG) should have the ability to set a net zero GHG emissions target in the future, when this is seen as credible.

Further, we also believe it would be appropriate at the present time to set a net zero carbon dioxide (CO₂) emissions target for 2050, as set out in the Committee on Climate Change's (CCC) "Option 2", and that this distinction between GHG and CO₂ targets should be made clear.

It is important to differentiate between GHG targets, which may be expressed as carbon dioxide equivalent (CO₂-e) targets but include other gases, and actual CO₂ targets – and to use the correct terms. Equally important is to recognise that a 90% GHG reduction target may encompass, indeed is likely to require, a near-zero, net-zero or below-zero level of CO₂ emission.

Additional comments on a net zero CO₂ emission target are made in response to Consultation Question 13.

3. a) Do you agree that the 2020 target should be for greenhouse gas emissions to be at least 56% lower than baseline levels?

Yes – SCCS agrees with the proposed interim targets for 2020, 2030 and 2040. In order to meet the more stretching 2050 target of 90% GHG emissions reduction there needs to be a consistent approach toward that target, as will be encouraged by a regular set of interim targets – it will not be possible to achieve it all during the last decade.

We note that the target increments for the 2030s and 2040s (12% per decade) are slightly larger than the increment for the 2020s (10%). This implies that the "capacity" of combined emission reduction techniques needs to be greater in the later decades, whereas some technology options will experience diminishing returns after a peak in rate of growth; onshore wind may already have reached this peak, energy efficiency programmes can be expected to reach a peak at some point. This suggests that SG should make clear plans for large-scale emission reduction technologies to be developed, and to come on stream at a significant rate (about one million tonnes per annum new capacity, each year on average) from no later than 2030. It is likely that SG will need to take a more pro-active position on technology development and deployment than previously; it may also need to create systems to attract and support early stage developers of appropriate solutions. To achieve this, plans need to be focused very soon and SG needs to ensure it holds the relevant policy levers to advance these plans. Taking this clear approach will benefit Scotland's ambitions to be an attractive place for innovative business development and will help maximise our economic potential.

b) Do you agree that a target should be set for greenhouse gas emissions to be at least 66% lower than baseline levels by 2030?

Yes – see 3.a) above.

c) Do you agree that a target should be set for greenhouse gas emissions to be at least 78% lower than baseline levels by 2040?

Yes – see 3.a) above.

4. Do you agree that annual emission reduction targets should be in the form of percentage reductions from baseline levels?

Yes – This is not a straightforward matter and we accept that it is sensible to follow the advice from CCC for the reasons it gives. However, we do have concerns that the use of percentage targets hides the reality of the task, which is related to the absolute reduction of emissions. The example of the 2020 targets used by the CCC to explain this point can be taken to justify either approach – the change in baseline level means the target for 2020 has essentially been relaxed by about four million tonnes CO₂-e per year, which is not desirable. The climate responds to the forcing effect of the cumulative absolute emission, not the emission relative to an arbitrary baseline. We encourage SG not to lose sight of this fact and to still give information on how percentage targets translate to absolute emissions when appropriate to the context. It might also consider a “ratchet mechanism” (or simply a fixed baseline) to avoid slippage of targets through changes in accounting for historic emissions. Under a ratchet mechanism, the baseline against which percentage targets are measured could be lowered (making targets tougher on an absolute basis) but not raised.

5. Do you agree that annual targets should be set as a direct consequence of interim and 2050 targets?

Yes – It is a logical extension of having fixed decadal targets to have a steady progression of annual targets. However, having such annual targets will inevitably lead to variance from the target in many years and SG should consider how this, and the message that such variance can give, will be managed. We would suggest that overachievement against target should be encouraged and celebrated, and that subsequent targets should be tightened to avoid relaxation of effort in following years. Underachievement should not be a cause for recriminations, but should be analysed to learn where the problems are and lead to increased effort in those areas.

