



Stay Grounded

Network countering aviation –
for a just transport system

A Talanoa Dialogue Submission

Recommending that the UNFCCC set policy that directly regulates aviation emissions

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Introduction

In this Talanoa Dialogue proposal we address the extent and rapid growth of global aviation as a *keystone issue* that we believe the UNFCCC must address – directly – if the world's governments are to ensure a reasonable outcome for the climate breakdown dilemma. We are grateful to the Talanoa Dialogue conveners for this opportunity to express views that otherwise would not be heard in the COP process. At the same time we must be frank and say that our network's member organizations are disenchanted by the COP process to date and by the influence that corporations have had in the COP's resistance to the systemic change the climate dilemma demands. The Talanoa Dialogue gives us tentative hope, and we thank you for considering the perspectives that follow.

Addressing aviation is a keystone for finding a holistic climate solution *for two broad reasons*:

First, the aviation industry's greenhouse gas emissions are a major contributor to the now increasingly evident breakdown of the global climate. Because (as explained later) the aviation industry is inadequately regulated by the UN International Civil Aviation Organization (ICAO), aviation's rampant expansion and the consequent increase of its greenhouse gas emissions will largely cancel-out international progress in reducing the GHG emissions of other economic sectors.

Second, flying is emblematic¹ of a host of affluence-related impacts on the climate. Overall the highest-emitting “10% of the global population contributes more than 50% of global emissions,”² and flying is a large contributing practice. Proposing at the COP table a political framework to reverse aviation's growth would be controversial - *and that is good*. Taboo subjects such as this must be brought into social and policymaking dialogues if we are to solve the climate dilemma. We believe aviation is the best and most visible subject for beginning this.³

Through our following answers to the three Talanoa Dialogue questions we address the keystone issue of aviation's greenhouse gas emissions and recommend policies we encourage the UNFCCC to consider.

About us:

Stay Grounded is a newly organized, growing international grassroots network that campaigns to resist aviation expansion on the basis of impacts on not only our global climate but also on local civil society, such as through land-grabbing (for airport construction or expansion) and impairments of health near airports that result from noise and air and water pollution.

We are people, communities and about 80 member organisations from around the world, facing these multiple impacts of aviation. Some of us are directly affected by noise or pollution from airports and air traffic patterns. Some of us are climate justice activists and young people who want to live our lives on a healthy planet. Some of us live in communities defending our homes, farmland and ecosystems from land-grabbing for new airports, airport expansion, biofuel production or projects for offsetting aviation emissions. Some of us are academics, trade unionists and workers in the transport sector, as well as environmental and transport organisations that foster alternative modes of transport such as railways or bus/coach systems.

Terms Used

“Aviation” and “airlines” refer to the commercial or corporate transport of passengers and freight by air.

“Aviation industry” is inclusive of the entire commercial aviation industry including manufacture (and the resources consumed in manufacture); the actual transport and supply of fuels; facilities (such as airports, and passenger and freight terminals, and “aerotropolis” developments that expand beyond those other facilities); and the airlines and their marketing efforts.

“Emissions” means greenhouse gas emissions.

“GHG(s)” means greenhouse gas(es).

“ICAO” is the United Nations' international aviation regulatory body, the International Civil Aviation Organization.

1. Where are we? (The first Talanoa Dialogue question)

As the Intergovernmental Panel on Climate Change's (IPCC's) recent “Special Report on Global Warming of 1.5 °C” points out, a very dramatic decline in CO₂ emissions is necessary beginning right now and taking only about two decades. It finds that the nationally determined contributions (NDCs) submitted under the Paris Accord are inadequate, and that they “cumulatively track toward a warming of 3-4°C above preindustrial temperatures by 2100.”⁴ For this reason and others explained in this answer, in particular the reduction of aviation emissions is vitally important.

