Advising national climate policy makers: A longitudinal analysis of the UK Climate Change Committee

Harriet Dudley [a,b,c,*], Andrew Jordan [a,b,c], Irene Lorenzoni [a,b,c]

[a] School of Environmental Sciences, University of East Anglia, UK
[b] Centre for Climate Change and Social Transformations (CAST), UK
[c] Tyndall Centre for Climate Change Research, UK

ARTICLE INFO

ABSTRACT

Despite the recent proliferation of national climate change advisory bodies, very little is known about what advice they provide, to whom, and when. To address these gaps in the literature, this article systematically analyses all 700 of the recommendations made by the UK Climate Change Committee (CCC) in the period 2009–20. The CCC is one of the oldest climate change advisory bodies of its kind in the world and its design has been widely emulated by other countries. For the first time, this article documents how the CCC's mitigation and adaptation recommendations have changed over time with respect to their addressee, sectoral focus and policy targets. It reveals that they became: more numerous per year; more cross-sectoral in their nature; clearer in targeting a specific addressee; and more focused in referring to specific policy targets. By drawing on Fischer's synthesis of policy evaluation to derive a measure of policy ambition, it also reveals that despite many of its recommendations being repeated year after year, the CCC has become more willing to challenge the policy status quo. It concludes by identifying future research needs in this important and fast-moving area of climate governance, notably understanding the conditions in which the recommendations of advisory bodies (do not) impact national policy.

1. Introduction

Almost all countries in the world have adopted climate policies (Eskander and Fankhauser, 2020). Many have committed to achieve net zero emissions and increase their climate resilience. Governments are increasingly reliant on expert advice to inform the design and delivery of these objectives (Christensen and Serrano Velarde, 2019), hence the establishment of climate advisory bodies, which have proliferated in recent decades (Averchenkova et al., 2021). In a relatively short period of time such bodies, which are now present in over 40 countries, have become a central feature of national climate change governance systems (Abraham-Dukuma et al., 2020).

Despite this – and the fact that some scholars consider them to be a critical facilitator of deep decarbonization (e.g., Averchenkova and Lázaro, 2020) – precious little is known about the nature of the advice they provide. The UK Climate Change Committee (CCC) was originally established by the 2008 UK Climate Change Act (CCA). The CCA is widely regarded as world-leading and its origins have been extensively studied e.g., see McGregor et al., (2012), Carter (2014) and Lorenzoni and Benson (2014).

Some argue that the CCC is a commitment device to encourage private investment (Lockwood, 2013, 2021). Others suggest that it has introduced a longer-term perspective into UK climate policy (Averchenkova and Lázaro, 2020). The CCC's statutory duties, as set out in the CCA, are to monitor, evaluate, report and advise on mitigation and adaptation (CCC, 2020a). Its primary function is to provide policy advice, principally in the form of recommendations which are contained in its annual progress reports to policymakers in the UK Parliament and devolved legislatures (Scotland, Wales, Northern Ireland), *not* create policy. The CCC also provides an input to the setting of the UK's carbon budgets.

However, existing accounts shed less light on the nature of its advice (but see Weaver et al. (2019), Abraham-Dukuma et al., (2020) and Lockwood (2021) for cross-country comparisons). In this article we focus on the CCC because: (1) it is "central to the UK's climate policy" (Averchenkova and Lázaro, 2020: 13); (2) it has been emulated by over half a dozen countries (Nash and Steurer, 2019); and (3) it has existed for over a decade, thus allowing us to adopt a sufficiently long-term

perspective on its contribution to policy change (Sabatier, 1988).

This article seeks to address these research gaps by providing the first in-depth longitudinal analysis of all the recommendations provided by the CCC to policymakers in the period 2009–20. It addresses four questions. The first three are as follows:

1. What mitigation and adaptation recommendations has the CCC provided in its annual progress reports to the UK Parliament?
2. When, to whom and in what form have these recommendations been provided?
3. How, if at all, has the nature of these recommendations changed since 2009?

An additional component of our analysis was to apply an existing theoretical framework to understand the extent to which the recommendations challenge the status quo. This is important because in climate policy - specifically that which aims to deliver net zero emissions by 2050 - the stringency or ambitiousness of policy has emerged as an important focus of political and policy debate. Therefore we draw on Frank Fischer's synthesis of the policy evaluation literature (Fischer, 1980, 1990, 2006) to understand the extent to which individual recommendations advocate for and/or challenge the policy status quo in the UK, a self-declared leader in the transition to net zero emissions. Hence our fourth research question is:

4. To what extent have the CCC's recommendations challenged the policy status quo?

The remainder of this article unfolds as follows. First we set out the functions of the CCC in relation to both mitigation and adaptation, two areas that are often treated separately in climate policy analysis (Fröhlich and Knieling, 2013; Nachmany et al., 2018). Then we present our methodology and findings according to a set of normative policy suggestions from the existing literature on how advice should ideally be structured (regarding their addressee, sectoral focus, targets etc.) to be impactful. This follows a similar approach used by Haug et al. (2009) and Russell and Benton (2011), both of whom acknowledged that there is no unambiguous interpretation of what counts as "good advice" (Owens, 2015: 146). Finally, we discuss our results, conclude and identify new priorities for research and policy.

Because of space constraints we exclude two dimensions of the CCC's advice. First, although little is known about the CCC's internal decision-making activities and procedures (Muinzer, 2018), including how it formulates its recommendations, we do not address either aspect. Second, we do not seek to document – let alone explain – how the CCC's advice is received by policymakers or the extent to which it is used to formulate national policy, as these constitute substantial research topics in their own right. Although a number of existing accounts have suggested that the UK Government's uptake of the CCC's advice has been rather minimal (e.g., see CCC (2016, 2017, 2018, 2019) and Averchenkova et al., (2018)), they did not examine the CCC's recommendations in detail.

2. The UK Climate Change Committee

Part 2 of the CCA established the CCC as a statutory Non-Departmental Public Body. It is funded by the UK government and its devolved legislatures (Averchenkova and Lázaro, 2020) and consists of a Chair and eight independent members (Weaver et al., 2019). It is supported by a Secretariat of around 30 people who have technical expertise across a range of climate change issues (Averchenkova et al., 2021).

The CCA sets out its statutory duties which include providing the Secretary of State with (CCA, Part 2, s.33–35, 2008):

- "Advice on the level of the 2050 target[1]; […]
- Advice in connection with carbon budgets; […] and,
- Advice on emissions from international aviation and international shipping".

