impact
ON SUSTAINABLE AVIATION

February 2023

The milestones to decarbonize aviation

Summary

impact's goal is to accelerate aviation's transition to net zero. To do this, impact plans to leverage the responsibility and capabilities of aircraft financiers to ensure that well-defined sustainability targets are firmly anchored in loan or lease agreements. The metrics required for this should also improve the accuracy and clarity of reporting on the sustainability of the financiers' investment and loan portfolios.

With this White Paper, impact recommends using different levels of increasingly difficult-to-achieve thresholds for a simple and transparent scoring system ("milestones"), replacing the need for ambiguous reference benchmarks. Milestones are defined by categories of capacity growth and decarbonization. Once an airline has accomplished a particular milestone, its sustainability score rises accordingly.

No assumptions or forecasting models are required to set appropriate milestones, the rules are fully transparent, and the thresholds remain constant until 2050. The concept of milestones is analytically sound and easy to understand, interpret and implement. Airlines that have developed their sustainability further than others from the outset have significantly better chances of reaching the milestones earlier than less ambitious competitors. Last but not least, the milestone concept measures exactly what it is supposed to.

Forecast-based benchmarks, in contrast, could turn out to be of little practical benefit, at least for aircraft finance applications. Forecasts are based on uncertain assumptions, and overly optimistic or pessimistic forecasts could reduce the pressure to decarbonize or increase it for no reason. Airlines resist the notion that they should all be compared against the same forecast determined for the industry as a whole. Last but not least, airlines and financiers alike reject the uncertainty and potential for red tape in the processes and documents related to forecast-based covenants. It is important to remember that uncertainty, ambiguity and complexity pave the way for greenwashing.

About impact

impact is a non-profit platform for investors in and financiers of airlines and aviation infrastructure that aims to be at the forefront of a new reality in aviation finance. impact is comprised of several collaborative working groups designed to deliver a credible and transparent roadmap to reduce CO_2 emissions from aviation to net zero by 2050. impact is funded by the pro bono contributions of members, which are composed of leading global financiers in the aviation sector.

impact members

Abbreviations

CO_2	Carbon dioxide
KPI	Key Performance Indicator
RPK	Revenue Passenger Kilometers
SAF	Sustainable Aviation Fuel

The great decoupling

The European Environment Agency (EEA) recently published an article on sustainability and mobility, "The great decoupling[1]" . In that paper, the authors noted: "Technological breakthroughs and social innovations have enabled an extraordinary decoupling of GDP growth from adverse environmental impacts". The value of that decoupling idea lies in the fact that it does not sacrifice one goal–essential climate protection–against another, prosperity and social cohesion. Decoupling recognizes these two dimensions of sustainability as fundamentally equivalent, fully in line with the United Nations Sustainable Development Goals[2] . The word "enabled" in the EEA text is also significant for aviation, as decoupling is not only about GDP growth at the level of nations. The goal of accelerating the decoupling of adverse environmental impacts from economic development also applies to most industries, and not least to aviation. Aviation is particularly hard to disentangle from its dependence on fossil fuels but at the same time is indispensable to prosperity and social cohesion globally.

How can aviation's environmental impact be decoupled from its growth? Most observers from academia, politics or the business community agree that this decoupling in aviation can be achieved by 2050, allowing aviation as a whole to reach its net zero target. However, this Great Decoupling of aviation is subject to preconditions that will require unprecedented efforts. Only small quantities of non-fossil, alternative fuels known as SAF are available, with the production capacities that will be needed not yet even planned, let alone financed. The same applies to technology for absorbing CO_2 from the atmosphere (carbon capture). And for all these technologies, even though they exist in principle, the renewable energies needed to operate them at sufficient scale are likely to present the most severe bottleneck. Last but not least, despite continual innovations, quantum leaps in aircraft or engine technology that could move the needle are not to be expected in the short term.

True sustainability requires a balance between social and environmental objectives. Long-term ambitions will miss the mark unless they are backed up very quickly with tangible, bold and arguably painful strategies. The issue is not whether decarbonization and growth in aviation are simultaneously feasible at all. It is solely a question of what preconditions must be met for them both to happen and how these preconditions can be met. This question, posed in this way, is not a matter of opinion, but of analysis. This is a critical problem for which impact wants to help find a solution.

The financial community recognizes its prominent role in assisting effective sustainability strategies in aviation. Airlines, aircraft and production facilities for alternative fuels and new technology and, last but not least, renewable energies, have to be financed. Which investments and financings have the greatest impact on sustainability? Which financings deserve to be labelled "sustainable"–and which mean little more than greenwashing?