6. Do you agree that all emission reduction targets should be set on the basis of actual emissions, removing the accounting adjustment for the EU ETS?

Yes – We agree that using actual emissions from Scottish sources is a preferable basis for setting targets, being easier to relate to actions taken within the Scottish economy.

7. a) What are your views on allowing the interim and 2050 emission reduction targets to be updated, with due regard to advice from the CCC, through secondary legislation?

We agree with the proposal to allow interim and 2050 emission reduction targets to be updated through secondary legislation, provided that objective advice from the CCC is taken and, in general, followed.

b) What do you think are the most important criteria to be considered when setting or updating emission reduction targets?

SCCS believes the most important criterion to be considered when setting or updating emission reduction targets is scientific knowledge about climate change, which will affect the level of a fair and safe Scottish emissions budget. This knowledge makes clear that climate change is driven by the cumulative quantity of GHGs emitted and so the core purpose of targets must be to relentlessly reduce the rate of GHG emission in Scotland. Beyond this, all the criteria are important but it is difficult to rank them objectively; importance will depend on context and there are trade offs to be balanced across the criteria.

8. a) What are your views on the frequency of future Climate Change Plans?

We consider that the current frequency of updating Climate Change Plans (CCP) every five years is effective, with a good balance between giving time for assessment of outcomes and ability to take corrective action if progress is not sufficient.

b) What are your views on the length of time that future Climate Change Plans should cover?

CCPs need to give good forward visibility for industry and investors considering major developments, such as carbon capture and storage (CCS) or grid conversion to hydrogen, where project lifetimes may be 20+ years. The current timespan of 16 years is adequate but there would be advantages in increasing this to 20 years. Additionally, a less detailed forward look 50 years into the future would be beneficial to indicate the “direction of travel”.

c) What are your views on how development of future Climate Change Plans could be aligned with Paris Stocktake Processes?

We think it is sensible for CCPs to be revised on the same frequency as the Paris Stocktakes, every five years. But we are unsure of the best relative timing. Perhaps, given the length of time these processes take, around the middle of a five-year period would be a pragmatic timing.

d) How many days do you think the period for Parliamentary consideration of draft Climate Change Plans should be?

We are sympathetic to suggestions that the period for parliamentary scrutiny of draft CCPs is increased from 60 days, but feel there should be a clear time limit set, probably at no more than 120 days, possibly 90 days.

9. What are your views on the proposal that any shortfall against previous targets should be made up through subsequent Climate Change Plans?

SCCS agrees with the proposal that each CCP should include measures to make up any shortfall in performance against previous targets. However, this should not dilute the focus on improving performance if there is underachievement against annual targets; relevant Ministers should carry clear responsibility to seek performance improvements, as indicated at Question 5.

10. What are your views on these initial considerations of the impacts of the Bill proposals on Scotland's people, both now and in future generations?

SCCS wholeheartedly supports SG's position of leadership on climate ambition and its aspiration to achieve a just and equitable transition to a low-carbon economy in a way that is fair to Scotland's people. We have no position on how this should be achieved but the initial considerations in the Consultation document sound sensible. We suggest that it is inevitable that some impacts of decarbonisation policies will be perceived as unfair by some groups and that SG should focus on projecting the positive benefits to society and the economy of strong climate action; benefits such as health, quality of life, national cohesion, pride of place, as well as economic and financial benefits.

11. What are your views on the opportunities and challenges that the Bill proposals could have for businesses?

While the partial Business and Regulatory Impact Assessment⁵ is very general, SCCS agrees with its recommendation to follow its "Option 3" proposal, which is in line with the proposals in this present consultation on the new Climate Change Bill. We welcome this bold approach while noting that this deep degree of decarbonisation of an economy has not previously been achieved and Ministers should expect and encourage the high levels of innovation, invention and investment that may prove to be needed.

