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## **Catastrophic aviation emissions: The Namuhs meet the Humans**

Richard Janda and Juan Pinto

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# CATASTROPHIC AVIATION EMISSIONS: THE NAMUHS MEET THE HUMANS

by

Richard Janda and Juan Pinto

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Imagine that intelligent beings from another world, call them the Namuhs,<sup>1</sup> arrive here to study our stewardship of the planet. They begin to probe what ecological challenges their Human counterparts face and what we are doing to ensure that we understand and address them successfully. Of course the Namuhs quickly determine that their Human counterparts are failing miserably.

They observe that Humans are using up the Earth's biocapacity at the utterly unsustainable rate of 1.6 planets a year.<sup>2</sup> They underscore that we are crossing through a number of boundary conditions for the safe operating space of the planet, including limits on greenhouse gases, stratospheric ozone and ocean acidity.<sup>3</sup> They point in particular to the problem of positive radiative forcing: the net increase in infrared radiation coming to the surface of the Earth because of the increased concentration of gases in the atmosphere that absorb such radiation.<sup>4</sup> Increased positive radiative forcing has the further consequence of generating feedback loops that further increase absorbed radiation notably in the Arctic, where decreased sea ice gives rise to an albedo effect: water does not reflect as much energy as ice.<sup>5</sup> The Namuhs are astonished that on the one hand Humans have increasingly precise and detailed knowledge of the scope and severity of the problem for the existing and future prospects of life but on the other hand had proven unwilling or unable to change significantly the behaviours they engage in that release greenhouse gases.

To advance their study of the situation on planet Earth, the Namuhs split up into a number of work parties to observe the most harmful Human behaviours. One work party focuses on how Humans produce energy for the generation of electricity. Another focuses on means of agriculture and consumption of food. Another focuses on industrial

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<sup>1</sup> We have in mind Horace Miner, "Body Ritual Among the Nacirema," (1956) 58 *Am. Anthropologist* 503-507. On the subject of diplomatic encounters in the Anthropocene, see Bruno Latour, *Face à Gaïa* (Paris: La Découverte, 2015).

<sup>2</sup> See the Global Footprint Network's calculations of Earth Overshoot Day, the day of the year on which we have collectively used the biocapacity that the earth can regenerate in a year: <http://www.overshootday.org/>. This year that date fell on August 8. In 1987, the date fell on December 19.

<sup>3</sup> Will Steffen, et al 347 *Science* 6223 (13 Feb 2015): DOI: 10.1126/science.1259855, online: Science <[science.sciencemag.org/content/347/6223/1259855.full](http://science.sciencemag.org/content/347/6223/1259855.full)>.

<sup>4</sup> See Stockholm Environment Institute and GHG Management Institute, "Radiative Forcing", online: Stockholm Environment Institute and GHG Management Institute <[www.co2offsetresearch.org/aviation/RF.html](http://www.co2offsetresearch.org/aviation/RF.html)>.

<sup>5</sup> NASA, "The Arctic is Absorbing more Sunlight", online: NASA <[earthobservatory.nasa.gov/IOTD/view.php?id=84930&eocn=image&eoci=related\\_image](http://earthobservatory.nasa.gov/IOTD/view.php?id=84930&eocn=image&eoci=related_image)>.

emissions. Another focuses on deforestation. And of course another work party focuses on transportation. A member of this last group has discovered that aviation emissions are to be discussed by a Human institution called ICAO, and so the Namuh arrange for a diplomatic exchange with a Human interlocutor, a member of the ICAO Assembly. Here is the translation of their discussion.

## I. THE NAMUH AND THE HUMAN PRESENT CREDENTIALS

**Namuh:** Excellency, you will appreciate of course that our presence on your planet is purely scientific. We seek to study the conditions for life wherever it is found in this universe. We have discovered that on some planets where life flourishes, forms of life themselves can disturb the relatively narrow band of conditions for homeostasis within a biosphere. They can overuse too rapidly the capacity of a biosphere to restore itself or they can change atmospheric conditions so as to make life unsustainable – sometimes both at once. We have encountered planets on which former conditions for life have disappeared. Indeed, your own neighbour Mars is already for you a kind of mirror held up to your planet showing you what it looks like to have had water but no remnant of life. What fascinates us about the Earth is that we have found you at precisely the moment when you are moving from homeostasis – I believe your name for it is the Holocene period – to a period of irreversible degradation. We understand that you are beginning to call the latter period the Anthropocene – the epoch in which Human impacts on your biosphere cause ubiquitous biogeophysical change.

We are truly impressed by your accomplishments as a species. You yourselves seem to prize your technical and material advancement. Those are of course many of the same accomplishments that have brought you to the brink of ecological catastrophe and although we acknowledge them, we are, to be frank, coming to the conclusion that you have not yet learned how to constrain or even abandon your technologies and your consumption when they produce harmful impacts on the conditions for life. However, because our main interest is in learning about and gaining increasing intelligence from life itself and its place within all else, we are impressed by how much you have come to know yourselves – a quality which we are somewhat surprised to discover that you seem to undervalue despite it long having been for you even a sacred injunction.

Let me explain myself. We have learned that you have gathered an enormous capacity to understand and model all the impacts you are producing. Let us take the example of aviation itself. We have processed all of the reports you have produced, including those of your own agency ICAO, and they contain rich sets of insights and information.<sup>6</sup> It is far from being the case, as we have indeed encountered in other circumstances, that you are producing devastating impacts without knowing so. We have

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<sup>6</sup> ICAO, *On Board: A Sustainable Future 2016 Environmental Report*. Online: <http://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf>.

learned that you even know of such circumstances, for example on your Easter Island.<sup>7</sup>

We note nonetheless that you have a tendency even as you gather knowledge to hide from it, at first simply by discarding things you are learning but do not fully understand, and second by resisting, sometimes quite fiercely, the difficult implications of what you come to know. Your microcosm of aviation provides among the best examples of both these observations. You know very well the impacts of greenhouse gases – notably carbon dioxide and methane – that are produced by your aircraft.<sup>8</sup> You know less well the impacts of contrails. Yet when confronted with studies showing that “net radiative forcing due to contrail cirrus remains the largest single radiative-forcing component associated with aviation,” which should at least make you conclude that the impacts of aviation significantly exceed its carbon dioxide emissions, you discount this factor awaiting further study.<sup>9</sup> This is all the more surprising given that you yourselves have long understood the necessity for precaution where impacts on the biosphere are concerned. Instead you cling to the odd need to make the problem you have created seem as small as possible. Thus you proclaim to all that your aircraft only account for 2% of all emissions, understanding as you must that in fact the proportion of radiative forcing is a growing multiple of that figure. Studies conducted by your scientists suggest that when aviation-induced cloudiness is taken into account, the real share is likely 4.9% and increasing.<sup>10</sup>

As best we can tell, this need to cling to 2% exhibits one of the psychological mechanisms you Humans have acquired to suppress responses to danger so as to comfort you in your existing behaviour. You manage to tell yourselves that dangerous activity you enjoy, if the danger can be made to appear smaller, is not truly a danger. We speculate that you developed this mechanism early in your evolution so as to confront and overcome physically much larger predators than yourselves. It became the virtue you call courage. But it is also in the vice you call recklessness. We are here simply to gather the truth as best we can perceive it, and the learning you do not yet fully understand but are discarding when you cling to a number like 2% displays recklessness.