[1] https://www.eea.europa.eu/publications/scenarios-for-a-sustainable-europe-2050/imaginary-3-the-great-decoupling
[2] https://sdgs.un.org/goals

The responsibility of driving the success of the Great Decoupling through financing and pushing it in the right direction is immense. impact, as the global association with the largest membership for financing the sustainability of air transport, wants to clarify a few simple questions as a prerequisite for effective sustainability strategies. What criteria are used to measure sustainability? How can these criteria be transparently anchored as a global standard in financing agreements? How can progress in decoupling be monitored, publicly communicated and effectively managed without greenwashing? And always with that twin goal in mind: climate protection on the one hand and prosperity and social cohesion on the other. Critically, these must not be played off against each other.

Before the Paris Agreement[3] , intensity, i.e. the ratio of emitted CO_2 to capacity, was the measure of choice because it accurately reflected the increasing efficiency of aircraft and engines. However, since COP26 in Glasgow[4] in 2021 or perhaps even before, it has also become clear that focusing solely on individual assets is not sufficient to limit the temperature increase to 1.5°C. Therefore, impact's recent White Paper "Less is more" (https://impact-on-sustainable-aviation.org/downloads/) described how three essential indicators are sufficient to provide a more holistic picture of sustainability and sustainability progress. These are: Footprint, referring to the volume of absolute CO_2 emissions[5]; intensity, referring to the amount of CO_2 emitted per unit of transport and decoupling, referring to the decoupling of CO_2 emissions trends from those of capacity development. These three essential KPIs paint a clear picture of the decarbonization and overarching sustainability of aviation for all stakeholders.

In lease and loan contracts, irrespective of whether "use-of-proceeds" or "sustainability-linked" prevails, clear sustainable development criteria ("covenants") are becoming increasingly indispensable to complement financial covenants. With hundreds of billions of dollars invested in the financing of aircraft, covenants are the point at which "the rubber meets the road".

As an example of a sustainability-driven covenant for the financing of aircraft, decoupling comes to the fore as a nearly ideal metric. The transparent differentiation and honest reference to decarbonization in relation to social value added are key advantages.

[3] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[4] https://www.gov.uk/government/publications/cop-26-declaration-international-aviation-climate-ambition-coalition/cop-26-declaration-international-aviation-climate-ambition-coalition

[5] CO_2 emissions should be adjusted for the lifecycle effect of SAF as well as for directly attributable effects from carbon capture

Predicting the unpredictable?

How much decoupling would be sufficient, how little would be insufficient? It is a widespread conviction that concrete forecasts are necessary to assess sustainability progress. Unsurprisingly, many aviation emissions forecasts have been published in recent years, aimed as yardsticks against which to compare the actual developments of individual airlines. The various forecasts differ considerably and are adjusted frequently to reflect ongoing developments and new scientific findings. This is mostly attributable to the fact that they are all, necessarily, based on assumptions about the future availability of alternative fuels or technologies, e.g. hydrogen, electric aircraft and carbon capture. Likewise, assumptions are made on future advances in the design of aircraft fuselages, wings, and engines, on "carrot-and-stick" regulatory policies, advances in air traffic control, or on the effects of price increases on passenger demand, etc. A lot of these assumptions suffer from a high level of uncertainty. Do we know, for instance, how much SAF will be available, where and when, what will the quality be and at what price? Do we know which other industries will compete with aviation for that limited supply? When assumptions are unclear, they can potentially be distorted according to vested interests.

Applying such forecasts as reference scenarios in financing contracts raises three challenges:

- The need to regularly adjust forecast-based benchmarks means that financing agreements must be amended on a regular basis too, benefitting either the airline or the financier each time, irrespective of the specific incentives agreed upon (see page 15). This will almost certainly lead to controversies between the contracting parties. Also, if the forecasts turn out to be too optimistic, the pressure for effective decarbonization is compromised. If the forecasts prove too pessimistic, they may well create undue pressure beyond feasibility. Financial agreements–like all contracts–cannot stand if their incentives are recognizably and permanently out of sync with economic reality. Such contracts threaten to fail the moment they are signed.

- Forecasts mostly refer to the airline industry as a whole, not to specific airlines. And airlines that have already trimmed their fleet and network to a high degree of sustainability may seem at a disadvantage compared to less advanced peers when looking at these forecast-based benchmarks. This may call into question the fairness of a benchmark-based methodology.

- Stakeholders complain that forecast-based benchmarks make contract terms unnecessarily complex, difficult to understand and add a lot of costly red tape to all related processes and documents.

Occam's razor and the principle of milestones

The milestone concept we present below demonstrates that:

- Decoupling "decarbonization progress" and "air traffic growth" can be translated directly into a simple, accurate scoring system that will be as watertight against greenwashing as conceivably possible;
- Forecast-based benchmarks are not necessary. Focusing on assessing whether an airline has achieved a certain sustainability score, how many hurdles have yet to be achieved by 2050, and how that compares with other airlines should be enough.

