

Article

Flying Green from a Carbon Neutral Airport: The Case of Brussels

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Abstract: The aviation sector is one of the fastest growing emitters of greenhouse gases worldwide. In addition, airports have important local environmental impacts, mainly in the form of noise pollution and deterioration in air quality. Although noise nuisance in the vicinity of airports is recognized as an important problem of the urban environment which is often addressed by regulation, other environmental problems associated with aviation are less widely acknowledged. In the climate debate, the importance of which is rising, aviation has remained under the radar for decades. In the present paper, we use the case of Brussels Airport (Belgium) to demonstrate that the local perception of air travel-related environmental problems may be heavily influenced by the communication strategy of the airport company in question. Basing our analysis on publicly available data, communication initiatives, media reports, and policy documents, we find that (1) the noise impact of aviation is recognized and mainly described in an institutionalized format, (2) the impact of aviation on local air quality is ignored, and (3) the communication on climate impact shows little correspondence or concern with the actual effects. These findings are relevant for other airports and sectors, since the type of environmental communication produced by airport companies can also be observed elsewhere.

Keywords: environmental planning; environmental communication; airports; carbon neutrality

1. Introduction

On 20 June 2018, Brussels Airport announced that it had achieved its goal of becoming carbon-neutral, and the company's CEO pointed to their efforts to limit the impact on the environment, and to their ambitions to further develop the airport in a sustainable way [1]. Although such communication is far from uncommon, it may be surprising, given that aviation has been criticized for its increasing carbon emissions, as well as other environmental impacts, notably noise and local air pollution.

Air travel grows much faster than most economic indicators. In 2017, the global number of air passengers grew by 8.1%. For the period 2005–2050, the aviation sector expects to quadruple its turnover [2]. However, research concludes that the anticipated growth is necessarily accompanied by a significant contribution to climate change and accelerated depletion of fossil fuels [3,4]. In 2016, the NGO Transport & Environment estimated that aviation was responsible for 4.9% of human-made global warming, a share that is rapidly increasing [5]. Also in 2016, emissions caused by interior transport (excluding non-domestic aviation) in the EU-28 amounted to 931 Mton of CO₂ equivalent, while according to European statistics, international aviation made an additional contribution of 148 Mton (and international navigation represented another 147 Mton) [6]. The aviation figures mentioned above, however, only reveal part of what is at stake, since the additional radiative forcing effect [7], which is typically caused by operating jet engines at high altitudes, was not yet included.

Even worse, Peeters et al. [2] argue that there are no prospective technological solutions that will make flying significantly less polluting; aviation emissions are more or less 'tech neutral' [8].

At the local level, tensions between airport activities and liveability in the surrounding areas are more pronounced. There is growing awareness of both the impact of air traffic-related noise pollution on the health of local residents [9] and the consequences for local air quality from the large volumes of kerosene burned [10]. Meanwhile, the climate impact of air traffic has entered urban and regional planning discussions. Climate, alongside other environmental issues, has played a significant role in bitter public debates about the expansion (Heathrow, London, UK) or relocation (Aéroport du Grand Ouest, near Nantes) of existing airports [11,12]. In the case of Heathrow, in June 2018 the UK parliament voted in favour of the construction of a third runway, a decision which was challenged through legal means by opponents, partly on the basis of climate-related arguments. After years of contestation, the plans for a new airport near Nantes were cancelled by the French government in January 2018. Although it would be an exaggeration to state that climate change has played a decisive role here, in 2010, when the discussion about the plans was at its most vigorous, a poll by the French environmental organization 'Agir pour l'Environnement' [13] found that only 27% of respondents (n = 1009) thought that, in times of climate debate, it was appropriate to build new airports.

Communication and marketing strategies of a number of airports, however, respond to the problems outlined above with messages that emphasize their sustainability initiatives. The Airport Carbon Accreditation programme, under which the claim of carbon neutrality by Brussels Airport was made, is an example of an institutionalized way of allowing airports to position themselves as environmentally conscious actors, while the responsibility for aircraft emissions is silently transferred to the airline operators [14,15].

The communication from Brussels Airport quoted above contrasts sharply with recent developments in climate debates and policies, which suggest that effectively tackling global warming is incompatible with the unabated growth of aviation [5]. Building on this observation, we first outline the ongoing public debates and the actual environmental impact of the air traffic facilitated by Brussels Airport. We then contrast it with the sustainability discourse developed by the airport company and authorities, who see the airport as an important pole of economic growth. Our research hypothesis is that reality and communication differ greatly, and that the general image of the environmental impact of the aviation sector is strongly influenced by the business communication strategies we examine. We place this research hypothesis in a theoretical framework of environmental discourse. However, in contrast with anti-realist approaches in discourse analysis, we take a rather positivist stance, contrasting the figures used in communication strategies with estimations of environmental effects based on academic and other sources. Although the current research is a case study, we claim that it is representative of a broader and globally relevant problem, one that can be extended not only to other airports, but also to environmental accreditation programmes and the environmental communication strategies of other actors.

2. Environmental Discourse: Theory and Application

The empirical analysis focuses on the claim that Brussels Airport is a carbon-neutral airport that develops in a sustainable way. One way to assess airport sustainability is to use environmental reports and other sources in a document analysis to evaluate activities like waste management [16] and energy management [17,18] at a particular airport. Environmental reporting by companies is also analyzed in comparative and longitudinal studies to map differences in reporting over space and time. The type of information provided and analyzed is not only quantitative, since 'active stakeholder engagement activities', for example, can be seen as a sign that an organization is aware of its wider impacts and social responsibilities [19] (p. 210). Apart from legal requirements, environmental reporting is also seen as a means to obtain a social license to operate and legitimize the activities of a company [20].

The more critical approaches in social and environmental accounting research typically include the social dimension when examining reporting practices. Corporate disclosure has the potential

to make visible the impacts which tend to be ignored and to assess 'the veracity of claims made by capital regarding social responsibility and environmental probity' [21] (p. 466). However, research has shown that, in practice, reports might distract attention from key issues, privilege a manager's or shareholder's perspective, and are only loosely connected to reality [21,22]. Thus, any document analysis needs to recognize that reports are never neutral documents. Claims, reported figures, and other elements communicated by companies for legal reasons or to legitimate their activities are the result of interactions with a variety of actors, including protest groups and researchers. As a result, document analysis cannot claim that the researcher is independent from the documents under study, as researchers play an active role in sustainability debates [23]. In a similar fashion, an analysis of environmental communication cannot be limited to the 'facts' reported in the documents under study. Besides, non-textual communication is also relevant, as has been emphasized in visual studies [24–26]. Therefore, environmental communication in this broad sense can best be described as discourse.

