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# Year in Review 2024

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## Introduction from the Chairperson of the impact Board

Dr. Ulrike Ziegler



*Dr. Ulrike Ziegler  
Chairperson of the Board of impact on sustainable aviation e.V.*

### A Year of Challenges, Progress, and New Horizons

As we reflect on 2024, it is clear that the year has been pivotal for the aviation industry's decarbonization efforts. Despite facing significant challenges – ranging from complex regulatory landscapes to technological and financial barriers – we have witnessed remarkable strides in the journey toward Net Zero. **impact** has played a crucial role in fostering collaboration, promoting innovation, and addressing key issues to accelerate the adoption of sustainable solutions across the sector.

Our inaugural **IMPACT Forum, co-sponsored by the U.S. Department of Transportation and WTW**, stood out as a key milestone. It brought together renowned scientists and industry leaders and provided a platform for deep, multidisciplinary discussions on the uncertainties and opportunities in aviation decarbonization. The key takeaway was the need for urgent systemic change to move beyond the gradual, incremental progress to date.

**impact's** commitment to actionable solutions have resulted in the [launch of Principles of Sustainable Aviation Financing](#) including promoting and embedding aviation sustainability measurements, quantifying climate risk in aviation and making long-term disruptive aviation investments bankable, which could be delivered by cross-stakeholder/-country working groups.

There is more to come from **impact** in 2025. We will build on this foundation, launching the Practitioner's Guide in Q1 2025, a practical resource designed to operationalize the Milestone Concept and accelerate decarbonization efforts across the aviation sector.

In 2024, we saw the successful launch of initiatives such as [Project SkyPower](#), which brought together key stakeholders to advocate for the development of an e-SAF industry in Europe. Meanwhile, the emergence of new regulatory frameworks, like the **UK mandates on sustainable aviation fuels (SAF)**, underscored the urgency of scaling SAF production to meet increasing blending requirements. The UK's approach to aiding the ramp-up of SAF will include a revenue certainty mechanism – a critical de-risking element – which is expected to be available from 2026. Another step in the right direction.

Equally noteworthy is the progress in SAF readiness across Europe. The **European Union Aviation Safety Agency (EASA)** published its first assessment on the state of the EU SAF market, forecasting sufficient SAF production by 2030 to meet regulatory targets. However, the report also highlighted inherent risks in scaling synthetic fuels, emphasizing the need for stable policy support and accelerated investment in emerging technologies.

Throughout the year, **partnerships and long-term commitments** have remained central to advancing decarbonization. Deals such as the 10-year offtake agreement between **International Airlines Group (IAG)** and Infinium exemplify the kind of bold, forward-looking commitments that are essential for ramping up production capacity and reducing investment risks in sustainable fuels.

Talking partnership: **impact** has decided to join the **Transatlantic Climate Alliance (TCA)**, founded by Massachusetts State Senator Marc Pacheco, in 2024. With time-critical climate goals, the TCA will bring together climate allies and subnational leaders to catalyze climate action. While innovative ideas are everywhere, all stakeholders would benefit from greater collaboration, support and education to turn these ideas into action. The Transatlantic Climate Alliance provides a powerful platform for sharing best practices, fostering cross-sector collaboration, and scaling zero-carbon technologies.

The year ended with the **RSB Conference 2024 “Sustainable Markets: Accelerating Finance for Good.”** Key highlights included the launch of the RSB Academy for capacity building and the inaugural RSB Transition Leaders’ Awards. The event underscored the importance of innovation, cross-sector collaboration, and robust standards in advancing sustainability and driving meaningful transformation.

A final thought on **“ESG fatigue”** – a term we’ve heard repeatedly throughout 2024. It’s true that many conferences have scaled back their focus on ESG, and as participants, we’ve noticed waning enthusiasm. This may stem from the lack of (affordable) quick-win solutions, the substantial investment required, and the ongoing pressure to meet budgets. However, **sustainability is not a passing trend**. Instead of shying away, we’re better served by embracing the challenge and proactively charting a path forward together.

As we close this year, we celebrate the collective efforts that have brought us closer to a sustainable aviation future while recognizing the immense work that lies ahead. 2025 promises to be a pivotal year as we transition from analysis to action, driving real-world impact through collaboration and innovation.

Thank you to all our **impact** members and cooperation partners for your steadfast commitment to this vital mission, and to the many experts who have generously dedicated their time and expertise to enhance the knowledge of our **impact** community.

Together, we can reshape the future of aviation.

Ulrike Ziegler  
on behalf of the impact Board of Directors



## The Milestone Concept: A new approach to aviation decarbonization

As the aviation industry strives to meet ambitious decarbonization goals, **impact** has continued its industry engagement on its proposed solution to bridge the gap between theoretical roadmaps and practical financial strategies. This approach, known as the **Milestone Concept**, is designed to provide a clearer, more actionable pathway for airlines, lessors, and financiers to track and incentivize progress toward Net Zero emissions. In this article, we revisit the Milestone Concept, its key components, and how it can help stakeholders in aviation finance navigate the complex landscape of sustainability.

### Background: Challenges in aviation decarbonization

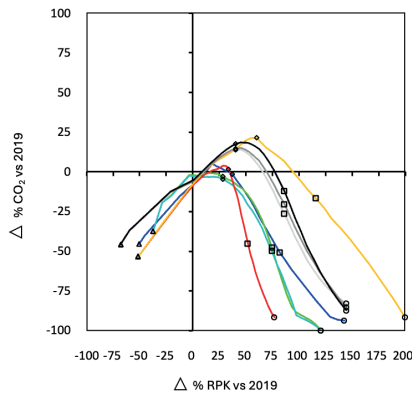
The aviation industry is facing several pressing challenges in its quest to achieve Net Zero due to its dependence on long-term infrastructure, capital-intensive investments, and the slow deployment of technological breakthroughs. A key issue identified in recent studies is the over-reliance on fleet replacement as the primary strategy for decarbonization. While upgrading aircraft to more fuel-efficient models will contribute to emissions reductions, it alone will not suffice to achieve Net Zero goals.

### Existing roadmaps: Potential pitfalls

Several organizations have put forward decarbonization roadmaps (Exhibit 1) outlining aviation's path to Net Zero. However, these roadmaps are not without their shortcomings. A critical issue is that many of these plans focus heavily on fleet renewal, which may only address about 20% of the required decarbonization efforts, even before we account for forecasted increases in capacity. The remaining challenges – such as scaling sustainable aviation fuel (SAF), developing experimental technologies like hydrogen, and optimizing operational efficiencies – often receive less attention in the current industry discourse.

Additionally, roadmaps differ significantly in their assumptions, projections, and methodologies. Some roadmaps may also be regularly updated, making it difficult for stakeholders to base investment decisions on a stable, consistent framework. For example, the International Energy Agency (IEA) and other bodies update their roadmaps annually. The result is uncertainty in terms of financing and planning, especially for banks, lessors, and airlines trying to align with decarbonization goals.