When considering its advice in connection with carbon budgets the CCC must take into account nine matters (CCA, Part 1, s.10(2a-i):

"Scientific knowledge about climate change; technology relevant to climate change; economic circumstances […]; fiscal circumstances […]; social circumstances […]; energy policy […]; differences in circumstances between England, Wales, Scotland and Northern Ireland; circumstances at European and international level; [and] the estimated amount of reportable emissions from international aviation and international shipping for the budgetary period or periods in question".

The CCC is also mandated to provide an annual report to the UK Parliament and each devolved legislature on progress towards meeting the carbon budgets set out in Part 1 of the CCA (CCA, Part 2, S.36, 2008). Within these reports, the CCC provides its formal recommendations for future action. These recommendations are our unit of analysis. The CCC also has a mandate to provide *ad hoc* advice, analysis, information, or other assistance at the request of a national authority (CCA, Part 2, s.38, 2008). Its *ad hoc* advice, published as 'Letters', is excluded from our analysis because it is not produced with the same remit, for the same audience or within a similar timeframe thus inhibiting cross-year comparisons (Owens, 2012; Turnpenny et al., 2014).

In 2009, the CCC established an Adaptation Committee[2] (AC) to "provide the [CCC] with such advice, analysis, information or other assistance as the [CCC] may require in connection with the exercise of its functions" (CCA, Schedule 1 Para 16(10)). The AC is mandated to provide the UK Parliament with a biennial progress report and a five-yearly assessment of the UK's National Adaptation Programme (NAP). The AC barely features in the existing literature.

Finally, the CCC is an *advisory* body. Although the Secretary of State must respond to the CCC's progress reports in Parliament (CCA, Part 2, s.37, 2008), that person is not mandated to accept or enact the CCC's recommendations. The CCC has no formal powers to enact climate policy or force national or devolved governments to implement its recommendations (Muinzer and Little, 2020).

3. Theory and methods

3.1. Annual progress reports

As a public body, the CCC[3] is expected to upload its publications to a public website (https://www.theccc.org.uk/publications/). Standardised webpage search criteria were used to identify its annual progress reports for test–retest purposes (Bryman, 2016). A search yielded 19 full-length reports and two summary reports. We focused on the full-length reports because they: (1) contained the CCC's formal recommendations i.e., our unit of analysis; and (2) were produced with the same remit, for the same audience and within a similar timeframe to enable cross-year comparisons (Owens, 2012; Turnpenny et al., 2014). The 19 reports were downloaded for content analysis.

3.2. The nature of policy advice

We undertook a pilot study of a random sample of five progress reports in order to identify the recommendations therein. This

---

[1] In 2019 this target was amended to net zero by 2050.
[2] Previously the Adaptation Sub-Committee (AC).
[3] Unless stated otherwise, henceforth references to the CCC encompass the AC.

immediately raised several methodological challenges. First, neither the CCA nor the CCC defines 'a recommendation' in its progress reports. Whilst the CCA requires the provision of 'advice', the CCC instead uses the language of 'recommendations' or synonyms thereof e.g., "policy requirements" (CCC, 2016: 16) or "milestones for the coming year" (CCC, 2018: 21). In what follows, we use the term 'recommendation' for consistency. Second, there was significant interannual variation in the layout of reports, the location of recommendations therein and the style in which they were expressed.

To ensure intercoder reliability and consistent textual interpretation we focused on the Executive Summary of each report, as this is where the recommendations were most often located across the corpus of 19 reports.[4] Based on our pilot we defined a recommendation as:

Any statement within the Executive Summary that an actor, whether named or not, should take some stated future action, indicated by terms such as 'required', 'should', 'must', 'recommends' but excluding terms such as 'could'; it includes key details such as the addressee, target and sectoral focus.

Bullet pointed actions following a particular statement (e.g., 'the CCC recommends…') were treated as individual recommendations. Our definition of a recommendation is consistent with similar studies by Russell and Benton (2011) and Monk (2012). Our pilot also revealed that at the core of each recommendation is an action point (or points) which we defined as:

Text that explicitly recommends action. It is embedded within a recommendation and indicated by active verbs e.g., to plan, review, evaluate, monitor, legislate etc.

3.3. Fischer's framework

The CCC's recommendations arise from its evaluation of a government's policy performance. The field of research addressing policy evaluation is extensive. We therefore drew on Fischer's synthesis of that literature (Fischer, 1980; 1990; 2006). Originating as a critique of technocracy, he offered a framework to "understand the nature of the [policy] problem and to find new and relevant ways of […] advice giving" (Fischer, 2007: 224). A fundamental goal of his postpositivist framework is to provide academics and political actors with a fresh understanding of how they can make and remake existing policy systems (Fischer, 2006). Crucially, his framework "offers insights into the construction of acceptable alternative policies" to the policy *status quo* at a given point in time (Fischer, 2007: 234).

Fischer's framework is organised around four levels. The first two levels constitute 'first-order evaluation' and probe how efficiently policy objectives are met relative to extant understandings of the prevailing policy problem (Fischer, 2006). In short, an evaluation at level one or two seeks to understand the extent to which existing policy goals and targets are fulfilled i.e., it does not challenge the policy status quo. By contrast, the latter two levels constitute 'second-order evaluation' and respectively assess whether policy objectives enhance or limit the achievement of societal values and therefore which values should underpin policy objectives and if the achievement of these values requires a restructuring of society. A recommendation that corresponds to level three or four therefore challenges the policy status quo, including extant policy problem framings.

We used his framework to analyse the extent to which the CCC's recommendations, which are derived from its evaluation of extant policy performance, have challenged the policy status quo over time. To our knowledge, no published studies have done this before. Table 1 sets out our original interpretation of Fischer's framework and explains how

---

[4] Recommendations also appeared to be located in the main body of the report or in an appendix. These were excluded for consistency.

Table 1
Our synthesis and application of Fischer's framework.