The Franciscan monk William of Ockham (1287-1347) claimed that of two equally good solutions to a problem, the one requiring fewer assumptions should be chosen. Applying Occam's razor, the milestone concept described is simple, transparent, measures what it is supposed to, and should be robust in the face of market fluctuations as well as greenwashing. The milestone principle is built in three simple, consecutive steps (see Figure 1):

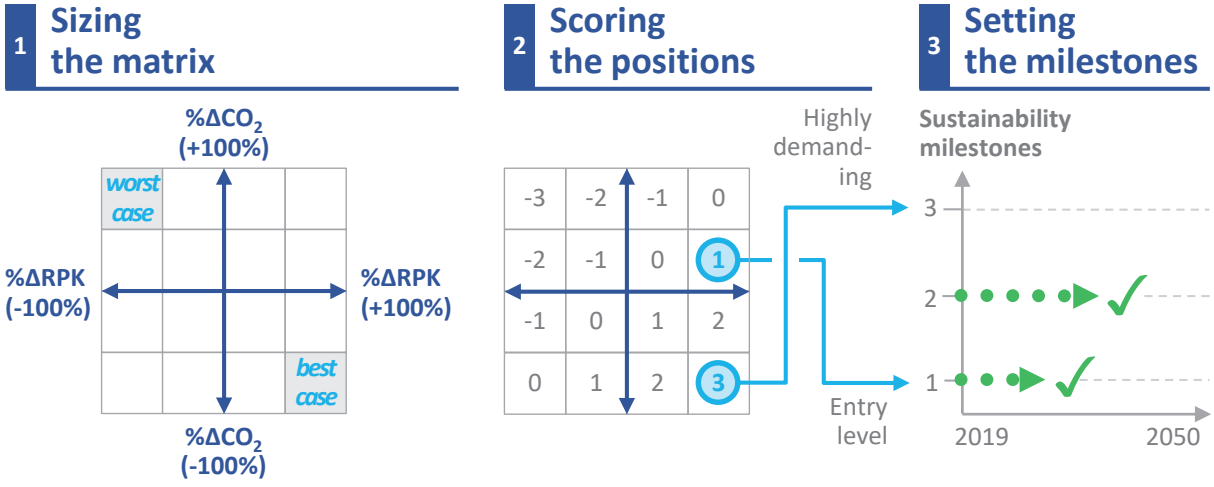

Figure 1: The chart on the left describes the coordinate system from the measure of changes in CO_2 and RPK, each relative to the base year, e.g. 2019. The center describes how single sustainability scores can be derived from the position in the coordinate system. On the right, the sustainability scores are used as increasingly demanding thresholds in a milestone system that assesses the sustainability of an airline in absolute terms and relative to other airlines.

Step 1: Sizing the matrix

The Finnish scientist Petri Tapio[6] , in his seminal work on decoupling in 2005, proposed relating changes in CO_2 to changes in economic output to assess the "delinking [of] economic growth from increasing environmental problems". In applying Tapio's concept to aviation, percentage changes of CO_2 and percentage changes of capacity (e.g., RPK[7]) are plotted in a two-dimensional coordinate system (the "matrix"), in which an airline's shrinkage or growth is shown on the horizontal axis and CO_2 increase and reduction on the vertical axis. At the coordinate origin in the center, the changes of CO_2 and capacity are zero, respectively. Changes are measured in principle against the year 2019.

Since the strived-for CO_2 reduction is close to -100%, the downward pointing axis of CO_2 reduction should reach -100%. Correspondingly, the upward pointing part of this axis must then also be able to capture a +100% increase in CO_2. Likewise, the change in capacity ranges from -100% (equivalent to collapse) to +100% (doubling of capacity).

The worst possible category would be the top left, where severe capacity shrinkage and sharply rising CO_2 emissions would coincide. No one would want to finance an airline like that. The most attractive position is bottom right, where almost ideal CO_2 reductions and strong capacity growth coincide.

Some airlines have suggested using earlier years than 2019 as a reference year. This may be particularly attractive for airlines that made significant sustainability progress in the years prior to 2019. A year other than 2019 is not a problem, either in terms of content or methodology, and can be agreed between the contracting parties accordingly, provided that pre-2019 years consistently show positive and not declining scores. All provisions then refer to the agreed reference year, not to 2019.

Step 2: Scoring the positions

The coordinate system is then overlaid with a simple grid of categories, with each category assigned a value. Each category represents a specific progress–or regression–in terms of capacity (RPK) and CO_2 development, measured as a percentage change from 2019. By what percentage have an airline's CO_2 emissions grown or shrunk since 2019?

Airlines whose CO_2 emissions are tightly coupled to capacity development are sorted on the diagonal from bottom left to top right in this coordinate system. They receive a "0" as value because the strict coupling of CO_2 to capacity means neither progress nor regression. The values of the other categories are simply incremented by 1 the further to the right (capacity growth) or down (decarbonization) they lie. For positions to the left (contraction) or above (expansion of emissions), increasingly negative points are assigned accordingly. In this way, the "best case" category at the bottom right receives the highest value, and the "worst case" category at the top left receives the lowest score. The highest–or lowest–score to be awarded depends, of course, on the number of categories in the matrix. In the matrix shown as an example with four sections on each axis, the highest possible score is +3, the lowest, correspondingly, is -3.