## Which roadmap is right?



Various well-respected institutions (MPP, ICCT, UMI, ATAG) come up with widely differing roadmaps for future developments:

- Different **questions**: Which roadmaps would be *necessary* to reach Net Zero by 2050? Which ones would be *feasible*?
- Vastly different **assumptions**: Availability SAF, legal regulations, etc.
- Different vested **interests**

There is a risk that those roadmaps will be chosen that best serve one's own interests

Exhibit 1

## The Milestone Concept: A clearer path to decarbonization

The **Milestone Concept**, proposed by **impact** offers a solution to these challenges by introducing a straightforward and transparent approach to measuring and incentivizing progress. Unlike traditional roadmaps, which rely on numerous assumptions and predictions about future technology, the Milestone Concept focuses on two key metrics: **airline emissions and capacity**.

The concept is grounded in simplicity and data availability. To apply the Milestone Concept, stakeholders need only two data points: the airline's absolute carbon emissions and its total RPK. These two metrics provide a clear snapshot of an airline's decarbonization performance, independent of speculative future assumptions or macroeconomic uncertainties.

### Key features of the Milestone Concept

#### 1. Simplicity and Stability:

The Milestone Concept avoids the complexity and frequent updates associated with traditional roadmaps. By focusing on only two metrics, the system is easy to implement and understand. Unlike the IEA's ever-changing roadmap, which is updated annually, the Milestone Concept remains stable over time, providing a reliable foundation for financial and operational decisions.

#### 2. Transparency and Accountability:

Transparency is crucial for both airlines and their financiers. In order to support the transition to Net Zero, there must be clear visibility into the progress being made. The Milestone Concept offers a transparent method for tracking emissions reductions relative to airline production (RPK). It also highlights the importance of decoupling emissions from growth in production.

### 3. Decoupling Emissions from Growth

A key aspect of the Milestone Concept is the focus on relative and eventually absolute decoupling. This means that airlines should aim to grow their production while reducing their emissions. As airlines continue to expand their services, the Milestone system ensures that airlines are incentivized to adopt more sustainable practices, such as optimizing routes, improving fuel efficiency, and securing SAF, while still meeting demand growth.

### 4. Accuracy and Performance Tracking

The Milestone Concept provides a more accurate and traceable measure of success compared to other models. By directly measuring the percentage change in both RPK and CO<sub>2</sub> emissions, the system allows stakeholders to see if an airline, lessor, or financial institution is truly on track to meet its decarbonization goals. This metric is far more concrete and meaningful than the intensity-based metrics (Exhibit 2) that are often used in sustainability-linked finance.

## Decoupling differentiates progress or regress. Intensity easily misleads.

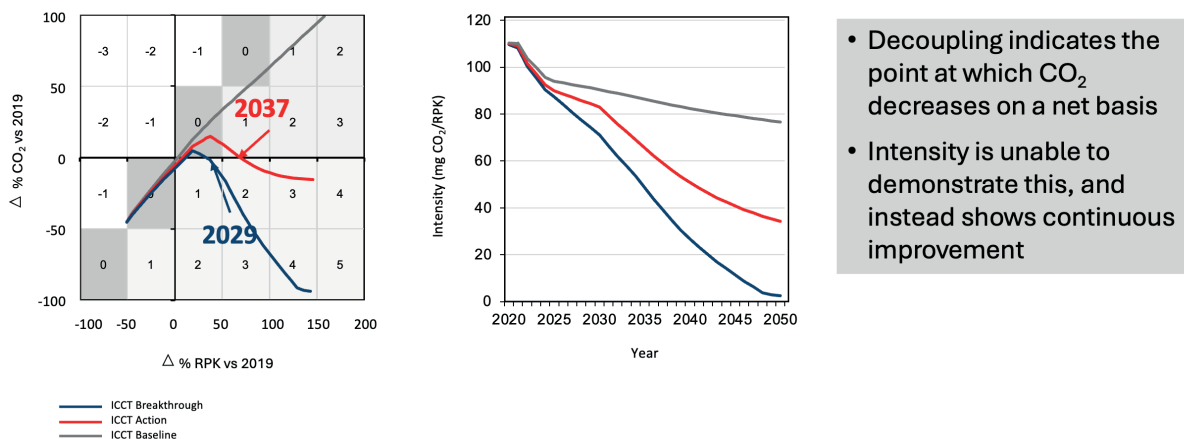


Exhibit 2

Intensity-based metrics can obscure the true environmental impact through increased absolute emissions and run the risk of greenwashing. The latter is a key concern for airlines, lessors, investors and financiers alike.

### 5. Standardization for greater investor confidence

As the aviation sector works toward decarbonization, financiers and investors are seeking more reliable and standardized data to assess risk and opportunity. The Milestone Concept's simple, transparent, and non-changing framework makes it an ideal tool for financial institutions that are financing the aviation sector's transition to Net Zero. Standardization will also make it easier to compare the performance of different airlines, aircraft lessors, and other aviation-related entities.

## Using the Milestone Concept in sustainability-linked financing

One of the most powerful applications of the Milestone Concept is in **sustainability-linked financing**. As standards evolve and become more robust, airlines and lessors that achieve higher Milestone scores can secure access to capital and finance in the long-term, potentially benefiting from better borrowing terms, and other financial incentives. For example, if an airline moves from a Milestone score of 1 to a score of 3 (indicating a significant reduction in emissions per unit of production), this could trigger a reduction in their borrowing costs, which would in turn facilitate further investments in sustainability technologies and operational improvements.

The simplicity of the Milestone Concept allows financial institutions to design sustainability-linked loan agreements that are easy to monitor and enforce. This, in turn, fosters greater confidence and enhances the likelihood of securing funding for decarbonization projects.

## The future of aviation decarbonization: a collaborative effort

While the Milestone Concept provides a robust framework for tracking and incentivizing progress, it is not a panacea. Achieving Net Zero in aviation will require a coordinated effort from airlines, lessors, technology developers, and financiers. The **Milestone Concept** should be seen as a tool that complements other initiatives which will aid the sectors' decarbonization – such as the development of SAF, hydrogen-powered aircraft, and improved air traffic management systems – to accelerate the industry's transition to a sustainable future.

As the aviation industry navigates its decarbonization journey, adopting clear, actionable metrics like the Milestone Concept will be key to overcoming the complex challenges that lie ahead. By focusing on tangible progress – both in terms of reducing emissions and increasing efficiency – aviation stakeholders can work together to ensure that the industry remains a vital part of the global economy, while minimizing its environmental impact.

On a final note: The impact Milestone Concept is complementary to RMI's Pegasus Guidelines. While both frameworks are advancing transparency and standardization, the Milestone Concept will enhance standards of sustainability-linked financing, incentivizing airlines and lessors to decarbonize, whereas the Pegasus Guidelines aid disclosure of the climate alignment of banks' lending to the aviation sector.

In conclusion, the Milestone Concept offers a new way forward for aviation decarbonization – one that is simple, transparent, and actionable. By focusing on two core metrics – airline emissions and RPK – this approach ensures that progress is measurable, achievable, and aligned with the broader goal of Net Zero. As the aviation industry seeks to meet its sustainability targets, the Milestone Concept can provide the clarity and financial incentives needed to make meaningful progress toward a sustainable future.

