Journal of Sustainable Tourism
Volume 30 Issue 9, 2022
0966-9582 (Print)

Routledge
Taylor & Francis Group

Journal of Sustainable Tourism

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rsus20

Understanding research impact manifestations in the environmental policy domain. Sustainable tourism research and the case of dutch aviation

Harald Buijtendijk & Eke Eijgelaar

To cite this article: Harald Buijtendijk & Eke Eijgelaar (2022) Understanding research impact manifestations in the environmental policy domain. Sustainable tourism research and the case of dutch aviation, Journal of Sustainable Tourism, 30:9, 2089-2106, DOI: 10.1080/09669582.2020.1760872

To link to this article: https://doi.org/10.1080/09669582.2020.1760872

Published online: 03 May 2020.

JOURNAL OF SUSTAINABLE TOURISM
2022, VOL. 30, NO. 9, 2089–2106
https://doi.org/10.1080/09669582.2020.1760872

Routledge
Taylor & Francis Group

Understanding research impact manifestations in the environmental policy domain. Sustainable tourism research and the case of dutch aviation

Harald Buijtendijk[a,b] and Eke Eijgelaar[b]

[a]Department of Environmental Sciences, Wageningen University & Research, Wageningen, The Netherlands; [b]Centre for Sustainability, Tourism and Transport, Breda University of Applied Sciences, Breda, The Netherlands

ABSTRACT

This paper uses discourse theory to obtain a broader understanding of how research impact of sustainable tourism research develops in the environmental policy domain. Discourse theory shifts emphasis from the substance of science versus policy to the use of science in policy processes and explains the political dimensions of policymaking. We first review a well-documented science-policy gap in sustainable tourism research on climate change to develop an alternative conceptualisation of research impact. Then, using a case study approach, we investigate this framework by evaluating the impact of a PhD thesis about aviation's global CO_2 emissions on the Dutch aviation policy process. The case study shows research impact is entwined with various other elements, and embedded in a specific governance context. Research influenced contrasting science-policy interactions and contributed to conflicting policy actions and reactions. The impact of research in this case was manifested through the formation and interplay of multiple knowledge objects that were both embraced and marginalised. In settings like this, research is used to legitimise pre-existing policy positions rather than to develop new policies. We discuss the implications of narrow conceptions of research impact. The paper highlights the need for advanced policy analysis in sustainable tourism research.

ARTICLE HISTORY
Received 4 December 2019
Accepted 21 April 2020

KEYWORDS
research impact; science-policy gap; sustainable tourism research; discourse theory; policy analysis; aviation policy

Introduction

This paper addresses the conception of research impact of sustainable tourism research (STR) in the environmental policy domain. Improved dissemination of research and collaboration with policy actors are presented as vital to close science-policy gaps and create impactful STR that contributes to pro-environmental policy change (Bramwell et al., 2017; Font et al., 2019). Collaboratively produced and properly communicated scientific evidence would then end up in science-based policies (Dredge, 2019). Science-policy gaps become science communication gaps, i.e. barriers to converting academic knowledge into useful 'resources' for policy actors (Dredge, 2015). Yet, the notion that science determines environmental policy is misleading (Rayner, 2006), and suggests a linear idea of knowledge transfer that has been the subject of sustained critique

CONTACT Harald Buijtendijk buijtendijk.h@buas.nl Breda University of Applied Sciences, PO Box 3917, Breda, 4800 DX, The Netherlands

in environmental policy studies (see e.g. Owens et al., 2006). It presupposes that science and policy share universally accepted definitions of environmental problems and that the content of policies is always the focus (Hajer, 2005). This analytical asymmetry disregards that the production of policy and that of science are entwined. Both domains are embedded in – established – social structures, such as institutions and conventions (Jasanoff, 2015). The products of science become tools for different policy actors (Buckley, 2012). 'Research impact', thus, is somewhat narrowly conceived. A focus on the substance of policy obscures the political dimensions of science-policy interactions, i.e. the use of science in policymaking (Jasanoff, 2015). An alternative conceptualisation of research impact is therefore relevant.

Post-structuralist discourse theory (hereafter referred to as discourse theory) helps us develop such a conceptualisation. In discourse theory – not to be confused with semiotics-oriented discourse analysis – reality is a discursive construct (Duineveld & Van Assche, 2011). Discourses are autonomous and necessarily incomplete processes of meaning production that construct different versions of reality, and that are produced and reproduced through identifiable practices (Hajer, 2005; Howarth, 2000). As discourses evolve through self-referral, they can never grasp reality in its entirety and always relate to other discourses (Van Assche et al., 2014). Power –never a stable condition – permeates this process (Duineveld & Van Assche, 2011). As discursive differences cannot be crossed, processes of dominance and subjugation arise when discourses collide (Van Assche et al., 2014). Consequently, in discourse theory, the use of science in environmental policymaking constitutes a discursive clash in which no form of (scientific) knowledge has direct access to the truth (Jasanoff, 2015). Rather than believing that universally accepted scientific definitions of environmental problems will bridge science-policy gaps, discourse theory allows us to trace how policy actors assimilate (the same) scientific evidence in different discourses (Hajer, 2005).

Discourse theory thus exposes the power-knowledge interactions integral to environmental policy struggles (Duineveld & Van Assche, 2011). This enables us to illustrate the "political pressures upon the policy space" (Dredge, 2019), and the selective appropriation of (scientific) knowledge (Hall, 2019). Deploying its analytical potential, this paper therefore aims to evaluate the way STR functions in a particular environmental policy struggle. By means of a case study, we trace the 'research impact' of a PhD thesis about aviation's global CO_2 emissions (Peeters, 2017) on the Dutch aviation policy process. The paper proceeds as follows. First we draw from STR on aviation-induced climate change and the 'science-policy gap' described in this literature (e.g. Cohen et al., 2016) to reconceptualise research impact as a process of object formation (Duineveld & Van Assche, 2011). Then, based on this framework, we present our case and trace how a marginalised discourse about aviation-induced climate change gradually entered the Dutch aviation policy process. We conclude that research impact is a long-term, emergent effect that manifests itself subtly in the policy process.

Discourse theory and a science-policy gap in sustainable tourism research

Discourse theory assumes that reality is constructed through the interplay of power and knowledge (Howarth, 2000). Power, in Foucault's view, is an amoral and relational "multiplicity of force relations" operative everywhere (Foucault, 1998, as cited in Duineveld & Van Assche, 2011, p. 81). Knowledge, in contrast, is never neutral. Knowledge enhances power relations. No form of knowledge is fully disconnected from the organisations, communities, topics, methods, and questions structuring its production; nor has direct access to the truth (Van Assche et al., 2014). In this view power and knowledge are integral to both science and policy. Both domains are shaped by different, colliding discourses. In discourse theory, the 'science-policy gap', presented in aforementioned research on aviation-induced climate change, is not a gap between science and policy, but a discursive construct that signals differences between prioritised and subjugated truth claims as power and knowledge interact (Duineveld & Van Assche, 2011). Thus, discourse theory

helps us move beyond the science-policy dichotomy and conceptualise environmental policy struggles as on-going processes of power-knowledge interactions across different discourses.

Reviewing this 'science-policy gap' through the lens of discourse theory, we identified three analytical asymmetries. The first one relates to the particular scientific scope in which this literature presents the desirable (decarbonised) transport futures it advocates. These futures, it suggests, require technocratic policies firmly embedded in IPCC climate risk frames (Peeters et al., 2019), in which policy requires global management (Oels, 2013). They involve "structural transitions" (Cohen et al., 2016, p. 327), "a tourism sector emission management and reporting system", and "a strategic policy framework" (Scott, 2016a, p. 68). And they are identified through science-based simulations and scenarios (Cohen et al., 2016; Peeters et al., 2019). Current policies are evaluated based on how effective they are in achieving these desirable futures (see for instance Scott et al., 2016b). This literature, thus, exhibits a strong belief in science-based policymaking (Font et al., 2019), based on a particular science-policy constellation, in which science determines acceptable (climate) risk levels for policymakers and society. This disregards alternative risk frames and science-policy constellations in the policy process (see Oels, 2013), and highlights the need to include their trajectories into our analysis.