Level of evaluation*	Description**	Example***	Application to mitigation/adaptation
Technical verification of policy objectives	How efficiently are policy objectives met relative to alternative means?	"…whether or not an educational reading programme fulfils its [objectives]"	Is a given policy on track to achieve its declared objectives?
Situational validation of policy objectives	Are policy objectives appropriate and relevant to 'the problem'?	"…are educational reading scores the most important criteria for a particular group of students?"	Are its objectives appropriate? If not, what should they be?
Systems vindication of value orientations	Does a policy objective enhance or limit the achievement of societal values (e.g., equality)?	Does "a focus … [on testing] scores … facilitate a … meritocratic social order ([rather than] a society [with] greater social equity and racial justice?"	What is the overriding policy problem i.e., is it really decarbonisation/adaptation?
Exploration of societal choices	Which societal values should policies be built upon and does achieving them require a restructuring of society?	"What kinds of social values should the educational curriculum be built upon and towards which end?"	Which social values should inform the prioritisation of problems (level 3), the setting of policy objectives (level 2) and policy implementation (level 1)?

*Verbatim Fischer (2006: 18) | **summary of Fischer (1980, 1990, 2006) | ***verbatim Fischer (2006: 20-22).

each level relates in principle to the evaluation of (UK) climate change policy.

3.4. Content analysis

Content analysis involves the coding of selected pieces of text according to specific coding categories (Krippendorff, 2004). We followed Mayring (2000) and first created codebooks (see Appendix 1 and 2) with a standardised definition, indication, exemplar recommendation and coding rules for each category. We created these to enhance inter-and intra-coder reliability and the replicability of our method.

We drew upon the existing literature of policy advice to develop four coding categories that suggested recommendations should specify:

- an *addressee* – they should be directed towards those with the authority to implement them (Goldstein, 2009; Russell and Benton, 2011).
- a *sectoral focus* - they should address specific sectoral interests and/or issues; cross-sectoral policies can best support both mitigation and adaptation (Bowen et al., 2014; Berry et al., 2015).
- *relevant targets* - they should include targets to indicate ambition and inform delivery and monitoring (Pye et al., 2017; McLaren et al., 2019; Hale et al., 2020).
- *action point(s)* - they should clearly state a future action(s) and explain why and how it/they should be taken (Hoornbeek, 2000; Goldstein, 2009; Russell and Benton, 2011).

A fifth category, the extent of *repetition*, was derived inductively from

our pilot study which identified that many of the CCC's recommendations were repeated over time.

A final category was derived from our reading of Fischer's framework. Fischer suggested that an evaluation "can commence at any one of the [levels]" (Fischer, 2006: 232) and that all four levels must be met for an evaluation to be justified (*ibid*). We therefore coded each of the CCC's recommendations against each of his four levels irrespective of whether it had met the criteria for the previous level/s. For example, a recommendation was coded as level 1 if it evaluated whether an existing decarbonisation or adaptation policy was on track to achieve its declared objectives. Regardless of whether a recommendation was coded as level 1 it was coded as level 4 if it evaluated which values should inform the nature and relative prioritization of prevailing policy problems (see Appendix 2 for further detail).

We used NVivo (v12) to store and code the 19 progress reports. In chronological order, the Executive Summary of each report was read. Each one was coded using codebooks (see Appendices 1, 2 and 3). Throughout, codes were iteratively reviewed, created, merged or dissolved to avoid duplication, as per Krippendorff (2004). Once a report had been coded, the count of recommendations per year and per coding category were summed and cross-referenced with the expected count based on the coding rules in the codebook to ensure that no recommendations were missed or double counted. In total, 700 recommendations were identified using the definition outlined above.

To ensure consistency, the authors performed three rounds of coding of all recommendations (N = 700) against Fischer's levels. One of us initially coded all recommendations against each level, referring to the codebook in Appendix 2. The other two then blindly coded half of the recommendations each, referring to the same codebook. Conditional formatting was used to identify instances of disagreement between coders. Where coders disagreed about the level(s) of a recommendation, a third coder made the final decision by coding the recommendation blind. Once all three rounds of coding were complete each recommendation was deemed to have met our pre-determined threshold of consensus i.e., two researchers having agreed on each code for each level. This follows the same rationale as Haug et al., (2009).

3.5. Main findings

Our research revealed that the CCC has provided no less than 700 recommendations between 2009 and 2020, addressing mitigation (N = 511) and adaptation (N = 189). Our content analysis also revealed notable interannual variation (see Appendix 3). For example, in 2011 the CCC issued only 5 recommendations, whereas in 2020 it issued 135. The CCC's 2020 report was also qualitatively different in other ways: the recommendations were organised by addressee (government department) for the first time; and they covered both mitigation and adaptation. In what follows, we indicate that report's relative contribution to our headline findings.

3.6. To whom were recommendations addressed?

Between 2009 and 2020 over half (N = 298, 58 %) of the CCC's mitigation recommendations were addressed to a named actor. Notably all recommendations in the 2020 report had an addressee; they were organised by government department for the first time. Prior to 2020 there was no standardised format for presenting recommendations and so the inclusion of an addressee was more intermittent, with only 44 % (N = 166) of the CCC's recommendations between 2009 and 2019 identifying an addressee. Comparably, between 2009 and 2020, 88 % (N = 167) of the AC's adaptation recommendations were addressed to a named actor. Over time the AC more consistently included addressees, often in brackets at the end of a recommendation or in a summary table.

Although the CCC's progress reports are formally submitted to the UK Parliament, some recommendations refer to a variety of other addressees including local authorities, businesses, and the devolved legislatures. Over the study period, government departments were the most common addressee for both mitigation (25 %, N = 129) and adaptation (66 %, N = 125) recommendations. The CCC's recommendations were most frequently addressed to the industrial strategy department (N = 38), the transport department (N = 22) and the environment department (N = 17). Similarly, the AC's recommendations were most often addressed to the environment department (N = 59). For both mitigation and adaptation, government departments received the most recommendations that contained multiple action points. Most commonly these were to 'coordinate action across sectors or policy areas' and 'plan future action'.

No less than 43 % (N = 222) of the CCC's, and 42 % (N = 80) of the AC's, recommendations were repeated at least once either verbatim or partially over time. The CCC tended to repeat recommendations *with* addressees more than those *without* addressees. Amongst all 511 mitigation recommendations, only 16 % (N = 84) of those without an addressee were repeated – either partially or verbatim – compared to 27 % (N = 140) of recommendations with an addressee. As a relative percentage of the number of recommendations each addressee received, recommendations addressed to multiple government departments and the current parliament were repeated the most at 81 % (N = 26) and 71 % (N = 5) respectively. Comparably only 35 % (N = 47) of the mitigation recommendations addressing a specified government department were repeated. We found a similar trend in all the 189 adaptation recommendations whereby those with an addressee were repeated more (N = 73, 38 %) than those without an addressee (N = 6, 3 %).