A. Aviation is causing substantial climate impacts

Commercial aviation is the most climate-damaging form of transport, far more so than the industry acknowledges. It is contributing around 5% of the adverse climate forcing that humans cause each year,⁵ an accounting that incorporates all the kinds of GHGs aircraft emit and the fact that the emissions mostly occur at high altitude where their warming effect is magnified. The GHGs include CO₂, of which aviation causes at least 2% of the global total.⁶ These two percentage numbers are more significant than it may seem because less than 10% of the world's people have ever flown,⁷ and the percentage of people who fly in a given year is far smaller than that.

In short, aviation has significant climate impacts for a single industry, both in absolute terms and in view of the tiny minority of the world's people who fly or ship goods by air. Moreover, these emissions and impacts are growing rapidly, and existing regulations at the domestic and international levels are grossly inadequate. Regulations approved or considered to date are incapable of stopping - much less reversing - the unsustainable growth of the aviation industry's emissions.

Travel and freight by air are largely discretionary, whether for business or personal purposes. A fundamental challenge posed by air travel is that its high speed allows vast distance to be covered in a short time, and it is distance that most directly relates to the emissions and the impact on climate. Flying enables travelling distances that otherwise would be considered rarely, if at all. In the absence of effective international regulation, the aviation industry does all it can to engage more people in the practice of flying, and in flying more frequently and over longer annual and lifetime distances. Of all human climate-harming activities, flying is one that for the most part is a luxury and where sacrifices must be implemented from the international level, through regulation of the industry.

B. Aviation's growth-rate and GHG emissions are high & inadequately regulated

For decades, aviation worldwide has been the fastest-growing source of GHGs emissions:

- Aviation's rate of growth has for decades been a generally consistent 4-6% annually⁸ (a doubling rate of 14-18 years), and has averaged 6.2% for the past five years.⁹ Aviation's fuel

consumption, and hence GHG emissions, is expected to be 2.7 times greater in 2040 than 2017.¹⁰ This increase will for example “more than offset reductions from electric cars.”¹¹

- In 2017, passenger air travel increased 7.6%¹² and air freight increased 9.3%,¹³ doubling rates of 9 and 8 years.
- The rate of increase of air travel and air freight is unregulated; the aviation industry and ICAO (the official UN regulator) intend this growth to continue without restriction. In fact ICAO's regulations encourage air travel and air freight volumes to grow as fast as they possibly can.
- The problem is that ICAO is a regulatory body that has been captured by the industry it regulates.
- Unfortunately, the main solutions to rising emissions currently propounded by the ICAO – offsetting and biofuels¹⁴ – are profoundly problematic and are extremely unlikely to deliver genuine reductions to emissions.¹⁵

For these reasons and others herein, we believe aviation’s “projected CO₂ emissions will be incompatible with the 2°C target,”¹⁶ much less the 1.5°C one. “There are few indications that any new technical or operational advances will start to make CO₂ cuts in real terms and across the world’s aircraft fleet that would negate the rise in CO₂ due to growth in activity. ... Unpopular as it is ... there is a clear role in aviation for demand management.”¹⁷

C. Technology will not solve aviation's emissions problem – scale is the problem

Efficiency improvements vs. aviation growth. Ever since the 1960s, the growth of aviation’s GHG emissions have outpaced gains in the fuel and emissions efficiency of aircraft, a consequence of high growth in the number of passenger-kilometers travelled. “[I]t is questionable whether [global fleet average] efficiency gains of 1.5% per year can be maintained” beyond 2020 and may decline to less than 1% per year in the 2020s.¹⁸ Gains from technology decline over time because the easy and most effective improvements to aircraft are made earlier. In fact such gains have already dropped steadily from about 5% per year in the 1960s to the present 1.5%.¹⁹ A related factor is that aircraft are long-term investments lasting several decades, so disruptive technology improvements will take a long time to be substantially incorporated into the global fleets of airliners, air freighters and business aircraft.²⁰ In contrast to the above forecasted small gains in efficiency, as discussed earlier the amount of air travel growth (measured as global passenger-kilometers per year) has consistently been 4-6% per year since the 1980s, and for the past 5 years has averaged 6.2% (an eleven-year doubling rate).²¹ Given the expected rate of efficiency improvement, this means air travel GHG emissions can be expected to grow at a rate of 3-3.5% per year, which is about a 20-year doubling rate. OPEC’s “World Oil Outlook 2040,”²² published this September, expects aviation fuel consumption, and hence emissions, to be 2.7 times higher in 2040 than now.