The second analytical asymmetry concerns the tendency to juxtapose the policy status quo with the advocated policy reality. The present situation is framed as a 'decarbonisation impasse' (Gössling & Scott, 2018). Policymakers are criticised for their inaction. They are represented as inert, and lacking the political will to implement "meaningful change" (Cohen et al., 2016, p. 327). Leaders are encouraged to show leadership (Scott et al., 2016a). Explanations for the impasse are offered, too. Among them, we list close relations between policymakers and the industry (Cohen et al., 2016), self-interests driving policy preferences (Cohen & Kantenbacher, 2020), and prevailing neoliberal governance structures (Gössling & Scott, 2018). These statements reflect Buckley's claim that policymakers mainly use information as "means to gain, power, fame, or money" (Buckley, 2012, p. 537). Yet, in the light of our argument, they seem one-sided. They suggest that certain scientific knowledge has intrinsic value (ibid.). However, in the policy process, this knowledge faces competing (scientific) knowledge, and serves as a means to different ends (Jasanoff, 2015). An approach that examines the settings in which different forms of (scientific) knowledge simultaneously inform alternative, and possibly contradictory, policy directions is therefore useful.

The third asymmetry we identified entails the representation of the knowledge required to close the 'science-policy gap'. Since Gössling (2002) introduced aviation-induced climate change in STR, a literature of calculated certainties has developed that depicts (climate) risks as "knowable, calculable, and therefore controllable" (Oels, 2013, p. 20). These studies present models, scenarios, and estimates concerning long-term emission challenges, costs, and impacts of assumed policy choices (e.g. Peeters et al., 2019; Scott et al., 2016a). Knowledge put forward by policymakers and alternative interpretations of risk are exclusively evaluated within this frame. Incompatible arguments are presented as fabricated uncertainties to justify business as usual (Gössling & Scott, 2018). Incompatible solutions, i.e. types of technological innovation, are exposed as hoaxes and myths (Peeters et al., 2016). This asymmetry obscures how different forms of knowledge become 'objects' in strategies that policy actors wittingly and unwittingly deploy to exert influence and negotiate risk (Duineveld & Van Assche, 2011). A more fine-grained analysis of their use is thus relevant.

Research impact as a process of object formation

We therefore argue that research impact can be understood as a process of object formation. Objects – in our case, aviation-induced climate change – are pronounced discursive constructs that feature as central elements of discourses. Examples include issues, topics, physical objects, ideas, and ideologies (Van Assche et al., 2014). Objects are never a given and always constructed (Howarth, 2000). Object formation takes place in contexts of competing discourses, where power and knowledge interact more intensively

(Duineveld & Van Assche, 2011). As illustrated above, STR on climate change has handed policymakers new objects as arguments, most notably 'health' (e.g. Cohen & Kantenbacher, 2020). Like the knowledge that created them, none of these objects is politically neutral. As objects form, they change the meaning of their environment: their embedding in language, science and institutions makes them more likely to function in policymaking (Van Assche et al., 2014). To examine the formation of the object of aviation-induced climate change in the Dutch aviation policy process, we adopt the framework of Duineveld and Van Assche (2011), who discern pathways, sites, and techniques of object formation.

Pathways are "the series of decisions and events that typifies the emergence and solidification of a discursive object" (Duineveld & Van Assche, 2011, p. 81). According to Van Assche et al. (2014), pathways entail the temporal dimensions of policy processes and comprise dependencies on the past (path dependencies), present (interdependencies), and future (goal dependencies). The past, in the shape of various legacies (i.e. previous policies, ingrained governance habits and incumbent actors) informs a shared understanding of the present. In the present, there is interdependence between policy actors and institutions whose authority relies on commitments to current policies, such as electoral and business interests. For the future, shared visions, for instance, steer policy directions and define which actors take part in policy processes. In sum, under these conditions, policy actors cannot freely change directions. By highlighting the temporal dimensions of policy processes, pathways, thus, enable us to identify the dependencies that hold back change in environmental policy struggles.

Sites are the (in)formal settings in which object formation occurs. They include occasions and places where actors assess joint actions. Sites can be permanent or transient, but always constitute scenes of "higher communicative density" (Van Assche et al., 2014, p. 29). In these settings, new objects emerge, and actors enter – and leave – the policy arena, and their presence/absence may lead to new pathways and sites. As a result of actors associating themselves with objects, distinct discourse coalitions can emerge, which are groups of actors that share identifiable practices and "the usage of a particular set of storylines over a particular period of time" (Hajer, 2005, p. 302). Discourse coalitions transcend pathways and sites, and different discourse coalitions can manifest themselves in a single actor, e.g. coalition governments. Consequently, by identifying sites in environmental policy struggles, we can trace their emergence and/or demise over time. This enables us to move beyond binary presentations of (gaps between) science and policy, to better understand the dynamic and contested nature of science in policy processes.

Techniques are aspects of the process of object formation that shape the emerging object (Duineveld & Van Assche, 2011). Actors sometimes intentionally and strategically deploy techniques, but often techniques are unintended, emergent effects of interactions between actors (Van Assche et al. (2014). Six techniques of object formation are distinguished (Duineveld & Van Assche, 2011): initially, the presence of the object is generally accepted but viewed as inconsequential (reification), before problems arise and it is perceived as more urgent (solidification). Next, elements previously taken for granted are linked to the object and become part of the discussion (codification). The public perception that the object is self-evident is concurrently strengthened (naturalisation). Through the use of scientific means, it becomes part of the objective truth (objectification), which obscures contingencies and alternatives, and it is included in policies and plans (institutionalisation). Techniques help us investigate how power manifests itself in science-policy interactions.

Case study: sustainable tourism research in dutch aviation policymaking

Case introduction and methodology

When Delft University of Technology (TU Delft) awarded Peeters the PhD degree for his thesis on aviation-induced climate change in November 2017, there was a perfect storm. The argument of the thesis was not new. Some of the underlying evidence had circulated since the 2000s

(notably Gössling, 2002). Yet, that autumn, the thesis attracted substantial national media coverage. In Dutch aviation policymaking, an environmental policy struggle emerged in which Peeters advised parliament twice (Peeters, 2019b; Peeters & Melkert, 2018), was the subject of several parliamentary questions, and intensively engaged with actors across the policy spectrum (see e.g. N&M et al., 2019; Peeters, 2019a). What happened?

To trace the unfolding of these events and examine our framework, we adopted a process-oriented case study approach because of its ability to capture the dynamic, context-specific nature of research impact within the temporal dimensions of policy evolutions (Boaz et al., 2009).

The case study design encompassed three components (I-III), premised on Hajer's (2005, p. 306) guidelines for argumentative discourse analysis. Document analysis (newspaper articles, reports, and academic studies on the Dutch aviation sector) and four unstructured "helicopter interviews" (two interviews with Peeters and two interviews with senior newspaper editors/journalists from opposing ends of the Dutch media spectrum) helped us establish a balanced overall chronology of the debate, and identify key informants across the policy spectrum (I). Using a semi-structured interview design based on a topic list operationalising our framework, eighteen central actors were subsequently interviewed (eight senior industry executives; three Members of Parliament; two senior government officials; four NGO & action group directors and senior advisors; and one senior aviation expert) to discern important moments and the different settings of the debate, as well as ways in which actors influenced the debate (II). Informants were thus selected using a combination of purposive and snowball sampling. A quantitative content analysis of all Dutch national and regional newspapers, using Nexis Uni™ (a major online database featuring full Dutch newspaper archives) complemented our inquiries (III).

Interviews took place from April to October 2019. The stated purpose of the interviews was to understand the developing national debate on aviation-induced climate change, without explicitly addressing the PhD thesis. In this period, as we will show, the debate evolved rapidly, with new developments occurring on a weekly basis. Given the political sensitivity, and the fact that a considerable number of our informants are public figures, participation was on the condition of anonymity. All respondents were contacted by phone or email. Interviews were held at locations picked by the respondents and lasted 60-90 minutes, apart from the helicopter interviews (60-180 minutes). Interviews were tailored to the informant's context; interviewers used open-ended and generic guiding questions to probe elaboration.