[6] P Tapio / Transport Policy 12 (2005) 137-151

[7] impact intends to upgrade RPK to RTK or ATK as soon as data availability permits

Step 3: Setting the milestones

Why not compensate the potential flaws of unstable forecasts with a few simple thresholds of de-carbonization progress, some of which are easy to achieve, some moderately challenging, and others more ambitious? And why not use the sustainability scores just described to define the thresholds?

An entry-level score of 1, for example, would apply to an airline whose CO_2 emissions ratio decelerates compared to any capacity increases. This would not yet be decarbonization, but it would at least be a step forward compared to tight coupling of CO_2 development to that of capacity.

At the other end of the scale, if an airline receives 3 points in the conceptual example shown, it has obviously achieved the best possible combination of CO_2 reduction and capacity growth. Between the highest and lowest (positive) score lie further threshold values, depending on the granularity (the number of categories) of the matrix. It is then important for an airline to exceed as many of the thresholds as possible as early as possible in order to take full advantage of any incentives.

Relative and absolute decoupling:

A division into only four steps on the CO_2 and four steps on the RPK axis, as shown in the conceptual example in Figure 1 is obviously insufficient to capture anything beyond the most significant developments. However, major steps are unlikely in the next decade, because drivers such as SAF and carbon capture, are not expected to gain sufficient scale during that period. Thus, for progress to become visible, the granularity of the matrix must be increased. We have simulated thousands of scenarios, ranging from reasonable to random, with different granularities and time periods covered, to identify the most appropriate granularity for the decades ahead. The results suggest a matrix of 16 * 16 categories would allow for the detection of even small steps in the right direction reliably and at an early stage, a prerequisite for a functioning incentive system.

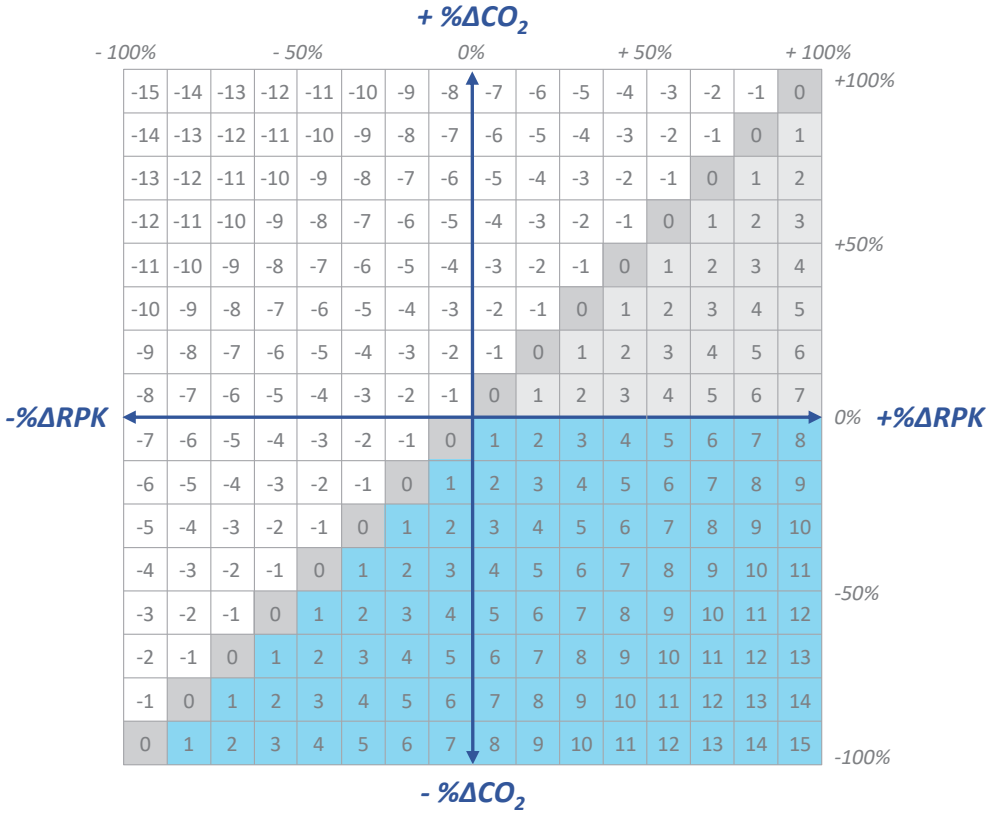

*Figure 2: The conceptual 4*4 matrix in Fig 1 is expanded to 16*16 categories on each axis to measure smaller development steps. White: Not eligible for incentives. Dark gray: Tightly coupled, hence not eligible for incentives. Gray: Relative decoupling. Blue: Absolute decoupling.*

The boxes colored white in Figure 2 represent situations in which CO_2 emissions actually worsen compared to capacity growth. They receive negative scores and should be a thing of the past, certainly not rewarded with positive scores or sustainability financing. Categories on the diagonal from lower left to upper right, marked as dark gray, denote situations in which CO_2 emissions are tightly coupled to capacity growth. These positions are scored with a 0, as they represent neither progress nor regression.

