Could -and should- Scotland sell carbon credits in international markets?

Completed by Lewis Cowie under the guidance and supervision of Dr Jen Roberts, MSc Sustainability and Environmental Studies/ 2021
Department of Civil and Environmental Engineering, University of Strathclyde

Summary

Scotland could remove carbon emission in excess of its output within the next three decades (CCC, 2020a). This work investigated the conditions through which Scotland can meet and exceed its emissions targets and potentially engage in the trade of carbon credits internationally. Key findings are:

- Without significant deployment of negative emission technologies (NETs) , Scotland will only be able to achieve net zero by 2045 *if* emission reduction policies and their effects follow highly optimistic modelling. By 2050 however, Scotland may be able to become net negative without the deployment of NETs under a slightly wider range of policy options.
- Experts interviewed highlighted influencing factors such as: the Scottish Government's desire to pursue NET deployment at scale; the potential to pursue the trade of carbon credits internationally; and the potential for Scotlands engagement in carbon trading to bolster climate ambition internationally. They also highlighted that Scotland's position on trading should be influenced by issues surrounding the environmental credibility of carbon credits and the risk of NETs and carbon credits acting as a moral hazard- reducing the drive towards wider decarbonisation rather than bolstering ambition.

1. Introduction

It has been suggested that, by overachieving national emissions targets Scotland could generate and trade carbon credits (Vivid Economics, 2019). Article 6 of The Paris Agreement outlines the rules that seek to govern a new international carbon market, allowing countries that have met their climate obligations, to trade carbon credits internationally (UNFCCC, 2015). In response to both Scotlands potential to produce carbon credits and the international effort to allow for this kind of climate cooperation, this work examined the conditions through which Scotland could engage in the trade of carbon credits. Carbon markets are formed on the principle that emissions in one location can be balanced- or offset- with reductions or removals somewhere else (Carbon Market Watch, 2019). Under an international carbon market, countries in which emission reductions or Carbon Dioxide Removal (CDR)- through the deployment of Negative Emission Technologies (NETs) or Nature-based Solution (NbS)- can be preserved, enhanced, or established relatively easily are incentivised to do so. Overall ambition can therefore be increased as countries will generate carbon credits that can be traded to areas in which emission reduction or removal is more expensive or challenging (Perman et al., 2003). In practice however, predecessors to the markets being proposed under The Paris Agreement have faced considerable criticism. Shortfalls within the frameworks that guide the Clean Development Mechanism (CDM) have resulted in questionable environmental integrity and negative impacts on indigenous communities and international development (Cames et al., 2016; Carbon Market Watch, 2018; Sutter and Parreño, 2007)

In order to answer the research question this study sought to achieve two distinct objectives:

- Assess the technical requirements of carbon credit generation in Scotland: Desk review to analyse mitigation pathways and in-depth interviews to investigate anticipated emission reduction and carbon dioxide removal.
- Investigate the potential role of Scotland in international carbon markets through in-depth interviews to evaluate factors that could influence the global trade of carbon credits and Scotland’s potential to participate in carbon trading.

2. Methodology

The research method is presented in figure 1. Data was gathered through:

- Analysis and comparison of mitigation pathways presented in the Climate Change Committee's (CCC) sixth carbon budget report (Climate Change Committee, 2020a).
- In-depth interviews with five experts in: Carbon dioxide removal technology and policy; Nature- based carbon dioxide removal policy; international climate cooperation and carbon markets, carbon budgeting and Paris compliant mitigation pathways; and one former member of the Scottish Parliament.

The CCC’s sixth carbon budget report presents five mitigation pathways- scenarios outlining different policy, behaviour and innovation conditions that would allow Scotland to achieve Net Zero by 2045, and the UK to become Net Zero by 2050 (CCC, 2020a). The pathways present conditions, ranging from the rapid adoption of both behaviour changes and innovative technologies that would allow Scotland to rapidly decarbonise and enhance CDR (Tailwinds pathway), to more pragmatic pathways that involve delayed policy action, a slow pace of innovation and a more gradual uptake of behaviour changes (Headwinds Pathway). The pathway advised to the Scottish and UK government (Balanced Net Zero pathway), deemed by the CCC to be an ambitious yet feasible scenario, has been supported by the Scottish Government and has advised proposed policy for emission reduction and CDR within Scotland’s updated climate change plan (Scottish Government, 2020a).