A vast literature exists on environmental and sustainability discourse, in which policies and strategies under investigation have been portrayed as myths [2,27], symbolic politics [28], greenwashing, or faux sustainability [29]. These strong terminologies can be used to describe a range of underlying issues, including an overly narrow scope and the neglect of the social dimension of sustainability; the combination of irreconcilable aims like growth and environmental preservation; and the mismatch between optimistic statements in glossy publications and major environmental impacts observed in practice. Ideas of truth and reality seem to play a central role here. However, truth and reality are contentious issues.

A considerable number of studies of environmental discourse employ a Foucauldian anti-realist approach and state that scientific facts or claims are socially and discursively constructed instead of discovered in an external reality. Hence, 'science does not produce truth but only truth claims' [30] (p. 282). While emphasizing that discourse gives meaning to physical and social realities, authors such as Hajer do not deny that severe ecological and social problems do exist. In other words, scientists, as well as other actors in sustainability debates, take part in an argumentative struggle over scientific, as well as political claims, but this cannot be reduced to a mere difference of opinion. The rejection of excessive relativism implies that an idea of truth is still present, and we now turn to Frankfurt's work on truth and bullshit to better grasp these concepts [31,32].

In a famous essay, Frankfurt [31] draws a distinction between 'lies' and 'bullshit' and clarifies that a lie cannot be seen in isolation from the truth or reality that is misrepresented. In contrast, bullshitting has little to do with lying or deliberately misrepresenting reality, but with a 'lack of connection to a concern with truth' [31] (p. 33). The 'bullshitter' does not try to mislead with regard to the facts but with regard to their own position and intentions. The speaker is, then, no longer concerned with the truthfulness of the facts she or he is dealing with, but with the effects. In a subsequent essay, Frankfurt [32] discusses why truth is important to us, and why, as a consequence, bullshitting and lying are undesirable. First, there is the practical utility of truth and knowledge: truth enables humans to make use of complex technologies and denying an inconvenient truth, such as climate change, may be detrimental for the quality of life of many humans. However, there is also a normative dimension. The goals and purposes that humans pursue are validated by statements of fact, and acting rationally requires an idea of what is truth and what is not. Finally, Frankfurt demonstrates that by making us believe in non-existent facts, liars and bullshitters impose their will on us by replacing our grasp of reality by their imagination. Since our grasp of reality is closely related to our identity, bullshit and lies are able to change who we are. While Frankfurt focuses on the individual level, this illustrates that the imposition of another's will and imagination -either by bullshitting or lying- is also problematic from a democratic point of view.

The relevance of Frankfurt's [31,32] work is that it provides a bridge between the idea of discourse and a positivist concept of reality. In other words, although we acknowledge that academic research, facts, and figures are never neutral, sustainability claims can be assessed in light of their correspondence with study results, coherence, and validity. This idea is sympathetic to Wylie's [33] defence of positivism

as a potentially critical approach. In the present paper, Section 3 is a 'positivist' description of the impacts of aviation in the case study region, and Section 4 applies a similar approach to environmental communication, by summarizing the content in a number of tables. The analysis conceptualizes this communication as discourse in which facts and figures may be mobilized for strategic purposes and confronts this discourse with the 'positivist' description in Section 3. While we acknowledge that our description of the impacts can be seen as discourse, we argue that these numbers cannot be reduced to an opinion.

3. The Case of Brussels Airport in Physical, Social-Political and Environmental Terms

3.1. Brussels Airport: An Overview

The case used in this study is Brussels Airport. Since an airport is a multifaceted organization, it is a challenge to provide a clear, unambiguous definition and delineation of Brussels Airport and the different functions it performs. According to Baxter et al. [16] (p. 1) 'airports play a vital role in the global air transport value chain, acting as the critical interface point between the surface-based and air transport modes', but the economic function of an airport company can also be described as the generation of profit and the creation of value for the shareholders (for the Brussels case, see Reference [34]). An airport can also be seen as the territory managed by an airport company, or as the activities under direct control of the company. We do not provide a simple definition of the case, since this definitional ambiguity is an essential part of the analysis, as will become clear later. Nevertheless, we emphasize the link between aviation and airports.

We start with the physical characteristics of the airport. Brussels Airport has three runways, the Z-shaped structure of which originates in a German military airfield that was built during the Second World War. The two busiest runways (07 L/25 R and 07 R/25 L) are oriented more or less east-west, while the third runway (01/19) has a north-south orientation. In 1958, this structure was confirmed as the operational basis of the airport [35]. In the same period, the location of the current terminal building was established, at a distance of about 10 km as-the-crow-flies from the central square of Brussels Grand Place.

Because of historical reasons, Brussels Airport is only a stone's throw away from the Brussels urban area. Due to the combination of unabated growth of the city and processes of suburbanization during the post-war period, the airport is now embedded in the urban agglomeration. In 1977, an important part of the surrounding area was designated as residential in the regional zoning plan of Halle-Vilvoorde-Asse, and the rapid increase in the demand for construction land and soaring real estate prices have ensured the development of residential areas even closer to the airport.

In Belgium, Brussels Airport is known as the 'national airport', receiving approximately 70% of all civilian flights with Belgium as a country of origin or destination. In 2017, it accommodated more than 112,000 departing flights. Unlike many other international airports, Brussels Airport did not go through a stable growth trajectory, which is due in part to the bankruptcy of the national air carrier Sabena in 2001, growing competition by the low-cost airport of Charleroi since 2001, the departure of the courier company DHL in 2008, and a terrorist bomb attack in 2016. Nevertheless, the number of passengers has been on the rise, with 12.4 million passengers arrived or transferred in 2017, a growth of 38% compared to 2007.

Until 2004, the airport was operated by the public Brussels International Airport Company (BIAC), which was then privatized and renamed Brussels Airport Company (BAC). Since then, 75% of the shares have been held by private investors, including the asset management firm Macquarie [36], with 25% held by the Belgian State [34]. However, in September 2018, the regional government of Flanders expressed interest in acquiring part of the privately-owned share package [37]. The airport is located in the Flemish region, which also represents the level of government that is largely responsible for planning the surrounding area, as well as the connecting road infrastructure. However, the nearby Brussels region is an important actor in the debate on the economic role of the airport and on its

transport links. The airport is an important source of employment, especially for the relatively low-skilled part of the Brussels population who face above-average risks of unemployment. It is also a source of significant noise pollution in the densely populated urban core [38]. Collective transport to the airport is provided by three public transport companies, including the national railway operator (train), the Flemish public transport company (bus) and the Brussels public transport company (bus, and soon tram).

Investments in airport infrastructure are largely borne by BAC, except the improvements to the railway connection completed through a public-private partnership between the federal rail infrastructure operator and private investors in 2012, the cost of which is partly covered through train ticket sales. The train offers a high-frequency, fast connection to the city centre of Brussels (15 min), and by car the Brussels ring road is 5 to 15 min away, depending on congestion levels. Freight is carried from and to the facilities by trucks and vans only, while jet fuel is delivered via the Central European Pipeline System.