We would also like to highlight briefly some of the opportunities for businesses and for the Scottish economy that can arise from having strong emissions reduction targets, and specifically from having a robust, large-scale CO₂ management and permanent storage system, such as that provided by fully developed and deployed CCS technology.

CCS can enable deep reductions in emissions across the whole economy. In combination with hydrogen production at large scale by steam methane reforming, CCS can enable deep decarbonisation of domestic and commercial heating, using hydrogen in place of natural gas in the upgraded gas distribution network, thereby preserving the value of the investment made in this network. Widespread availability of "low-carbon" hydrogen may also enable decarbonisation of transport, leading to business opportunities in developing and deploying fuel-cell electric vehicles and in other parts of the transport sector, particularly heavy vehicles. Hydrogen-powered vehicles are already operating in the UK and in several other countries; infrastructure costs for hydrogen as transport fuel may be significantly lower than large-scale upgrading of electrical grid supplies for transport use.

⁵ Scottish Government, 2017: https://consult.scotland.gov.uk/energy-and-climate-change-directorate/climate-change-bill/supporting_documents/Climate_Change_Bill_Partial_BRIA.pdf

The availability of CCS infrastructure to manage emissions can help protect energy-intensive industries from the effects of carbon pricing and so help retain these industries in Scotland. Such industries, including chemicals, petrochemicals, cement, glass, pulp and paper, and their supply chains, are valued employers and generate significant economic value in Scotland. CCS is the most promising option for large reductions in emissions from these industries and many of them are located in areas that can be serviced by CCS infrastructure. Such areas can develop as low-carbon industry zones, attracting new business growth without increasing emissions.

To achieve GHG emissions reduction to 90% of baseline levels is likely to require “negative emissions” of CO₂ to offset difficult to control emissions of other GHGs. Capture and storage of biogenic CO₂ from bioenergy (biogas/biomethane or biomass combustion) or from fermentation industries (distilleries and breweries) can deliver “negative emissions” and is an area where Scotland could take a global lead by investing to develop such opportunities.

Underlying these and other specific business opportunities that will arise from the establishment of a large-scale CCS infrastructure using offshore storage in the North Sea, the development of CO₂ transport and storage facilities opens two significant new business opportunities. One is by extending the productive lifetime of oil fields through CO₂-enhanced oil recovery; the other is by offering CO₂ management and storage services to other states around the North Sea basin.⁶ While there are undoubtedly challenges and costs in establishing such infrastructure, there is potential to deliver substantial and long-term revenue streams through sustaining oil production and through service charges for CO₂ storage. This new North Sea CO₂ management industry would complement and progressively replace the waning hydrocarbon production industry, needing much of the same technology and so preserving expertise, maintaining employment and delivering continued economic value to Scotland.

12. a) What are your views on the evidence set out in the Environmental Report that has been used to inform the assessment process?

No view expressed.

b) What are your views on the predicted environmental effects as set out in the Environmental Report?

No view expressed.

c) Are there any other environmental effects that have not been considered?

No view expressed.

d) Do you agree with the conclusions and recommendations set out in the Environmental Report?

⁶ Scottish Carbon Capture & Storage, 2016: http://www.sccs.org.uk/images/expertise/reports/working-papers/WP_SCCS_2016_01_Scottish_CO2_hub.pdf

Yes – SCCS supports the conclusions of the Strategic Environmental Assessment⁷ in general. We note and support, in particular, two conclusions that have resonance with our views on the need for deployment of CCS as a CO₂ management and storage system, and the means by which this may be achieved.

Firstly, conclusion 10.1.4 points to the increasingly important role that storage of carbon in the marine or terrestrial environment is likely to play in the future. This would include permanent storage as CO₂ in deep geological structures offshore as part of the integrated CCS chain, as well as, potentially, other less well developed CO₂ storage technologies.