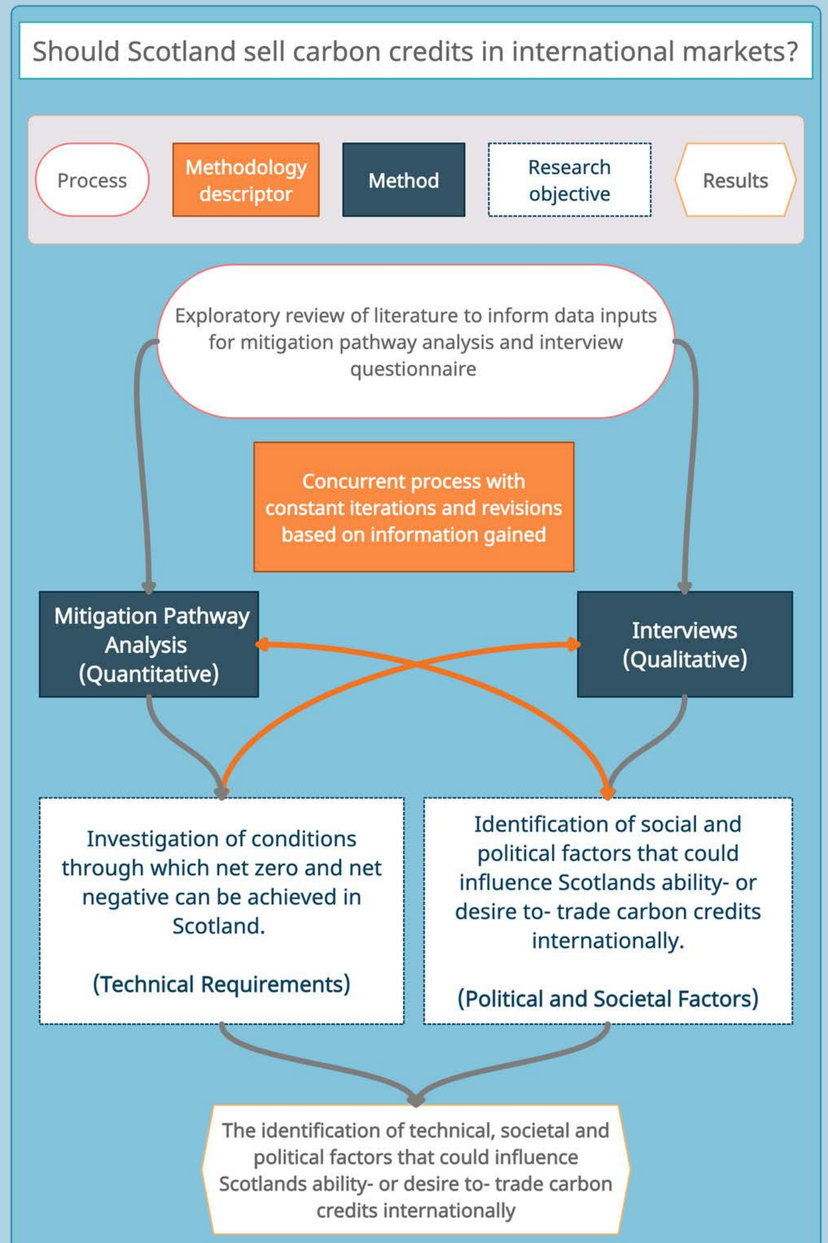

Figure 1, Graphical overview of methodology

Could -and should- Scotland sell carbon credits in international markets?

3. Results

Mitigation pathways that would allow Scotlands carbon removals to be equal to- or greater than- its emissions were identified. Themes that were identified through the analysis of expert interviews, provided context to the topic of carbon credit generation and carbon trading. The various factors that could influence Scotland's propensity to generate carbon credits- or trade them internationally were discussed. An overview of the results obtained via both mitigation pathway analysis and expert interviews can be found within the logic map presented on page 3.