With electric aircraft, any large scale benefit is still unforeseeable. Electric-powered flight is not yet proven on a commercial scale and present indicators are that it likely will be feasible only for short distances and small airliners (a few tens of passengers), due to the lower energy-per-weight and energy-per-volume densities of batteries, compared to jet fuel. It will take decades for technical development and certification of electric flight and for the integration of such aircraft into fleets.²³ Because high-speed flight encourages longer-distance travel than may otherwise be undertaken²⁴ and is energy intensive, we must consider how much renewable electricity can be generated (given limitations of land, materials availability and pace of renewable energy construction) and consequently how much electric flight can reasonably be supported among other uses for electricity.

Biofuels only make matter worse. The aviation industry proposes to resort to using biofuels to absolve its large and growing size and its increasing climate impacts. The fallacy of this move is apparent from the current global biofuel production of 84 million tonnes per year²⁵ – nearly all of it for road transport – which is already causing substantial social, environmental, and climate harms leading to an on-going backlash from civil society. In comparison, ICAO's “2050 Vision for

Sustainable Biofuels,”²⁶ adopted this March, plans for an annual aviation biofuel production of 128 million tonnes in 2040, increasing to 285 million tonnes by 2050. That would supply less than half of projected aviation fuel consumption, would still contribute GHG emissions even if somewhat reduced, and the rest of the fuel volume would still be fossil kerosene. The climate, social and environmental impacts of producing even a small fraction of those quantities of biofuel would simply be unacceptable. Both direct and indirect harms caused by biofuel production are well-known,^{27,28} and include:

- land-grabbing in the global so-called South
- food price volatility and undermined food security
- increased use of synthetic fertilizers, pesticides and other agro-chemicals
- deforestation and other ecosystem damage or destruction
- indirect GHG emissions caused by land use change, including loss of vital carbon sinks.

Synthetic fuels – better than biofuels but still problematic at large scale. Electro-fuels²⁹ are technically possible. However they require significant amounts of renewable electricity to synthesize and when burnt at-altitude still contribute to the non-CO2 warming due to the release of water vapour, NO_x and other compounds. Therefore, at best the impact of renewable synthesized electrofuel is a 50% reduction in the climate warming impact of aviation.

Conclusion – technology does not solve the aviation problem. Because technology alone falls far short of solving aviation’s climate impacts, and in the case of biofuel and electro-fuel have high impacts, it is crucial that the UNFCCC establish policy that caps at present levels and then rapidly reduces the amount of air travel and air freight. Growth in aviation is several percent more per year than efficiency improvements. The needed rapid reduction can be accomplished through a declining cap on annual jet fuel consumption or by other direct means (e.g. limiting the available slots at airports or other throughput at airports, and limiting construction of new airports) that in combination will cause a rapid emissions reduction. Those means are discussed below under Talanoa question three.

D. The present regulation of aviation growth & emissions fails under the Paris Accord

Control of aviation and its emissions is necessary at both national and international levels, and in several respects this entails consideration of equity among nations and populations and classes of people. Current policy under the UN International Civil Aviation Organisation (ICAO) appeals to using biofuels and emissions-offsetting tactics; but neither of these approaches directly reduce emissions from planes, and both are environmentally and morally problematic.