3.7. To which sector(s) were recommendations addressed?

In the study period we found a notable interannual variation in the number and type of sectors to whom recommendations were addressed. In its first report (2009), they addressed three economic sectors, namely energy (N = 17, 46 %), surface transport (N = 11, 30 %), and buildings (N = 7, 19 %); only 5 % (N = 2) were cross-sectoral. Over time the CCC has steadily addressed more sectors, reaching ten by 2020 including aviation, industry, shipping, waste and agriculture/land use. It also began to formulate recommendations for the so-called difficult-to-mitigate sectors such as agriculture/land use (from 2010), waste (from 2012), and aviation and shipping (from 2014). For these sectors, action points were consistently more future focused, e.g., to 'plan future action', 'introduce a policy or policy framework' and 'coordinate across sectors or policy areas'. Simultaneously, it also increased the number of cross-sectoral recommendations from two (5 %) in 2009 to 50 (37 %) in 2020 (compared to a 12-year annual average of 14 %). Examples of the CCC's cross-sectoral mitigation recommendations include:

> "[i]mprove the evidence base on energy efficiency of appliances, district heating, surface transport emissions by mode, agriculture emissions, waste emissions" (CCC, 2012: 12).
> "[i]ntegrate Net Zero into all policy making, and ensure procurement strategies are consistent with the UK's climate objectives" (CCC, 2020: 25).

The most repeated recommendations were for waste (N = 16, 52 %), aviation (N = 4, 50 %), agriculture/land use (N = 21, 48 %) and surface transport (N = 36, 46 %). Repeated recommendations respectively pertained to: (1) banning the landfill of biodegradable waste; (2) publishing an effective policy framework for aviation emissions; (3) developing a framework for monitoring and reducing agricultural emissions; and (4) addressing barriers to the uptake of electric vehicles.

The AC's recommendations tended to routinely address the same four sectors, namely water, infrastructure, buildings and agriculture/land-use. Nonetheless, the majority (N = 90, 48 %) of its total recommendations were cross-sectoral and typically pertained to the integration of adaptation into planning and decision-making, particularly relating to land-use, water management and flooding. Fully 69 % (N =

11) of the AC's recommendations for the buildings sector were repeated across the sample period, being mainly related to the risk of overheating.

3.8. Did the recommendations include targets and timescales?

Recommendations were coded for whether they included (1) a quantitative target e.g., % emissions reduction, and/or (2) a timescale for delivery. Our results were mixed. For mitigation, 10 % (N = 53) of recommendations included both a target and a timescale, whilst 37 % (N = 191) contained neither. Recommendations with neither a target nor a timescale were found to repeat more over the sample period than recommendations with both. In general, recommendations included only a timescale (N = 317, 62 %) but the CCC's interpretation varied e. g., 'by 2050′ vs 'ahead of the next progress report' vs 'ongoing'. Recommendations that only included a timescale most often contained action points such as 'coordinate across sectors or policy areas', 'plan future action' and/or 'introduce a strategy'.

The CCC's references to quantitative targets typically related to three aspects. First, the provision of funding e.g., "Funding required for charging infrastructure […] should be no more than £230 million…" (CCC, 2009: 26). Although 21 % (N = 28) of the recommendations with an action point to 'provide funding' contained timescales for delivery, only 5 % (N = 6) of them also included quantitative targets. Second, the adoption of a new policy initiative e.g., "[introduce] a Zero Emission Vehicle Mandate requiring increasing shares of sales to be zero-carbon, reaching 100 % by 2032" (CCC, 2020: 37). Third, achieving an emissions reduction target e.g., "98 % reduction in emissions by 2050" (CCC, 2019: 14). Recommendations with the action point to 'establish a new policy objective' were most likely to include both a quantitative target and a timescale for delivery.

For adaptation, 31 % (N = 58) of the AC's total recommendations contained neither a target nor a timescale. Only two, out of 189, recommendations referenced a quantitative target and a timescale; curiously, both were in the 2015 report. The AC's recommendations most frequently contained the action points to 'coordinate across policy areas or sectors' and/or 'plan future action'. But of these recommendations, only 27 % (N = 50) and 37 % (N = 51) respectively contained a timescale and only one recommendation with each action point contained a quantitative target. Similar to the CCC, 24 % (N = 14) of the AC's recommendations that had neither target were repeated between 2009 and 2020. For both mitigation and adaptation, recommendations without quantitative targets tended to be more qualitative and value-based, such as:

> "Characterise uncertainties – transparently report the assumptions made and openly explore the implications of uncertainty in both climate and socio-economic scenarios." (AC, 2011: 11).
> " … stronger incentives to purchase cleaner vehicles" (CCC, 2019: 14)
> "Demonstrate UK climate leadership at COP26 and the G7" (CCC, 2020b: 26)

3.9. To what extent did recommendations challenge the policy status quo?

In the study period, the majority of the mitigation recommendations were at level 1 and level 2[5] (67 % and 80 % respectively). Relatively few recommendations significantly challenged the policy status quo (14 % at level 3 and a mere 3 % at level 4). The AC's recommendations exhibited a similar pattern: 55 % were at level 1 or 2, 25 % were at level 3 and only 7 % were at level 4. As shown in Fig. 1a and b[6] there was notable interannual variation in the number, and proportion, of

recommendations that were at each level.

Over the sample period the majority of the CCC's (N = 415, 81 %), and the AC's (N = 113, 60 %), recommendations were at level 2. At this level mitigation recommendations consistently made reference to the delivery of existing policy obligations, for example carbon budgets and net zero, and pre-existing policies such as the Energy Company Obligation. Adaptation recommendations at this level called for the establishment of new targets and obligations, as exemplified by this recommendation, which includes a number of actions (AC, 2017: 19):

> "To ensure that activity and investments have a significant, cost-effective impact on reducing vulnerabilities, the second NAP should
> - set clear priorities for adaptation;
> - ensure objectives are outcome-focused, measurable, time-bound and have clear ownership;
> - prioritise the core set of policies and actions that will have the biggest impact;
> - build on the breadth of community and business engagement in the first NAP; and.
> - include effective monitoring and evaluation".