3.2. Public Debates Centred on Brussels Airport

The development of Brussels Airport has been accompanied by a long tradition of public debate, in which the positions held by the Brussels and Flemish governments largely coincide with the different interests and concerns of their respective populations, mainly the urban population in Brussels and the suburban population in Flanders.

In the Brussels region, the emphasis has mainly been on noise pollution caused by the airport, mainly due to night flights and the choice of politically imposed flight routes for taking-off and landing aircraft [39]. These flight routes, which are decided at the level of the Federal government, not only have an impact on the question of which neighbourhoods are negatively affected at certain times of the day, but also on the number of night flights that can be operated from Brussels Airport. As of early 2009, the applicable environmental permit caps the annual number of night flights at 16,000 (with both landings and take-offs counted), while the total number of flights is not restricted. In contrast, the (much larger) airport of Amsterdam-Schiphol in the neighbouring Netherlands has an environmental cap of 500,000 flights annually.

On the other hand, the importance of the airport for the position of Brussels as an international political and business centre, and as a provider of low-skilled jobs in particular, is widely recognized. Therefore, efforts are continuously being made to improve the accessibility of the airport to the city, in particular by public transport and outside office hours [40].

In Flanders, the problem of noise pollution is present as well, although the lower population density means fewer residents are negatively affected compared to Brussels, regardless of the applicable flight route scheme. The societal debate concentrates on spatial planning issues, and on questions about the possibility and desirability of airport expansion. Although the airport underwent a major redevelopment in the period 1994–2002, when two new piers were constructed [41], the complex still fits within the spatial constraints of the regional zoning plan. Important engineering works relating to accessibility remained within the scope of the spatial plan, partly due to the largely underground construction of a new high-speed rail link and train station. On the other hand, the expansion of the airport has entailed fairly large-scale office developments in the nearby municipalities of Zaventem and Diegem, which have had a substantial impact on the built environment and have contributed to the recent office real estate 'bubble' in the Brussels metropolitan area. Moreover, Brussels Airport has developed ideas about possible future expansions, which may include an additional access road and parking facilities extending beyond the current spatial demarcation. An additional access road would mainly be aimed at increasing the number of travellers who can arrive by car while circumventing congestion on the Brussels ring road [42]. At the same time, the regional zoning plan, the most important contours of which date back to the 1970s, has allowed the construction of additional housing near the runways for a long time. Pressure on the local real estate market has, consequently, entailed numerous residential developments at locations which do not meet current liveability standards.

Strangely enough, in the case of the Brussels metropolitan area, climate change seems to have played virtually no role in the public debate about the impact and desirability of a possible airport expansion. Unlike the Netherlands, Belgium has never taken steps to introduce a flight tax. Moreover, the entire aviation sector in Belgium remains exempt from VAT and excise duties, as is the case in most countries in the world. Regional competition within the airport sector and the threat that activities might relocate to the Charleroi regional airport, but also to Eindhoven and Amsterdam Schiphol, partly overshadow the environmental debate, and in particular the climate impact debate.

In the following sections, we will discuss three environmental threats that are linked to the activities of the Brussels Airport: noise; local air quality; and greenhouse gas emissions, which are the ‘the three most critical environmental priorities for airport operators’ put forward by Brussels Airport [43] and four other airport partners in their Collaborative Environmental Management agreement.

3.3. Noise Pollution

As early as the 1970s, the location and orientation of Brussels Airport’s main runways have led to political discussions about the flight routes. In particular, the landing operations, when aircraft fly very low over the urban area, generate a significant amount of noise nuisance. Night flights, which are essential for some logistic service providers, are, of course, experienced as the most unpleasant.

In 1974, the so-called Chabert routes, which were named after the then-minister of traffic, were decided on at national level. Although it is hardly possible to reconstruct how the various successive flight route schemes were negotiated, it is clear that the logic of the decision-making process was partly controlled by attempts to spare the place of residence of the competent politicians and their respective voters. The Chabert routes concentrated hindrance in the northern part of the Brussels region. As the airspace above the Brussels agglomeration became busier, not only did nuisance increase, but so did the political pressure to start working on the routes [39].

In the 1990s, several local action groups mobilised and denounced the problem of noise disturbance. The action groups included Boreas (now Actie Noordrand), which defended the interests of the residents of the municipalities in the northern periphery, and a number of counterparts representing the interests of the inhabitants of the city of Brussels itself and the municipalities in the eastern periphery [39] (since 2017, united in the so-called Consortium Oostrand). The action groups target the number of night flights, as well as the flight route schemes and the noisiness of particular types of aircraft. In 1999, the Brussels government introduced noise standards for aircraft. Under pressure from the Federal government, however, the application of the standards was suspended until 2002, in order to look for a more economically feasible solution. Also in 1999, the then-Federal Minister of Mobility Durant launched the intention to ban all flights between 1 a.m. and 5 a.m. starting in 2003, a proposal that was later weakened and turned into an imposed reduction of noise pollution. Further political debate about whether to spread or concentrate night flight routes eventually led to the resignation of Minister Durant in 2002.

According to the European Environmental Noise Directive (2002/49/EC), noise maps and a noise management action plan need to be made for the airport every 5 years. Table 1 shows the number of inhabitants per noise contour, according to the most recent plan issued by the Flemish government. Noise contours are depicted in Figure 1.

Table 1. Number of residents within noise contours, 2015 (population figures: 2011).

dB(A)	45–50	50–55	55–60	60–65	65–70	>70
L _{den}	-	-	72,628	17,721	5244	483
L _{night}	125,407	26,956	8239	762	159	2

Source: LNE [44].