3.1 Carbon credit production

Across the mitigation pathways analysed, only one was capable of delivering Net Zero by 2045 without the influence of NET removals in line with Scottish Government targets (5.7MtCO2e from 2032-2050) (Scottish Government, 2020)

The CCC, within their presentation of the *tailwinds* scenario, make clear that this scenario is considerably optimistic and that the policy conditions included would be challenging to implement (CCC, 2020b). The scale of emission reduction required, would mean that all policy introduced in the pursuit of Net Zero is fully effective in minimising the cost of emission reductions and eliciting widespread behavioural changes (CCC,2020a). Mitigation pathway analysis results are presented in Tables 2 and 3.

Table 1. Conditions under which Scotland can reach **Net Zero** by **2045**

Scenario	Mitigation and nature-based removals	Mitigation, nature-based removals and negative emission technologies
Tailwinds	✓	✓
Headwinds	✗	✗
Widespread Engagement	✗	✓
Widespread Innovation	✗	✓
Balanced Net Zero Pathway	✗	✓

Table 2. Conditions under which Scotland can reach **Net Negative** by **2050**

Scenario	Mitigation and nature-based removals	Mitigation , nature-based removals and negative emission technologies
Tailwinds	✓	✓
Headwinds	✗	✓
Widespread Engagement	✓	✓
Widespread Innovation	✓	✓
Balanced Net Zero Pathway	✗	✓

Whilst the physical capacity to generate carbon removals within Scotland was highlighted within some interviews, the significant rate of increase in removals required to align Scottish emissions with the more optimistic scenarios depicted above was also made clear by several experts.

***"Scotland- on paper- is extremely well resourced... Nonetheless, we're talking about going, on the engineering side at least, from a standing start to lots in very little time. I think we do have to be pretty measured and critical of that"*- Interviewee July 2021**

3.2 Trading carbon credits

Varied concerns, surrounding the international trade of carbon credits were voiced by the interview participants. One of the most prominent concerns included uncertainty regarding the global carbon trading framework. One participant highlighted the potential influence of the pending finalisation of Article 6 of the Paris agreement on perceptions regarding global carbon trading.

Table 3 presents a summary of the results obtained through thematic interview analysis.

Topic	Benefits/ Opportunities	Concerns/ Weaknesses
Carbon dioxide removal (NETs and NbS)	**Drivers:** Consensus of support, Committed funding, Emission reduction boundaries **Enablers:** NbS research and development, Land management changes, Political incentives, Financial incentives **Opportunities:** Contribution to global innovation	**Barriers:** Financial constraints, Political hesitance. Reserved powers, Technological limitations. **Challenges:** Accounting complexity, Conflicting priorities, Existing policy , Permanence, Moral hazard **Impacts:** Climate Justice implications, Human welfare, Land-use change
Emission reduction	**Enablers**: Innovation, Policy change **Opportunities:** Financial gain, International development	**Barriers:** Existing policies, Political hesitance, Reserved powers **Challenges:** Inequality, Technological innovation **Impacts:** Hindered international development
International carbon trading: global perspective	**Drivers:** Financial gain, International climate cooperation **Enablers:** Market support, political advancements **Opportunities:** Financial gain, International development	**Barriers:** Administrative requirement, Market uncertainty, Market complexity. **Challenges:** Environmental credibility, Moral hazard., Political uncertainty, Future climate, Validation of credits **Impacts:** Hindered international development
International carbon trading: Scottish perspective	**Enablers:** Political ambition, Bureaucratic capacity, Physical capacity **Opportunities:** Contribution to global best practice Financial gain	**Barriers:** Political hesitancy, Devolved powers **Challenges:** Future climate **Impacts:** Diversion of funds from international development, Moral hazard: international scope

One of the major factors considered to influence Scotlands potential participation in carbon trading was whether trading under Article 6 was seen to enhance overall ambition and operate in an environmentally robust way or, if carbon trading was not being undertaken in good faith, instead it supported polluters in delaying action to reduce emissions i.e. the moral hazard argument.