For more insights watch the recording of ISTAT Learning Lab: "Sustainable Finance Fundamentals: Driving Aviation Toward Net Zero" - Jean Chedeville, Natixis and Prof. Thomas Conlon, University College Dublin.



## IMPACT Forum: Review and summary

Two years after the launch of impact on sustainable aviation e.V. (**impact**), the largest sustainability association in aviation finance, the inaugural Aviation Climate Stocktake Forum (IMPACT Forum) was held in London in December 2024 – **impact**'s most important gathering yet.

The two-day IMPACT Forum served as a science-led assessment of the gaps in policy, finance, and science which are hindering aviation from achieving Net Zero. Delegates included representatives from aviation decarbonization's broader supply chain, **impact** members, international academics, sustainability professionals and high-level stakeholders from both sides of the Atlantic.

### Key observations

#### **Voluntary action won't suffice**

"Demand is not the issue: Every drop of SAF produced has been bought and used," IATA stated in a December 2023 press release. However, while SAF demand has been strong due to early European mandates and airline commitments, universal adoption remains challenging. Many airlines may not sign the offtake agreements required to advance SAF projects to final investment decisions (FID).

A recurring Forum theme was the weak credit quality of most airlines beyond the top 20 operators, reinforcing the need for some sort of "SAF offtake agreement insurance product".

Despite SAF mandates in many jurisdictions, other technologies, like CO<sub>2</sub> direct air capture and storage (DACS), rely entirely on voluntary demand. One DACS company argued for integrating permanent carbon removal credits into CORSIA with sub-mandates for future purchases, warning that without compliance evolution, DACS cannot scale.

#### **"Free Money" – a sustainable solution?**

"Free money tends not to be politically sustainable," an academic noted, criticizing SAF monetary incentives. U.S. officials admitted the Inflation Reduction Act (IRA) tax credits for SAF are "hardly perfect or sufficient" and face uncertainties under a potential Trump presidency. While direct government funding may be politically fragile, loan guarantees remain a favored approach. The U.S. DOE Loan Programs Office was praised but it was also acknowledged that it must take more risks to support first-of-a-kind SAF projects. Forum commentators noted upcoming rules for the 45Z tax credit, expected by January 20, coinciding with the next U.S. administration's inauguration.

### **Hypothecation: A solid funding foundation**

Both academics and industry leaders agree that aviation decarbonization needs self-funded mechanisms. A significant portion of EU-ETS and UK-ETS revenues from aviation aren't reinvested in energy transition efforts. These revenues should directly support alternative fuel development and advanced technologies to create stable incentives. Reliance on ad-hoc budget allocations leaves funding vulnerable to shifting political priorities.

### **Ensure social buy-in**

Aviation is a visible contributor to climate change, making its decarbonization efforts highly scrutinized. While public awareness of aviation's climate impact is significant, the industry's renewable energy requirements are underestimated. To succeed, aviation must persuade society that its renewable energy needs are a worthwhile investment.

### **Should aircraft lessors step up?**

Aircraft lessors were urged to play a more proactive role, with several recommendations, i.e.

- Require CORSIA compliance in leases to ensure scheme success and indirectly boost SAF demand.
- Leverage strong balance sheets to scale SAF through investment or offtake agreements.

### **IMPACT Forum Ambitions**

**impact** plans for the IMPACT Forum to reconvene annually to evaluate progress and update action plans while forming working cross-stakeholder/-country working groups to advance the Principles of Sustainable Aviation Financing.

The IMPACT Forum concluded on 3rd December 2024 with the launch of the Principles of Sustainable Aviation Financing Principles, four cross-stakeholder priorities accompanied by concrete action points ([see full list](#)). More importantly, it laid the groundwork for multi-stakeholder climate self-analysis, including aviation finance.



## Chats on the sidelines of the IMPACT Forum, December 2024

### impact Board Members



From left to right: Jean Chedeville; Global Head of Aviation Finance at Natixis; Dr. Ulrike Ziegler; President impact on Sustainable Aviation, Hugo Kanters; Managing Director, Global Head Aviation Finance and Head Sector Coverage Transport & Logistics, ING

#### **Jean Chedeville:**

*What was the thinking behind organizing the IMPACT Forum?*

#### **Ulrike Ziegler:**

We've been at so many conferences and hearing people talk about decarbonization. When you say: "How do we do it?" They're all pointing at decarbonization map as if these were a solution. But I guess you need to understand that these decarbonization maps, of which there are multiple, have hundreds of underlying assumptions and, if anything, can only serve as a guidance. They are not the absolute truth. That is why we thought we need to come up with a different approach to truly take stock.

With all levers to decarbonization, be it operational efficiencies, be it new aircraft technologies, be it Sustainable Aviation Fuel (SAF), be it carbon capture, we must understand where we stand today, what are the gaps to actually deliver on the action plans?

For us it was obvious and crucial to get science involved to assess the status, that was the rationale behind it. Unless you know the facts, you cannot develop concrete actions. Also, one must reflect on the complexity of the decarbonisation eco-system of our industry. This is no longer about drilling a hole, refining oil and fuelling an aircraft. When it comes to aviation's decarbonization you need many more stakeholders. Yet, most of the talks are bilateral or take place in echo-chambers.

We need to get all of the relevant stakeholder at one table to discuss and understand the risk map. Who can bring what to the table, who can actually afford to help de-risking, and we must share the know-how so that everyone in that supply chain benefits. We should reconvene on a regular basis, put together cross-stakeholder, cross-country working groups to truly work towards potential solutions. We need to take action, we need to free up money today to really meet the SAF 2030 target.

**Hugo Kanters:**

*Jean, we have listened to a number of keynotes and very high quality panel discussions. What are your take-aways so far?*

**Jean Chedeville:**

One key takeaway is the enthusiasm that we see in the room. All the stakeholders in our aviation eco-system are still actively pushing the decarbonization agenda of the industry. Also, we have a very diverse group of people in this room, including researchers, airlines, policy makers, and investors, obviously. And that group together shared a lot on the content, on what is required to move to the next level. Ultimately, the last takeaway will be, what we're going to see after the Forum, when the working groups are discussing on how to embed sustainability metrics in contracts, putting a price tag on not decarbonizing and on mobilizing the findings to support the decarbonization journey.

**Ulrike Ziegler:**

*What are your thoughts on the Principles of Sustainable Aviation Financing? Why did we, as **impact**, put these principles together?*

**Hugo Kanters:**

The starting point is that the decarbonization of the aviation sector – although it is a hard-to-abate sector – is going to be, or is already, the strategic focus point for the entire sector. And if you talk about decarbonization, the first thing you should be focusing on is: What do we know? What do we measure? Can we distinguish between airlines or aircraft operators that are committed, given their operations to decarbonize, from those who don't? And **impact** has developed, a great methodology called Milestones to measure that impact - whether there is decarbonization on a relative basis or an absolute basis. And that is, first and foremost, a starting point. The decarbonization of the sector is a very complex matter. We need to bring more people together, which is exactly what **impact** is facilitating here. There is a discussion between financiers, regulators and, to a certain degree NGOs and scientists.