However, there is another, deeper and more puzzling mechanism that accompanies

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<sup>7</sup> Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* 2d ed. (New York: Viking, 2011) 79-120.

<sup>8</sup> See US Environment Protection Agency (EPA) Final Rule “Finding That Greenhouse Gas Emissions From Aircraft Cause or Contribute to Air Pollution That May Reasonably Be Anticipated To Endanger Public Health and Welfare” 40 CFR Parts 87 and 1068, *Federal Register* Part V Vol. 81 No. 157 54422 (16 August 2016). Online: <https://www.gpo.gov/fdsys/pkg/FR-2016-08-15/pdf/2016-18399.pdf> at 54424.

The Administrator defines the ‘air pollution’ referred to in section 231(a)(2)(A) of the [Clean Air Act - CAA] to be the combined mix of CO<sub>2</sub>, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (henceforth the six ‘well-mixed GHGs’). This is the same definition that was used for the finding for purposes of section 202(a). It is the Administrator’s judgment that the total body of scientific evidence compellingly supports a positive endangerment finding that elevated concentrations of the six well-mixed GHGs constitute air pollution that endangers both the public health and welfare of current and future generations within the meaning of CAA section 231(a)(2)(A).

<sup>9</sup> Ulrike Burkhardt and Bernd Kärcher “Global radiative forcing from contrail cirrus,” (2011) 1 *Nature Climate Change* 54–58, online: [www.nature.com/nclimate/journal/v1/n1/full/nclimate1068.html](http://www.nature.com/nclimate/journal/v1/n1/full/nclimate1068.html).

<sup>10</sup> David Lee et al. “Aviation and global climate change in the 21<sup>st</sup> century,” (2009) 43(22-23) *Atmospheric Environment* 3520, online: Science Direct <[www.sciencedirect.com/science/article/pii/S1352231009003574](http://www.sciencedirect.com/science/article/pii/S1352231009003574)>.

your recklessness. It is your resistance even to what you are prepared to acknowledge. Thus, you actually know that what you face is not simply a risk or danger but in fact a looming catastrophe setting in motion irreversibly the end for your conditions of life. However, you tell yourselves that the catastrophe is not as large as that because you cannot live it yourselves, substituting the acknowledgement of an uncertain catastrophe of some kind projected dimly into the future. Thus you seem capable of both relating to the consequences of your actions and suppressing them at the same time. We speculate that this has to do with your relationship to your own mortality.

You have a less than fully developed capacity for self-consciousness, it seems to us, because as you evolved and came to know that you will die, you continued to suppress a direct relationship to that inevitability for the sake of ongoing survival especially during that period of history when your life expectancy was short.<sup>11</sup> Where the prospects of widespread catastrophe produced by Human behaviour are immediate, as when you faced the threat of nuclear war, you have been remarkably capable of producing collective constraints on destruction. Similarly, when you face immediate global threats to your own health, as in the case of ozone depletion, you have been relatively successful at ending the behaviour causing it. We speculate that your survival instinct operates strongly in the face of causal relationships perceivable by your senses at a point in time. Each of you can perceive or imagine perceiving a nuclear bomb or a skin tumour caused by over-exposure to ultraviolet radiation. Where, however, you are only able connect outcomes to complex causal pathways you have to model over time, such as climate change leading to loss of arable land and leading further to food shortages, you are unable to relate yourselves directly to the magnitude of the catastrophe you are causing and hence cannot bring yourselves to control the behaviour producing it.

There was surely a time in your evolutionary history at which all that your survival instinct could orient you away from were immediate and direct threats. Other threats remained mysterious and unknown to you and you called them acts of God. In those circumstances, you developed a form of wishful thinking that sought out divine intervention. A trace of that form of thinking remains in your ability to suspend concern about the climate catastrophe and wait for the salvation of a future technology. But please recognize that you are now at a crossroads in the evolution of your species where you are challenged to determine whether you can extend your survival instinct to encompass the catastrophe you have caused collectively through the complex interaction of all of your behaviour with the process of the biosphere.

**Human:** Excellency, we are honoured by your presence and take due note of your observations concerning our situation and conduct. We appreciate that you have assumed a detached, scientific perspective on the climate crisis facing our planet. Nevertheless, we think it is important, in order to assist your understanding of our

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<sup>11</sup> Antonio Damasio, *Self Comes to Mind: Constructing the Conscious Brain* (New York: Pantheon, 2010) 25, 72-3, for a discussion of how consciousness relates to the safe-keeping of life.

response, to emphasize some of the constraints that we face and to underscore the seriousness with which we are in fact confronting the crisis, the existence and imminence of which we acknowledge. We note the delicacy with which you referred to your own conclusions about our behaviour as speculative and we seek to show you that there is greater intelligence in our collective action than you might initially discern as outside observers. Indeed, we ourselves have had to learn about the distinction between the etic standpoint of scientific observers and the emic standpoint of actors themselves.<sup>12</sup> We do not discount your standpoint but we wish to complement it with our own in order to produce a more complete understanding.

We are not familiar with your planet, its ecosystems, and the place of your species within them, but you have already observed that our species now has its presence felt throughout our planet and indeed the activity your work party is investigating, aviation, is a significant part of that. But for our ability to move everywhere across the globe with relative rapidity we would not be today the species we have become in the Anthropocene. Other species, as doubtless you have observed, have migrated across the Earth, many through flight. In our case, however, flight was not an original endowment. It was instead a capacity we strived for centuries to achieve and finally succeeded in producing. It was a signal Human achievement. Although your initial remarks suggest that the technology we have made impresses you less than the knowledge we have acquired, please bear in mind that for us, knowledge and technology are intimately connected. According to one of our most famous physicists, Richard Feynman, "What I cannot create, I do not understand," meaning that Human knowing is intertwined with Human making.<sup>13</sup> The progress of Human knowledge has spurred advances in Human technology, which in turn has spurred advances in Human knowledge. But for the advent of aeronautics we would not have the airplane and but for the increasing technical prowess of the airplane we would not have pushed toward the exploration of outer space with its sophisticated technologies. Indeed the whole set of aerospace technologies form a significant part of what allows us to gather the data giving us our knowledge of the state of our planet.