Data analysis comprised: (i) the manual conversion of all transcripts into individual chronologies (comprising the key moments, policy settings, and means of exerting influence that each respondent perceived); (ii) data triangulation by comparing these chronologies with newspaper articles, reports, letters to parliament, parliamentary motions and websites; and (iii) a Nexis Uni™ analysis in which the aggregated timeframe (Q4-2015-present) and aviation and climate change-related topics that informants identified were used as input (results were manually cleaned and presented in quarterly years). In this way, we identified key incidents, tracking the gradual formation of the object of aviation-induced climate change in the Dutch aviation policy process (Hajer, 2005).

The result is a comprehensive case study, which we present in the next sections. It consists of three episodes, reflecting past, present, and future policy pathways and related dependencies. Within these temporal dimensions, using the metaphor of a perfect storm, we identify the different sites and techniques that formed the object of aviation-induced climate change in the policy process. All interpretations are based on data. Case study references are limited to those specifically mentioned by respondents.

Episode I – legacies of the past

Historically, in the Netherlands, the object of aviation-induced climate change was recognised, but considered irrelevant to national aviation policy (*reification*). The government treated it as a

global policy item, which they addressed through the International Civil Aviation Organisation (ICAO) and the European Union (Huijs, 2011; VVD et al., 2017). Like France, Germany, and the United Kingdom, the Netherlands – densely populated, increasingly urbanised – is home to one of Europe's global aviation hubs: Schiphol airport. But unlike Paris Charles de Gaulle, Frankfurt airport, and London Heathrow, Schiphol is disproportionally large compared to its national catchment area (de Jong & Boelens, 2014). We identified a series of past policies – spanning three decades and revolving around the question of how to develop and maintain a competitive global aviation hub when space is limited – that helped create this situation. This *pathway* nurtured certain governance habits and facilitated the business of two incumbent actors with close government ties: Royal Schiphol Group (RSG) and KLM Royal Dutch Airlines.

RSG is an independent commercial enterprise in which the government has a majority stake. It owns and operates the national airport Schiphol and several regional airports, including Lelystad Airport (hereafter Lelystad). Schiphol, situated in an increasingly urbanised area near Amsterdam, recorded 499,444 flights and ranked as second airport for hub connectivity worldwide in 2018 (RSG, 2019). That same year, KLM (35,000 employees; 166 destinations from Schiphol), which has always been (partially) government-owned, served 34 million passengers and generated 11 billion EUR of revenue (KLM., 2019). Alongside these two, an aerospace cluster has evolved, mainly around TU Delft.

Before the storm: forging growth in the face of environmental limits

Schiphol's development into a global aviation hub is the result of an effective public-private partnership that can be traced back to 1985, when the government appointed Schiphol as a mainport of the Dutch economy (Huijs, 2011). Ever since, the term 'mainport' has become an object in Dutch aviation policymaking, where it has been used to propagate the function of very large air- or seaports as engines of economic growth. Growth strategies between Schiphol (global hub) and KLM (home carrier) were aligned. By exerting influence through the Ministry of Infrastructure and Water Management (I&W), KLM and Schiphol succeeded in making their strategies part of government policy (ibid.).

Gradually, this public-private partnership institutionalised as an 'iron triangle': Schiphol, KLM, I&W developed a governance habit of jointly preparing and taking decisions, with the government relying heavily on aviation sector information (Huijs, 2011). The triangle has since functioned as a *site* and cultivated a common discourse that focused on Schiphol's national economic importance, which facilitated hub expansion.

As Schiphol's environmental impacts (particularly noise) became increasingly pressing (de Jong & Boelens, 2014), actors outside the triangle, such as Schiphol's neighbouring residents, environmental NGOs, and local and regional governments, came to depend on each other to influence aviation policy. The resulting stand-off resembled what Huijs (2011) described as a dialogue of the deaf: actors produced stories about the environmental costs and economic benefits of aviation that were true on their own terms and increasingly talked at rather than listened to each other.

To break this deadlock, the government supplemented the mainport policy with a so-called dual policy objective in the 1990s: expand Schiphol as hub while decreasing its environmental effects (Huijs, 2011). This worked in favour of Schiphol and KLM. Using the mainport as a frame, they stressed their national economic importance (see Boons et al., 2010). The environmental objective mainly focused on safety and noise, not emissions. I&W considered environmental impact measures expensive. Parliament did not push for national emission reduction. Environmental NGOs steered clear of the topic as they saw little space to exert influence; residents were mainly concerned about noise.

To concretise the dual-policy objective, several collaborative platforms have since been installed, reminiscent of the so-called *Poldermodel*; the deep-rooted Dutch governance habit of consensus-based policymaking through extensive negotiations (Vogelij, 2015). One of these

platforms, the Alders Table, became a central *site* for the implementation of the dual-policy objective. It included representatives of all relevant stakeholders (de Jong & Boelens, 2014), except for environmental NGOs. The Alders Table was presented as a permanent institution and was granted legitimacy: parliament would accept any agreement this platform reached as national policy.

In 2008, the first Alders Agreement (Alders, 2008) capped Schiphol's mainport expansion to 500,000 flights per annum in 2020. The policy comprised a proposed 'fifty-fifty principle' (Schiphol and residents would split the benefits from environmental gains), and a so-called 'selectivity rule': a traffic redistribution arrangement that envisioned a move of leisure and budget airlines to regional airports (Schiphol subsidiaries), for Schiphol to expand hub traffic.

The Alders Agreement was controversial from the start. The abstract fifty-fifty principle was never legislated. The selectivity rule possibly conflicted with European Union competition rules, which Alders (2008) acknowledged, and the proposed move of leisure and budget flights from Schiphol to regional airports would haunt aviation policymaking for the next decade. Residents around these regional airports had not been involved in the negotiations (Boons et al., 2010). Particularly Lelystad, a general aviation airfield at the time, was envisioned to become a so-called 'overspill airport', although its location was considered unsuitable for civil aviation (LVNL-To70, 2009). In March 2015, the government decided to develop Lelystad as civil aviation airport, to open in April 2018.

These decisions and events constitute a history of steering attempts (Van Assche et al., 2014): a *pathway* of (past) policy commitments to hub expansion in the face of environmental limits, in which the *object* of aviation-induced climate change lacked presence. These policy legacies continue to inform shared understandings of the present, making it difficult for policymakers to change direction in the face of a storm, as we show next.

Storm signals: more room for environmental politics

Like perfect storms, objects rarely emerge from nowhere. They form as unrelated circumstances converge. In our case, in 2016 and 2017, different and taken-for-granted elements became the subject of debate and correspondingly became more urgent (*solidification*). Figure 1 shows the dynamics in the formation of objects most relevant for this case. Before the storm, only some media attention during the 'Paris' negotiations was notable in Q4 2015. Yet, in 2016 and 2017, three developments, clearly visible in Figure 1, signalled the storm's arrival.

First, the mainport policy was called into question. As Schiphol would reach the agreed cap of 500,000 flights sooner than expected, I&W asked the Alders Table for a renewed advice on Schiphol's development up to 2030 in March 2016. Up until that point in the debate, the 2008 Alders Agreement had effectively functioned as a policy that legitimised Schiphol's and KLM's push for expansion while containing public discontent: it left antagonists little room to make an impact. That changed over the summer of 2016. The Council for the Environment and Infrastructure (RLI), a strategic advisory board of the government, published *Beyond Mainports*, concluding that Schiphol was not a major economic driver (Rli, 2016). 'Noise' gained momentum. The 'mainport's' fall from grace had begun.

Second, aviation became a topic on the national political agenda. Parliamentary elections took place in March 2017. The Green Party scored well and initially participated in coalition talks, but eventually joined the opposition. After the elections, they selected aviation as one of their main topics, as the lack of realistic technological mitigation solutions legitimised a debate about fundamental sustainability questions. Newspapers followed suit in Q2, 2017. Unconventionally, the coalition agreement presented that October, contained a specific section on aviation (see VVD et al., 2017). The text coined the terms 'smart' and 'sustainable', and announced the preparation of a new Civil Aviation Policy Memorandum 2020-2050. Political opportunities to attack the aviation sector in parliament appeared on the horizon.