The pathway to decarbonization is not going to be an easy one. It's not going to be a short one. We need all the levers that we can pull.

## Interview with Marc Pacheco, Massachusetts State Senator, United States



*Interviewed by Jean Chedeville, Global Head of Aviation Finance at Natixis and impact Board Member*

### **Jean Chedeville:**

*Senator Pacheco, what impact do you see from the change of the U.S. administration and the potential withdrawal, again, of the U.S. from the Paris Agreement. What impact could it have on the sustainability journey of aviation?*

### **Senator Marc Pacheco:**

First of all, thank you so much for the invitation. I think the work that **impact** has done here at this Forum is just amazing. And it's great to see the diversity of ideas. People come together and want to solve the crisis that is facing every sector in the economy.

Let me just say, relative to the change in U.S. administration, the last time this took place, when we were removed from the Paris Agreement, many states in the United States, said: "We're still in." So, at the national level, you can remove the country, but at the state level, state leadership will try to continue to move forward. And I think there's a bigger difference right now than there was the last time around.

Last time around, we had not fully begun in earnest the installation of offshore wind. We were trying to move forward in that regard, but we hadn't had an Inflation Reduction Act that had been passed under the Biden-Harris administration.

Literally, so many resources for cities and towns and businesses and industry to move forward with embracing a clean energy future, and to ultimately bring down the costs that otherwise would be there without the investments that were made.

I think the market actually has shifted a bit [in terms of] where the financial markets, the private sector investment firms, the banks all want to see a movement to a clean energy future where they know we will have the newest technologies, the investment in upgrading the grid, so that residents will be able to take advantage of solar, wind, and geothermal anaerobic digestion technology.

In Massachusetts we're working together with companies in these areas as we're trying to make a difference. Just this week, we've seen a 286% increase in the amount of solar energy that has been implemented in the country. So we've seen huge investments in that area. In Massachusetts there's going to be over 806 megawatts of offshore wind coming online. When you add that to all the other offshore wind that's planned, you're talking more than 20-25 gigawatts of offshore wind. Which you know, once you pay for the bridge to get there, then, on the other side of that bridge of investment, the wind is free. There is not a cost for the fuel source, right? Same thing with solar and the sun. So, you couldn't have a better set of opportunities if we're willing to meet the challenge and seize the opportunity and embrace a clean energy future.

**Jean Chedeville:**

*Fantastic. So, basically, there's no way back? Investments have started, infrastructure is being built, and the change of administration may take a different view on the geopolitical side of things, but domestically speaking, the ambition to decarbonize remains?*

**Senator Marc Pacheco:**

It remains, and I think there are innovative organizations across the world, but certainly in the transatlantic region, there are already partnerships in the renewable energy sectors.

**Jean Chedeville:**

*Could you tell us a bit more about the Transatlantic Climate Alliance that you've recently established?*

**Senator Marc Pacheco:**

The Transatlantic Climate Alliance is a 501(c)(3) NGO, for which the paperwork is now filed with the federal government for their approval. And once we move forward with the finalization of the approval we'll try to go out and move forward with raising the resources to start this NGO, to bring people together, implementing best practices in the transatlantic region.

There are a lot of best practices that are being developed. Solar companies that are now actually being built in America. You know, car companies that are being built in the United States of America – EVs; and the list goes on. These are all new jobs, over 700,000 new jobs in the manufacturing sector alone. Not all renewable energy technology jobs, but just new investment that is taking place because of the relationship we've had on both sides of the Atlantic and also in Asia. But we're going to be focusing on the transatlantic region because of the partnerships that are already there with educational institutions on both sides of the Atlantic.

It's great to see so many leaders in the aviation world that have come together and want to be part of the solution, rather than just being part of the problem. So that's exciting. You see that it's inspirational, actually.

**Jean Chedeville:**

**impact** is building bridges across continents and sectors with the goal to bring people from all over the world and different parts of the value chain together to discuss best practices and potential solutions. So, very similar to your project...

**Senator Marc Pacheco:**

Yes, there is a synergy there. And I think the size can be aligned there, where the work that is being done with **impact** can be part of what has taken place with the Transatlantic Climate Alliance. And we hope that **impact** will formally join the Alliance. And when they do, they would be founding members of the Transatlantic Climate Alliance and have access to all those other contacts within the transatlantic space. And I think that's helpful, because it brings more people to the table to understand the predicament that the airline industry sees itself in. And look at ways in which we can all work together to try to get the right type of solution for everyone.

**Jean Chedeville:**

*I think that's going to be part of some of the takeaways of the IMPACT Forum, where we are going to build working groups towards finding those solutions.*

**Senator Marc Pacheco:**

It's great that it's structured the way that it has been structured; the good thing about it is the transparency involved, where it's clearly totally open to everyone. And there's an encouragement for people to share their ideas and to have a seat at the table. And because everybody doesn't have access to the best idea, the best ideas come when you bring a lot of people that are in the sector and the industry together, and you hear from them directly, and that's what is being done at this conference. Congratulations to you and everybody associated with the IMPACT Forum and to all the Board Members as well for the great work that you're all doing.

For details on the Transatlantic Climate Alliance



Al Gore, former U.S. Vice President on the launch of the Transatlantic Climate Alliance





## Interview with Sheila Remes, Aviation Sustainability and Strategy Consultant



*Interviewed by Michael Halaby, Managing Director - Head of Aviation Advisory, MUFG and impact Board Member*

### **Michael Halaby:**

*Sheila, thank you very much indeed for attending our IMPACT Forum over the last two days. We really appreciate you being here including your support in moderating and participating in some of the sessions. Could you share with us some of your key observations of the IMPACT Forum and perhaps, what you think next steps should be?*

### **Sheila Remes:**

*Thank you, Michael, for having me and participating. The last day and a half has been pretty amazing. Pulling together all of the different parts of the industry actually makes sustainable aviation a reality. And what I thought was most interesting is the passion and the commitment of the different people who had shown up from the different parts and sectors of the industry. I think the next steps in terms of what really needs to happen, is to put together those action points of the IMPACT Forum so that it can start to come to reality. There is some foundation and framework that we can all work to as an industry.*

### **Michael Halaby:**

*This brings me to another question: How do we assess the progress of aviation decarbonization at the moment? And how do you see that playing out?*

**Sheila Remes:**

I think the concept of having some metrics that can be shared and uniform across the industry is really great. As we talked about, there's way too many reporting requirements. And very few of the airlines actually report. So really, having a way to assess all of the industry would be a key component of moving forward.

**Michael Halaby:**

*I think I've mentioned this in a couple of conferences recently, but we do hear and see people talking about ESG 'fatigue'. Do you think that's happening? And if it is, is there a way to address that?*

**Sheila Remes:**

I think ESG fatigue is definitely something that has come up in the US. I'm not as sure if it's as prevalent in Europe, so I hope not, because then Europe will continue to lead and will continue to try and make progress together. But I think part of it is some of the social aspects of ESG. I do think there's a large majority of people who do believe and experience the impact of environment and climate change on them. So I think there's a belief that something needs to be done. There's probably just the question of who owns it and who pays for it, which is the chronic, perennial question.