This close relationship between technology and knowledge has another important implication. We cannot simply detach ourselves from those technologies that provide us with new ways to know and to be. The airplane is the perfect example of this. Humans with the airplane are not the same as Humans without it. We can relate to the planet very differently. We see it from a perspective that is only possible from the sky. We can live personally connected to others at great distance because anywhere they are we can be as well within a day. Everything we seek to accomplish through our ventures and transactions can happen on a planetary scale because of aviation. And we can even hope to produce greater mutual understanding among all the diverse Human communities

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<sup>12</sup> Marvin Harris, "History and Significance of the Etic/Etic Distinction," (1976) 5 *An. Rev. Anthropology* 329.

<sup>13</sup> See Quora, "What did Richard Feynman mean when he said, 'What I cannot create, I do not understand'?", online: Quora <[www.quora.com/What-did-Richard-Feynman-mean-when-he-said-What-I-cannot-create-I-do-not-understand](http://www.quora.com/What-did-Richard-Feynman-mean-when-he-said-What-I-cannot-create-I-do-not-understand)>.

across the surface of the planet because we now visit each other readily and informally, enjoying all the places of the Earth through an activity we call tourism. It is thus not an exaggeration to say that aviation is now a Human way of life. To affirm that this way of life is itself at odds with life presents us with nothing short of a contradiction. We are unable to live with contradictions, and thus we ask ourselves how to make our way of life compatible with preserving life. That is the role of the planetary organization to which I am a representative. We are asking ourselves how to make aviation increasingly compatible with the need to preserve the planet. We maintain a commitment to preserving and indeed expanding the use of aviation at the same time as we promote measures to make aviation less harmful to the planet. This is where our knowledge has brought us and I would respectfully conclude, Excellency, that far from recoiling from addressing the looming climate catastrophe, we are doing everything possible to prevent it.

## II. THE NAMUH AND THE HUMAN DISCUSS ICAO'S MEASURES TO ADDRESS THE CLIMATE CATASTROPHE

**Namuh:** Excellency, you have provided us with significant insight into your motivation and self-understanding. Indeed, as I already suggested, we admire that the injunction to pursue knowledge of yourselves is one of your most ancient pieces of wisdom. Thus, Excellency, let me ask you this. If you know that you will not stop doing what has become part of your way of life, what do you do with the knowledge that this way of life is producing a catastrophe?

**Human:** Excellency, I will seek to make my meaning clearer because I fear that my words lacked precision. Another piece of our ancient wisdom that you have doubtless encountered is to seek what we have called the Golden Mean. We seek to find the felicitous point between extremes according to which the lack of what is good or beneficial, for example access to flight, is accepted in the same degree as the quantity of what is beneficial falls short of a dangerous limit, for example greenhouse gas emissions. In this way we seek out as much flight as we can have proportionate to its impact on the climate. Given your careful study of our ways, our history and our traditions, you probably know that the story of Jatáyus and Sampáti<sup>14</sup> as well as the parallel story of Icarus and Daedalus. These stories foreshadowed our current situation. We have long imagined that if we learned to fly and then flew too close to the Sun, which we now know to mean too close to the limits of increased temperature that we can produce through the interaction of our emissions with solar radiation, there could be a sudden crash – today we might call this a downward turn in the felicity conditions for life. That is what you mean by catastrophe. We are aware of this danger and you have arrived at the very point at which we are seeking to avert it.

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<sup>14</sup> From the *Ramayana*, Canto LXI, online : Project Gutenberg  
<[www.sacred-texts.com/hin/rama/ry336.htm](http://www.sacred-texts.com/hin/rama/ry336.htm)>.

**Namuh:** I am pleased, Excellency, that you have reminded us of these ancient stories because it was not my place to do so or to assume the role of interpreter of your own traditions. Nevertheless you will permit me I hope to make an observation about the wisdom contained in those stories. In neither case was the injunction to avoid the extreme in fact obeyed. In both stories the temptation of, enthusiasm for and elation with flight overcame the knowledge of limit. In the Hindu version of the story, Sampāti rushed to shield his errant brother from the Sun only to have his own wings scorched and burned away. In the Greek version of the story, Daedalus watched helpless as his son fell into the abyss. The Greek version thus anticipates that the previous generation will watch as the next generation is left to its fate. Neither story tells us that you will learn to respect the limit.

**Human:** Excellency, the very point of these stories is to teach us to respect the limit. They allow us to see and to feel what it means to lose a brother or a child to our excesses with flight. We are mindful of the lessons of these stories and confident that we can apply their teachings to our current circumstances.

**Namuh:** Well let us then discuss, Excellency, whether the measures you are contemplating are true to those teachings. Jatáyus and Icarus both believed that they could push the limit just a little further and faced the horrific consequences. The question becomes whether you are acting like them or are learning to behave differently. I fear that the former is true. You know that you cannot continue to fly as you do without experiencing the effects of the Sun. Your continued emissions are the equivalent of the scorched feathers of Sampāti or the melting wax of Icarus. While no single burnt vane or drop of liquid or molecule of carbon dioxide itself spells catastrophe, there comes a point at which what you have fashioned to resist increased heat will dissolve. Pardon me, Excellency, but the measures you are contemplating, which involve stabilizing the level of aviation emissions at existing levels, entail that you will continue to fly too close to the Sun. The simple and difficult fact is this: you must immediately begin to scale your total emissions back until they reach 0, and you have precious little time to do so. Your own estimates, for example put forward by physicists at Oxford University, tell you that you have a shrinking window of 22 years to bring your total emissions across all sectors down to 0.<sup>15</sup> You know as well that carbon dioxide persists in the atmosphere for hundreds of years.<sup>16</sup> Since the measures you are about to recommend are premised on continuing to increase aviation greenhouse gas emissions for the next four years and then offsetting further growth in emissions beyond that point, your plan involves continuing to do what

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<sup>15</sup> Oxford e-Research Centre, *Trillionth Tone Project*, online: Trillionth Tone Project <[www.trillionthtonne.org](http://www.trillionthtonne.org)>.