Secondly, conclusion 10.1.5 supports the reuse of existing infrastructure, where feasible, to support infrastructure needs of new technologies. This is specifically important for deploying CO₂ storage offshore in the North Sea, where existing pipelines can be repurposed for CO₂ transport, saving significant capital cost and implementation time compared to new-build, as well as causing less disturbance of the seabed environment. We strongly encourage Scottish Government to take steps to secure appropriate pipelines and related infrastructure from possible decommissioning.

e) Please provide any other comments you have on the Environmental Report.

No comments.

13. Please use this space to tell us any other thoughts you have about the proposed Climate Change Bill not covered in your earlier answers.

Support for a net zero CO₂ target:

Further to our response to Consultation Question 2 above, we also believe it would be appropriate at the present time to set a net zero CO₂ emissions target for 2050, as set out in the CCC's "Option 2".

Net zero CO₂ can be projected for Scotland through a combination of CO₂ capture and permanent geological storage (that is, CCS) with CO₂ being captured from biogenic sources, including biogas, landfill gas, biomass combustion, fermentation industries and forest product processing, all contributing to generate "negative" CO₂ emissions. Scotland has the potential for significant negative CO₂ emissions from these sectors and there is also scope for CO₂ negative actions from changing agricultural practices, increasing soil carbon content using biochar, enhanced mineral weathering and, possibly, direct capture of CO₂ from the air (if the energy used is zero carbon).

Provided CO₂ emissions from industrial processes and fossil fuel use are reduced in line with the proposed 90% reduction target by 2050, through all the measures currently envisaged (including energy efficiency, fuel switching, renewables, gas grid decarbonisation with hydrogen and CCS), there is a real potential for Scotland to achieve a net zero CO₂ balance in this timescale. This achievement would be sustainable, as required by the 2015 Paris

⁷ Scottish Government, 2017: https://consult.scotland.gov.uk/energy-and-climate-change-directorate/climate-change-bill/supporting_documents/SCT07175538641_environmental_%20Final_v2.pdf

Agreement, and would strengthen Scotland's place amongst the leading nations in GHG emissions reduction.

Responsibilities as a hydrocarbon-producing nation:

At present, nations do not carry responsibility under climate change agreements for GHG emissions resulting from consumption of exported fossil hydrocarbons. Responsibility for emissions is held by the state consuming or converting the hydrocarbons; the exporting nation is only responsible for emissions from the production process. This position may become more difficult to maintain as emissions budgets tighten following the processes of the Paris Agreement.

We suggest SG should start to consider what options to address this issue are open to Scotland as a net exporter of hydrocarbons. These range from complete cessation of hydrocarbon export, through reducing "carbon-intensity" of hydrocarbons by techniques such as CO₂-enhanced oil recovery (where large quantities of CO₂ can be permanently stored while increasing economic recovery of oil from older fields), to mandatory certification schemes requiring equivalent amounts of carbon (as CO₂) to be stored as are produced (as hydrocarbons).

Early consideration of this issue would allow Scotland to maintain its leadership position in tackling climate change as international thinking on climate justice develops.

Responsibilities as an importer of "embedded carbon":

Conversely, nations that import goods or services with an "embedded carbon footprint" (that is, GHGs are emitted in the country of production or supply) do not carry the responsibility for associated emissions under current climate change agreements. There is a risk that wealthier countries can "offshore" their emissions to developing nations, reducing the consuming country's emission while increasing global emissions.

As Scotland successfully continues to reduce its own GHG emissions, the relative importance of embedded emissions in imports is likely to increase and may become a high proportion of domestic emissions by 2050. In the spirit of high ambition and climate change leadership that Scotland aspires to, we suggest that SG should consider ways of measuring and reporting the embedded carbon footprint of imported goods and services. It should also consider policies and actions to minimise "offshoring" and re-importing, where this leads to higher emissions overall, and develop initiatives aimed at stimulating supply of low-carbon goods and services from Scottish suppliers.

As well as underlining Scotland's commitment to mitigating climate change, this approach would support the economy through retaining manufacturing and service provision within Scotland and would be particularly important for large, energy-intensive industries.