The complete ineffectiveness of current policy to reduce emissions, the total absence of any serious policy to reduce emissions, and the inequitable climate impacts caused by aviation's growth are reflective of the ICAO having been captured by aviation interests. As such, the ICAO is unsuitable as an independent agency to regulate the aviation industry's emissions and growth. We discuss what UNFCCC can do about this below under Talanoa question three.

E. A matter of equity: the need for UNFCCC to directly regulate aviation

It is estimated that less than 10% of the global population have ever set foot on an aircraft.³⁰ Even in developed nations, less than half of the population flies in a given year. This means that, due to both climate impacts and those small numbers of flyers, it is mostly non-flyers who bear the brunt of: (1) aviation's contribution to the climate crisis; (2) the negative humanitarian and climate impacts of airport construction and expansion (impairment of carbon sinks; land-grabbing and community displacement) that rampant growth in aviation is causing; and (3) health issues involving noise and non-GHG pollution near increasingly busy airports.

F. Social factors are key concerning aviation's excessive & growing emissions

Aviation is emblematic of the socially-constructed ‘soft denial’³¹ of climate breakdown and inequity; flying is extremely carbon-intensive and the privilege of a generally affluent global minority (<10% of the global population). Concerted action by the UNFCCC to dramatically limit aviation’s overall emissions in line with the Paris Accord would have significant direct benefit for the climate and therefore everyone globally. Equally important, because flying is commonly tied to the personal identity of an individual who flies,³² the shock of learning about the need for a policy that directly or indirectly reduces the ability to fly (frequency and/or distance) *will have a knock-on effect* in gaining among many of these affluent people an acquiescence to the need – voluntarily or through additional policy – for the quick reduction of other (non-aviation) high-emitting practices.

G. Factors we have not considered

Our answers to the Talanoa Dialogue questions do not consider military aviation and its GHG emissions because the data are scarce and incomplete. Nonetheless, emissions from military aviation are likely significant, unchecked and virtually ignored. We recommend that the UNFCCC request the International Panel on Climate Change (IPCC) to seek this data and report back.

2. Where do we want to go? (The second Talanoa Dialogue question)

The “Where are we?” section identified the severity of the aviation emissions problem, and why this is a *keystone issue* for ensuring a reasonable outcome from the climate breakdown the world is undergoing. The section also established that ICAO’s regulation of aviation’s GHG emissions is grossly inadequate, and demonstrates the urgent need for the UNFCCC to take over that responsibility itself, through policy made by accord.

This urgent need is for UNFCCC to establish a regulatory framework that will directly restrict (not “offset”) aviation's emissions, ensuring that they will be swiftly reduced consistent with the objectives of the Paris Accord to hold global temperature rise to well-below 2°C and if possible below 1.5°C. The aviation emissions policy must be equitable among nations and provide for this equity to improve over time. This matter of equity is particularly important for some developing countries, such as small island developing states (SIDS), which are geographically isolated and depend on aviation for their transport and food imports.

In support of people’s need for mobility and the needs of the travel industry, the policy should explicitly favour non-flight transport modes for intercity travel and other long-distance travel, as well as encourage within-region holidays as an alternative to long-distance travel. The favoured modes should be ones that have low or zero GHG emissions and which operate at speeds which do not encourage traveling excessive distances.

3. How do we get there? (The third Talanoa Dialogue question)

A. The world needs a UNFCCC accord that directly regulates aviation emissions

As noted in our answer to the first Talanoa question, the IPCC's recent “Special Report on Global Warming of 1.5 °C” dramatically points out the need to reduce GHG emissions to nil over a timeframe of two decades. It finds that the cumulative contribution of national commitments toward climate change mitigation are inadequate and are likely to lead to a temperature rise of 3-4 °C by the end of this century, unless seriously improved.³³ As a high-emissions practice that is largely a luxury and which collectively has a significant climate impact, flying can and should be cut back. Reductions of aviation emissions, through direct regulation implemented without delay, is vitally important.