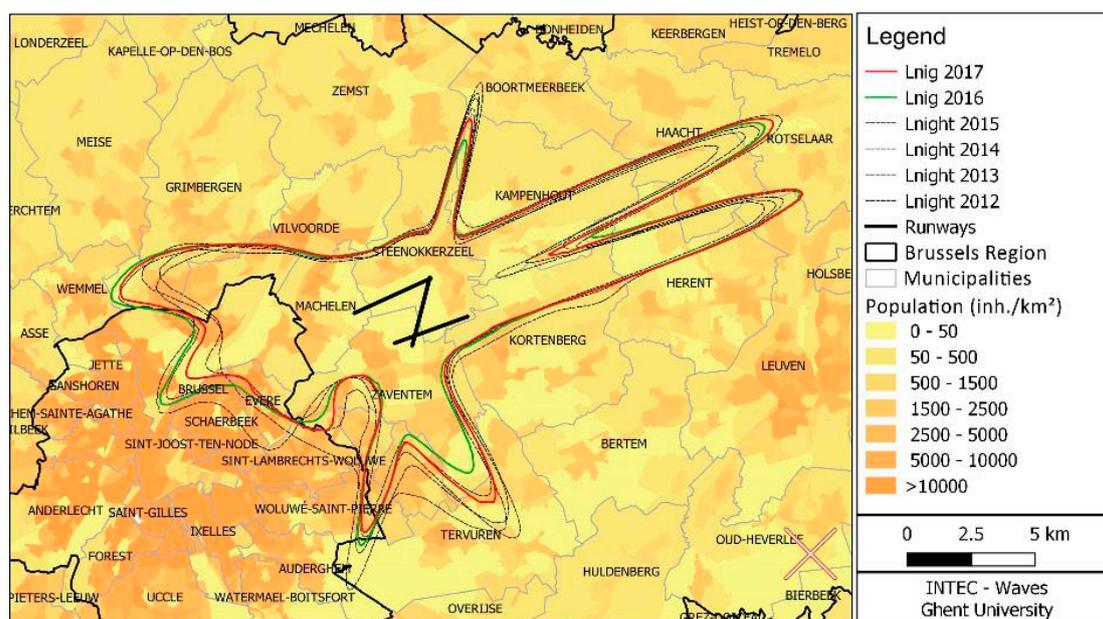


Figure 1. Development of $L_{\text{night}} = 45 \text{ dB(A)}$ noise contours around Brussels Airport, 2012–2017 (Source and copyright [45]).

In the period 2002–2014, different options for concentrated versus spread flight route schemes have been tested, with different modalities for night and weekend flights, while weather conditions could still justify deviations from the imposed routes. In practice, this policy process was heavily influenced by a succession of court rulings.

Courier company DHL, which used Brussels Airport as its European hub and is strongly dependent on night flights for its logistics activities, threatened to cease operations at Brussels Airport in 2004, unless the admitted number of night flights, which had been capped by the Flemish government at 25,000 per year, would be adjusted upwards. However, negotiations at various government levels did not lead to an agreement that was acceptable to DHL. At the end of 2004, DHL decided to effectively move its European hub from Brussels to Leipzig [9]. The relocation of DHL became a reality in April 2008, when the Flemish Brabant provincial government decided to reduce the maximum number of night flights to 16,000 per year, of which no more than 5000 departing flights. This partly met the requirements of the action groups, but not those set by the airport company.

In 2014, the so-called Wathélet Plan, which aimed at a wider spread of the noise hindrance, was implemented. However, such a spatial redistribution meant that the total number of residents who experienced noise nuisance increased, especially in the northern periphery. A salient detail is that the flight routes continued to avoid the Royal domain and palace in Laeken. In the Brussels region, stricter noise standards for aircraft were introduced in February 2017, particularly for the period between 11 p.m. and 7 a.m. Since May 2017, violations have been reported and the Brussels Region has begun collecting penalties from the airlines involved.

3.4. Local Air Quality

Regarding local air quality, problems are usually perceived as linked to significant concentrations of road traffic (part of which is powered by diesel engines), heating of buildings (which include the use of wood stoves), industrial production processes, and intensive farming. Environmental agencies in Europe monitor numerous pollutants, among which nitrogen oxides, particulate matter, soot, carbon monoxide, sulphur dioxide and non-methane volatile organic compounds.

In the public debate on air quality in Belgium, none of these sources are deemed to be associated with airport activities. The Flanders Environment Agency operates two measuring stations for

particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂) in the immediate vicinity of Brussels Airport (Steenokkerzeel 1 and 2). However, aggregated measurement results from these stations do not show exceptionally high exposure to the observed pollutants. Nevertheless, in the academic literature, attention for the impact of airport activities on air quality is growing, with particular reference to the danger of carbon monoxide [46] and ultrafine particles (UFP, which are defined as particles with a diameter below 100 nm) [10].

In 2016, the Flanders Environment Agency commissioned for the first time a study that needed to systematically map the presence of UFP (here defined as the range between 10 nm and 20 nm) in the vicinity of the airport. Five temporary monitoring stations were used, three of which were located close to the runways, one was established in the countryside 7 km to the east of the airport, and one 5 km to the west of the airport, in the urban area and close to the Brussels ring road. The results showed that the average concentration of UFP in the immediate vicinity of the airport was three times higher than the concentration at the background measurement site at 7 km, and that the maximum concentration (99th highest percentile) was about seven times higher near the airport than in the vicinity of the Brussels peripheral ring road [47]. The highest concentrations were observed between 6 a.m. and 10 a.m. and between 4 p.m. and 8 p.m. time frames that correspond to the busiest hours at Brussels Airport. Such increased concentrations were observed at all measuring stations downwind from the runways.

These results are in line with what has been found in similar measurement campaigns in the vicinity of several other airports in the US and in Europe. At Amsterdam Schiphol, the airport's contribution to the concentration of UFP in the residential area closest to the airport was found to be comparable to that of road traffic in traffic-loaded urban streets [47].

It is striking that only the concentration of UFP surges to an important extent in the vicinity of Brussels Airport, while the concentrations of NO₂ and coarser fractions of particulate matter (PM_{2.5} and PM₁₀), which are subject to larger-scale measurement campaigns in the wider area around the airport, do not stand out. One such example was the citizen science campaign 'Curieuzeneuzen' in 2018, in which about 20,000 measuring tubes for NO₂ were distributed among households in Flanders and which had significant resonance in the media. The campaign found no disturbing levels of exposure among families living near the airport, unlike locations in the immediate vicinity of a motorway for example [48]. The special characteristic of jet engines to contribute primarily to UFP concentrations, a pollutant that is hardly monitored due to the substantial costs associated with such measurements, may be part of the reason why in the public debate Brussels Airport is not known as a company that contributes to air pollution in the Brussels agglomeration.

An additional reason is the lack of knowledge about the health impact of increased concentrations of UFP. Although it is clear that direct exposure of airport workers to exhaust gases from aircraft is problematic, it is less clear what airports contribute to the general level of air pollution in urban areas. Masiol and Harrison [10] state that it is very difficult and expensive to quantify the share of airport activities in air pollution in urban areas; this difficulty generally prevents the development of adequate policies in this field. For Brussels Airport, Peters et al. [47] note that the most important contribution to the concentration of UFP originates from road traffic, but a significant contribution from airport activities can be observed near the airport, which is measurable up to a distance of at least 7 km.

3.5. Climate Impact

Data on the emissions of air traffic associated with Brussels Airport are neither officially calculated nor published. Based on information provided by the fuel suppliers, civil aviation aircraft departing from Brussels Airport took in 1.33 billion litres of kerosene in 2017 (Personal communication by fuel supplier Skytanking), which represents 112,500 departures, with an average refuelling of almost 12,000 litres. Combustion of this volume of kerosene yields 3.43 Mton CO₂ (Based on an assumed 2.58 kg CO₂ produced per litre kerosene combusted) [49]. In order to estimate the real impact on climate change of burning kerosene at high altitudes, this figure needs to be adjusted through a multiplier

that represents the radiative forcing effect. Although research into the magnitude of the radiative forcing effect cannot yet be considered completed, based on the literature, we apply a factor of 1.9, which represents an average estimate [50] (p. 64). We can, therefore, estimate the climate impact of all civilian aircraft departed from Brussels Airport in 2017 at 6.52 Mton CO₂ eq. Note that we attribute the emissions of aircraft to the airport where the jet fuel is loaded, which seems a reasonable assumption, since fuel ferrying seems to generate only small imbalances [51]. Dominant wind directions, as well as other elements, might impact the relative position of an airport in the amount of jet fuel loaded, but in order to provide an order of magnitude, the amount of fuel loaded seems a reasonable approximation.