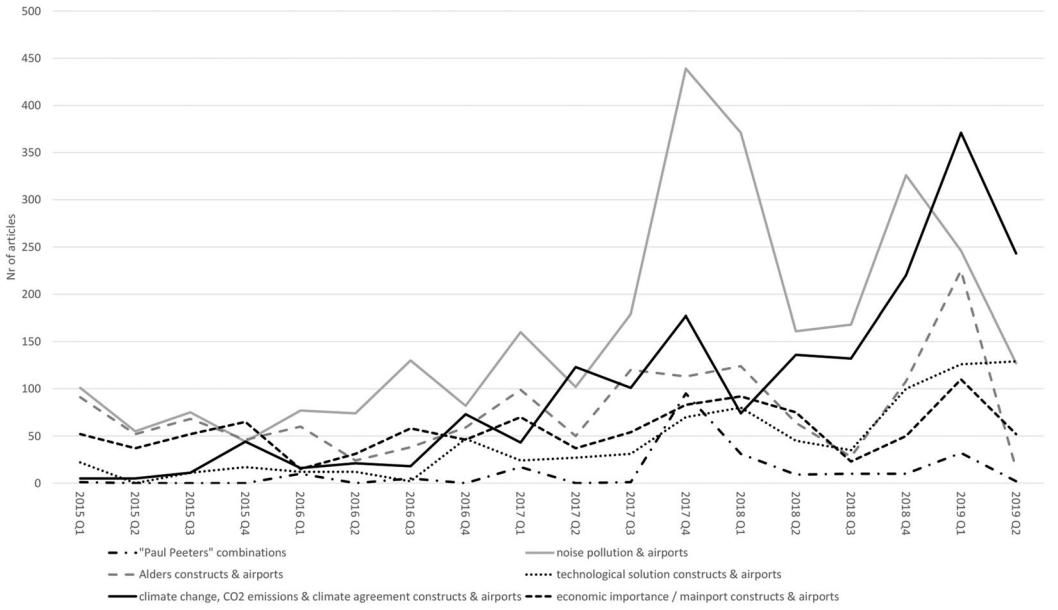

Figure 1. Object formation dynamics. The graph illustrates the dynamics of the formation of several 'knowledge objects' related to Schiphol and Lelystad, in terms of the number of national and regional newspaper articles from 2015 onwards (the period identified by our informants). Source: own analysis with Nexis Uni™.

Third, a new actor emerged and entered the policy arena. In 2017, the Lelystad situation escalated. The government had already postponed the airport's opening due to flight routing issues in November 2016. A structural rezoning of (crowded) Dutch airspace was required. Pressed by Schiphol's looming congestion, I&W opted for a temporary solution. Lelystad traffic would stay below Schiphol traffic and use low-level airspace for approach and departures (Dijksma, 2017a). This move triggered unanticipated resistance from communities under these (new) flight paths. Resident action groups formed. One of them (*HoogOverIJssel*) had members with in-depth technical expertise of aviation and knew how to engage with media and politicians. The group analysed Lelystad's Environmental Impact Assessment (EIA), and reached out to MPs and the media, claiming the anticipated noise levels were incorrect. Dijksma, the responsible State Secretary of Infrastructure at the time, was pressed by the Green Party to discuss the matter with *HoogOverIJssel* and had to admit EIA flaws a few months later (Dijksma, 2017b). 'Noise' and the EIA enjoyed a high share of headlines for six months. By the time the new government took office in October 2017, Lelystad had moved into the national media spotlight.

These developments illustrate *path dependency*: the 2008 Alders Agreement had restrained the course of the policy process for nearly a decade. The related mounting resistance had drawn the attention of a second actor that, until then, had been absent from the debate: the environmental movement. Environmental NGOs waited for an opportunity to step in. It arrived late in 2017, when long-awaited room to make aviation the subject of environmental politics opened up.

A perfect storm: aviation-induced climate change enters the policy process

The storm hit in November 2017, when TU Delft awarded Peeters the PhD degree, and previously unrelated elements were drawn into the debate. The PhD press release was designed for maximum impact (see TU Delft, 2017). Its catch line ("tourism and travel make Paris targets unachievable") addressed Dutch policymakers attending the climate talks in Bonn (COP23):

maximum expansion of "the Dutch mainport Schiphol airport" is not a sustainable development option for the Netherlands. Its impact was considerable.

Several major newspapers published articles that linked Schiphol's expansion to the Paris Agreement (Bruinsma & Stil, 2017; Stil, 2017). Some argued for de-growth of Schiphol (Reijn, 2017). The message featured in some 90+ newspaper articles in that fourth quarter of 2017; the effect visible in Figure 1. Peeters already had a media track record as aviation and climate change expert. Current affairs TV programme *Buitenhof* invited Peeters to discuss Schiphol (Hagens, 2017). Parliamentary questions used the message of the PhD to scrutinise Dutch climate policy, Schiphol's growth, and Lelystad (van Raan, 2017). 'Paris' had entered the Dutch aviation policy process.

The environmental NGOs now had their pretext. They entered the unfolding debate from that autumn onwards. International NGO Transport & Environment (T&E) launched an international lobby campaign in countries dealing with aviation controversies. In the Netherlands, T&E fed information to environmental NGOs, resident action groups, and MPs. New *sites* subsequently emerged. Early 2018 three major Dutch environmental NGOs – *Natuur & Milieu* (Nature & Environment; hereafter N&M); Greenpeace; and the Natuur en Milieu Federatie Noord-Holland (regional environmental council; hereafter MNH) – started a coordinated aviation policy lobby and nation-wide campaign. In Parliament, three opposition parties formed a green alliance. On multiple occasions in late 2017 and 2018, they steered aviation debates towards emission reduction and compelled the government to admit that aviation emissions would continue to increase and that – with this knowledge – its plan was to open a new airport. Several motions, proposing emissions measures have been tabled since (taxation, reducing flight volumes on Schiphol).

Accordingly, through the forging of connections between Schiphol and the Paris Agreement, previously unrelated and taken for granted policy items – hub expansion and climate change – entwined in the Dutch aviation policy process. The object of aviation-induced climate change, considered international policy matter up until that point, correspondingly emerged as a national policy item (*codification*). Ever since, Dutch aviation policy had become the subject of environmental politics.

Present policy pathways

Competing policy actors tend to block or complement each other's strategies, thus acknowledging their adversaries (cf. Van Assche et al., 2014). We identified these *path interdependencies* in the environmental policy struggle that unfolded from 2018 onwards.

In the wake of the storm: discursive confrontations intensify

That year, the object of aviation-induced climate (was) turned into a matter of public concern. 2018 saw Greta Thunberg-inspired school strikes, discussions about 'flight shame' and increased train travel. During an unusually warm summer, media coverage on aviation and climate change grew steadily (see Figure 1). N&M, Greenpeace, and MNH exploited the public discontent, which, in part, they had helped create. They organised meet-ups, symposia and rallies. With the help of green alliance MPs, the NGOs helped action groups build nation-wide platforms. The Collaborating Action Groups Against Low-level flight paths (SATL) and a national citizens' council against aviation growth (LBBL) were subsequently established. Both registered as legal entities. Thus, (the impression of) a nation-wide protest movement had been created. Aviation-induced climate change had become self-evident in the public perception (*naturalisation*).

The government and the aviation sector faced mounting public scrutiny. Schiphol, preferring the localised setting of the Alders Table to a nation-wide debate about growth, denied the actor-status of SATL, arguing that only residents living near operational airports (rather than under the flight paths of future airports) had a legitimate stake in the discussion. The credibility

of the Alders Table, however, further diminished. '*Schiphollen*' had earned a national dictionary entry (van Dale, 2019). This verb refers to the governance habit of making (deliberately complex) agreements that will not be kept, because one knows beforehand that future agreements will follow (that will also not be kept). Meanwhile, action groups worked to expose the intimate relations between the sector and I&W. National news media played into their hands, revealing that I&W officials and Schiphol had collaborated closely on preparing the airport's new EIA and jointly decided what information would be made available for parliament, local governments and residents. Reservations about the trustworthiness of the government were mounting.