## Interview with Damien Meadows, Jim Spaeth and Alex Philpott



*Interviewed by Jörg Schirmacher, Head of Transport Finance, Helaba, and impact Board Member  
Damien Meadows, Advisor on European and International Carbon Markets, DG Climate Action, European Commission,  
Jim Spaeth, Program Manager, U.S. Department of Energy, Bioenergy Technologies Office, Alex Philpott, Deputy Head  
of Aviation Decarbonization at Department for Transport (DfT), United Kingdom*

### **Jörg Schirmacher:**

*I'm very fortunate to have three very high-profile guests to talk about policy and SAF and the efforts to decarbonize the aviation industry, representing the leading regions of this world when it comes to sustainability and aviation: US, UK and Europe.*

*So, Jim and Damien, let me start with you. The support of the government via the Inflation Reduction Act (IRA) is a little bit different from the EU's approach to fostering the Sustainable Aviation Fuel (SAF) ramp up. How feasible is it to share best practices amongst each other and with other countries.*

### **Jim Spaeth:**

For the US, we'd be very happy to share best practices and what we've experienced. We are always trying to collaborate and recognize that SAF is not going to be just a domestic industry, but truly to be successful, it needs to be a global industry. So, we'd be very happy to engage in formal and informal conversations and opportunities with the European Commission and elsewhere.

### **Damien Meadows:**

And I would echo what Jim says there. I think Europe is sometimes mischaracterized as having 'sticks' as policies. We have a lot of 'carrots'. I admire the IRA, it's a miracle it's there. In Europe, we have billions of euros available for SAF, for other types of emission reductions in aviation. And it's very much a process, an iterative process of 'learning by doing'. So, whether it's with the US, whether it's with the UK, whether it's with Brazil, we are keen to see what others are doing and improve. That's how policy gets better over time.

**Jörg Schirrmacher:**

*I think that's a very important point. I think sometimes maybe things are perceived differently from what they are. So, thanks for clarifying that. And... reflecting on the support mechanisms which are in place - what has the feedback been since its implementation been? What worked well, and where do you see room for improvement?*

**Damien Meadows:**

I think it's crucial to be able to revise over time to sort of see what works well. Because this is where, given the climate challenge, we need strong policies. We need strong incentives to move forward. And Europe is supporting both at the production side and at the consumption side. We are still not at the scale of (SAF) production we need so I think these support mechanisms, they need to be there. But in terms of the balance between particular fuels, Europe is supporting up to 100% of the cost difference for HEFA (Hydroprocessed Esters and Fatty Acids), a simple biofuel, as well as for synthetic fuels. One of the feedbacks we've heard is that synthetic fuels need more support. HEFA is more mature. We should maybe look at that in our next review.

**Jim Spaeth:**

The industry feedback, in general, has been very positive. And the SAF industry has been enthusiastically growing over the last few years. Of the two major tax credits related to SAF, the first one, the Sustainable Aviation Fuel Tax Credit, has been 'definitized'. The industry is very appreciative that it's out there and is now waiting for the Clean Fuels Production Tax Credit rules to come out after January 1, 2025.

**Jörg Schirrmacher:**

*Alex, the UK has established the Jet Zero Council (renamed to: Jet Zero Taskforce). Can you elaborate a little bit on what is the mission of the Council? Who are the members of the Council? And reflecting on today's achievements, what is the feedback you're getting from investors?*

**Alex Philpott:**

I'm pleased to say that group will actually be meeting later this week, as the Jet Zero Taskforce. The UK Government has recommitted to and strengthened and improved the group, as the way that we collaborate with industry and with all partners in the UK who have commitments to aviation decarbonization. Its mission is to help the UK make a successful, productive and beneficial transfer to Net Zero aviation by 2050. And to look at different barriers that are in the way of that, to assess those and to work together in overcoming them. Whether it's issues like SAF feedstocks or infrastructure for hydrogen aircraft. Those are all within scope of the Jet Zero Taskforce.

In terms of progress so far, the UK recently signed into law a SAF Mandate requiring 10% SAF by 2030. And the Jet Zero Council – in its previous incarnation – played a really good role in shaping that, assessing different parameters to make sure that it can be ambitious but also work effectively. We've had feedback from investors and financiers that a bit more is needed in terms of helping SAF plants get to a commercial scale. So that's why government committed to a revenue certainty mechanism, which will be signed into law by 2026. This will be industry funded but will provide some additional certainty about revenues that SAF plants in the UK can be expected to generate and is going to help in ramping up the supply within the UK to meet that 10% demand.

**Jörg Schirmmacher:**

*You mentioned the mandate, the revenue certainty mechanism, which is going to be established. To what extent is that the result from the UK learning from prevailing support mechanisms of the US and the EU? Where you're doing it slightly differently?*

**Alex Philpott:**

We have learned from the approach undertaken by the EU and in the US, and I think it is fair to say they, in turn, follow what we're doing, and learn from us. And we have really good relations with counterparts in the US and EU authorities. I think we're taking slightly different approaches. There are many similarities. Where there are differences that reflects slightly different policy priorities, and also our different feedstock and energy availability on the market. So I think there's a really good exchange of policy between the three markets, and beyond in fact. We are keen to continue and do more of that as SAF production and demand ramp up.

**Jörg Schirmmacher:**

*We probably all agree that sustainability and decarbonization of the aviation industry will only be successful as a global effort. Question to all of you: How can we foster more cooperation with other countries and regions to advance aviation's decarbonization?*

**Damien Meadows:**

I think through having successful examples. I mean countries always want to learn from each other. I would absolutely say Europe wouldn't have the 'carrots' that it has in terms of support mechanisms, unless there was the Inflation Reduction Act in the US, there's been some healthy competition. We work with Chinese colleagues, who have a carbon pricing system that's bigger than the European one. And if I take just one example, if it's possible to subsidize airlines, support them financially to fly better routes that reduce non-CO<sub>2</sub> impacts. then I think a year or two of trialling that, and frankly, airlines and authorities across the entire world could be taking it up. It's expected to be a low-cost way to reduce a lot of aviation's climate impact. So, we work across the field, from e-SAF to biofuels, to technologies to reducing non-CO<sub>2</sub> emissions. I think sharing successful examples and working to learn from others is key for that as well.

**Jim Spaeth:**

The one major existing international collaboration mechanism for aviation is, of course, ICAO and its CORSIA program. It's led by the FAA for the U.S. government. But we have lots of other, both bilateral and multilateral engagement fora that we participate in, and we look to those as opportunities to share best practices, and to learn from each other, and at times, we do joint research or joint analysis, including under the Clean Energy Ministerial collaboration, the IEA Bioenergy Technology Collaboration program, the Global Biofuels Alliance, activities at the G7, G20, and even at the COP level. There are almost too many opportunities for these collaborations that it's difficult to participate in all of them efficiently. But we welcome those opportunities and look forward to working in this space with countries all over the world, the OECD, and developing countries, emerging markets, etc. We all need further assistance in developing the SAF markets.