Although the contribution of aircraft taking off at Brussels Airport seems significant, global warming is hardly present in the public debate about Brussels Airport. In 2018, however, Belgian popular media started to pay attention to the important contribution of the aviation sector to the climate problem, and climate activists (e.g., Zomer Zonder Vliegen/‘Fly-Free Summer’) have started to raise awareness about it, so far however without targeting Brussels Airport.

4. The Company’s Environmental Communication

4.1. Description of the Data Sources

The entry point for the examination is the website of Brussels Airport, which contains two sections that are especially relevant for this study: (1) a section on environmental issues, and (2) the website on the strategic vision ‘Brussels Airport 2040’, which are available in French, Dutch, and English (the latter is used for the analysis).

4.1.1. Website: Environment

The structure of the section on the environment is given in Figure 2, with a link provided at the top of the first page to a video and the environmental report entitled ‘Together for a sustainable airport, today and tomorrow: Discover how we reduce our ecological footprint’, which is followed by the statement that ‘Concern for the environment is an integral part of all our activities. Since 2011 our commitments were laid down in our ‘Environmental and Energy Policy Statement’. For us this means that any new projects are evaluated for their environmental and energy impact from the very beginning.’ [52].

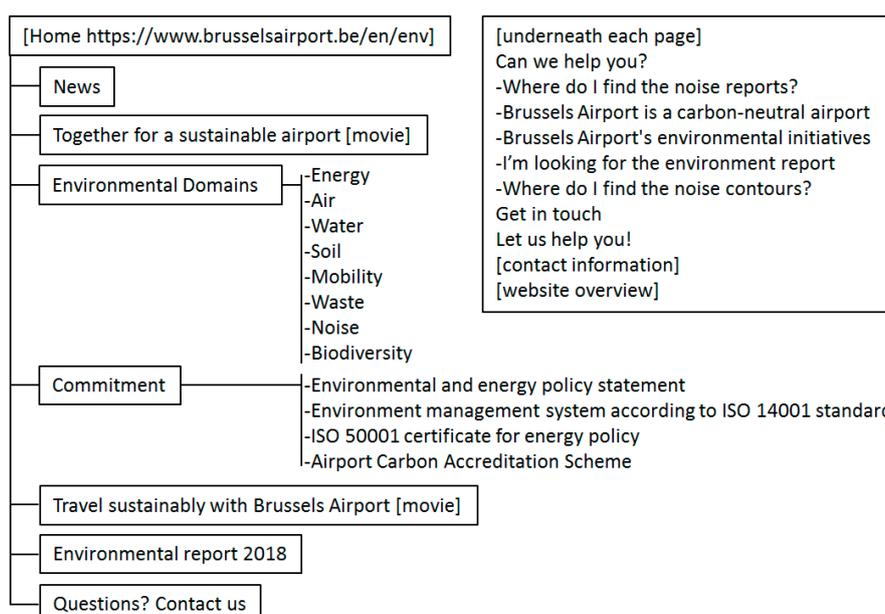


Figure 2. Overview of Brussels Airport’s website on environmental issues [50].

The only item under the heading ‘News’ in 2018 is ‘Brussels Airport achieves carbon neutrality’ (20 June 2018); the latest news item from 2017 also refers to this topic (‘Becoming carbon-neutral in 2018’, 6 July 2017). The video ‘Together for a sustainable airport’ is summarized in Table 2 and is structured in line with the environmental topics as listed in the web page section with the same name, which contains short texts (87–303 words). A video on ‘green landings’ (‘Continuous Descent Operations’) can be found under the heading ‘Air’, and the section on noise contains links to noise reports and an interactive map with noise contours. The section labelled ‘Commitment’ offers a link to the Environmental and Energy Policy Statement, which is a two-page document dating back to 2011, containing general environmental principles, and short principles for the domains of Energy and CO₂, Waste, Water, Noise, and Soil. This document also refers to the ISO 14001 and ISO 50001 certificates.

Table 2. Summary of the website content.

Video ‘Together for a Sustainable Airport’ [53]		Website ‘Environmental Domains’ [54]	
Topic	Duration	Domain	Words
Intermodal hub	30" (13.5%)	Mobility	87 (7.8%)
Waste	20" (9.0%)	Waste	132 (11.8%)
Water	22" (9.9%)	Water	114 (10.2%)
Energy	27" (12.1%)	Energy	102 (9.2%)
CO ₂	32" (14.3%)	Air [+movie]	97 (8.7%)
Ground Noise	16" (7.2%)	Noise [+links]	303 (27.2%)
Air Noise	18" (8.1%)		
Biodiversity	19" (8.5%)	Biodiversity	177 (15.9%)
		Soil	102 (9.2%)
Atmospheric shots	19" (11.2%)		
Final statement	14" (6.3%)		

The Airport Carbon Accreditation Scheme is the basis for Brussels Airport’s carbon-neutrality claim. This programme was set up by the Airports Council International, which represents the interests of airport companies. The programme awards certificates in different categories, with the highest rank (‘neutrality’) being awarded to airports that not only minimize their greenhouse gas emissions, but also offset the remaining emissions. For example, Heathrow Airport reached level 3 (‘optimization’) and the Nantes Atlantique airport falls under level 1 (‘mapping’ meaning that emission of greenhouse gases is monitored) (Airport Carbon Accreditation, 2018). Brussels Airport is among the airports listed under level 3+ (‘neutrality’) in 2018.

The video ‘Travel sustainably with Brussels Airport’ is accompanied by the text ‘Discover what you can do to travel sustainably from Brussels Airport’ and seems to be directed towards travellers. The content is summarized in Table 3 and shows items, such as accessibility by public transport, green electricity, water-free urinals, waste reduction, and the possibility to compensate CO₂ emissions. This and other videos are professionally made with animations and pleasant background music.

Table 3. Summary of the video ‘Travel sustainably with Brussels Airport’ [55].