In these events, we traced the emergence of two discourse coalitions (cf. Hajer, 2005). They produced opposing representations of the world – and corresponding interpretations of the past, present, and future – in efforts to justify concurrent policy or propose alternative policy directions: a sector coalition and a green coalition. The former comprised the long-established iron triangle actors (I&W, KLM, Schiphol), aerospace associations and TU Delft, and other airlines. The latter included the aforementioned green alliance and environmental NGOs, and an evolving network of local action groups.

The sector coalition, upholding the status quo, depicts aviation-induced climate change as a technological challenge entwined with pro-growth globalism and national pride. Together with KLM, Schiphol is portrayed as an icon of the Netherlands as a trading nation. Zero aviation growth is postulated as pointless because of current global growth projections. Growth is presented as a condition to develop new technologies that reduce emissions. There are aspiring visions of developing and exporting these technologies, premised on typical mercantilist interpretations of global trade. Policies should support these ambitions and not distort the 'international level playing field'. The green coalition, opposing the status quo, depicts aviation-induced climate change as a problem of injustice, exposing the sector's continuous push for growth despite reaching various limits (safety, environment, climate, etc.). The sector is presented as lacking meaningful climate action while being largely exempted from tax; policies should therefore apply the 'polluter pays' principle.

In the unfolding discursive conflict, we observed different strategies for exerting influence. We identified 'commissioned results', i.e. the commissioning of independent (commercial) research agencies to generate science-based counter-evidence to increase credibility (see Table 1), as a tried-and-tested method (see Boons et al., 2010). 'Commissioned results' served to create a realm of scientific factualness in the construction of opposing truth claims (*objectification*), which further polarised the debate.

'Commissioned results' evoked selective reasoning, reminiscent of the dialogue of the deaf (Huijs, 2011): focusing on one side of the argument (both coalitions); cherry picking 'facts' (research agencies); and political editing of reports (I&W). It also helped articulate doomsday stories, depicting the dystopias that await us if preferred routes are not taken (e.g. massive unemployment versus the world not meeting the Paris Agreement). Finally, it aided the devising of frames that put the other in a bad light, e.g. 'one pays more tax when one refuels a Fiat Panda than when one refuels a 747' (MP about KLM) and 'bunglers' (I&W about action groups). Amidst this intensifying debate, there was pressure on and in the government to take the initiative and forge a breakthrough.

Future pathways? – restoring trust through technological innovation

Shared visions and plans can stabilise a discourse by creating a joint dependency on the future. In the final episode of our case, we observed this *goal dependence* in attempts of I&W and incumbent actors to develop a shared vision and plan addressing aviation-induced climate change, and resume control over the debate.

Table 1. Commissioned results (selection 2018-2019).

Report (consultancy in bold; title own translation)	Commissioner	Message
Decisio/SEO. (April 2018). *Exploratory societal cost-benefit analysis policy alternatives aviation*.	I&W	*'Schiphol and Lelystad growth is the most positive costs and benefits scenario'*
RoyalHaskoningDHV. (May 2018). *Compare flying with rail travel on short distances and how we can choose the train more often*.	MNH (NGO)	*Investigating solutions for replacing short distance flights*
CE Delft. (June 2018). *Economic and sustainability effects aviation tax.*	Ministry of Finance	*'A flight tax has positive, though limited economic and environmental effects'*
CE Delft. (June 2018). *Developments Dutch aviation: short overview*.	N&M (NGO)	*2050 scenarios show passenger and CO_2 growth*
Motivaction. (October 2018). *Aviation in the Netherlands: investigation into Dutch population support*.	I&W	*Various (and opposing) outcomes*
Aviation Economics. (October 2018). *The true price of a flight ticket*.	N&M (NGO)	*'External costs add 63% to average ticket price'*
SEO. (November 2018). *Effects of a national aviation tax*.	KLM	*'National aviation tax ineffective for achieving climate goals'*
CE Delft. (November 2018). *Evaluation of Smart and Sustainable action plan Dutch aviation: 35% less CO_2 in 2030.*	Dutch Aviation Group	*'Smart and sustainable goals achievable with strong effort'*
RoyalHaskoningDHV. (March 2019). *Emission reduction potential of Dutch aviation*.	N&M (NGO)	*'Reduction potential depends on CO_2 price development'*
CE Delft. (April 2019). *Economic and sustainability effects aviation tax: calculation of new variants*.	Ministry of the Interior	*'A flight tax has positive, though limited economic and environmental effects'*
CE Delft. (June 2019). *CO_2-emissions of KLM and Schiphol*.	Greenpeace (NGO)	*'Complete picture of KLM and Schiphol emissions'*
Leobus/NEO Observatory. (June 2019). *Second opinion exploratory societal cost-benefit analysis policy alternatives aviation*.	SATL (action group)	*'Stopping Schiphol growth and not opening Lelystad best for prosperity'*
CE Delft. (July 2019). *Must aviation grow to keep our prosperity? Critical analysis of much heard arguments*.	N&M (NGO)	*'Economy will do fine without aviation growth'*

From the moment the new coalition government took office in October 2017, the intensifying debate jeopardised the position of the new Minister of Infrastructure, Van Nieuwenhuizen-Wijbenga. The conservative-liberal People's Party for Freedom and Democracy (VVD), which supported the sector's growth aspirations and had just formed a third consecutive coalition government, recognised the political risk. VVD priority was to restore calm to the debate, so that the government could implement the coalition agreement.

Early 2018, to ease public discontent, the minister informed parliament that 'restoring trust' had become priority and postponed Lelystad's opening for a second time. Media attention regarding noise dropped (see Figure 1). Responsibility for aviation was moved from the State Secretary to the Minister. Early 2018, a new Director General (Dronkers) was appointed to support the director of the aviation department. The sector had questioned the required sensitivity and leadership skills of the latter to handle the politically complex matter of Schiphol and Lelystad, provoking action groups. Schiphol made a similar strategic move in these months, by replacing its full-blown-growth oriented CEO by an experienced politician and marked conciliator, adjusting the airport's tone to moderate, conditional growth. To take the sting out of the opposition's arguments, the minister promised parliament regular updates on the efforts of the aviation sector to reduce emissions (van Nieuwenhuizen-Wijbenga, 2019). This promise led to the sustainable aviation Climate Agreement sub-platform.

February 2018, the government started five 'Climate Agreement sectorial platforms' that were to formulate proposals on how to achieve the 2030 CO_2 target and contribute to a National Climate Agreement. I&W was responsible for the platform on mobility. As aviation was not

included in this platform (in accordance with the Paris Agreement), Dronkers persuaded the sector to establish a sustainable aviation sub-platform aimed at achieving emission reductions. He chaired the sub-platform himself but lacked formal (legal) means to move the sector forward in terms of climate action. To put pressure on the sector, he invited N&M – as a respected environmental NGO – to join (also on behalf of Greenpeace and MNH). In June 2018, the sub-platform met for the first time.

As part of this effort, main sector actors presented an action plan for emission reduction, named 'Smart and Sustainable' (keywords that also featured in the coalition agreement) in October 2018 (Dutch Aviation Group, 2018), followed by a draft sustainable aviation covenant in March 2019 (ACN et al., 2019). Both documents convey a message of technological optimism: they showcase new technologies like electric and futuristic aircraft designs, and link these to claims of significant future emission reductions (see the rise of both technology and climate in Figure 1). In line with her promise of early 2018, Van Nieuwenhuizen-Wijbenga presented the covenant to parliament that same month.

Meanwhile, it turned out that N&M was not just invited to pressure the sector. Their presence made this sector platform look like a fully-fledged climate platform with a societal support base. Yet, in meetings, their participation was curtailed: I&W and the sector often spoke with one voice; the alternative solutions N&M proposed were discarded as unfeasible (without substantiating evidence). I&W-officials pushed for integration in the official Climate Agreement sectorial platform on mobility, which would grant sector actors access to a special climate action fund designated for the climate platforms. N&M blocked this attempt on legitimacy grounds (the Paris Agreement). N&M's presence, in other words, facilitated an act of iron triangle strategising: focus emission reduction measures on (subsidies for) technological innovation in the sector. In March 2019, N&M therefore abandoned the talks. In their view, the action plan and the covenant safeguarded sector rather than climate interests and left alternative policy measures (carbon pricing, reducing the number of flights) untouched (van Nieuwenhuizen-Wijbenga, 2019).