<sup>16</sup> "Carbon is forever," *Nature Reports Climate Change* (20 November 2008), online: Nature <[www.nature.com/climate/2008/0812/full/climate.2008.122.html](http://www.nature.com/climate/2008/0812/full/climate.2008.122.html)>

University of Chicago oceanographer David Archer, who led the study with Caldeira and others, is credited with doing more than anyone to show how long CO<sub>2</sub> from fossil fuels will last in the atmosphere. As he puts it in his new book *The Long Thaw*, "The lifetime of fossil fuel CO<sub>2</sub> in the atmosphere is a few centuries, plus 25 percent that lasts essentially forever. The next time you fill your tank, reflect upon this" [quoting David Archer, Archer, D. *The Long Thaw: How Humans Are Changing the Next 100,000 Years of Earth's Climate* (Princeton: Princeton Univ. Press, 2008)].

you know you have to stop, and doing it at a growing rate.<sup>17</sup> All of those 56,000 new passenger aircraft projected to take to the skies by 2040 are so many new instantiations of Sampāti and Icarus.<sup>18</sup> However, in the contemporary version of the story, they are not the ones to suffer: it is all of life on your planet.

**Human:** Excellency, you are indeed well informed and express yourself with great poignancy. Yet please let me reassure you about the seriousness of our efforts. We have worked hard to develop a new aircraft CO<sub>2</sub> emissions standard applicable to new aircraft type designs as of 2020, but also to new deliveries of current in-production aircraft types from 2023.<sup>19</sup> A cut-off date of 2028 for production of aircraft that do not comply with the standard is recommended. Our global aspirational goal is to keep the global net CO<sub>2</sub> emissions from international aviation from 2020 at the same level.<sup>20</sup> The outcome of our global market-based measure scheme, which we call GMBM, will be to invest significantly in carbon offsets, such as reforestation. This will be done with encouragement to use offsets for the development of aviation-related methodologies and without imposing an inappropriate economic burden on international aviation.<sup>21</sup> Even before undertaking this ambitious investment, we seek to use aircraft technologies, operational improvements and sustainable alternative fuels to provide environmental benefits.<sup>22</sup> And we will do this with as much fairness as we can, taking into account the special circumstances and respective capabilities of the political entities we call States.<sup>23</sup> This explains the phasing-in of our measures over the next 10 years and the exemptions that we will grant in very narrow circumstances.<sup>24</sup> Given the significance of aviation to our planetary way of life, we will also ensure that there is no excessive pricing of emissions units or restrictions on access to carbon markets.<sup>25</sup>

**Namuh:** You will pardon me, Excellency, but when I hear you describe and justify your measures, I detect a change in the character of your discourse. You seem to have become the spokesperson for maintaining an industry. Your new aircraft emissions standard, a modest improvement, has been negotiated so as to keep manufacturers and operators of existing aircraft satisfied, since it will allow production of existing aircraft for up to twelve more years and will not require removal of higher polluting aircraft from the fleet. In any event, if demand for aviation services continues to rise, increased aircraft efficiency will be eclipsed and total emissions will continue to rise. Furthermore, your global

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<sup>17</sup> ICAO, *Draft Assembly Resolution text on a Global Market-based Measure (GMBM) Scheme*, 11 March 2016.

<sup>18</sup> Jeff Tollefson, "UN agency proposes greenhouse-gas standard for aircraft," (2016) 530 *Nature* 266 doi:10.1038/nature.2016.19336, online: Nature <[www.nature.com/news/un-agency-proposes-greenhouse-gas-standard-for-aircraft-1.19336](http://www.nature.com/news/un-agency-proposes-greenhouse-gas-standard-for-aircraft-1.19336)>.

<sup>19</sup> ICAO, Press Release, "New ICAO Aircraft CO<sub>2</sub> Standard One Step Closer To Final Adoption" (8 February 2016), online: ICAO <[www.icao.int/Newsroom/Pages/New-ICAO-Aircraft-CO2-Standard-One-Step-Closer-To-Final-Adoption.aspx](http://www.icao.int/Newsroom/Pages/New-ICAO-Aircraft-CO2-Standard-One-Step-Closer-To-Final-Adoption.aspx)>. See also Air Transport Action Group, "Q&A: The ICAO CO<sub>2</sub> Standard for Aircraft" (February, 2016). Online: [atag.org/component/downloads/downloads/307.html](http://atag.org/component/downloads/downloads/307.html).

<sup>20</sup> *Supra* note 17 s 2.

<sup>21</sup> *Ibid.*, ss 3 and 19.

<sup>22</sup> *Ibid.*, s 1.

<sup>23</sup> *Ibid.*, s 6.

<sup>24</sup> *Ibid.*, s 7.

<sup>25</sup> *Ibid.*, s 15.

aspirational goal, as you call it, only refers to stabilizing aviation emissions and does not refer to the limit conditions of the biosphere. Just months ago, senior representatives of all your States met in Paris and established very different aspirational goals: to pursue efforts to keep your planet from being subject to more than a 1.5°C temperature increase over preindustrial levels, acknowledging as they did at the time that a maximum 2.0°C was fraught with risk.<sup>26</sup> Yet your current language makes no reference to this recognized planetary limit condition and how aviation emissions relate to it.

Pardon me if I also observe that we have learned that in advance of the Paris conference, to the outside observer, the role of ICAO was far from straightforward. On the one hand, ICAO's Secretary-General signed an ambitious "Statement of the UN System Chief Executives Board for Coordination on Climate Change" urging Parties to the Paris Conference to adopt measures placing your planet "on an urgent pathway to limit global temperature rise to below 2°C this century" and committing to support the result.<sup>27</sup> On the other hand, ICAO Council issued a declaration seeking to ensure that aviation not be targeted to generate "disproportionate" revenues for climate finance and succeeded in ensuring that ICAO not be mentioned explicitly as having a role and responsibility in achieving the goals of the Paris Agreement, in contrast to what the antecedent Kyoto Protocol had provided.<sup>28</sup>

Furthermore, a recent report coming from the European Parliament reviews ICAO's proposed measures and underscores that without reductions in demand for aviation services, no scenario for technological progress would be compatible with limiting global temperature increases to 3.2°C.<sup>29</sup> We must ponder carefully the conclusions of that study, which I quote at some length:

Initiatives and actions taken by ICAO ... to address GHG emissions started late and have been insufficient from an environmental perspective to date: they do not take appropriate account of global decarbonisation requirements. ICAO has agreed to carbon neutral growth from 2020 onwards but policies to ensure that this target is achieved will not be adopted before autumn 2016. Even this target is only

<sup>26</sup> United Nations Framework Convention on Climate Change, *Conference of the Parties, Twenty-first Session, Paris Agreement*, 11 December 2015 (FCCC/CP/2015/L.9/Rev/1).

<sup>27</sup> United Nations System Chief Executives Board for Coordination, "Statement of the UN System Chief Executives Board for Coordination on Climate Change" 24 November 2015, online: United Nations System Chief Executives Board for Coordination <[www.unsceb.org/CEBPublicFiles/High-Level%20Committee%20on%20Programmes/Document/CEB%20statement%20on%20Climate%20Change\\_Nov%202015\\_0.pdf](http://www.unsceb.org/CEBPublicFiles/High-Level%20Committee%20on%20Programmes/Document/CEB%20statement%20on%20Climate%20Change_Nov%202015_0.pdf)>.