Here, we suggest a direct and straightforward means for reducing aviation emissions which we believe merits being added to on-going international policy considerations. Our suggestion is for UNFCCC to create policy that regulates the annual allowed production of aircraft fuel, with fuel distribution to be allocated by ICAO. Although matters concerning aircraft fuel for international

flights are presently controlled through article 24 of the 1944 Chicago Convention on International Civil Aviation,³⁴ we believe it is feasible for UNFCCC to supplant those controls with new ones, because UNFCCC adopts its policies through international accord. We raise the following points in support of new policy:

- It is crucial that the UNFCCC, by accord, *cap at the present level* the worldwide amount of jet fuel the aviation industry may use annually and at the same time *set an explicit schedule* for the rapid reduction of the allowed annual amount. (We don't suggest a schedule here, leaving that to international discussion and policymaking.) This policy removes authority from ICAO to regulate the aviation industry's climate-impacting emissions, other than working to develop and implement improved aircraft and flight-operations technologies.
- As part of the above by-accord policy, ICAO should be assigned the task of allocating the capped annual jet fuel consumption among nations, which can then distribute their annual allocations among airlines and owners of business and private aircraft. This fits the role for which ICAO was created (setting rules for internal function of the industry internationally), and removes the newer role for which it is ill-suited (regulating the industry's own overall impact on the climate) and for which it has a fundamental conflict of interest. Direction to ICAO should be to distribute fuels for equitable air transport service among nations.
- The term "jet fuel" is used here to encompass both fossil-sourced kerosene and biofuels. The reduction schedule could provide separate amounts for fossil fuel and biofuel. If so, it should take into account limitations that should be placed on biofuel use in consideration of: (1) what other economic sectors need such fuels; and (2) matters of environmental, social and equity impacts of producing such fuels (discussed above in section 1.C).

Other means of reducing aviation emissions that the UNFCCC should consider addressing in policies are:

- Limit the construction or expansion of airports;
- Limit the number of aircraft "slots" at airports;
- Place a high tax on aviation fuel;
- High and progressive taxation of airline tickets (such as a Frequent Flyer Levy, for instance);
- Ban air travel advertisement (similar to bans on tobacco advertisement in some nations), to reduce demand;
- Ban frequent flyer programmes, with a short phase-out period for using already acquired "miles," to reduce demand.

B. The world needs a UNFCCC accord that encourages sensible forms of mobility.

In addition to directly reducing aviation emissions, such as through policy suggested above, it is important for the UNFCCC to adopt policy that diverts travel demand from flying to modes of travel that are compatible with net-zero climate emissions, such as these policies:

- Eliminate anti-competitive subsidies that presently favour high-emission forms of transport such as aviation, so that low emission forms of transport will instead be favoured in the marketplace.
- A key need is to end the enormous indirect subsidy caused by not taxing aviation fuel internationally.

4. Conclusion

We believe the analysis and recommendations presented in this submission are cogent and that they provide realistic - even if challenging - solutions to aviation's enormous and growing contribution to the existential threat of climate breakdown.

We recognise that our approach and recommendations may be viewed as being outside of mainstream policy discussion. We contend, though, that they are now ripe for serious deliberation at the COP table. Allowing, even tacitly, the continued growth of aviation and its emissions is irreconcilable with the critically dangerous climate breakdown situation.

The extent to which growth in aviation and growth in its carbon emissions can be decoupled from each other is extremely limited and fundamentally insufficient. All potential regulations of aviation that are easily implemented *are easy precisely because they are ineffective* and therefore garner little resistance from the industry or vested interests. The world can no longer afford ineffective measures. We, as a global society, must take the more difficult policy path that will *directly confront the problem and correct it with certainty*. We urge the UNFCCC to set us on this path without delay by deliberating on and acting on our recommendations. And we thank you for the opportunity to participate in the Talanoa Dialogue.