Accordingly, the sustainable aviation sub-platform proved a new *site*. By confining (future) policy options, it delineated the inclusion and exclusion of actors and objects (Duineveld & Van Assche, 2011). The action plan and covenant codified aviation-induced climate change in organisations and plans (*institutionalisation*) and placed the object firmly in the realm of technological innovation.

Storm impact

It is too early to pinpoint the storm's definitive impact. However, the object of aviation-induced climate change had by now become a central policy item in Dutch aviation; more dominant than the established objects 'economy' and 'noise' (see Figure 1), leading to profound shifts in Dutch aviation policymaking.

The Alders Table gradually became irrelevant and disbanded in January 2019 (generating its final media peak, see Figure 1). In its final report, the Alders Table questioned its own purpose given the changed policy setting, and acknowledged that Lelystad had become integral to decisions about Schiphol's future (ORS, 2019). Power transferred from this *site* to national politicians (and the different lobbies influencing them), enticing the government to come up with legislation-based policies rather than *Poldermodel* compromises. At present, Schiphol's hub development is a full-blown political problem. March 2020, the status is that the government *intends* to open Lelystad in November 2020, at the earliest.

Arguably, I&W, too, lost political leverage. In November 2018, parliament passed a motion that opened the debate on aviation tax and encouraged the government to build international support for an international kerosene tax as a mechanism to encourage sustainable aviation fuels. In May 2019, the Ministry of Finance announced its pursuit of an international aviation tax

and carbon pricing. A new policy pathway, beyond the direct control of I&W, had subsequently opened up.

Discussion

This paper used discourse theory to evaluate how STR impacted a particular environmental policy struggle. We started this paper with the observation that, in STR, research impact is somewhat narrowly conceived. Emphasis on the adoption of science in policy and the closing of science-policy gaps through improved research dissemination and partnerships (see for instance Font et al., 2019) presupposes that the domains of science and policy share universally accepted scientific definitions of environmental problems and that the content of policies is always the focus (Hajer, 2005). We illustrated this analytical asymmetry in presentations of the 'science-policy gap' in STR on aviation-induced climate change. The advantage of discourse theory is that it accommodates a broader conceptualisation of research impact. It enabled us to move beyond the substance of science and policy, trace how policy actors assimilate (the same) knowledge objects in different discourses, and identify research impact as an emergent discursive effect across contrasting science-policy constellations. We argue that such an exercise is relevant: it makes us aware that the creation of pro-environmental policy change involves negotiating different constructions of risk in the face of uncertainty (Oels, 2013).

In our case, a PhD thesis on aviation's global CO_2 emissions introduced the object of aviation-induced climate change to the Dutch aviation policy process, where it evoked new perceptions of risks and uncertainties. Since 1985, a well-trodden policy pathway had characterised Dutch aviation policymaking (Huijs, 2011). An institutionalised discourse facilitated the expansion politics of the national airport Schiphol while subjugating rivalling discourses of localised resistance. In the resulting dialogue of the deaf, the aviation emission challenge was only recognised as an international problem. From November 2017 onwards, however, this topic became more urgent, as media coverage of this PhD linked previously unrelated objects (the global climate crisis, the Paris Agreement) to the policy of expanding Schiphol. This offered the environmental movement the opportunity to join the debate. A new national policy pathway subsequently opened, scrutinising Schiphol, its politics of growth, and aviation at large for its climate impact. The Dutch aviation policy status quo had become emblematic of the global climate crisis and the subject of environmental politics (cf. Hajer, 2005).

In the resulting policy struggle, the object of aviation-induced climate change stabilised in the opposing storylines of two discourse coalitions (Hajer, 2005): an environmental alliance presenting the object as a matter of climate justice and institutional change, and a government-mobilised industry alliance depicting the object as a technological challenge. Both discourse coalitions resorted to tested strategies of exerting influence. The environmental alliance constructed (impressions of) a nation-wide protest movement; the sector alliance, defending the status quo, again attempted to make their business strategies part of government policy, reflected in the draft covenant for sustainable aviation (ACN et al., 2019). Both coalitions used the method of 'commissioned results' to generate scientific evidence supporting their respective positions and to construct objective truth claims (see Table 1). This evidence was subsequently used to draw additional objects, such as 'technological innovation' and 'taxation', into the discussion and develop contrasting visions and plans (e.g. Dutch Aviation Group, 2018; N&M et al., 2019). Science, thus, was integral to this policy struggle, which continues to this day.

The framework developed in this paper advances our understanding of research impact in environmental policy struggles. In our study, pathways of object formation illuminated that different (inter)dependencies shape policy paths and hold back change (Van Assche et al., 2014). The domains of science and policy both produce future claims, evident, for instance, in Peeters et al. (2019) and the Dutch aviation sector's 'Smart and Sustainable' action plan (Dutch Aviation

Group, 2018). In both domains, these claims are science-based (IPCC reports and commissioned results, respectively). Yet, while the future claims produced in science serve the future and expose the past and present (Scott et al., 2016b), the future claims produced in the policy domain generally serve economic and electoral interests. In our case, these dependencies showed from the "unique reproductive logic of the reigning actor/institution configuration" (Van Assche et al., 2014, p. 42): hegemonic iron triangle actors and successive policies upholding Schiphol's 'mainport' expansion (see Huijs, 2011; VVD et al., 2017). Accordingly, research impact is an aggregated effect that develops from multiple (contrasting) science-policy interactions.

Sites of object formation accentuated this dynamic and contested nature of science in environmental policy struggles. In our study, the thesis contributed to the emergence of new sites (i.e. the environmental alliance, collaborating action groups), which led to the creation of counter-sites (the sub-platform sustainable aviation) and the disbandment of established sites (the Alders Table). Both the Alders Table and the sustainable aviation sub-platform resembled decentralised forms of *Poldermodel* decision-making (Vogelij, 2015). Although seemingly open negotiations between actors with different interests, they resembled what Jasanoff (2002, p. 268) described as pre-scripted forms of group interactions that "perpetuate existing hierarchies". Their creation – or maintenance – tends to make discourses and discourse coalitions more pronounced. In this study, science played an important role in this process: the two discourse coalitions that emerged across these sites used science to exert influence. Thus, in environmental policy struggles, research impact comprises conflicting policy actions and reactions. This disparity seems to grow over time and is arguably exacerbated by the continuous deployment of (commissioned) research.

The different *techniques* of object formation we observed in our case study underline this disparity. All contenders used science to bolster truth claims and undermine competing ones. According to Weingart (1999), such science-politics erodes scientific authority because it forces policymakers to make decisions based on contradictory advice. In these situations, science produces knowledge objects that function as "repositories of power" (Jasanoff, 2002, p. 253). These objects present temporary certainties in the face of uncertainty. This is evident, for example, in the 'models' and 'scenarios' presented in STR on climate change (e.g. Peeters et al., 2019; Scott et al., 2016a). 'Technological innovation' – the central object of the sustainable aviation sub-platform – is a particularly prominent instrument of power. This object "legitimises the practice of statecraft" (Jasanoff, 2002, p. 257), as established hierarchies associate themselves with (concepts of) novel technologies to reinforce their positions (see Figure 2). Accordingly, in environmental policy struggles, research impact is not a quasi-isolated effect on the world beyond academia, but manifests itself through a multiplicity of knowledge objects that are both embraced and marginalised.