The gray boxes denote significant progress: CO_2 emissions are still increasing in absolute terms, but decreasing relative to capacity growth in "relative decoupling". Relative decoupling is an important trend: Even though emissions are still increasing, at least the tight coupling to capacity growth has been broken. (See our White Paper mentioned previously for more detail.)

The categories colored blue indicate situations in which true decarbonization is taking place, i.e., a decrease in CO_2 emissions, regardless of how much the airline's capacity grows, or "absolute decarbonization".

It would already be a significant achievement as a milestone goal to attain additional growth without additional emissions. But such carbon neutral growth can only be a transitional achievement and does not correspond to net zero.

Bringing milestones to life

Figure 3 shows how the milestones confined to just three thresholds in the conceptual image in Figure 1 can now distinguish 15 thresholds by means of the higher granularity. As examples for the functioning of the milestone concept, the colored dots represent the empirical scores of two major airlines for each year from 2008 to 2021, considering 2008 as the base year. On the left, a hub-and-spoke airline is shown; on the right, a low-cost carrier. The examples highlight that

- at least these two airlines have slowly but significantly increased their sustainability scores;
- none of the airlines has even come close to absolute decoupling (associated with actual decarbonization), requiring a score of 8 or higher.

If sustainability in a loan or lease agreement were tied solely to the development of CO_2 or growth, there might be serious effects on the contractual agreements in a shock situation such as the pandemic. However, as the examples shown in Figure 5 demonstrate, decoupling in the pandemic typically led to shifts on the diagonal of the sustainability matrix with largely similar scores, since CO_2 and capacity changed in proportion. In addition, downgrading of scores should only occur when two consecutive years of lower scores are observed.

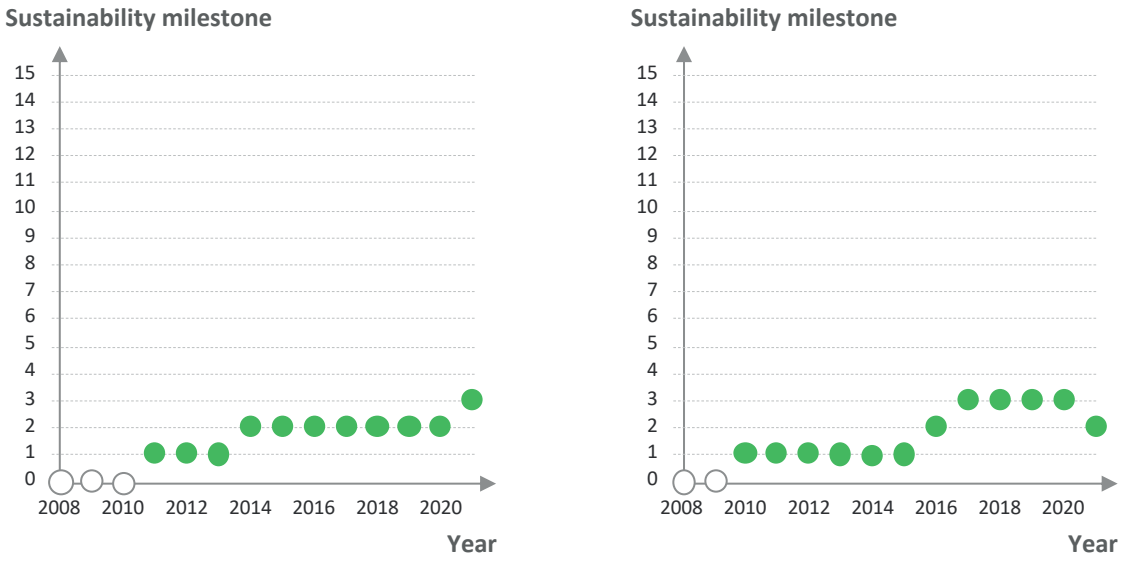

Figure 3: Fifteen sustainable development milestones are plotted on the vertical axis, and the period from 2008 to 2021 is plotted on the horizontal axis. As empirical examples, the colored dots denote the scoring of two major airlines: On the left side, the sequence of milestones achieved is shown for a large European hub-and-spoke airline, on the right for a major European low-cost carrier. White dots indicate scores of value 0, i.e. tight coupling.