Content	Duration	Share
We are easily accessible by public transport	10"	7.8%
We use 100% green electricity . . . 3% of which is generated by our own solar parks	7"	5.5%
Save paper: use an e-ticket	2"	1.6%
Less weight in the aircraft . . . means lower CO ₂ emissions	11"	8.6%
Prevent waste: do not carry liquid containers of more than 100 mL in your hand luggage	7"	5.5%
Charge your devices with the Webikes	11"	8.6%
With Greentripper, you compensate the CO ₂ emissions of your flight	9"	7.0%
You can enjoy a range of organic and Fairtrade products	9"	7.0%
Proper waste sorting, better recycling	8"	6.3%
Water-free urinals to save water [. . .] We purify the waste water from our sanitary facilities and aircrafts ourselves	17"	13.3%
Travel sustainably with Brussels Airport the heart of Europe	13"	10.2%
[Atmospheric shots]	24"	18.8%

The last specific section on the website concerns environmental reporting and contains the reports for the years 2010–2018 (excluding 2013). In the foreword to the 2018 report, the CEO states that this year's report is different and 'thinner than ever before' [56] (p. 3). This is because extra information is provided on the company website. This report is illustrative of the shift that can be observed from 2010 onwards [57]. The 2010 report is a rather unattractive document, with rudimentary graphics and a standard word processing software layout. From 2011 onwards, the graphic design is more attractive, but the content is still reported in a typical administrative style. Since the 2014 edition in particular, the environmental report is structured around interviews with stakeholders who present investments in environmental measures or their vision of a sustainable airport. The examples include the use of a more sustainable type of asphalt for runways and replacing lamps by LED technology, a campaign concerning the tyre pressure of vehicles, investments in water treatment, and the placing of three beehives by staff. The website of the 2018 environmental report [58] presents 22 of these initiatives, of which nine are related to surface transport (e.g., CNG vehicles, e-buses, rail traffic), only one refers directly to aviation ('Quieter and more fuel-efficient aircraft'), and one describes the signing of the Collaborative Environmental Management agreement by Brussels Airport Company, Skeyes (the air traffic controller), Brussels Airlines, TUI Fly, and DHL Express. In addition, 'carbon neutrality' is one of the highlighted initiatives, and the discussion of this topic is accompanied by a video (Table 4). Most of this video is dedicated to the Saving Trees project in Uganda, which involves the distribution of more energy-efficient ovens to the local population by the organization CO₂ Logic as a way of offsetting emissions. The last two pages of the environmental reports provide environmental key figures. Regarding air emissions, it is reported that actual CO₂ emissions from stationary sources decreased from 22,668 tonnes in 2010 to 15,027 tonnes in 2017. Nothing is said about contributions to local air pollution.

Table 4. Summary of the video 'Brussels Airport: a carbon neutral airport' [59].

Topic	Duration	%
General information	39'	14.4
Green electricity (solar panels)	33'	12.2
Greening surface transport	13'	4.8
LED lighting airfield	22'	8.1
Cooling and heating of buildings	51'	18.9
Compensation of emissions	112'	41.5

4.1.2. The Company's Strategic Vision 2040

In 2016, Brussels Airport presented its Strategic Vision 2040 'Connecting Belgium to the Future', which offers 'a balanced approach between the economic development of the airport and the care for our environment.' [60]. The web portal, the structure of which is presented in Figure 3, is visually attractive and contains a considerable number of drawings, graphs, and images of planned buildings and infrastructures. Under the heading 'The world in 2040', economic growth is portrayed as the main global trend, and the aviation sector is portrayed as the 'growth engine for the world economy.' Aviation is described as able to control and reduce its environmental impacts by means of technological innovation and larger aircraft, while at the same time thoughtful urban planning reduces noise impacts. The balanced approach also involves an open dialogue with 80 selected participants who represent 'all' stakeholders. Furthermore, in its communication, Brussels Airport emphasizes that its activities are of national interest. What are considered needed developments can be found under the heading 'Development Brussels Airport', including an 'Airport Business District', parking premises, and an increase in runway capacity. The website highlights also a number of positive stories on a variety of topics, such as employees commuting by bike to the airport, and the airport's leading position in pharmaceutical logistics. Finally, a video summarizes the main elements.



Figure 3. Overview of the website on the Strategic Vision 2040 of Brussels Airport [61].

The video [62] starts with representations of exploring the world, travelling to new places, opening new business markets, and the fact that many international institutions are based in Brussels, a city which welcomes both international leaders and tourists. Furthermore, the video refers to the direct employment of more than 20,000 people. Then, the voice-over asks rhetorically: ‘This is today, but how about tomorrow?’ and the voice continues:

‘Over the next 20 years the world population is expected to grow by 20%. The middle class will grow by 70% worldwide. 75% of the population from the growth countries in Africa, Asia and South America will travel by plane at least once a year. Brussels Airport needs to adapt to this new reality. Its objective is to meet your needs and keep up with the international trends. This means an annual organic growth of 2.9%, no more, no less. By 2040, Brussels Airport will be handling 40 million passengers a year, instead of the 20 million today. To support our economy, cargo transport at the airport will almost double.’ [62]

Subsequently, the video discusses the potential environmental impact:

‘But this doesn’t mean there will be twice as many aircraft or more noise. No, because the new airplanes are bigger and can carry more passengers or cargo on board. New airplanes are also more silent and more fuel efficient.’ [62]

Finally, the video stresses the added value for the region:

‘The strategic vision 2040 includes infrastructure adaptations to provide more boarding gates for your comfort, to allow airlines to land or take off more rapidly, and to upgrade the logistics facilities at Brucargo zone. This way, Brussels Airport will provide a job to an additional 60,000 people. It will improve the access to the airport and the mobility in the region. Creating an efficient multimodal hub for planes, trains, trams, buses, and cars, and even bikes. Brussels Airport will also become an Airport Business district providing exclusive services, multimodal connectivity and more welfare for your country. In short, this vision also concerns you.’ [62]

Regarding climate change, the words ‘greenhouse’ and ‘climate’ are not mentioned on the website of the strategic vision, but CO₂ is mentioned seven times in the text. In four cases, the website states that new aircraft emit less CO₂, and two examples are provided: the Airbus A350 (25% less CO₂ per seat), and the Airbus A320 neo (20% less CO₂ per seat). Two other mentions of CO₂ refer to operational measures, limiting taxiing time, and constant-angle descent (green landing), respectively. Finally, there is a quote from the president of the ICAO Council:

‘The aviation sector presently accounts for under 2% of the world’s annual CO₂ emissions, but we also recognise that the projected doubling of global passengers and flights by 2030 must be managed responsibly and sustainably. ICAO adopted a new global market-based measure (GMBM) to offset CO₂ emissions from international flights.’ [63]

Besides the president of the ICAO Council, the website contains supportive quotes and images from the Prime Minister of Belgium, the European Transport Commissioner, the Director-General of the Belgian Foreign Trade Agency, the CEO of the regional public transport company De Lijn, and a number of business people.

4.1.3. Advertising Campaign ‘5 Facts about Brussels Airport’

While the strategic vision and the corresponding forum 2040 emphasizes an open dialogue, a communication of Brussels Airport from 2016 strikes a different tone. A full page newspaper advertisement [64] presented ‘5 facts about Brussels airport’, claiming that: (1) 3000 employees living in Brussels, and 14,600 in Flanders come to work every day at the airport, (2) the number of local residents which suffer from noise nuisance decreased by more than 50% since the year 2000, (3) Brussels Airport is not the only airport located near a large city, (4) from an economic and social perspective, moving cargo activities away ‘equals suicide’, and (5) a flying law has to end a number of ‘Kafkian’ situations (a statement pertaining to incoherent regulations regarding noise pollution and the distribution of flight routes).