***"the devil will be in the detail of what Article 6 eventually looks like. Is it somewhere that broadly looks kosher... Or actually, a bit like its predecessors, is there a general view that it's a bit sketchy and therefore best avoided if possible?"*- Interviewee July 2021**

4. Conclusions

Scotland has the potential to achieve Net Zero by 2045 and exceed this target by becoming net negative by 2050, both with and without the influence of NET removals. Challenging policy conditions, however, are present within the pathways that have shown this to be possible. Interview participants highlighted the numerous challenges involved in achieving the appropriate levels of emission mitigation and removal within the given timeframe (CCC, 2020a). Two recent developments add greater context to this research on Scotlands contribution to the Paris Agreement. Firstly, The Scottish Government published an indicative nationally determined contribution (NDC) presenting the interim target of a 75% reduction in emissions by 2030 as Scotlands contribution to the Paris Agreement, rather than the final - net zero by 2045- goal that was considered in this study (Scottish Government, 2021). Secondly, within the CCC's 2021 assessment of Scotlands progress towards decarbonisation, the UK government's designation of a major NET cluster in Scotland as a 'reserve' project behind greater priority projects in the north of England, was highlighted as a factor that could impede timely NET deployment in Scotland and may force contingency measures to be enacted to reach environmental targets (CCC, 2021). This development within the UK approach to NET development increases uncertainty around Scotlands reliance on short term NET deployment within decarbonisation pathways.

Interview themes pertaining the potential ability- and desire- of Scotland to engage with carbon trading under international market frameworks have revealed that uncertainty regarding the outcome of Article 6 negotiations and the credibility of the market that could arise as a consequence, are key factors that could inhibit carbon trading at a global scale. Since the submission of this research the rules governing global carbon markets have become more clear through negotiations at COP26 in Glasgow. During COP26 the Article 6 'rulebook' that governs new global carbon markets was decided (Carbon Brief, 2021). Some features, such as the allowance of trading in some CDM credits may serve to hinder wider support and confidence in the markets. Other decided elements however may bolster confidence that trading could be environmentally sound in the future including stipulations that prevent the 'double counting' of emissions reductions across multiple parties (Carbon Brief, 2021). In Scotland specifically, the power dynamics that exist between the government of Scotland and the UK, and the prevailing perception of carbon markets as a tool to deliver effective climate change mitigation have been suggested to be influencing factors that may promote or inhibit Scotlands participation in international carbon trading.

Should Scotland sell carbon credits in international markets?

Hypothesis:
Scotland *should* sell carbon credits

if

Objective 1. Assess the technical requirements of carbon credit generation in Scotland: Desk review to analyse mitigation pathways and in-depth interviews to evaluate anticipated emission reductions and removals.

Scotland *can* achieve net zero by 2045 — and — Scotland *can* generate carbon credits through removing carbon in excess of its emissions

if

Objective 2. Investigate the potential role of Scotland within international carbon markets through in-depth interviews, to evaluate factors that influence he global trade of carbon credits and Scotlands potential trade of credits specifically.

The factors that promote international carbon trading are more influential than those that impede it — and — The factors that promote Scotlands participation in international carbon trading are more influential than those that impede it

if

Mitigation Pathway Analysis: Can Scotland achieve Net Zero by 2045?

Scotland fails in developing NETs in line with government targets — or — Scotland succeeds in developing NETs in line with government targets

and — and

Emission reductions and removals align with the *Tailwinds Pathway*

Emission reductions and removals align with the *Tailwinds Pathway* — or — Emission reductions and removals align with the *Net Zero Balanced Pathway*

Emission reductions and removals align with the *Widespread Innovation Pathway* — or — Emission reductions and removals align with the *Widespread Engagement Pathway*

Mitigation Pathway Analysis: Can Scotland become net negative and produce carbon credits?