A simple how-to example:

A simple example of how the sustainability score is derived (Figure 4): Assume an airline emitted 15 million tons of CO_2 in 2019, but only 9 million tons in 2029. In 2019, this airline is said to have produced 160 billion RPK and in 2029 256 billion RPK. Emissions decreased by 6 million tons or 40% from 2019 to 2029 (%ΔCO_2), and capacity increased by 96 billion RPK or 60% (%ΔRPK) in the same period. In Figure 2, a value of -40% for CO_2 and a value of +60% for RPK correspond to a score of 8, i.e., right in the mid-range of absolute decoupling, since CO_2 has effectively decreased and RPK has effectively increased.

	2019	2029	Change	Rating
CO_2	15 M tons	9 M tons	ΔCO_2: -40%	8
RPK	160 B	256 B	ΔRPK: +60%	

Figure 4: Example of a calculation of ΔRPK and ΔCO_2 for a fictitious airline. 2019 is assumed as the base year and 2029 as the current year. CO_2 is measured as million metric tons, RPK as billions.

Benchmarking

As important as a scoring system is to be able to calculate a meaningful sustainability rating for each asset, airline, or portfolio, comparisons are particularly revealing: Comparisons of different airlines at the same point in time, comparisons of the rate of progress of a sample of airlines, and comparisons of historical data with each other and with today.

Figure 5 shows two examples of airlines that have made quite significant and steady progress along the path to relative decoupling since at least 2008. On the left, a hub-and-spoke airline is shown; on the right, a low-cost carrier. The base year in both cases is 2008. In both cases, the continuous but slow trend towards relative decoupling is clearly visible. Importantly, in the pandemic year, the positions in both cases moved downward on the diagonal to the left, because capacities were cut sharply and CO_2 emissions followed closely. This shows that market distortions do not lead to erratic swings in position on the sustainability matrix, but to shifts on the "coupling" diagonal. It is interesting to note that in 2020, the hub-and-spoke carrier slid far down the diagonal to the left, while the low-cost carrier only slid comparatively little. Both cases moved on the diagonal only, suggesting sufficient robustness of the model against market distortions, even severe ones.

Figure 5 also underscores that there is no shortcut from "coupled" today to "absolute decoupling" tomorrow. And the charts show that much more effort is needed to bend the trend from relative decoupling into a clear and inevitable trend toward and into absolute decoupling.

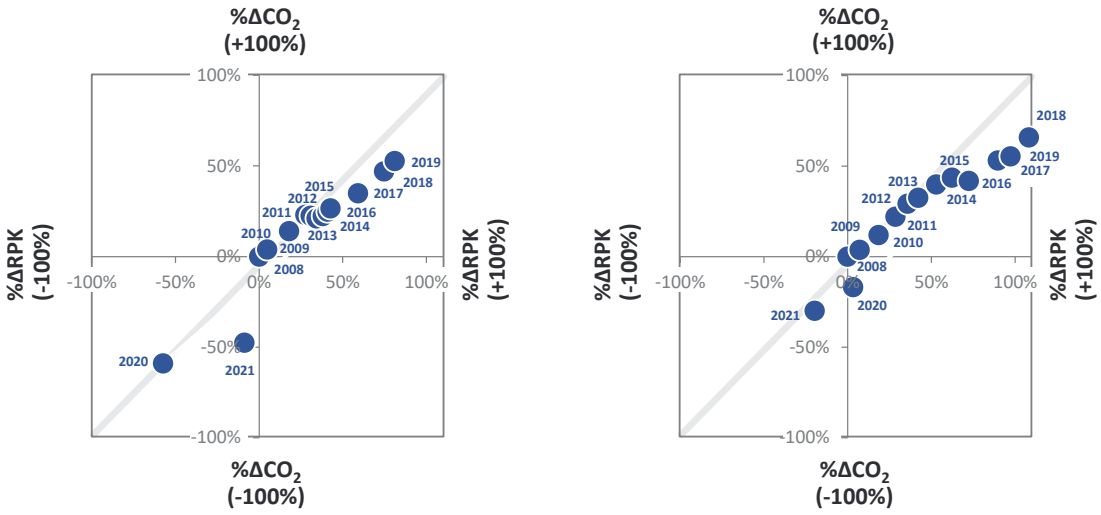

Figure 5: An example of prudent benchmarking: On the left side, the development of CO_2 and RPK from 2008 to 2021 is shown for a major European hub-and-spoke carrier, compared to 2008. On the right, the same analysis is shown for a major European low-cost carrier. For further detail, see text above.

Irrespective of the underlying methodology, sustainability must be measured for each airline independently of other airlines. Proposals to evaluate the sustainability of an airline only in comparison to the average of other airlines declare mediocrity as an aspiration, not net zero. A bad score remains a bad score even if all other airlines have bad scores. This means that any scoring system should be compared only as output. Averages as input for the calculation of scores, however, inevitably lead to erroneous conclusions.

As discussed, impact cannot recommend forecasts as the basis for loan or lease agreements. Nevertheless, for monitoring purposes, it is important to compare what has been achieved against the 2050 net zero goal, so impact plans to regularly compile available forecasts and compare them with the current data on what has been achieved to date. While this benchmarking exercise cannot solely define the sustainability trajectory, it helps to assess the likelihood of an airline or the industry as a whole actually ending up at net zero in 2050. What additional efforts would be necessary to reach net zero?