4.1.4. Strategic Vision for the Spatial Policy Plan of Flanders

While the communication of Brussels Airport can be seen as a private sector initiative, traces of the future plans for Brussels Airport can also be found in a number of public policy documents. Although the ‘Strategic Vision for the Spatial Policy Plan of Flanders’ [65] (Departement Omgeving, 2018) is only one of the range of relevant policy documents, it is the most comprehensive visioning document that was recently approved by the Flemish government. We choose to focus on this document because it is exemplary in the way in which the discourse pursued by Brussels Airport seeps through to policy-makers. The text in this document of 93 pages explicitly refers to Brussels Airport 6 times.

The vision is organized around six strategic policy objectives, and Brussels airport is mostly mentioned in the context of the second strategic objective centred on economic development. The airport is referred to as an important gateway that is crucial for international accessibility, with the need to develop a ‘metropolitan leverage site’, which includes an ‘airport city’ and a ‘specific programme of facilities and work locations (such as restaurants, hotels, entertainment, culture, tourism)’ (p. 62). The airport is also listed as one of the ‘international logistics hubs’ and has to contribute to the ‘sustainable and multimodal development’ of Flanders as a future platform of logistics (p. 66). This vision is also present in the visual layout of the document. The cover shows a design of tiles with stylized drawings of residential, manufacturing, and office buildings, a wind farm, nature and agricultural zones, with the image of an airport on one of the five tiles. Inside the document, one can find four similar ‘clean’ drawings and one image of an airport.

The third strategic objective, which is about the environment, proposes urban planning in order to limit climate change, to improve air quality, and to reduce noise pollution (p. 20). However, under this strategic objective, airport activities are mentioned only once and are associated with noise pollution solely, in a statement about residential development in the vicinity of the airport that needs to proceed in line with ‘technological progress’ and ‘with the flight routes, as far as possible’ (p. 62). In the Strategic Environmental Assessment process that accompanies the Strategic Vision, the limited attention devoted to the environmental impact of the airport was criticized, but only in the context of noise [66]. While in the latter document urban and regional planning is again assumed to support achieving climate goals and the improvement of air quality, no connection at all is made with airport activities.

5. Discussion

The central question put forward in the current paper is whether ambitious communications on sustainability correspond with environmental reality. Following the claim that ‘CO₂ emissions, noise

reduction and local air quality are the critical focus areas of our airport's sustainability policy' [67] these three domains are the focus of analysis. When we connect the three environmental issues discussed with the related public debates, and with the communication line of the airport, we observe rather important disparities in terms of the concerns attached to each of the three issues at stake.

The first environmental theme, noise pollution, seems to be taken very seriously by Brussels Airport. Although the promotional video 'Together for a sustainable airport', which is not so much aimed at local residents, but rather at a wider audience, spends only 8% of its broadcasting time on it, no less than a quarter (27%) of the environmental website is dedicated to this theme. It is clear that the company cannot afford to ignore or dismiss this problem, and it is indeed true that noise pollution is the only environmental issue that has demonstrably limited the airport's expansion yet. Although the company has never been enthusiastic about the imposition of a cap on night flights, nor welcomed the penalties issued by the Brussels environmental administration to the airline operators, it is actively encouraging the use of less noisy aircraft and tries to play an active role in policy-making with respect to the flight routes. The focus seems to be on coping with legal requirements, such as noise maps, while the '5 facts about Brussels airport' advertising campaign illustrates that the airport is not a passive onlooker but wants to safeguard its plans.

Regarding local air quality, several initiatives are directed towards greening surface transport at and towards the airport. Nevertheless, limited information is provided on actual levels of pollutants. In fact, Brussels Airport does not mention levels of air pollution at all, neither on the website (0%), in the videos (0%), or in the annual environmental report (0%). It is, however, hard to believe that the company is not aware at all of the significant emissions of ultrafine particles by ascending aircraft, and its impact on the quality of the air in the surroundings, given the growing attention to it in the scientific literature, as well as within the competent environmental agencies. Instead, in the environmental communication of the airport, excessive attention is paid to forms of environmental care that are not very typical of airport activities (such as water management (10% of the environmental website), biodiversity (16%), soil pollution (9%), or of which the potential environmental benefits are minimal and perhaps even negligible compared to the impact of the carbon emissions by the planes that are fuelled through the airport (such as charging your phone via an electricity producing exercise bike, which accounts for 9% of the video 'Travel sustainably with Brussels Airport').

That brings us to the problem of the airport's contribution to climate change. The Airport Carbon Accreditation programme responds to the need of self-profiling of airport companies in terms of sustainability [14]. At company level, several initiatives reduce energy consumption and CO₂ emissions, in particular with regard to heating, cooling, and internal transport. In environmental communication (14% of the video 'Together for a sustainable airport' is about climate emissions), however, nothing is said about the climate impact of the enormous amounts of kerosene that are distributed via the airport and consequently combusted. In contrast, only the direct CO₂ emissions of the airport company itself, excluding the aircraft, are reported. Brussels Airport emitted approximately 15 kton of CO₂ in 2017, an amount that was fully offset by buying carbon compensation [56]. This amount of operational emissions represents approximately 0.23% of the emissions of civilian aircraft departing from Brussels Airport in 2017 (6.52 Mton CO₂ eq, our calculation).

For the year 2017, the total greenhouse emissions in Belgium amounted to 114.5 Mton CO₂ eq [68], which is the official figure of domestic emissions in which international aviation and shipping are not included. The climate impact of civil aviation bound to Brussels Airport (6.52 Mton CO₂ eq) is therefore equivalent to 5.7% of the total climate impact of domestic emissions in Belgium.

Thus, the perspective from which the issue of greenhouse gas emissions is examined is highly consequential. If we do not include the fuel consumption of the aircraft, Brussels Airport only represents an amount of emissions that is typical of a medium-sized company with no manufacturing activities, and it even performs very well with regard to efforts aimed at limiting and offsetting its emissions. However, if we count the amount of kerosene that is loaded, and convert it to CO₂ eq by applying a multiplier for the radiative forcing effect, the total contribution to climate change that

originates from Brussels Airport gets multiplied by 435, making it one of the largest polluters in Belgium when it comes to climate impact. In order to put this into context, Table 5 provides an overview of the five largest industrial emitters of greenhouse gases in Belgium, based on verified emissions for 2017 [68].

Table 5. Official top 5 industrial emitters of greenhouse gases in 2017.