<sup>28</sup> See ICAO Council Declaration on International Aviation and Climate Change (18 November 2015), online: ICAO <[www.icao.int/environmental-protection/Pages/cop21.aspx](http://www.icao.int/environmental-protection/Pages/cop21.aspx)>. Recital 8 reads:

The ICAO Council... Urges ICAO and its Member States to express a clear concern, through the UNFCCC process, on the use of international aviation as a potential source for the mobilization of revenue for climate finance to the other sectors, in order to ensure that international aviation would not be targeted as a source of such revenue in a disproportionate manner, as requested by Assembly Resolution A38-18, paragraph 30.

See also Greenair, "Omission of international aviation from Paris climate agreement a vote of confidence, says ICAO President" (16 December 2015), online: Greenair <[www.greenaironline.com/news.php?viewStory=2173](http://www.greenaironline.com/news.php?viewStory=2173)>. By contrast see 1997 Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC) 2303 UNTS 148 / [2008] ATS 2 / 37 ILM 22 (1998) Article 2.

<sup>29</sup> European Parliament, Directorate-General for Internal Policies, *Emission Reduction Targets for International Aviation and Shipping* November, 2015 IP/A/ENVI/2015-11 at 22, online: European Parliament <[www.europarl.europa.eu/RegData/etudes/STUD/2015/569964/IPOL\\_STU\(2015\)569964\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2015/569964/IPOL_STU(2015)569964_EN.pdf)>.

aspirational, i.e. nonbinding and without concrete responsibilities for countries or operators. ... In the long term, these measures will mitigate growth of the sectoral CO<sub>2</sub> emissions but not lead to absolute emission reductions.

If, as in the past, the ambition of [ICAO] continues to fall behind efforts in other sectors and if action to combat climate change is further postponed, [the] CO<sub>2</sub> emission [share] in global CO<sub>2</sub> emissions may rise substantially to 22 % for international aviation ...

Fully decarbonising [aviation] within only 30 years is certainly too ambitious and ultimately unrealistic. However, stabilising emissions at 2020 levels (carbon neutral growth) is certainly not enough. If global decarbonisation requirements are taken seriously, a clear downward trend of emissions needs to be established sooner rather than later. To stay below 2°C, the target for aviation for 2030 should not exceed 39 % of its 2005 emission levels (50 % below the baseline) and should be -41 % compared to 2005 emission levels in 2050. ...

[I]t is unlikely that these targets can be achieved only by technological and operations improvements. ... Achieving these targets may require both encouraging behavioural change which leads to reduced demand for international transport services and enabling the offsetting of climate impacts by financing emission reductions in other sectors. Moreover, it needs to be taken into account that particularly the non-CO<sub>2</sub> climate impacts of aviation will not be reduced if fossil fuels are replaced by hydrocarbons extracted from renewable energies. Only electrical propulsion, demand reduction (Bows-Larkin 2015) or offsetting remaining emissions will enable full decarbonisation of the aviation sector.<sup>30</sup>

I hasten to add, Excellency, that we have had separate discussions with representatives of the European Union, and have emphasized with them the degree to which their own increasing demand for so-called short-haul flights is incompatible with decarbonisation, particularly given that they have a well-established rail transport system that allows them to eliminate use of such flights.<sup>31</sup> In short, none of the measures you contemplate seeks to curb and phase out demand for aviation services until such time as you develop new technology that will not damage the biosphere.

### III. THE HUMAN EXPLAINS THE BEHAVIOURAL LIMITS OF THE SPECIES TO THE NAMUH

**Human:** You will pardon me, Excellency, but when I hear you describe and justify what

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<sup>30</sup> *Ibid* at 40-1.

<sup>31</sup> See Paul Fitzgerald, "Europe's Emissions Trading System: Questioning its Raison d'Être," (2011) 10 *Issues Av. L. & Pol'y* 189. See also Paul Fitzgerald, "In Search of Greener Commercial Aviation," (2013) 13 *Issues Av. L. & Pol'y* 199 for a discussion of the advantages and policy directions in favour of "up-gauging".

you believe to be necessary for our planet, I also detect a change in your discourse. You seem to have become, and please excuse the expression, what we sometimes call “Holier-than-Thou”. I know nothing about your planet and the challenges you have faced in respecting its ecological boundaries, and I acknowledge, of course, that if you are here to study our situation it means that you have managed to maintain yourselves as living beings even beyond the boundaries of your planet. But the Humans are not in the favourable circumstances of the Namuh. We must cope with who we are, what we have become and what is possible not only within the ecological limits of our biosphere but also within the behavioural limits of our species. The Report you cite is well meaning enough, but it glosses over a major unresolved challenge. We do not have a global means for achieving behavioural change. All we can do through international institutions like ICAO is to take behaviour as we find it and perhaps, at the margins, nudge it in better directions.<sup>32</sup> Within the institutional limits of ICAO, it is unthinkable that we would manage the aviation industry toward its own elimination. As I have sought to explain, that industry is too deeply imbricated in our global way of life to be phased out, even in the short term. And although you have been skeptical, not to say dismissive, of the broader context within which we conceive our aspirational goals, I must now emphasize that aviation contributes only a small proportion of the overall emissions of humanity. Another of our common expressions, which you have surely encountered and which alludes to our evolutionary period as hunter-gatherers, is that one first takes low-hanging fruit. It is harder to reduce the emissions from aviation than it is to substitute clean energy sources for the electricity grid. Aviation will play its part within existing behavioural constraints by offsetting any emissions beyond 2020 levels and using the costs of those offsets to constrain demand, since those costs will have to be reflected in ticket prices. That is the purpose of market-based measures. But the low-hanging fruit from other sectors must be gathered before we can imagine the aviation sector taking on any more difficult burden. Again, Excellency, pardon my boldness, but it is as if you were asking us to stop eating because of the emissions we generate through our food when in fact we can reduce emissions more efficiently and less drastically by other means.