However, we found a notable interannual variation in the number and proportion of mitigation and adaptation recommendations that aligned to each level. For example, since 2019 the number of mitigation recommendations at levels 3 and 4 has increased suggesting the CCC has become more willing to challenge the policy status quo. For example, in 2020 the CCC provided the Treasury with the level 4 mitigation recommendations that it should "[d]evelop a plan for funding decarbonisation fairly and review the distribution of costs for businesses, households and the Exchequer" and "[c]onsider near-term as well as long-term decarbonisation funding needs and policy implications for a just transition" (CCC, 2020: 27). However, despite 35 % of the AC's adaptation recommendations in 2019 being at level 3 this decreased to 4 % in 2020. Comparably, none of its 2019 adaptation recommendations were at level 4 whilst 6 % of its 2020 recommendations were.

Between 2009 and 2020 only a minority of the CCC's recommendations represented a significant challenge to the policy status quo (i.e., were at level 4). Mitigation recommendations at this level tended to underline the importance of fair and equitable decarbonisation, for example "ensure costs fairly distributed and a just transition" (CCC, 2019: 15), and for climate policy to address other problem framings such as human health and amenity. For example: "[t]ake an active role in climate policy development that also has health benefits, such as active travel, access to green space, air quality, better buildings and healthier diets" (CCC, 2020b: 43). Adaptation recommendations at this level were also ambitious in their scope, for example: "[d]evelop a plan for funding climate resilience across infrastructure, society and the economy, equivalent to the work currently being undertaken on Net Zero" (CCC, 2020b: 27).

We also found that the level of the recommendations varied by sector. Curiously, over the sample period, none of the CCC's recommendations addressing the difficult-to-mitigate sectors (namely covering aviation, energy, industry, shipping and waste) were at level 4; instead, these recommendations were concentrated at levels 1 and 2. The buildings sector received the most (N = 7) level 4 mitigation recommendations, but these were all made prior to 2015. The highest number (N = 10) of level 4 adaptation recommendations were cross-sectoral. However, most cross-sectoral adaptation recommendations were coded at level 1 (N = 51) and level 2 (N = 59).

Finally (and to our knowledge), we performed the first empirical test of whether evaluations proceed through each of Fischer's levels in-turn. Over the sample period, of the 321 mitigation recommendations at level 1, 289 (90 %) were also level 2, 78 (24 %) were also level 3 but only 19 (6 %) were at all four levels. Similarly, of the 90 adaptation recommendations at level 1, 64 (71 %) were also level 2, 10 (11 %) were also level 3 but none were at all four levels. Therefore, it appears that the

---

[5] See section on Fischer's framework above for an explanation of each level.
[6] In figure 1b years without data indicate there were no adaptation recommendations.

Chart a) data table

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Level 4	3	1	0	0	1	1	2	1	0	0	1	10
Level 3	8	3	1	2	3	5	7	3	3	3	5	53
Level 2	32	24	3	27	28	29	41	27	35	20	34	11
Level 1	23	23	5	20	18	20	27	24	27	18	25	93

Chart b) data table

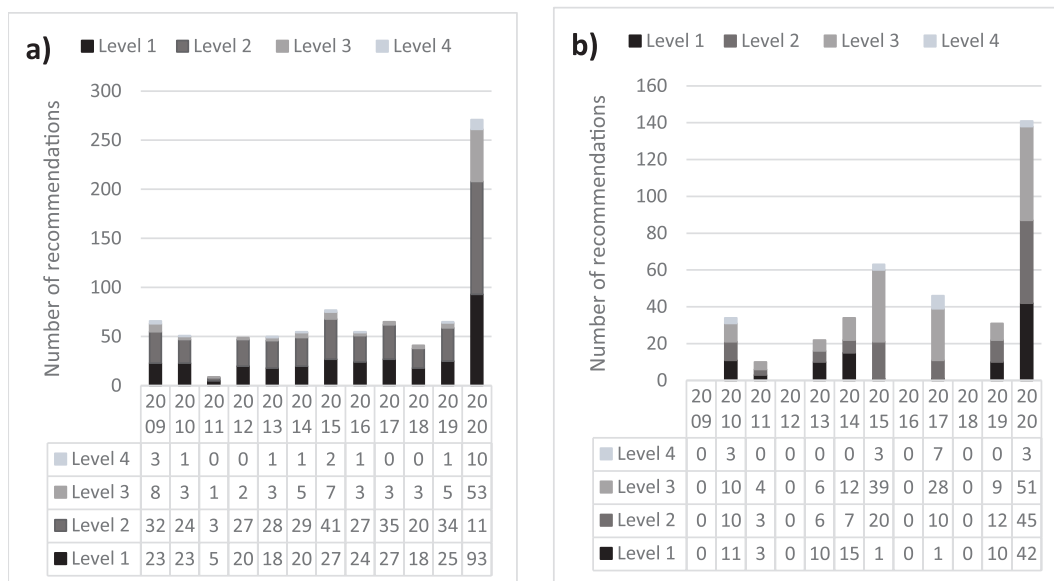|	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Level 4	0	3	0	0	0	0	3	0	7	0	0	3
Level 3	0	10	4	0	6	12	39	0	28	0	9	51
Level 2	0	10	3	0	6	7	20	0	10	0	12	45
Level 1	0	11	3	0	10	15	1	0	1	0	10	42

Fig. 1. a (left panel) and b (right panel). The longitudinal distribution of recommendations that correspond with each of Fischer's levels shown (a) for the CCC's mitigation recommendations, and (b) for its adaptation recommendations.

majority of the CCC's and AC's recommendations have not simultaneously evaluated the government's performance against the policy status quo, whilst fundamentally challenging the underlying premise or framing of it. The next section discusses our findings in relation to what the existing literature suggests policy advice should look like.

4. Discussion

4.1. Addressee

In their study of UK Select Committees, Russell and Benton (2011) found a variety of addressees beyond central government. They argued:

"…some recommendations aimed at 'other' groups appear to have little chance of being implemented, or indeed even read, by the audience that they are aimed at, and have no obvious connection to government responsibilities. These could be considered to be a waste of committee time" (*ibid*: 28).

We detected a similar phenomenon: we found that 37 of the CCC's mitigation recommendations were addressed to multiple government departments, all in the 2020 report. Moreover, nearly half (48 %, N = 247) of the CCC's recommendations contained multiple action points. Within the existing literature it has been argued that "this lack of clarity from committees may make it easier for government to dodge their recommendations" (Russell and Benton, 2011: 27). And despite devolved legislatures receiving separate progress reports and recommendations, the CCC still addressed 4 % (N = 19) of its mitigation recommendations to them (2009–17). Curiously, of the recommendations addressed to devolved governments, 53 % (N = 10) were repeated over time.