Incentive systems

The earlier airlines accumulate scores and the earlier they achieve absolute decoupling, the earlier and more permanent the incentives. The race to net zero is all about time advantages. And the incentive system must reward advantages in this time-based competition.

Time-based competition I: Freezing relative decoupling scores in 2030

There is a clear goal of net zero in 2050. This goal requires very effective development, and with each delay, the goal becomes harder to achieve. Relative decoupling refers to a period of transition but not yet to decarbonization. If the airline industry or individual airlines focus for too long only on low-hanging fruits, on the measures that would have been implemented anyway for cost reasons, then the goal becomes unattainable. That is why time-based competition comes to the fore. At the end of 2030, the points achieved through relative decoupling are to be frozen at their current levels. They will not be lost, but higher value points will only be awarded for absolute decoupling from then on, i.e. actual CO_2 reductions relative to the underlying base year (e.g., 2019).

Time based competition II: Rewarding growth–if effective decarbonization permits

The matrix presented in Figure 2 does reward growth, but only up to a maximum of 100%. Any growth beyond 100% relative to 2019 is treated the same as 100%. The intention is to build up increasing pressure in the direction of sustainable growth, not growth for the sake of growth. If an average 3.0% growth[8] is assumed from 2019, the 100% growth threshold will be reached in 2041. This creates an implicit attenuation of strong growth, especially in the second half of the period from today to 2050, when an increasing number of airlines have reached the threshold of 100% growth compared to the base year and cannot achieve additional scores solely from further growth.

[8] Air Transport Action Group (ATAG), 2020: Waypoint 2050

Three types of incentives

Aircraft financiers have three levers to foster such time-based competition. First, access to capital, second, public scrutiny, and third financial incentives in the form of basis points (Figure 6):

Access to capital

- Financiers increasingly need support to access competitive capital in sufficient quantities and at affordable prices.
- An increasing number of investors requires credible sustainability metrics and strategies to finance assets and operators alike.
- Regulatory obligations as well as funding opportunities drive stronger focus on sustainability for all aviation stakeholders.

Reputational gain

- Financiers are under significant pressure to justify their financing of aviation. For financiers, reputational risks meanwhile rank as highly as those from financial exposure.
- The milestone concept provides financiers with an accurate, credible, transparent, and simple metric to demonstrably steer investments toward actual sustainability and to back it up with pinpoint covenants in loan agreements.

Financial objectives

- The milestone system and its rules of play allow banks to provide financial incentives in the form of basis points to loan agreements according to a uniform and consistent metric.
- impact provides the tools for this purpose, which banks and airlines then negotiate and align in each individual case.

Figure 6: The three pillars for rewarding sustainability in aviation

Access to capital:

The indications are that access to capital for aircraft financing is increasingly becoming a yes/no question of provable sustainability, not least because aviation competes with other industries which can decarbonize faster. On the one hand, this is due to increasingly narrowly defined regulatory requirements (see, for example, the ReFuelEU Aviation initiative[9]) or similarly narrowly defined, yet attractive, support measures. In any case, this carrot-and-stick approach requires the funding institutions to provide increasingly elaborate evidence of credible and ambitious measures to strengthen sustainability.

Public scrutiny:

On the one hand, risks from reputational problems today rank at least as highly as risks from financial exposure for aircraft financiers. On the other hand, the market and the public reward credible and truly ambitious efforts. In order to be able to manage these opportunities and risks for the reputation of aircraft financiers, crystal-clear covenants, which can steer capital toward sustainability in a publicly visible way and monitor the corresponding success, are indispensable.

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0561

Transparency is therefore also indispensable. Transparency must not be hidden behind paywalls and escape public discussion. All stakeholders must contribute to complete and verifiable transparency if reputational risks are to become manageable. impact members are committed to demanding their contractual airline counterparties disclose their CO_2 and RPK metrics to impact as well as in their annual reports. These two figures are the DNA from which the three essential KPIs and CO_2 and RPK trends can be derived. The three essential KPIs are to be published annually, as are the sustainability scores described above, along with comparative benchmarks and detailed trend analyses.

Financial incentive:

With the essential KPIs and the milestone concept presented here, impact provides its members with a toolbox for negotiating credit agreements and underpinning covenants with airlines, regardless of their underlying business model, size or regional focus, allowing a simple benchmark for financial incentives. Banks and lessors are free to negotiate the particularities of financial incentives with their airline counterparts at their discretion. Consequently, impact members are prepared to align financial incentives with the scoring system presented here. All further details are to be agreed between the negotiating partners.