**Namuh:** It is good, Excellency, that we finally begin to have such a frank exchange. It is only when you explore your deepest convictions that you can confront your deepest incapacities. This is a crucial step in knowing yourselves. The evolutionary process of life itself involves confronting the incapacity of existing forms of life. If you are to take stewardship of your own evolution as a species, you must probe as deeply as you can what it is you are incapable of doing in order to discover the hidden capacity in life and in what you call the laws of nature. This is after all what you succeeded in doing by achieving the capacity for flight and for your emerging capacity for travel beyond your planet. You are now capable of doing what your own endowments excluded. You can set for yourselves an even deeper and more significant goal: to achieve the capacity to govern your own incapacity. You are precisely at the point at which you must see for yourselves

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<sup>32</sup> Cass Sunstein and Richard Thaler, *Nudge* (New Haven: Yale U. Press, 2008).

the impossibility of changing your own behaviour, and then set about to do so.<sup>33</sup>

Your allusion to low-hanging fruit sadly also reveals something about the roots of your incapacity to change your behaviour. One of your strongest survival instincts is to change as little as possible in what you actually do and indeed, as a matter of risk-aversion, to err behaviourally speaking, on the side of the status quo. I will repeat what I said earlier in different terms. It is only at the point of directly experienced disruption, disorder, and indeed violence that you display the willingness suddenly to abandon your behavioural status quo. Until such a time, you satisfy yourselves with low-hanging fruit and cannot persuade yourselves of the urgency for transformational change. There is a dangerous lag between your knowledge of looming danger and your response to it. We understand that you even have a name for this behavioural lag: you call it the tragedy of the commons, referring to your tendency to overuse planetary resources past the point of sustainability because each of you seeks to maintain the status quo of incremental personal gains from those resources.<sup>34</sup> The measures you are proposing for aviation entail a planetary tragedy of the commons.

You set for me the challenge, Excellency, that surely I would not have you stop eating so as to end emissions. Forgive me if I return the challenge and tell you that you and other species will stop eating if you do not end emissions. Your damage to the biosphere will punish you with the rapid decline in the numbers of your own kind and the incapacity of the planet to provide food and sustenance. It is you, not me, who proposes this outcome.

And let us explore and more deeply the implications of your example. If you ask yourselves: "Must we stop eating?" you will come to one kind of catastrophic answer. If you ask yourselves: "Must we stop eating as we do?" you will begin to discern a possible transformation. You are already beginning to understand that you can no longer eat the sources of protein you use because the emissions thereby produced are unsustainable. You can seek to stop your eating behaviour without stopping to eat. Why can you not stop your transportation behaviour without stopping to move? In the life of your species, it is but a fraction of a moment that you have used global aviation. Why can you not even imagine suspending the use of that technology and substituting alternatives until you develop sustainable alternatives?

**Human:** Excellency, since we are being candid and trying to probe the deepest motivations of my species, I must invoke a characteristic of our behaviour to which we have not yet given sufficient attention. It has to do with a nebulous and difficult phenomenon we call power. Among us this does not refer to the physics of transforming energy into work. It refers instead to the ability to exercise authority over others. It is a

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<sup>33</sup> Rosalie Jukier, "If It's not Impossible, It's not Worth Doing: Rod Macdonald's Vision of Legal Education," in Richard Janda et al. *The Unbounded Level of the Mind: Rod Macdonald's Legal Imagination* (Montreal: McGill-Queen's, 2015).

<sup>34</sup> Garrett Hardin, "The Tragedy of the Commons," (1968) 162 *Science* 1243.

capacity we seek as a species and when it is achieved, it is enormously difficult to displace, since those who hold it seek to maintain and reproduce it. It is not too great a simplification to assert that to attack and curtail aviation is to attack and curtail power in the Human sense. The powerful in Human societies have come to rely a great deal upon aviation. It has even become a symbol of power to be able to fly in one's own aircraft whenever one chooses. The most important use of aviation is for what we call business, and it has a direct relationship to power.

Understandably in your investigations you are paying most attention to how we seek to maintain the prospects of life on our planet. You are what we call scientists. But the planet we live in is one that has been made over by Human power and business. We have come to relate to our own planet and its ecosystems, which we call nature, as a resource available to a second nature we have made ourselves, which we call the economy.<sup>35</sup> We have come to concentrate power over the economy in the hands of entities we call companies or businesses, the main type of which we call corporations, and of these the most powerful operate across the planet. They make products and provide services in exchange for a representation of value we call money. On our planet, the accumulation of money measures power.

Those with money are the ones who use aviation most frequently. Indeed, airlines have created a set of rewards for those who fly most frequently so that they can fly even more. Airlines are themselves businesses, which have often lost more money than they have made. In the last 5 years, airlines as a whole have finally been making more money than they lose, and have benefited enormously from having increased demand for their services.<sup>36</sup> They hold firmly to maintaining that position of power. In sum, airlines as businesses are resisting any measures that will make them lose money, and other businesses seek to continue using airlines to enable their operations around the world. To phase out demand for airline services would be to attack powerful businesses directly. This is simply not a possible approach for an international organization that itself depends on the cooperation of the powerful.

What is possible instead is to have businesses accept that they themselves should take measures to limit their emissions within the constraints of their need to make money. A number of airlines have implemented ambitious programs to measure and verify their emissions and to set stringent targets for emissions reductions. Thus, for example, a company called Virgin Atlantic has committed to external verification of its total CO<sub>2</sub> equivalent emissions, and has set the goal of increasing fuel efficiency 30% by 2020 over 2005 levels per distance flown and passengers and freight carried.<sup>37</sup> The airline has

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<sup>35</sup> Bruno Latour, *An Inquiry into the Modes of Existence: An Anthropology of the Moderns* (Cambridge, Mass.: Harvard U. Press, 2013) at 382 ff.

<sup>36</sup> IATA Press Release No. 27, (2 June 2016), "Industry Profitability Increases", online: IATA <[www.iata.org/pressroom/pr/Pages/2016-06-02-02.aspx](http://www.iata.org/pressroom/pr/Pages/2016-06-02-02.aspx)>.

<sup>37</sup> Virgin Atlantic, *Sustainability Report 2016* at 16-22, online: Virgin Atlantic <[www.virgin-atlantic.com/content/dam/VAA/Documents/sustainabilitypdf/Virgin\\_Atlantic\\_Full\\_Sustainability\\_Report\\_2016.pdf](http://www.virgin-atlantic.com/content/dam/VAA/Documents/sustainabilitypdf/Virgin_Atlantic_Full_Sustainability_Report_2016.pdf)>.

already succeeded in reducing its total emissions by 15% since 2007. It has invested significantly in producing new fuels that reduce carbon emissions.<sup>38</sup> It has also studied ways to improve the behaviour of its pilots so as to ensure that they reduce emissions to the greatest degree possible as they operate aircraft.<sup>39</sup> Other airlines have their own programs and targets for improving environmental impacts.<sup>40</sup> Many provide air travelers with opportunities to offset their carbon emissions, and some independent offset programs have emerged that are subject to rigorous verification.<sup>41</sup> In addition, a number of businesses are themselves seeking to reduce their reliance upon business travel in order to diminish their carbon footprints.<sup>42</sup> We call such self-imposed measures corporate social responsibility, in line with a famous saying of ours that “with great power comes great responsibility.”<sup>43</sup> Appeals to the voluntary exercise this responsibility are our best opportunity to mobilize the powerful in favour of climate action.