4.2. Sectoral focus

The broadening sectoral focus of the CCC's recommendations over time appears to reflect a growing society-wide awareness of the need for deeper decarbonisation across all socio-economic sectors (Muinzer and Little, 2020). Similarly, mitigation and adaptation are increasingly regarded as not separate but intimately interlinked challenges. This is reflected in the increase in the number of the CCC's mitigation and adaptation recommendations that were cross-sectoral over time, as exemplified by this recommendation: "[c]ontinue to embed Net Zero as

a core Government goal and strengthen focus on climate adaptation" (CCC, 2020b: 24).

4.3. Targets

Whilst the importance of including clear targets in climate policy to drive implementation is widely advocated in the existing literature (e.g., Harvey, et al., 2018; Jordan and Moore, 2020), few have studied whether advisory bodies routinely advise it in their recommendations. In their study, Russell and Benton (2011: 32) argued that the inclusion of targets makes it easier for a recommendation to be tracked/audited. However, they also found that only a small proportion of the recommendations made by UK Select Committees did so, meaning that "a judgement about [recommendation] implementation would be subjective, or simply impossible".

Our study indicates that the CCC has included more explicit targets in its recommendations over time. Although, therefore, Russell and Benton's criticism could be levelled at the CCC's advice, we also recognise that setting targets to achieve particular policy changes, particularly level 4 changes in problem framing, could be difficult. In some cases, therefore, evaluation of the implementation of a recommendation may require examining various elements in relation to each other, in the absence of a specific target.

4.4. Challenge to the policy status quo

In her analysis of the Royal Commission on Environmental Pollution, Owens (2011) argued that recommendations that challenge the status quo (i.e., for us, those corresponding to levels 3 and 4) are more likely to be dismissed by recipients. If true (and bearing in mind that we did not analyse the impact of recommendations), we would expect those corresponding to the higher levels to exhibit the highest rates of repetition. However, these expectations were not borne out in our data. Amongst the CCC's 511 mitigation recommendations, we found little difference in the relative percentage of level 4 recommendations that were repeated compared to level 1 recommendations, at 55 % (N = 11) and 48 % (N = 153) respectively. But for adaptation, we observed the opposite trend: 31 % (N = 5) of the AC's level 4 recommendations were repeated compared to 51 % (N = 47) of its level 1 recommendations.

These findings align with those of Weiss and Bucuvalas (1980). In their study, they expected research that challenged existing practices to

be used less by policymakers, but in fact discovered the opposite to be true. They concluded:

> "…research that confirms that current policy is working well offers little food for thought. Research that challenges policy stimulates people to rethink their positions and to grapple with new opportunities. They find such research valuable" (*ibid*: 308).

There is ample opportunity to test this claim in relation to the usefulness of climate policy advice, as well as exploring whether repetition in the publication of recommendations affects their policy use over time.

4.5. Conclusions and future research priorities

Climate policy advisory bodies have proliferated in recent decades and now represent important actors in the increasingly polycentric landscape of climate change governance (Jordan et al., 2018). Even though the provision of advice to policymakers is often one of their core tasks, very little is known about what form it takes. For the first time, this article has identified and categorized all 700 recommendations made by the CCC to the UK Parliament in the period 2009–20. We analysed these recommendations using six coding categories derived from relevant existing literatures.

Three important findings emerged from our analysis. First, there has been a significant interannual variation between the areas of mitigation and adaptation. For example, only in recent years have the mitigation recommendations begun to consistently include an addressee whereas this has been common practice for the adaptation recommendations. Second, its recommendations have been relatively repetitious: no less than 43 % (N = 222) of the CCC's, and 42 % (N = 80) of the AC's, recommendations were repeated at least once either verbatim or partially over time. Thirdly, for a long period the majority of the CCC's and the AC's recommendations did not significantly challenge the status quo (i.e., they were at Fischer levels 1 and 2), although this trend changed abruptly with the publication of the 2020 report. That report contained the highest proportion of level 3 and 4 recommendations for mitigation; all the recommendations had an addressee; it had the highest number of cross-sectoral adaptation and mitigation recommendations; and more than half of its mitigation recommendations were novel.

This article has made five contributions to the existing literature. First, it has offered the first longitudinal examination of the advice, in the form of recommendations, provided by a national climate advisory body. Second, it has studied both the CCC's mitigation and adaptation recommendations, two areas of policy that are often treated separately by researchers and practitioners. Third, it has developed and, for the first time applied, an empirical measure of the ambitiousness of policy advice, drawing on Fischer's framework (see also Lockwood (2013)). Fourth, it has offered novel insight into what advice has been provided, to whom and when - a necessary precondition for eventually understanding an advisory body's policy impact. Finally, it has offered a valuable corrective to the normative literature, which suggests that policy advice should: include an appropriate and specified addressee; address the interests and/or issues of a specified sector; and include clear targets and timescales for delivery. In practice, many of the CCC's recommendations have fallen short of these normative desiderata.

Our study also opens up a new area of research on climate policy advisory bodies. Four issues stand out as meriting greater attention. First, new work should seek to understand their inner workings, particularly how and why they formulate their advice in the form that they do. When the CCA was being debated in parliament, the Treasury was apparently concerned that the scope of the issues that it was expected to address was too wide (and hence political) for a supposedly technical committee (Lockwood, 2021). The CCA (Part 2, 2008) therefore mandates the CCC to focus on nine issues (see above). However the CCA provided the CCC with no guidance on how to rank or weigh the importance of these issues (Muinzer, 2018). Our findings suggest that although the CCC has largely stuck to these nine issues, it has become

more willing to challenge the policy status quo, particularly with respect to the policies and measures needed to deliver society-wide decarbonization.

Second, why and under what conditions do advisory bodies continually repeat their recommendations? Russell and Benton (2011: 79) suggest that altering policy requires dogged determination: advisory bodies may repeatedly return to policy issues because "it takes time to persuade government to change its mind". However, Weiss (1980: 402) cautions that "repetition is only one route to the accretion of policy without decision"; achieving policy change may, in other words, involve timing a particular recommendation to maximise its policy impact. Future research could build on our finding that the nature of repetition varies significantly across time and sectors, and between the areas of mitigation and adaptation.