**Alex Philpott:**

I'd agree entirely with Damien's and Jim's comments. It's a really important part of the transition – to make it successful, but also affordable for everyone - if we work globally. Just last week, the UK announced £450,000 of funding to help some African countries to look into potential for SAF production. We're happy to have policy exchange with many, many countries. But I would also like to go a bit further. And I know US and EU colleagues are doing similar. We're also looking to help ICAO play a role in this, in terms of directing financing and funding from public and private sources towards SAF production - and not just in advanced economies but in developing countries as well. So I think that capacity building support has a role to play, too.



## Interview with Fred Krupp, President Environmental Defense Fund



*Interviewed by Ulrike Ziegler, President impact*

### **Ulrike Ziegler:**

*Thank you for coming to our IMPACT Forum in early December 2024. The Environmental Defense Fund (EDF) was established in 1967 and it has looked at multiple industries ever since. Can you give us a feel as to which industries have been really successful in decarbonizing? And why do you think they have been successful?*

### **Fred Krupp:**

Probably the industry that's 'cleaned up' the most in terms of conventional pollutants, but also decarbonizing, in the United States is the power sector. In terms of conventional pollutants, sulfur dioxide – the cause of our acid rain – those emissions are down 90 % because a market system was put in place to incentivize reducing the amount of sulfur that's put in the air from power plants. At the same time, a series of things, including transition away from coal, including incentives, regulations, the availability of natural gas here in the United States – all of these have dramatically lowered the carbon emissions to help to massively – though not completely yet – decarbonize the US power sector.

### **Ulrike Ziegler:**

*Looking back at the one-and-a-half days that you've been able to join us.*

*We've followed presentations with case studies; we had top scientists opine on the decarbonization status of the industry. What were your key observations?*

**Fred Krupp:**

You had a great collection of people from aircraft manufacturers to those who lease airplanes, to airlines, NGOs, government officials... Congratulations for the work you're doing and the folks you were able to put together. My overwhelming takeaway was that this [decarbonization] work is not going to get done by begging people to do something that's not financially in their interests. We have to work together to create the policies, the incentives, the private collaborations, the private public partnerships that make it in the financial interests of people to move forward. That was my basic takeaway.

**Ulrike Ziegler:**

*'Cooperation' or 'collaboration' is certainly a key term that I use very often. As one of the IMPACT Forum participants said: 'We need radical cooperation' or 'collaboration'. It seems we are still confined to our echo-chambers. And that was the idea behind organizing the Forum: to make sure we have the relevant stakeholders. But I'm still wondering how we can really incentivize people to take the next step, although it might not appear – at first glance – in their financial interest? Do you see a chance for us all working for the greater good, i.e. decarbonization?*

**Fred Krupp:**

We absolutely do. And I think there absolutely should be an interest in the short-term in doing things even that aren't in the financial best interest – to create the new systems and the new models and the new technologies that will pay off in the future. I think even here we're going to need government policies in the short-term to get the level of innovation and experimentation now that we need, so that we can decarbonize the aviation sector in a timely way.

One thing that was a big takeaway for me at the conference, Ulrike, and it was kind of a new learning for me, is the new research on contrails and how with a concerted effort by several of the actors, to experiment now, we may be in a position – within a very few years – to have a big impact on reducing the global warming potential of aircraft flights. And so that's pretty exciting.

**Ulrike Ziegler:**

*Absolutely. And that's why we pulled all these people together. Another issue that I would be keen to get your thoughts on is the possible review in 2027 of ReFuelEU Aviation – the EU's flagship policy promoting SAF use. Lots of people are nervous about changes to this policy. At the same time, across the Atlantic, we're about to have a change in administration in the US, investors and financiers alike are saying: "Oh my God, can I trust the system?" Zooming in on the US, do you think certain decarbonization policies – for aviation and other sectors – might be pulled back? What's your view?*

**Fred Krupp:**

Well, there's no sugar-coating it. There is reason for concern. On the other hand, the very important Inflation Reduction Act (the IRA) here in the US, these tax credits that have been provided for sustainable aviation fuel (SAF), they have powerful influential constituents that want those credits continued. Many of the airline industries and aircraft manufacturers understand that the future is going to require a sustainable way of operating. And the fact that the government over the last couple of years, in 2022 specifically, provided these tax credits is something that many people are going to work hard to preserve. I think I understand the legitimate concern, but I would say it's too early to predict what's going to happen.



**Ulrike Ziegler:**

*Exactly, and we shouldn't be sidetracked by these concerns, they're part of our risk evaluation. But still, as you just said, it's in the interest of lots of U.S. constituents to keep the system of decarbonization incentives as it is and ideally even improve on them. Last, but not least, let's talk cooperation and collaboration. To what extent does the EDF cooperate and collaborate with other industry actors?*

**Fred Krupp:**

It's our whole theory of change – to partner and collaborate with others. That includes others in the NGO space, in the United States and internationally. It includes others in the private sector, includes those in governments. It's only by bringing people together – by that phrase that I heard when I was with you: 'radical cooperation' – that we have a chance of changing the world. No one individual, no one group has enough 'throw weight' to bring about the sort of transformation that's needed. But together, we not only have to do it, but we can make a huge difference.

**Ulrike Ziegler:**

*Thank you Fred for taking the time to chat with us. We look forward to staying connected and working alongside EDF.*

**Fred Krupp:**

Ulrike, thank you. We're honored to be part of your network.

## WTW – How the insurance sector can aid aviation's decarbonization progress

By Charlotte Dubec and Daniel Bannister, WTW



*Charlotte Dubec  
ESG Lead Global  
Aviation & Space*



*Daniel Bannister  
Weather & Climate Risk  
Research Lead*

As the world increasingly focuses on reducing carbon emissions, the aviation industry finds itself under scrutiny. The sector currently only contributes around 2.5% of the world's human-induced CO<sub>2</sub> emissions, but its share is expected to rise as other industries decarbonize.

Extreme weather events are also increasingly having a direct impact on the aviation sector. Recent years have seen disruption from hot weather causing runways to buckle, flash floods inundating runways and terminals and the damage from hailstorms forcing the closure of airport terminals. This makes it increasingly important for the aviation industry to reduce its emissions and enhance its resilience to the effects of climate change.

The insurance sector is uniquely positioned to help support the aviation industry's decarbonization process. By taking an integrated approach, the insurance sector can help aviation companies understand their exposure to climate risks, develop targeted strategies to protect financial performance and adapt to an evolving climate landscape. By financing mitigation efforts, underwriting climate-positive projects, and guiding research toward practical applications, insurers can help aviation organizations move toward sustainable operations.

### **Why is the insurance sector interested?**

The aviation industry is run with very tight margins and even minor disruptions can have knock-on effects that impact the position of the global fleet for days afterwards, as shown not just by the recent floods but also by the ramifications of the 2024 Crowd Strike disruption.

From an insurance perspective, these disruptions can lead to claims both for the physical infrastructure and damaged hardware, but there are also a range of other potential claims including business interruption and weather that go beyond traditional aviation hull and liability policies.