#### IV. THE NAMUH PROPOSES MEASURES TO THE HUMAN

**Namuh:** I am honoured, Excellency, that you share these sincere thoughts with me. Indeed, they help to expose that the climate catastrophe is very deeply rooted in your current behaviour. Let us pursue our candid exchange further. We know that the powerful are causing a vastly disproportionate quantity of emissions in comparison with the population of your species. It is estimated that only 6% of your species has flown in the last year, and of that population, a much smaller fraction is responsible for most emissions given that they are frequent travellers.<sup>44</sup> This fact can be assessed from the standpoint of your planetary carbon budget. Each member of your species now has a 4 tonne CO<sub>2e</sub> budget, which you must shrink to 0 within less than three decades. For each of you to respect a personal carbon budget of less than 4 tonnes, you simply cannot fly at all.<sup>45</sup> For most of you, that represents no change in behaviour. For some of you – including

<sup>38</sup> *Ibid.* 26-7.

<sup>39</sup> Claire Lambert et al. “The effects of giving Captains feedback and targets on SOP fuel and carbon efficiency information: Results of the Virgin Atlantic University of Chicago and London School of Economics Captains’ Study,” (20 June 20 2016), online: Virgin Atlantic <[www.virginatlantic.com/content/dam/VAA/Documents/sustainabilitypdf/VAA\\_Captains\\_Study\\_Summary\\_FINAL\\_170616.pdf](http://www.virginatlantic.com/content/dam/VAA/Documents/sustainabilitypdf/VAA_Captains_Study_Summary_FINAL_170616.pdf)>.

<sup>40</sup> “How Some Airlines are Striving Toward Sustainability,” *Responsible Travel Report*, Online: *Responsible Travel Report* <[www.responsibletravelreport.com/component/content/article/2648-how-some-airlines-are-striving-toward-sustainability](http://www.responsibletravelreport.com/component/content/article/2648-how-some-airlines-are-striving-toward-sustainability)>.

<sup>41</sup> See Gold Standard, online: [www.goldstandard.org](http://www.goldstandard.org).

<sup>42</sup> See Kate Harrison, “Save Money and Reduce Carbon Emissions from Business Travel”, *Forbes* (10 May 2016), online: Forbes <[www.forbes.com/sites/kateharrison/2016/05/10/save-money-and-reduce-carbon-emissions-from-business-travel/#31355b277eec](http://www.forbes.com/sites/kateharrison/2016/05/10/save-money-and-reduce-carbon-emissions-from-business-travel/#31355b277eec)>.

<sup>43</sup> France, Convention Nationale, “Décret : Des fonctions des Représentans du Peuple, relatives aux corps administratifs, aux sociétés populaires, aux ressources locales du commerce et de l’industrie, et aux établissemens à former ou à perfectionner,” in *Collection générale des décrets rendus par la Convention Nationale*, Volume 35 (7 May 1793) 72:

Les Représentans du peuple se rendront à leur destination, investis de la plus haute confiance et de pouvoirs illimités. Ils vont déployer un grand caractère. *Ils doivent envisager qu’une grande responsabilité est la suite inséparable d’un grand pouvoir.* Ce sera à leur énergie, à leur courage, et surtout à leur prudence, qu’ils devront leur succès et leur gloire. [emphasis added].

Online: <[play.google.com/books/reader?id=lwxHAAAcAAJ&printsec=frontcover&output=reader&hl=en\\_US&pg=GBS.PA1](https://play.google.com/books/reader?id=lwxHAAAcAAJ&printsec=frontcover&output=reader&hl=en_US&pg=GBS.PA1)>.

<sup>44</sup> Christine Negroni, “How Much of the World’s Population Has Flown in an Airplane? Some Numbers and Some Guesses,” *Air & Space* 6 January 2016, online: Air & Space <[www.airspacemag.com/daily-planet/how-much-worlds-population-has-flown-airplane-180957719/](http://www.airspacemag.com/daily-planet/how-much-worlds-population-has-flown-airplane-180957719/)>. Business travellers also generate more emissions when they travel in non-economy classes since they take up more space (and thus weight) on the aircraft.

<sup>45</sup> Shrink That Footprint, “Shrink your travel footprint”: “If you hope to reduce your personal footprint to a low target, like 4 t CO<sub>2e</sub> a year, there is very little room for flying at all, and certainly not for long distances.” Online: Shrink That Footprint <[shrinkthatfootprint.com/shrink-your-travel-footprint](http://shrinkthatfootprint.com/shrink-your-travel-footprint)>. See also Yael Parag and Deborah Strickland, *Personal Carbon Budgeting: What People Need to Know, Learn and Have in Order to Manage and Live Within a Carbon Budget, and the Policies that could Support Them*, UK

I might add those of you who attend ICAO conferences as well as your environmental activists who travel the world by aircraft – that represents a dramatic and difficult change. Whatever the virtues of the corporate social responsibility efforts undertaken by some of your companies, they simply cannot be implemented in a manner consistent with individual carbon budgets. We have spoken much of offsets, and this is to date your most serious answer to role of aviation in the climate catastrophe. Yet that is the equivalent of continuing to poison your body while administering a partial antidote. You know that you need the antidote anyway and that less poison will make it more effective. All of the offsets you plan on funding, such as reforestation, need to occur given the existing levels of CO<sub>2</sub>e in the atmosphere. Offsets may help to clear your conscience, but they do not stop the unsustainable growth in emissions.

Imagine therefore that you were really to plan phasing out air travel until zero-emissions technology replaced it. You would certainly face an economic shock as a result and would need to implement adjustment policies for airlines and aircraft manufacturers.<sup>46</sup> Much of your business travel would be replaced by increasing use of your telecommunications networks, which can be made to operate with close to zero carbon footprint.<sup>47</sup> There would be an immediate boost for your airship manufacturers, who would begin to produce very low carbon footprint airships that could cross the Atlantic Ocean in two days.<sup>48</sup> In essence, your powerful would have to accept a further claim on their time. But on what basis can they insist that their convenience is more important than the planet?

A strict phase-out of air travel, say over a five-year period, would spur a significant investment in rail and hyperloop transport.<sup>49</sup> It was also attract resources to research and development of new modes of air transport for the future. Can your ICAO be brought even to consider such an approach?