Third, there is an opportunity to use our methods and framework to analyse advisory bodies in other countries and fields beyond climate change, to produce a more systematic account of the changing nature of policy advice, bearing in mind some of the well-known difficulties that arise when coding documents. For both mitigation and adaptation recommendations, the percentage of disagreement between the first two coders was highest for level 1 (CCC, 32 %; AC, 51 %) and level 2 (CCC, 44 %; AC, 62 %). The lowest level of disagreement was at level 3 (CCC, 22 %; AC 21 %) and level 4 (CCC, 11 %; AC 15 %). This bears out our impression that the AC's recommendations were particularly challenging to code because (like other aspects of adaptation policy) they tend to contain fewer explicit policy objectives.

Fourth, there is the vexed issue of how, if at all, advice impacts climate policy. Future research could explore the factors that lead to successful policy advice and what structural factors allow an advisory body to achieve policy impact. Although the Secretary of State is mandated by the CCA to respond to the CCC's progress reports and the individual recommendations therein (CCA, Part 2, s.37), that person is not obligated to accept or act on them. If a robust empirical measure of use can be devised (Weiss, 1980; Rich, 1997), it would be useful to apply it to the CCC's work. For example, to what extent has policy impact varied across the six categories that we coded for? The existing literature suggests that addressees are important for policy delivery because "if political and administrative actors do not have a direct stake in the issue, they are unlikely to adopt and act upon expert advice on the issue" (Christensen and Serrano Velarde, 2019: 51). Thus, future research could assess whether recommendations that clearly identify addressees are more likely to be accepted and possibly eventually implemented. Our research has revealed that the CCC has recently (i.e., the 2020 report) changed the format of its recommendations to make such features more evident, hinting that some policy learning may have taken place. Similarly, to what extent has impact varied across sectors? Averchenkova et al., (2018) claim that the UK Government has generally overlooked recommendations relating to emissions from buildings and CCS. They cite this non-use as "one of the reasons for the gap between policy delivery and legislated targets" (*ibid:* 4). It would be worthwhile subjecting their claim to more detailed empirical testing.

Finally (and following Russell and Benton (2011)), to what extent does the ambitiousness of advice – or, for us, particular recommendations - affect its reception and subsequent (non–)use? Our findings suggest that the ambitiousness of the CCC's recommendations has varied over time and across sectors. Repetition has been a notable but little noticed hallmark of the CCC's work since 2009. Repetition – perhaps understood as tenacity - may be especially important with regards to something like decarbonisation that is multi-decadal and when "the best advice may be the least welcome, particularly in the short term" (Owens, 2011: 94).

Climate Change and Social Transformations (CAST) (ES/S012257/1 and ES/P00072X/1). For further details, see: https://www.deepdcarb.org.

CRediT authorship contribution statement

Harriet Dudley: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft. **Andrew Jordan:** Formal analysis, Writing – review & editing, Supervision. **Irene Lorenzoni:** Formal analysis, Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.gloenvcha.2022.102589.

References

Abraham-Dukuma, M.C., et al., 2020. Multidisciplinary composition of climate change commissions: Transnational trends and expert perspectives. Sustainability (Switzerland) 12 (24), 1–23. https://doi.org/10.3390/su122410280.

AC (2017) *Progress in preparing for climate change: 2017 Report to Parliament*. Available at: https://www.theccc.org.uk/publication/2017-report-to-parliament-progress-in-preparing-for-climate-change/.

Averchenkova, A. and Lázaro, L. (2020) 'The design of an independent expert advisory mechanism under the European Climate Law: What are the options ?', (September).

Averchenkova, A., Fankhauser, S., Finnegan, J.J., 2018. The role of independent bodies in climate governance: the UK's Committee on Climate Change. Grantham Research Institute on Climate Change and the Environment. https://doi.org/10.1088/1751-8113/44/8/085201.

Averchenkova, A., Fankhauser, S., Finnegan, J.J., 2021. The influence of climate change advisory bodies on political debates: evidence from the UK Committee on Climate Change. Climate Policy 21 (9), 1218–1233.

Berry, P.M., et al., 2015. Cross-sectoral interactions of adaptation and mitigation measures. Climatic Change 128 (3–4), 381–393. https://doi.org/10.1007/s10584-014-1214-0.

Bowen, K.J., Ebi, K., Friel, S., 2014. Climate change adaptation and mitigation: next steps for cross-sectoral action to protect global health. Mitigation and Adaptation Strategies for Global Change 19 (7), 1033–1040. https://doi.org/10.1007/s11027-013-9458-y.

Bryman, A., 2016. Social Research Methods. Oxford University Press.

Carter, N., 2014. The politics of climate change in the UK. Wiley Interdisciplinary Reviews: Climate Change 5 (3), 423–433. https://doi.org/10.1002/wcc.274.

CCC (2017) *Meeting Carbon Budgets: Closing the policy gap. 2017 Report to Parliament*. Available at: https://www.theccc.org.uk/publication/2017-report-to-parliament-meeting-carbon-budgets-closing-the-policy-gap/.

CCC (2009) *Meeting Carbon Budgets - the need for a step change: Progress Report to Parliament*. Available at: https://www.theccc.org.uk/publication/meeting-carbon-budgets-the-need-for-a-step-change-1st-progress-report/.

CCC (2016) *Meeting Carbon Budgets - 2016 Progress Report to Parliament*. Available at: https://www.theccc.org.uk/publication/meeting-carbon-budgets-2016-progress-report-to-parliament/.

CCC (2018) *Reducing UK emissions: 2018 Progress Report to Parliament*. Available at: https://www.theccc.org.uk/publication/reducing-uk-emissions-2018-progress-report-to-parliament/.

CCC (2019) *Reducing UK emissions: 2019 Progress Report to Parliament*. Available at: https://www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament/.

CCC (2020a) 'CCC Insights Briefing 2: The UK's independent adviser on tackling climate change'. Available at: https://www.theccc.org.uk/publication/insights-briefings-sharing-the-uk-approach-to-addressing-climate-change/.

CCC (2020b) *Reducing UK emissions: Progress Report to Parliament*. Available at: https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/.

Christensen, J., Serrano Velarde, K., 2019. The role of advisory bodies in the emergence of cross-cutting policy issues: comparing innovation policy in Norway and Germany.

European Politics and Society 20 (1), 49–65. https://doi.org/10.1080/23745118.2018.1515864.

Eskander, S.M.S.U., Fankhauser, S., 2020. Reduction in greenhouse gas emissions from national climate legislation. Nature Climate Change 10 (8), 750–756. https://doi.org/10.1038/s41558-020-0831-z.