If the sea levels continue to rise, insurers will face unprecedented accumulation risk, with infrastructure ranging from airports to cities to shipping ports all potentially being inundated simultaneously. Most insurers underwrite a diverse book of business so that a high level of claims in one industry in a particular year is balanced by lower claims elsewhere. Recent flash floods have impacted several industries at once, making it more difficult for insurers to spread their risk. There is also the need to respond to increasingly active stakeholders, such as shareholders and regulators, who are asking organizations to go beyond simply providing a list of key risks. Organizations need to be ready to answer questions about the methodology used to define a risk, the potential value of risk and how the board are taking action.

Climate transition risk and a grouping of environmental risks that encompassed broadscale climate concerns placed fourth and fifth in the rankings in the 2024 WTW Emerging and Interconnected Risks Survey, with risk descriptions highlighting the range of industries acting or responding to change happening in their ecosystem.

Respondents highlighted their uncertainties around Net Zero transition, such as policy, legal, and market changes, which could see some organizations face significant moves in asset values and cash flows or higher costs of doing business. Claims reduction, the threat of reputational damage and the potential disapproval of shareholders and regulators gives the insurance and risk management sector a strong incentive to put its combined expertise behind getting the aviation industry to where it needs to be.

There are several areas where this knowledge and expertise can be of use, but it is possibly simplest to define the strategy as a process of identifying, quantifying and managing risk.

## **Identify**

The use of climate projections, risk assessment tools, and catastrophe models enables insurers to provide businesses with strategic insights into the risks they face today and identify risks which could emerge in the future.

For example, WTW's Airport Risk Index (ARI) recently highlighted the severity of risks faced by airports in the Middle East following the flooding in Dubai, which saw over 1,200 flights cancelled in two days in April 2024. The ARI model demonstrates that returning to normal operations after such an event could take anywhere from 11 days to a full year, depending on the infrastructure's resilience, but it also highlighted areas where business practices could be enhanced to improve the speed of recovery.

With traditional insurance often falling short, particularly in cases like Dubai where physical damage was minimal but operational losses were significant, innovative parametric solutions such as non-physical damage business interruption (NPDBI) can be explored. These offer pre-agreed payouts based on specific triggers, such as rainfall intensity or number of flight cancellations, ensuring that aviation companies can recover financially even in the absence of direct physical damage.

The sector is not only helping to manage existing risks, but also supporting the research that will guide the future of sustainable aviation. For example, the WTW Research Network has been an active participant in the Towards Zero Carbon Aviation (TOZCA) project led by Professor Andreas Schäfer at the Air Transportation Systems Lab, University College London. The multi-year project has been examining how the sector can realistically move towards a Net Zero climate impact global aviation system by 2050, and the costs and emissions trajectories associated with such transitions.

Insights such as these can be used to understand material transition risks and opportunities faced by different businesses across the aviation value chain. Companies at the forefront of transition planning can adapt their business strategies more efficiently as consumers adopt more sustainable behaviors (for example, switching to rail or becoming more willing to purchase carbon offsets) and lower-carbon technologies emerge (for example, when to time the lease of a newer, more efficient aircraft).

### **Quantify**

With information about the nature of emerging risks, the insurance sector has also become adept at quantifying how those risks can impact organizations right across the aviation supply chain.

The insurance sector may focus on risk management and insurance, but it also has perspective across several industries which can be used to support the aviation industry's carbon emission reduction challenge. It is involved in the implementation of carbon reduction projects in several sectors and that experience can support the aviation industry as it embraces the opportunities that the next few years could bring.

To cite a relatively simple example, there is discussion across the airport sector of the potential importance of implementing microgrids to support the growing demand for power over the next few years. Microgrids have not been widely deployed in the aviation sector, but they have been developed for some data centres, hospitals and commercial buildings. The risk management and insurance sector has often been involved in these projects and can offer valuable insight to airport sector organizations going down the microgrid route.

### **Manage**

The insurance sector brings a unique depth of expertise as it works to support its clients. Rather than simply offer a transactional experience, it is bringing its expertise to the fore, which is a development that the aviation industry can take advantage of as it evolves in response to the climate challenge.

## Project SkyPower

### Exploring Project SkyPower's plans to drive e-SAF growth

[Project SkyPower](#) is a CEO-led initiative to make e-SAF a commercial reality this decade. Its mission is to pave the way for the first large-scale e-SAF plants in Europe to reach Final Investment Decision by the end of 2025. Fourteen CEOs from companies across the European aviation and energy value chain are leading this initiative, with an additional 40+ organizations involved in the working groups. The project is supported by the Green Finance Institute and the Mission Possible Partnership, and funded by the Children's Investment Fund Foundation, Breakthrough Energy, and the Climateworks Foundation.

To better understand this effort, **impact** speaks with Max Held, Aviation Lead at Systemiq, which runs Project SkyPower's secretariat, and Coordinator of Project SkyPower.



#### What is the rationale for initiating Project SkyPower?

The current global SAF project pipeline is dominated by bio-SAF, foremost HEFA. However, the industry needs to scale e-SAF production in addition to bio-SAF due to the constraints of high-integrity, sustainable biomass. By 2050, e-SAF could abate more than 500 million tonnes of CO<sub>2</sub> globally. The EU and the UK have mandated the supply of e-SAF volumes starting from 2030, and 2028 respectively – however, to date we have not seen Final Investment Decisions (FID) in any large-scale (25+ kilo-tonnes per annum, or ktpa) e-SAF project, anywhere in the world. EU and UK e-SAF mandates are at risk of not being met. Within Europe, only a handful of projects, with a combined production capacity of approximately 300 ktpa, show strong potential to start production by 2030 but would still require significant support. Should all these projects succeed, it still would only amount to about half of the mandated e-SAF volumes by 2030.

Against this background, we have initiated Project SkyPower as an initiative to foster cross-value chain collaboration and get e-SAF projects closer to FID, by working across the following key levers: (a) Regulatory certainty on e-SAF mandates and penalty systems, (b) effective and adequately capitalized public subsidy schemes, (c) bankable 10+ year offtake commitments at the required premiums, (d) instruments to mitigate compliance, technology performance and financing risks of first-of-its-kind, large-scale e-SAF projects.



**What were the key challenges in putting Project SkyPower together and how did you address them?**

In 2024, we found that there was no alignment on three fundamentals: (1) the true cost of e-SAF production in Europe, (2) the common barriers that prevent e-SAF projects from getting to FID, and (3) high-impact solutions to remove those system barriers. Together with the 50+ organisations involved in Project SkyPower, we built an open-source, openaccess techno-economic model and engaged extensive with the entire e-SAF eco-system (incl. industry, finance, policy, NGOs) to create alignment on the three mentioned topics. In 2025, we will move from analysis to action (following a 10-point action plan) to ensure we achieve our mission.

**Tell us more about the stakeholders participating in Project SkyPower? Why them and who, if anyone, is missing at the table?**

Project SkyPower has 50+ members from all parts of the e-SAF value chain, incl. feedstock suppliers, fuel producers, fuel suppliers, technology providers, EPC contractors, airports, airlines, end customers, commercial investment banks, and equity investors. To get e-SAF projects to FID, all stakeholders across the value chain need to collaborate, e.g. to get to bankable offtake agreements, to create adequate risk-reward sharing models to de-risk technology performance risks, or to establish the right financing structures. Furthermore, European as well as national policy makers have been closely following the work of Project SkyPower – a critical requirement for success, as e-SAF projects will not be pushed onto the market by its advantageous economics, but by pure political will alongside cross value chain collaboration.