**Human:** Excellency, I sense that we do now come to the core of the matter and I wish to respect the spirit of honest exchange that we have established together. I spoke earlier of the relationship between the climate catastrophe and the Human phenomenon of power. I must now confess to you that I am not myself immune to the workings of power in my capacity as a representative at ICAO. I have been named by my government, the supreme authority of my State. My government is itself dependent upon maintaining the balance of power within it. My role is to speak not for myself but for the authority that has named

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Energy Research Working Paper, UKERC/WP/DR/2009/014 (June 2009). Online: Oxford University <[www.eci.ox.ac.uk/research/energy/downloads/paragstrickland09pcbudget.pdf](http://www.eci.ox.ac.uk/research/energy/downloads/paragstrickland09pcbudget.pdf)>.

<sup>46</sup> Edward Iacobucci et al., *Economic Shocks: Defining a Role for Government Policy Study* 35 (Toronto: C.D. Howe Institute, 2001).

<sup>47</sup> See Greenstar Network. Online: <http://greenstarnetwork.com>.

<sup>48</sup> Fusion, “The airships of the future have arrived” 5 April 2016, online: Fusion <[fusion.net/287548/airships-of-the-future-have-arrived](http://fusion.net/287548/airships-of-the-future-have-arrived)>.

<sup>49</sup> Aviva Rutkin, “Pictures: Hyperloop gets a test run as first pod is unveiled,” *New Scientist* (18 May 2016):

The Hyperloop is ‘once a concept, now very much in development’, says MIT team captain Philippe Kirschen. ‘The dream is a mode of transportation that is incredibly fast, incredibly convenient and it’s conceivably carbon-free.’  
Online: *New Scientist* <[www.newscientist.com/article/mg23030744-500-pictures-hyperloop-track-has-test-run-as-first-pod-is-unveiled](http://www.newscientist.com/article/mg23030744-500-pictures-hyperloop-track-has-test-run-as-first-pod-is-unveiled)>.

me. Even if I feel the implacable logic of your position, I am not free to articulate it before the Assembly. If I were to take the position you propose, my government would renounce my ICAO credentials and name a new representative. At best, I would be greeted as what we call a loose canon, meaning someone whose words are not solidly bound to the official line and who thus directs remarks in an unpredictable direction. At worst, I would be scorned as an impractical idealist incapable working within the limits of reality. In either case, my career as a diplomat for my State would be over, my prospects of livelihood in jeopardy, and my capacity to care for my family therefore in great peril. Sadly, Excellency, it is far too dangerous for me to urge what you would propose, whatever its merits might be.

**Namuh:** That is to say the least, Excellency, a tragic reflection of your planet's circumstances. The practical planetary limits of your reality are that you can put no more greenhouse gases into the atmosphere. The prospects of life are in jeopardy and your capacity to care for the next generation is in great peril. Instead you have to worry about your career. Why is it impossible for you to persuade your government of what you believe? Why can you not at least insist on a session of your planetary Assembly at which there is open, candid discussion of all present without repercussion? There is much ancient wisdom among your indigenous peoples, with their talking circles and their insistence upon speaking with a view to the next seven generations. Why is it impossible for your ICAO to follow their example?

**Human:** Excellency, I am but one of seven billion members of my species. It is not for me alone to determine the structures of power, the operation of the economy, the dictates of politics and the rules of official discourse. I am but a humble servant.

**Namuh:** And yet, Excellency, you have an enormous privilege and responsibility. You are among the infinitesimally tiny fraction of your species enabled to speak to and influence the outcome of the work of ICAO. Surely you cannot allow our frank exchange of views to come to nothing.

**Human:** Excellency, all of our words will continue to weigh on me. I will do my very best within the mandate I have received. I will seek to make everything ICAO is capable of agreeing upon as verifiable and adhered to as possible. I will explore all ways to accelerate, even modestly, the commitments to offset and narrow as much as possible all exceptions and escape clauses. I will pour myself into ensuring that the ICAO framework is made as solid as it can be. I fear, Excellency, that this will strike you as all too modest a goal. But my experience teaches me that if I set too lofty a goal, like the one you propose, nothing at all will emerge from the discussions among different actors with different sets of interests. Negotiations will simply break down. The recent Paris Agreement illustrates that if goals are kept aspirational and broad, States can agree. But the moment money and power are clearly and immediately at stake, infighting will begin and some actors will prefer reaching no agreement to having an agreement that is costly to them or to the

interests they represent. You must bear in mind, Excellency, that ICAO was created and remains in existence to foster the growth of international civil aviation. The interests of airline companies, some still owned by States, are part of the very *raison d'être* of the organization to which I am a representative. I repeat what is surely for you a disappointing truth: it is simply beyond the scope of possibility that ICAO would contemplate constraining demand for airline services. Thus, I have no choice but to do my best on another path.

**Namuh:** The disappointment to be felt is not simply by me but by all of the forms of life, including that of your own species, which your planet has spawned. Plainly, Excellency, if the climate catastrophe is to be averted, which is something I have come to believe that you sincerely seek, it will not be through your work or through the work of the planetary agencies Human beings have designed. I have concluded that your only possibility, as far-fetched as it now seems, lies in large-scale behavioural changes generated through the collective action of all members of your species. Perhaps the purpose of ICAO and other international bodies will be to prompt such collective action once your planet's population gains understanding of the inadequacy of official measures. In short, as far as aviation is concerned, people must stop flying on their own.

**Human:** Before we part, Excellency, will you allow me a final question? As I say, I know nothing of your planet and I would like you to tell me, did your species ever face and avert a catastrophe of the kind we confront on Earth?

**Namuh:** In fact, Excellency, it is not quite true that you know nothing of our planet. Just in the past few days, your scientists have announced that they have discovered it orbiting the sun closest to yours.<sup>50</sup> Our home is quite different from your own, being somewhat larger and revolving around our smaller sun in fewer than twelve of your days. The pace of seasons we had and the abundance of life it produced was something to behold. In comparison to what we had, your planet, as gorgeous as it is, feels to me slow and sparse.

**Human:** Why do you speak in the past tense, Excellency? Is it because you have been away from your world for long?

**Namuh:** Excellency, surely you must have guessed by now. We are the remnant of our species that left our world seeking prospects on life on your planet when we failed to address a climate catastrophe of our own. Our scientists, like yours, discovered your planet and had just enough time to learn how to send us to it before life on our planet was extinguished. Perhaps, therefore, you can imagine our dismay at what we have discovered here.

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<sup>50</sup> Guillem Anglade-Escudé et al., "A terrestrial planet candidate in a temperature orbit around Proxima Centauri," 536 *Nature* 437 (25 August 2016) doi:10.1036/nature19106, online: Nature <[www.nature.com/articles/doi:10.1036/nature19106](http://www.nature.com/articles/doi:10.1036/nature19106)>.

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