Conclusion

The alternative conceptualisation of research impact developed in this paper offers a more nuanced understanding of the 'science-policy gap' presented in STR addressing climate change. We argue that this 'science-policy gap' is not a gap between science and policy, but a manifestation of science-politics, i.e. the simultaneous politicisation of science and scientification of policy (Weingart, 1999). This constitutes a clash between an unfolding discourse of ecological logic and the still dominant discourse of economic logic. Between them, these discourses construct contrasting socio-technical futures (see Buijtendijk et al., 2018) achieved through fundamentally different science-policy constellations (Jasanoff, 2015). They stem from irreconcilable views on risks (in our case market failure vs. climate crisis) and risk assessment, turning decisions over them into power struggles (Beck, 2009; Oels, 2013). Consequently, as discursive gaps can never be

Figure 2. Minister van Nieuwenhuizen-Wijbenga supporting promising new technology (Quote: "We want aviation to become more sustainable and cleaner. The platform sustainable aviation is a good initiative to boost the developments in electric aviation.").
Source: Minlen, (2018)

closed (Van Assche et al., 2014), what remains is a field of profound cultural politics; a debate in which society reflects on its achievements and questions values and politics itself (Hajer, 1996).

As our study illustrated, cultural politics is a hostile setting for consensus-based policymaking, let alone the unquestioned acceptance of scientific evidence. In this realm, agreement or compromise ends debate and triggers new uncertainties that jeopardise acquired credibility and positions of power. This may explain, as our study showed, why governments prefer the seemingly value-free option of technological innovation over structural policy change (Jasanoff, 2002) and, conversely, why NGOs sometimes abandon climate negotiations. Thus, in these settings, the function of research is not to inform, but to legitimise pre-existing, institutionalised policy positions. This strengthens the status quo. The more policy actors use science to cancel out the science of opponents, "the more powerful political or economic interests prevail, just as they would have without science" (Rayner, 2006, p. 5).

This paper raises questions about narrow conceptions of research impact. Our study shows research impact is a long-term, emergent effect, entwined with various other elements, that manifests itself subtly in policy processes. In particular, it described the intricate force field in which policymakers have to negotiate conflicting science-based truth claims, and select options that allow them to make decisions and reduce risks in the face of uncertainty (Weingart et al., 2000).

STR researchers should be aware of this force field when engaging with policy actors as part of the propagated 'impactful' research endeavours (Font et al., 2019). This study showed the importance of persuasive science communication and engagement with policy actors: the PhD press release was well-timed and Peeters qualified as a convincing communicator of science (see Peters, 2008). But, above all, it illustrated the importance of steadfastness. Since the start of his professorship in 2002, Peeters has been conducting various projects with policy actors. His message and arguments have always been the same. In contrast, 'hit-and-run' commissioned results can generate significant funding, media attention and public debate – great for case studies

about research impact (Owens et al., 2006) – but also progressively limit the possibilities for genuine policy dialogues and new policy paths.

Policy actors, too, should be aware of this force field and critically reflect on their reasons for commissioning research. Such studies may help in buying time and credibility, but can also enforce deadlocks.

Finally, this paper highlights the need for advanced policy analyses in STR that address this intricate force field, examine environmental policy struggles from up-close and within (Jasanoff, 2015), and in different governance contexts. To avoid the analytical asymmetries that emerge when a single environmental reality is pitched against policy rhetoric, environmental policy studies acknowledging that impact takes time to manifest, i.e. through the reframing of problems and solutions, and a slow change of vocabulary and mindsets (Owens et al., 2006) – in other words, through discourse – are particularly valuable. We hope that our paper helps invigorate this debate.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Harald Buijtendijk is Researcher at the Centre for Sustainability, Tourism and Transport (CSTT) of Breda University of Applied Sciences. He is currently PhD candidate at the Department of Environmental Sciences, Wageningen University & Research. His key interest is in sustainability transitions.

Eke Eijgelaar is Researcher at the Centre for Sustainability, Tourism and Transport (CSTT) of Breda University of Applied Sciences, the Netherlands. His expertise is in sustainability issues of tourism and tourism transport.

References

ACN, AOPA Netherlands, BARIN, Correndon, Dnata, easyJet, … VNO-NCW. (2019). *Ontwerpakkoord Duurzame Luchtvaart [Draft Covenant Sustainable Aviation]*. https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2019/03/27/bijlage-2-ontwerpakkoord-duurzame-luchtvaart/bijlage-2-ontwerpakkoord-duurzame-luchtvaart.pdf

Alders, H. (2008). *Aldersadvies Schiphol [Alders advice Schiphol]*. Alderstafel.

Beck, U. (2009). *World at risk*. Polity Press.

Boaz, A., Fitzpatrick, S., & Shaw, B. (2009). Assessing the impact of research on policy: a literature review. *Science and Public Policy*, *36*(4), 255–270. https://doi.org/10.3152/030234209X436545

Boons, F., Van Buuren, A., & Teisman, G. (2010). Governance of sustainability at airports: Moving beyond the debate between growth and noise. *Natural Resources Forum*, *34*(4), 303–313. https://doi.org/10.1111/j.1477-8947.2010.01314.x

Bramwell, B., Higham, J., Lane, B., & Miller, G. (2017). Advocacy or neutrality? Disseminating research findings and driving change toward sustainable tourism in a fast changing world. *Journal of Sustainable Tourism*, *25*(1), 1–7. https://doi.org/10.1080/09669582.2015.1106146

Bruinsma, G., & Stil, H. (2017, November 19). Luchtvaartexpert: Maak vliegen peperduur [Aviation expert: make flying very expensive. https://www.ad.nl/economie/luchtvaartexpert-maak-vliegen-peperduur~afd59433/.

Buckley, R. (2012). Sustainable tourism: Research and reality. *Annals of Tourism Research*, *39*(2), 528–546. https://doi.org/10.1016/j.annals.2012.02.003

Buijtendijk, H., Blom, J., Vermeer, J., & van der Duim, R. (2018). Eco-innovation for sustainable tourism transitions as a process of collaborative co-production: the case of a carbon management calculator for the Dutch travel industry. *Journal of Sustainable Tourism*, *26*(7), 1222–1240. https://doi.org/10.1080/09669582.2018.1433184

Cohen, S. A., Higham, J., Gössling, S., Peeters, P., & Eijgelaar, E. (2016). Finding effective pathways to sustainable mobility: Bridging the science-policy gap. *Journal of Sustainable Tourism*, *24*(3), 317–334. https://doi.org/10.1080/09669582.2015.1136637

Cohen, S. A., & Kantenbacher, J. (2020). Flying less: Personal health and environmental co-benefits. *Journal of Sustainable Tourism*, *28*(2), 361–316. https://doi.org/10.1080/09669582.2019.1585442