Respectfully submitted,

Stay Grounded – an international network

Contact:

info@stay-grounded.org

<https://stay-grounded.org>

Phone: 0043/6503773102

Postal address:

Stay Grounded
c/o GLOBAL 2000 / Food & Water Watch
Neustiftgasse 36
1070 Wien
Vienna, Austria

Coordinators: Magdalena Heuwieser, Mira Kapfinger

End Notes

¹ See response by climate scientist Kevin Anderson, fwd from question made 24:39, in a panel discussion following his talk, "Universities and Climate Change - Part of the problem or solution?" on 4 July 2017, sponsored by CEMUS in Sweden. Recording: <https://www.youtube.com/watch?v=v6fLarIV2AI>.

² "Making our collective response to climate change more equitable." C40 Blog, 4/6/2018. https://www.c40.org/blog_posts/making-our-collective-response-to-climate-change-more-equitable. Moreover, a UK gov't study found that 15% of adults took 70% of flights. FullFact, 24 Nov. 2016. <https://fullfact.org/economy/do-15-people-take-70-flights/>

³ Gossling & Cohen (2014), at 23-24: "[I]n touching taboos there [] is potentiality to re-order, even though this may require overcoming psychological barriers both on the side of those touching taboos and those holding taboos sacred. ... [O]vercoming taboos will be fraught with difficulty; yet, without overcoming taboos, significant sustainable transport policies on a broader scale are unlikely to emerge." <https://epubs.surrey.ac.uk/805807/22/Gossling%20%26%20Cohen%202014.pdf>

⁴ IPCC SR1.5 at 1-11. http://report.ipcc.ch/sr15/pdf/sr15_chapter1.pdf

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- ⁵ Hemmings (2018). "Aviation: 2 to 3 times more damaging to the climate than industry claims." Transport & Environment. 6 Feb 2018. <https://www.transportenvironment.org/news/aviation-2-3-times-more-damaging-climate-industry-claims>
- ⁶ Grewe (2018). "Climate Impact of Aviation CO2 and non-CO2 effects and examples for mitigation options". Presentation. https://www.transportenvironment.org/sites/te/files/Climate%20impact%20of%20aviation%20CO2%20and%20non-CO2%20effects_Volker%20Grewe.pdf
- ⁷ Scott et al. (2012): Tourism and Climate Change: Impacts, Adaptation and Mitigation (p.109), citing Worldwatch Inst. (2008): Vital Signs 2006-2007 (<http://www.worldwatch.org/node/4346>). "Yet only 5 percent of the world's population has ever flown," (p. 68). This estimate is old, but the most recent, so we use a conservative "10%".
- ⁸ OPEC (2018). World Oil Outlook 2040, p.143. <https://woo.opec.org/pdf-download>
- ⁹ Boeing (2017). "Current market outlook: 2017-2036", p.7. <http://www.boeing.com/resources/boeingdotcom/commercial/market/current-market-outlook-2017/assets/downloads/cmo-2017-10-20.pdf>
- ¹⁰ OPEC (2018) (*supra*), p.145.
- ¹¹ Analysis of OPEC (2018) reported in: The Guardian (21 Sept 2018), "Opec predicts massive rise in oil production over next five years: Increasing demand from airlines will more than offset reductions from electric cars". <https://amp.theguardian.com/business/2018/sep/23/opec-predicts-massive-rise-in-oil-production-over-next-five-years>
- ¹² Travel Mole (1 Feb 2018). "Air travel growth smashes 10-year average". http://www.travelmole.com/news_feature.php?news_id=2030884
- ¹³ Aviation Week & Space Technology (10 Dec 2018). "Booming E-Commerce Sector Drives Air Cargo Demand". <http://aviationweek.com/commercial-aviation/booming-e-commerce-sector-drives-air-cargo-demand>
- ¹⁴ ICAO also works on regulations involving efficiency and emissions; however, the scope for improvement in these areas is limited as we discuss in section 1.C.
- ¹⁵ Heuwieser (2017). "The illusion of green flying." Finance & Trade Watch, Vienna. http://www.ftwatch.at/flying_green/
- ¹⁶ Bows-Larkin et al. 2016, "Aviation and climate change: The continuing challenge", <https://onlinelibrary.wiley.com/doi/10.1002/9780470686652.eae1031>, in: "Encyclopedia of Aerospace Engineering", 2016. p.2
- ¹⁷ *Id.*, p.8.
- ¹⁸ Peeters et al. 2016, "Are technology myths stalling aviation climate policy?". Transportation Research Part D: Transport and Environment. 44:pp.30-42. <http://www.sciencedirect.com/science/article/pii/S1361920916000158>
- ¹⁹ *Id.*
- ²⁰ Bows-Larkin et al. 2016 (*supra*).
- ²¹ Boeing 2018, "Current Market Outlook, 2017-20136". <https://www.boeing.com/resources/boeingdotcom/commercial/market/current-market-outlook-2017/assets/downloads/cmo-2018-3-20.pdf>
- ²² OPEC (2018). (*supra*).
- ²³ Royal Aeronautical Soc. (2017). "Can easyJet shor circuit airliner flight?". <https://www.aerosociety.com/news/can-easyjet-short-circuit-electric-airliner-flight/>
- ²⁴ Dickinson, J.E. et al. (2013). "Understanding temporal rhythms and travel behaviour at destinations: potential ways to achieve more sustainable travel." Jnl Sust. Tourism. 21(7), 1070-1090. p.1. <http://eprints.bournemouth.ac.uk/21154/1/Dickinson%20et%20al%202014%20JOST.pdf>