Fischer, F., 1980. Politics, values, and public policy. Westview Press, Colorado.

Fischer, F., 1990. Technocracy and the politics of expertise. SAGE Publications, London.

Fischer, F., 2006. Evaluating public policy. Cengage Learning.

Fröhlich, J., Knieling, J., 2013. Conceptualising climate change governance. Climate Change Management 9–26. https://doi.org/10.1007/978-3-642-29831-8_2.

Goldstein, H., 2009. Translating research into public policy. Journal of Public Health Policy 30 (SUPPL. 1), 16–21. https://doi.org/10.1057/jphp.2008.49.

Hale, T.N., et al., 2020. Sub- and non-state climate action: a framework to assess progress, implementation and impact. Climate Policy 1–15. https://doi.org/10.1080/14693062.2020.1828796.

Harvey, H., Orvis, R., Rissman, J., 2018. Designing climate solutions: a policy guide for low-carbon energy. Island Press, USA.

Haug, C. *et al.* (2009) 'Navigating the dilemmas of climate policy in Europe: evidence from policy evaluation studies', *Climatic Change 2009 101:3*, 101(3), pp. 427–445. 10.1007/S10584-009-9682-3.

Hoornbeek, J., 2000. Information and environmental policy: A tale of two agencies. Journal of Comparative Policy Analysis 2 (2), 145–187. https://doi.org/10.1023/A:1026540717775.

Jordan, A., et al., 2018. Governing climate change: Polycentricity in action? Cambridge University Press, Cambridge.

Jordan, A. J. and Moore, B. (2020) *The Quest for Durability*, *Durable by Design?* Cambridge University Press. 10.1017/9781108779869.003.

Krippendorff, K., 2004. Content analysis: an introduction to its methodology, 2nd edn. SAGE Publications, USA.

Lockwood, M., 2013. The political sustainability of climate policy: The case of the UK Climate Change Act. Global Environmental Change 23 (5), 1339–1348. https://doi.org/10.1016/j.gloenvcha.2013.07.001.

Lockwood, M., 2021. Routes to credible climate commitment: the UK and Denmark compared. Climate Policy 1–14. https://doi.org/10.1080/14693062.2020.1868391.

Lorenzoni, I., Benson, D., 2014. Radical institutional change in environmental governance: Explaining the origins of the UK Climate Change Act 2008 through discursive and streams perspectives. Global Environmental Change 29, 10–21. https://doi.org/10.1016/j.gloenvcha.2014.07.011.

Mayring, P. (2000) 'Qualitative Content Analysis.', *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 1(2). Available at: https://doi.org/10.17169/fqs-1.2.1089.

McGregor, P.G., Kim Swales, J., Winning, M.A., 2012. A review of the role and remit of the committee on climate change. Energy Policy 41, 466–473. https://doi.org/10.1016/j.enpol.2011.11.007.

McLaren, D.P., et al., 2019. Beyond "Net-Zero": A Case for Separate Targets for Emissions Reduction and Negative Emissions. Frontiers in Climate 1, 4. https://doi.org/10.3389/fclim.2019.00004.

Monk, D., 2012. Committee Inquiries in the Australian Parliament and their Influence on Government: Government Acceptance of Recommendations as a Measure of Parliamentary Performance. The Journal of Legislative Studies 18 (2), 137–160. https://doi.org/10.1080/13572334.2012.673062.

Muinzer, T., 2018. Climate and energy governance for the UK low carbon transition: The climate change act 2008. Climate and Energy Governance for the UK Low Carbon Transition: The Climate Change Act 2008. https://doi.org/10.1007/978-3-319-94670-2.

Muinzer, T. and Little, G. (2020) A Stocktake of Legal Research on the United Kingdom's Climate Change Act: Present Understandings, Future Opportunities. Intersentia.

Nachmany, M. *et al.* (2018) *Global trends in climate change legislation and litigation: 2017 Update*. Available at: www.lse.ac.uk/grantham/%0Awww.lse.ac.uk/Grantham%0Ahttp://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/04/Global-trends-in-climate-change-legislation-and-litigation-2018-snapshot-3.pdf.

Nash, S.L., Steurer, R., 2019. Taking stock of Climate Change Acts in Europe: living policy processes or symbolic gestures? Climate Policy 19 (8), 1052–1065. https://doi.org/10.1080/14693062.2019.1623164.

Owens, S., 2011. Knowledge, advice and influence: the role of the UK Royal Commission on Environmental Pollution, 1970–2009. In: Lentsch, J., Weingart, P. (Eds.), The Politics of Scientific Advice: Institutional Design for Quality Assurance. Cambridge University Press, pp. 73–101.

Owens, S., 2012. Experts and the environment-the UK royal commission on environmental pollution 1970–2011. J. Environ. Law 24 (1), 1–22. https://doi.org/10.1093/jel/eqr031.

Owens, S., 2015. Knowledge, policy, and expertise: The UK Royal Commission on Environmental Pollution 1970–2011. Oxford University Press.

Pye, S., et al., 2017. Achieving net-zero emissions through the reframing of UK national targets in the post-Paris Agreement era. Nat. Energy 2 (3), 17024. https://doi.org/10.1038/nenergy.2017.24.

Rich, R.F., 1997. Measuring knowledge utilization: Processes and outcomes. Knowledge Policy 10 (3), 11–24. https://doi.org/10.1007/bf02912504.

Russell, M. and Benton, M. (2011) *Selective Influence: The Policy Impact of House of Commons Select Committees*. London: UK.

Sabatier, P.A., 1988. An advocacy coalition framework of policy change and the role of policy-oriented learning therein. Policy Sci. 21 (2–3), 129–168. https://doi.org/10.1007/BF00136406.

Turnpenny, J., Russel, D., Jordan, A., 2014. The challenge of embedding an ecosystem services approach: Patterns of knowledge utilisation in public policy appraisal. Environ. Plann. C Govern. Policy 32 (2), 247–262. https://doi.org/10.1068/c1317j.

Weaver, S., Lötjönen, S. and Ollikainen, M. (2019) 'Overview of National Climate Change Advisory Councils'.

Weiss, C.H., 1980. Knowledge creep and decision accretion. Knowledge 1 (3), 381–404. https://doi.org/10.1177/107554708000100303.

Weiss, C.H., Bucuvalas, M.J., 1980. Truth tests and utility tests: decision-makers' frames of reference for social science research. Am. Sociol. Rev. 45 (2), 302–313.