de Jong, B., & Boelens, L. (2014). Understanding Amsterdam Airport Schiphol through controversies. *Systems Research and Behavioral Science*, *31*(1), 3–13. https://doi.org/10.1002/sres.2188
Dijksma, S. A. M. (2017a). *Luchtvaartbeleid. #31936-390 [Aviation policy]*. House of Representatives.
Dijksma, S. A. M. (2017b). *Luchtvaartbeleid. #31936-422 [Aviation policy]*. House of Representatives.
Dredge, D. (2015). Does relevance matter in academic policy research?. *Journal of Policy Research in Tourism, Leisure and Events*, *7*(2), 173–177. https://doi.org/10.1080/19407963.2014.990661
Dredge, D. (2019). Sustainability evidence-based tourism policies [TRINET post]. Retrieved January 31, 2019.
Duineveld, M., & Van Assche, K. (2011). The power of tulips: Constructing nature and heritage in a contested landscape. *Journal of Environmental Policy & Planning*, *13*(2), 79–98. https://doi.org/10.1080/1523908X.2011.572655
Dutch Aviation Group (2018). *Slim én duurzaam: Actieplan Luchtvaart Nederland: 35% minder CO2 in 2030 [Smart and Sustainable: Action plan Dutch aviation: 35% less CO2 in 2030]*. Dutch Aviation Group.
Font, X., Higham, J., Miller, G., & Pourfakhimi, S. (2019). Research engagement, impact and sustainable tourism. *Journal of Sustainable Tourism*, *27*(1), 1–11. https://doi.org/10.1080/09669582.2019.1560673
Gössling, S. (2002). Global environmental consequences of tourism. *Global Environmental Change*, *12*(4), 283–302. https://doi.org/10.1016/S0959-3780(02)00044-4
Gössling, S., & Scott, D. (2018). The decarbonisation impasse: global tourism leaders' views on climate change mitigation. *Journal of Sustainable Tourism*, *26*(12), 2071–2086. https://doi.org/10.1080/09669582.2018.1529770
Hagens, P. J. (2017). Rem op vliegen [Break on flying] [Television series episode 19-11-2017]. In *Buitenhof*. VPRO.
Hajer, M. (1996). Ecological modernisation as cultural politics. In S. Lash, B. Szerszynski, & B. Wynne (Eds.), *Risk, environment, and modernity: Towards a new ecology* (pp. 246–268). Sage.
Hajer, M. (2005). Coalitions, practices, and meaning in environmental politics: From acid rain to BSE. In D. Howarth & J. Torfing (Eds.), *Discourse theory in european politics: Identity, policy and governance* (pp. 297–315). Palgrave Macmillan UK.
Hall, C. M. (2019). Constructing sustainable tourism development: The 2030 agenda and the managerial ecology of sustainable tourism. *Journal of Sustainable Tourism*, *27*(7), 1044–1060. https://doi.org/10.1080/09669582.2018.1560456
Howarth, D. (2000). *Discourse*. Open University Press.
Huijs, M. G. (2011). Building castles in the (Dutch) air: Understanding the policy deadlock of Amsterdam Airport Schiphol 1989-2009. [PhD], TU Delft.
Jasanoff, S. (2002). New modernities: Reimagining science, technology and development. *Environmental Values*, *11*(3), 253–276. https://doi.org/10.3197/096327102129341082
Jasanoff, S. (2015). Future imperfect: Science, technology, and the imaginations of modernity. In S. Jasanoff & S.-H. Kim (Eds.), *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power* (pp. 1–33). University of Chicago Press.
KLM. (2019). *Annual report 2018*. KLM Royal Dutch Airlines.
LVNL-To70. (2009). *Luchtruim Flevoland 2020: een verkenning van de mogelijkheden [Airspace Flevoland 2020: a study of options]*. Air Traffic Control the Netherlands (LVNL).
Minlen, W. (2018). Partijen bundelen krachten voor duurzaam vliegen [Parties join forces for sustainable aviation]. https://twitter.com/MinIenW/status/1013817489153806336
N&M, Greenpeace, & MNH. (2019). *Een nieuw toekomstbeeld voor de luchtvaart [A new future vision for aviation]*. *Natuur & Milieu, Greenpeace & Natuur en Milieufederatie Noord-Holland*.
Oels, A. (2013). Rendering climate change governable by risk: From probability to contingency. *Geoforum*, *45*, 17–29. https://doi.org/10.1016/j.geoforum.2011.09.007
ORS (2019). *Advies Toekomstbestendig NNHS & Advies Middellange termijnoplossing "wonen en vliegen. [Advice future-proof norms and enforcement regime & advice mid-term solution living and flying]*. Omgevingsraad Schiphol.
Owens, S., Petts, J., & Bulkeley, H. (2006). Boundary Work: Knowledge. *Environment and Planning C: Government and Policy*, *24*(5), 633–643. https://doi.org/10.1068/c0606j
Peeters, P. (2017). *Tourism's impact on climate change and its mitigation challenges. How can tourism become 'climatically sustainable'?* [PhD], TU Delft.
Peeters, P. (2019a). *Minder en duurzamer vliegen? [To fly less and more sustainable?]*. Paper Presented at the DAG-Symposium 'De Vlucht Naar Voren'.
Peeters, P. (2019b). *Parlement en Wetenschap: Factsheet Vliegbelasting, gedrag en alternatieven. #2019Z12788 [Parliament and Science: factsheet aviation tax, behaviour and alternatives]*. House of Representatives, De Jonge Akademie, KNAW, NWO, TNO, VSNU.
Peeters, P., Higham, J., Cohen, S., Eijgelaar, E., & Gössling, S. (2019). Desirable tourism transport futures. *Journal of Sustainable Tourism*, *27*(2), 173–188. https://doi.org/10.1080/09669582.2018.1477785
Peeters, P., Higham, J., Kutzner, D., Cohen, S., & Gössling, S. (2016). Are technology myths stalling aviation climate policy?. *Transportation Research Part D: Transport and Environment*, *44*, 30–42. https://doi.org/10.1016/j.trd.2016.02.004

Peeters, P., & Melkert, J. (2018). *Parlement en Wetenschap: Factsheet Toekomst verduurzaming luchtvaart. #2018Z11731 [Parliament and Science: Factsheet future sustainable development aviation]*. House of Representatives, De Jonge Akademie, KNAW, NWO, VSNU.

Peters, H. P. (2008). Scientists as public experts. In M. Bucchi & B. Trench (Eds.), *Routledge handbook of public communication of science and technology* (pp. 131–146). Routledge.

Rayner, S. (2006). What drives environmental policy?. *Global Environmental Change*, *16*(1), 4–6. https://doi.org/10.1016/j.gloenvcha.2005.11.003

Reijn, G. (2017, November 28). De luchtvaart is de nagel aan de doodskist van het klimaat: zo gaan we 'Parijs' zeker niet halenMet het vliegtuig gaan we 'Parijs' zeker niet halen [Aviation is a nail in the climate's coffin: by plane we won't make it to 'Paris']. *Volkskrant*. https://www.volkskrant.nl/de-gids/de-luchtvaart-is-de-nagel-aan-de-doodskist-van-het-klimaat-zo-gaan-we-parijs-zeker-niet-halen~b0e3c23f/

Rli. (2016). *Beyond mainports*. Council for the Environment and Infrastructure (Rli).

RSG. (2019). *Royal Schiphol Group 2018 Annual Report*. Royal Schiphol Group.

Scott, D., Gössling, S., Hall, C. M., & Peeters, P. (2016a). Can tourism be part of the decarbonized global economy? The costs and risks of alternate carbon reduction policy pathways. *Journal of Sustainable Tourism*, *24*(1), 1–72. https://doi.org/10.1080/09669582.2015.1107080

Scott, D., Hall, C. M., & Gössling, S. (2016b). A report on the Paris Climate Change Agreement and its implications for tourism: why we will always have Paris. *Journal of Sustainable Tourism*, *24*(7), 933–948. https://doi.org/10.1080/09669582.2016.1187623

Stil, H. (2017). Alleen rem op vliegen helpt milieu [Only break on flying helps environment]. *Parool*. https://www.parool.nl/nieuws/alleen-rem-op-vliegen-kan-het-milieu-nog-redden~b5308bb9/?referer=https%3A%2F%2Fwww.google.nl%2F.

Delft, T. U. (2017). Tourism and travel make Paris targets unachievable. https://www.tudelft.nl/en/2017/tu-delft/tourism-and-travel-make-paris-targets-unachievable/

Van Assche, K., Beunen, R., & Duineveld, M. (2014). *Evolutionary governance theory: An introduction*. Springer.

van Dale. (2019). Schiphollen. https://www.vandale.nl

van Nieuwenhuizen-Wijbenga, C. (2019). *Klimaatbeleid voor luchtvaart. #31936-585 [Climate policy for aviation]*. House of Representatives.

van Raan, L. (2017). *Onderzoek waaruit blijkt dat de groeiende luchtvaart het halen van klimaatdoelstellingen onmogelijk maakt. #2017Z15536 [Research that demonstrates aviation growth to obstruct achievement of climate goals]*. House of Representatives.

Vogelij, J. C. (2015). *Effective strategy making: Co-designing scenarios as a tool for effective strategic planning* [PhD]. TU Delft.

VVD, CDA, D66, & CU. (2017). *Confidence in the Future. 2017–2021 Coalition Agreement*. Government of the Netherlands.

Weingart, P. (1999). Scientific expertise and political accountability: paradoxes of science in politics. *Science and Public Policy*, *26*(3), 151–161. https://doi.org/10.3152/147154399781782437

Weingart, P., Engels, A., & Pansegrau, P. (2000). Risks of communication: discourses on climate change in science, politics, and the mass media. *Public Understanding of Science*, *9*(3), 261–283. https://doi.org/10.1088/0963-6625/9/3/304