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- ²⁵ BP (2018). “BP Statistical Review of World Energy June 2018”, p.45.
<https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review/bp-stats-review-2018-full-report.pdf>
- ²⁶ ICAO (proposed 2017, adopted 2018). “2050 Vision for Sustainable Aviation Fuels”.
<https://www.icao.int/Meetings/CAAF2/Documents/CAAF.2.WP.013.4.en.pdf>. Note that we consider the name of this policy document to be greenwash; aviation biofuels are anything but sustainable, and the policy gives some fossil-origin aviation kerosene a sustainable label - absolutely unjustified.
- ²⁷ Open letter to ICAO signed by 96 civil society organizations, 6 Oct 2017.
<http://www.biofuelwatch.org.uk/2017/aviation-biofuels-open-letter/>
- ²⁸ Ecofys et al. (2014). "The land use change impact of biofuels consumed in the EU: Quantification of area and greenhouse gas impacts".
https://ec.europa.eu/energy/sites/ener/files/documents/Final%20Report_GLOBIOM_publication.pdf
- ²⁹ Explanation of electro-fuels: <https://en.wikipedia.org/wiki/Electrofuel>
- ³⁰ See endnote 7.
- ³¹ Hoexter (2016). "Living in the Web of Soft Climate Denial." New Econ. Perspectives, 7 Sept 2016.
<http://neweconomicperspectives.org/2016/09/living-web-soft-climate-denial.html>
- ³² Hibbert J.F. et al. (2013). “Identity and tourism mobility: an exploration of the attitude-behaviour gap.” In: Jnl Sust. Tourism 2014 book: “Understanding & Governing Sustainable Tourism Mobility” (Cohen et al., eds.). 21:7:pp.999-1016.
https://www.researchgate.net/profile/Susanna_Curtin/publication/271940921_Identity_and_tourism_mobility_An_exploration_of_the_attitude-behaviour_gap/
- ³³ IPCC SR1.5 at 1-11. http://report.ipcc.ch/sr15/pdf/sr15_chapter1.pdf
- ³⁴ 1944 Chicago Convention:
https://en.wikipedia.org/wiki/Chicago_Convention_on_International_Civil_Aviation