	Company	Sector	Verified Emissions (Mt CO ₂ eq), 2017
1	Electrabel-Knippegroen	electricity	5.21
2	ArcelorMittal Gent 1	steel production	4.37
3	Total Raffinaderij Antwerpen	oil refinery	3.68
4	BASF Antwerpen –27a	chemistry	3.30
5	Esso Raffinaderij	oil refinery	1.88

If we were to consider Brussels Airport as an integrated company, the core business of which consists of air transport, then Brussels Airport would be number 1 in the list above and should, therefore, be regarded as the largest industrial emitter in the country. However, this conclusion is somewhat premature for three reasons. Firstly, it would be incorrect to apply the above reasoning only to airports and not to seaports. If we consider the port of Antwerp, including all ships that depart from there, as one company, then this company would have a worse environmental record than Brussels Airport. However, a similar analysis for seaports falls outside the scope of this article, which means that we have insufficient quantitative evidence for such a comparison. Secondly, it is not entirely correct to consider Electrabel Knippegroen and ArcelorMittal Gent 1 as two separate companies, since an important part of the production cycle of Electrabel Knippegroen is inextricably linked to that of ArcelorMittal Gent 1, and both companies are also physically located next to each other. Based on the environmental impact assessment of 2015 by ArcelorMittal Gent, it would be more correct to estimate the total annual emissions of the steel production facility at 8.69 Mt CO₂ eq (as of 2013) [69], which would mean that the factory would still be at the top of the list of the most important emitters, even if Brussels Airport would be included (Table 5). A third reservation must be made about the use of the multiplier, by which the radiative forcing effect is represented in our calculations. For the time being, there is no scientific consensus on the exact value of this multiplier, which is likely to vary under different atmospheric and geographic circumstances, while it does have a decisive influence on the estimated climate impact of air traffic departing from Brussels Airport.

Given these considerations, airport carbon neutrality has characteristics of side issue specialisation, which might be an indication of incompetence [70] or of the impossibility to change the situation. The organization that compensates the CO₂ emissions of Brussels Airport (CO₂ Logic) also offers voluntary compensation for flights, but acknowledges that it would be too expensive to ask travellers to pay the ‘real’ societal cost of emissions since ‘no-one would participate if we would ask that price’ [71] (p. 4—translation by the authors). This adds to the general opposition against carbon offsetting [72]. It seems that a structural approach to reduce the climate impact of aviation cannot be limited to minor initiatives. Even if at a global scale, a contribution to human-made global warming of ‘only’ about 5% can be seen as a side-issue, the impact of aviation departing from Brussels Airport is considerable. Efficiency gains have not outpaced the growth of emissions due to increasing passenger numbers and freight volumes, hence it is very likely that the share of aviation in overall climate impact will increase [2]. Furthermore, flying is much more frequent in higher income groups, which suggests that a small part of the population is responsible for aviation emissions [73].

Turning again to the communication of Brussels Airport discussed in this article, the focus on stakeholders is its main characteristic. It is clear that Brussels Airport presents itself as a socially responsible enterprise, with self-imposed high ecological and social standards. Its voluntaristic discourse strongly emphasizes the economic importance of the airport for the surrounding region, and systematically associates the environmental problems caused by airport activities with solutions that are on their way. Brussels Airport portrays itself as a central hub in the airport community or

ecosystem. However, the question of whether the proposed solutions effectively address the core of the problems outlined, is avoided. This strategy seems to be successful in safeguarding the company's interests, since its positive message is almost uncritically incorporated in the policy plans of at least one competent public actor. Researchers and other actors promote the inclusion of stakeholders in environmental reporting and policy, but in the case under study stakeholders are mobilized in a way that distracts attention from real environmental impacts.

In its communication, Brussels Airport strategically switches from its role as representative of the airport community to its role as an organization only responsible for its own activities. No unambiguous definition of 'airport' is provided. The responsibilities that come along with 'carbon neutrality' relate only to its own activities, but any assets in terms of communication are spread more widely. Public transport is such a case in point. Trains and buses operated by public companies regularly appear in promotional videos and other communications, reinforcing the sustainable image of the airport and repeatedly underlining that the airport is a node in a network. However, figures of the climate impact of the airport are limited to the activities of the company, or show the relative contributions of, for example, technologically advanced new aircraft. The main message seems to be that many initiatives are taken by members of the airport community. However, the contribution of several of these initiatives is relative, in light of the overall impact of the airport on its environment. For example, the 2018 environmental report refers to the two new hybrid SUVs of a taxi company as a successful and promising measure, and the installation of three beehives is communicated alongside lower user fees for quieter aircraft.

Based on the analysis, we observe that the type of communication used cannot be considered an attempt to obtain a comprehensive view of the environmental impact of the airport in general, and aviation in particular, nor to reduce this impact. Hence, communication does not seem much concerned with the truthfulness of the environmental facts. The aim seems to be to legitimize the expansion plans put forward in the 'Vision 2040'. In other words, the communication shows characteristics of Frankfurtian bullshit: a myriad of initiatives and statements by stakeholders are mobilized to show that the airport community cares for the environment, but this is not accompanied by a comprehensive overview of the actual environmental impact, nor is there a profound assessment of the future plans. In this context, it should be noted that our analysis focused on company communications, and we do not claim that there are no employees who have a genuine concern for the environment.

6. Conclusions

In this paper we examined the interrelations between environmental impact, social debate and environmental communication with regard to airports, applied to the case of Brussels Airport. Our research questions focused on the extent to which real environmental effects, and the communication about them, are in line with each other and whether perceptions of the airport's environmental impact are guided by the communication strategy of the airport company itself. We assessed three sets of environmental effects: noise pollution, air pollution, and climate impact. With regard to noise pollution, we note that the airport acknowledges the nuisance caused and is willing to reduce the problem, perhaps with the intention of being taken seriously as a partner of negotiation. With regard to local air quality, the airport seems to largely ignore the problem of aviation-related emissions, and thus matches the lack of public debate on this issue. With regard to climate impact, we find that the airport partially acknowledges the problem, but at the same time actively steers the debate in a direction that is not posing any threat to its core activities. We observe that this message is adopted by the strategic vision for the Spatial Policy Plan for Flanders, in which Brussels Airport is presented as an economic growth pole, while in terms of environmental concern solely the problem of noise pollution is acknowledged. We can conclude that the communication of Brussels Airport does not reflect the climate impact of the activities it facilitates. By positioning itself as carbon neutral, the company creates the impression that the use of its facilities does not contribute

to climate change. If, however, the climate impact caused by the aircraft departing from Brussels Airport is considered, the impact of the airport is comparable to, or greater than, that of the largest Belgian industrial emitters. If this were not an academic article, we would state that ‘an ounce of image is worth a ton of CO₂’. Given the structural character of the climate impact of aviation, and the international presence of the Airport Carbon Accreditation programme, these results are relevant for other airports as well. Further research may clarify the possible transferability of the results but may also critically look into other claims, such as the economic benefits of airports and job creation.

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