Appendix
Questions and answers:

1. Why differentiate capacity growth and progress in decarbonization? Why not just use intensity?

A metric that does not explicitly include CO_2 reduction in its calculation is prone to misunderstandings and counterproductive misalignments. Net zero can only be achieved if intensity also drops to practically zero. In this respect, a drastic reduction of intensity is a necessary condition, but not a sufficient one. Intensity must be accompanied by indicators that encompass the development of absolute emissions. Hence the three essential KPIs and not just one, and hence the coordinate system to independently compare the trends of CO_2 as well as RPK.

If RPK growth of 3.0% per year (ATAG 2022[8], "central scenario") and a CO_2 reduction of 0% are assumed, i.e., no decarbonization at all, the corresponding intensity drops to 62% of the 2019 value by 2035 and to 40% by 2050. This seeming improvement in the intensity value is achieved solely by expanding capacity, which the indicator does not reveal. In addition, the target of net zero could be missed by a wide margin, even if intensity were to drop by about 40% by 2035. Intensity is an important economic measure but insufficient to comprehend sustainability.

2. Is it sustainable to give positive scores for rapid growth without decarbonization?

In principle, of course, no. But as long as SAF, carbon capture and other technologies for highly effective decarbonization are lacking, growth without additional emissions would represent a major step forward (breaking the current tight link between emissions and capacity development). Once SAF and other technologies are sufficiently available, only absolute decarbonization should matter. From then on, rewards without absolute decarbonization would indeed be indefensible. For this reason, impact proposes that from 2030 onward, no additional points be awarded that are not backed by absolute CO_2 reductions. This combination of rewarding relative decoupling in a first "pre-SAF" transition phase, but only absolute decoupling from 2030 onward in a second phase, would indeed be sustainable because it offers the right incentives at all times.

3. How to assess start-up airlines?

Start-up airlines are to receive as their starting value the 33rd percentile of the scores of all airlines valid at the time of the contract.

4. How should scores be calculated in the case of mergers?

Mergers require an ex-post calculation of which sustainability scores would be appropriate if the merger had already occurred in 2019.

5. What if an airline exits insolvency procedures?

Since airlines are typically assessed as going concerns in insolvency proceedings, there is no need for special rules to assess the developments of CO_2 and production volumes.

6. Will the matrix be tailor-made for each airline and how are different business models accounted for?

The matrix, the sustainability scores and the milestone concept have no bias of any kind for or against specific business models, regions or size classes. The measurement of sustainability is comparable across all airlines without restriction of simplicity, accuracy, conclusiveness or risk of bias.

7. How are factors such as SAF usage or carbon capture being accounted for?

impact would encourage airlines to calculate CO_2 emissions on a lifecycle-corrected basis. impact would welcome carbon capture being directly credited as an emissions-reducing measure, similar to SAF. Carbon capture has a direct and measurable effect, in contrast to compensation measures which are more dependent on longer-term and harder-to-ensure effects.

8. How will impact ensure the reliability of input data?

impact requires certified input data and performs a large number of plausibility tests, excluding non-credible or blatantly defective data from further consideration.

9. How detailed will the definition of Scopes be?

Airlines do not measure their Scope 1 emissions through sensors on the aircraft but calculate them on the basis of fuel consumption. This allows plausibility checks, provided data for fuel consumption is provided. If no emissions data is provided, fuel consumption can at least allow for a fairly accurate estimate of the resulting CO_2 emissions.

10. Is impact considering direct emissions or lifecycle emissions?

impact is open to considering lifecycle or well-to-wake emissions instead of direct emissions if the airlines would report them consistently as such. However, one caveat must be taken into account: ICAO stipulates that well-to-wake is calculated by multiplying fuel consumption by a factor of 3.83, while direct CO_2 emissions are calculated by multiplying fuel consumption by a factor of 3.16. Well-to-wake and direct emissions are thus both linearly dependent on fuel consumption. The absolute value of well-to-wake undoubtedly represents the climate-damaging effect of fuels more accurately than the value of direct emissions. However, since well-to-wake is calculated with a linear factor (3.83) based on fuel consumption in the same way as direct emissions (3.16), the difference becomes irrelevant when percentage changes are calculated as proposed here.

A 10 percent change remains a 10 percent change whether direct or well-to-wake data is used. Switching to well-to-wake would not change the rationale or functioning of the milestone logic. However, this would require airlines to report certified well-to-wake emissions. As long as this is not the case, impact suggests continuing to base calculations on direct emissions.

11. How does impact factor in the potential for aircraft efficiency improvements?

The effect of new aircraft or improved operational processes must be reflected in reduced CO_2 emissions and should be measured accordingly in terms of reduced CO_2 emissions.

12. Why not use absolute CO_2 footprint?

The absolute CO_2 value of an airline by itself has little significance (206,332 metric tons per year: is that a lot or a little?). A substantive statement only arises through comparison with the corresponding production volume (intensity) or through the change over time (e.g., decoupling).

13. What happens if airlines go backward through the milestones?

An airline can improve or worsen its score, but downticks will only be taken into account if they have been observed for two consecutive years.

Disclaimer

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