Scotland fails in developing NETs in line with government targets — or — Scotland succeeds in developing NETs in line with government targets

and — and

Emission reductions and removals align with the *Tailwinds Pathway*

or

Emission reductions and removals align with the *Widespread Innovation Pathway*

Emission reductions and removals align with the *Tailwinds Pathway* — or — Emission reductions and removals align with the *Net Zero Balanced Pathway*

or

Emission reductions and removals align with the *Widespread Engagement Pathway*

Emission reductions and removals align with the *Widespread Innovation Pathway* — Emission reductions and removals align with the *Widespread Engagement Pathway*

International carbon trading: Global perspective

Positive factors identified — > — Negative factors identified

Drivers:
Financial gain
International climate cooperation

Barriers:
Administrative requirement
Market uncertainty
Market complexity

Enablers:
Market support
Political advancements

Challenges:
Environmental credibility
Moral hazard
Political uncertainty
Future climate
Validation of credits

Opportunities:
Financial gain
International development

Impacts:
Hindered international development

and

Interview topic: Carbon dioxide removal

Positive factors identified — > — Negative factors identified

Drivers:
Consensus
Committed funding
Emission reduction boundaries

Barriers:
Financial constraints
Political hesitance
Reserved powers
Technological limitations

Enablers:
Research into Nature based solutions
Land management changes
Political and financial incentives

Challenges:
Accounting complexity
Conflicting priorities
Existing policy
Permanence
Moral hazard

Opportunities:
Contribution to global innovation

Impacts:
Climate Justice implications
Human welfare
Land-use change

Interview topic: Emission reduction

Positive factors identified — > — Negative factors identified

Barriers:
Existing policy
Political hesitance
Reserved powers

Enablers:
Innovation
Policy change

Challenges:
Inequality
Technological innovation

Opportunities:
Financial gain
International development

Impacts:
Hindered international development

International carbon trading: Scottish perspective

Positive factors identified — > — Negative factors identified

Barriers:
Political hesitancy
Devolved powers

Enablers:
Political ambition
Bureaucratic capacity
Physical capacity

Challenges:
Future climate

Opportunities:
Contribution to global best practice
Financial gain

Impacts:
Diversion of funds from international development
Moral hazard: international scope

Condition: Greater than — Condition: and — Condition: or — Condition: if

References

Carbon Brief (2021) COP26: Key outcomes agreed at UN climate talks (Available at: https://www.carbonbrief.org/cop26-key-outcomes-agreed-at-the-un-climate-talks-in-glasgow) (Accessed: 15/12/2021)

Climate Change Committee (2020a) *Sixth Carbon Budget* Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/ (Accessed: 18/10/2021)

Climate Change Committee (2020b) *Sixth Carbon Budget Dataset* Available at: https://www.theccc.org.uk/wp-content/uploads/2021/02/The-Sixth-Carbon-Budget-Dataset.xlsx (Accessed: 18/10/2021)

Climate Change Committee (2021) Progress Reducing Emissions in Scotland: 2021 Report to Parliament (Available at: https://www.theccc.org.uk/publication/progress-reducing-emissions-in-scotland-2021-report-to-parliament/ (Accessed: 15/12/2021)

Department for Business, Energy and Industrial Strategy (2020) *The UK's Nationally Determined Contribution under the Paris Agreement* Available at: https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc (Accessed: 18/07/2021)

Robson, C. and McCartan, K., (2016) *Real world research: a resource for users of social research methods in applied settings.* 4th Edition. Wiley.

Scottish Government (2021) *Scotland's contribution to the Paris Agreement – an indicative NDC* Available at: https://www.gov.scot/publications/scotlands-contribution-paris-agreement-indicative-ndc/ (Accessed: 13/12/2021)

United Nations Framework Convention on Climate Change (2016) *United Nations Framework Convention on Climate Change (UNFCCC) (2015) Paris Agreement* Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed: 18/10/2021)

Vivid Economics (2019) Delivering on Net Zero: Next Steps for Scotland Available at: https://www.vivideconomics.com/wp-content/uploads/2019/10/WWF_Report_VIVID_Climate_2019_web.pdf (Accessed: 18/10/2021)

Acronyms

CCC- Climate Change Committee

CDM- Clean Development Mechanism

CDR - Carbon Dioxide Removal

COP 26- The 26th Conference Of the Parties to the United Nations Framework Convention on Climate Change

NbS- Nature-based Solutions

NDC- Nationally Determined Contribution

NETs- Negative Emission Technologies

UN- United Nations

UK- United Kingdom