**e-SAF is not the only type of SAF lacking investment, we also continue to see a lack of investment in other types of SAF which have a higher technological readiness level (TRL) than e-SAF and are more scalable in the short-term - how can this be addressed?**

Currently, we see a lot of cleantech innovation in the first-of-a-kind (FOAK) trap, i.e. the challenge to get from innovation to FOAK, commercial size. e-SAF, advanced bio-SAF as well as other CAPEX-heavy cleantech solutions are facing similar problems such as (a) a lack of bankable, long-term offtake agreements (where off-takers are usually only off-taking fuel for 1-3 years, instead of the 10+ years required for bankability of SAF projects), as well as (b) a lack of adequately de-risked financing structures, where such cleantech projects ideally need the investment volumes of a pension fund coupled with the risk appetite of a venture capital firm. In the absence of such a solution, private sector financing (both equity and debt) requires significant de-risking from the public side. Commercial investment banks are eager to finance advanced SAF projects if they were e.g. de-risked by low-interest loans by the EIB or national investment banks, as well as loan guarantees from export credit agencies. Equity investors usually demand a certain amount of public funding, e.g. in the form of grants, to de-risk their investments. Such public funding could come from the EU Hydrogen Bank, the EU Innovation Fund or SAF Allowances. In the UK, the planned revenue certainty mechanism is expected to de-risk e-SAF projects.

**What are the next steps: How can Project SkyPower's findings and recommendations be translated into real world action?**

Project SkyPower's mission is to pave the way for the first large-scale e-SAF projects in Europe to get to FID by the end of 2025. We believe this can be achieved, if we implement five critical actions: (1) Policy makers need to provide regulatory certainty by ensuring that the e-SAF mandates are rock solid – e.g. Member States need to publish absolute penalty systems. (2) The European Commission needs to provide adequate public funding for the first wave of e-SAF projects. (3) Fuel suppliers and/or airlines need to enter bankable, 10+ year offtake agreements. (4) e-SAF projects need to be de-risked from a financial perspective, through low-interest loans and loan guarantees. (5) The projects need to be de-risked from a technological performance perspective, by establishing adequate risk-sharing models between EPC providers, tech licensors, project developers, off-takers, governments, insurance companies, etc.

**ProjectSkypower labels itself an open-source initiative. To what extent can your work be applied to other countries/continents?**

A common blocker for cleantech solutions is their nascent business case, where new low-carbon technologies have troubles in scaling from innovation to commercialization. This is usually such a complex task that individual companies often cannot resolve within their own system boundaries. On e-SAF, Project SkyPower has brought together the right companies across the value chain, built trust and is about to remove systemic blockers and to enable individual stakeholders to take bold actions that would not be possible if one of them acted alone. Thereby, Project SkyPower champions a new model of pre-competitive, cross-value chain collaboration that can be applied to other sectors: scaling e-SAF, with innovation in its core technologies (e.g. renewable energy, Power-to-X, and carbon capture technologies) can have spill-over effects to other commoditized sectors, like shipping and fertilizer production.

Two of Project SkyPower's core principles are transparency and impartiality. Therefore, our first insights report as well as the underlying techno-economic model are open-source (to not hide any assumptions) and open-access (to create a fact-based, transparent knowledge base that can enable the cross-sectoral learnings described above).

## IAG - Tales from the SAF Market

impact talks to IAG's SAF VP on what it takes for airlines to lead the way



Aaron Robinson  
Vice President of SAF  
International Airlines Group (IAG)

**What inspired you to pursue a career in aviation, and how did you become involved in the sustainability aspects of the airline industry?**

I've always been interested in aviation and airlines in particular, but my career goals evolved over time. Originally, I wanted to be an airline pilot, but then I recognized an opportunity for greater impact on the management side. I was interested in network planning and deciding where all the aircraft should fly to maximize value, but instead of the commercial side of the business, after coming out of university, I ended up on operations. I started my airline management career at Northwest Airlines in fuel efficiency and conservation – which of course reduces emissions as well. Fuel conservation had fewer opportunities after fuel prices dropped, but sustainability was increasing in importance. It's been a fascinating and highly rewarding journey. Sustainability requires working with great people across the whole airline, across aviation, and beyond aviation as well.

**Having led SAF purchasing initiatives at United Airlines and now at IAG, two of the largest SAF buyers globally, would it be accurate to say you've negotiated more SAF contracts than – at the very least – most people in the industry? How has this experience shaped your perspective on the market?**

I think that's fair. Working with industry leaders on decarbonization firsthand lets one directly understand the intricacies and challenges. There are such a variety of SAF contracts even in short-term deals, such as how price is structured, or how supply fits into existing relationships. A long-term deal is a difficult challenge, because you have to do some very fine maneuvering. The agreement must meet the airline's needs, the producer's needs, the financier's needs... all at once, and finding that right combination can be incredibly challenging. I haven't seen any two long-term agreements where the price structure has really been the same. SAF producers, in some ways, are like children: they're all special and unique in their own ways, still learning, and we hope they grow up to great success.

**What key considerations should airlines prioritize when negotiating SAF offtake or supply contracts to ensure both long-term sustainability and operational success?**

A major challenge in the industry is that airlines continue to be highly risk-averse when it comes to sustainability. Some airlines don't want to sign an agreement unless they feel there's a very high probability of success, which is frankly unrealistic. We all know SAF is more expensive compared to jet fuel, so how does an airline justify buying and signing up for something that's more expensive? This is a market failure, and regulations are designed to solve market failures. Mandates exist to make the alternative – high buyout prices – an even worse outcome, in order to drive behavior. But it's also preparing for the future, i.e. blunt regulations like demand management that may be a lot worse.

The most critical question I asked [IAG Group Sustainability Officer] Jonathon Counsell when moving to IAG was: 'What's the attitude at IAG around risk? Do we allow risk, or do we avoid it?' And he replied: 'There's no question. The biggest risk of all is doing nothing. We have to take risk.' That's the right attitude, and I think more airlines need to think that way about decarbonization. On sustainability, IAG has always been a leader in the sector, being the **first airline group globally to commit to Net Zero by 2050** and as of February 2024, we have secured around one third of our 10% SAF by 2030 target.

**In addition to your role at IAG, you're recognized as a prominent industry communicator, sharing valuable insights about SAF via LinkedIn and other forums. What are some of the most common misconceptions about the SAF market that you aim to clarify?**

There's a lot more talk than action. We welcome the mandates but sweeping regulation which increases costs to airlines and their customers, has the potential to threaten the competitiveness of the European aviation sector globally. Last year (2023) SAF was about 0.1% of global jet fuel use. There are many long-term SAF deals being signed, but only across a small number of start-up producers.

Scale matters; we need significant volumes of SAF to decarbonize. The industry has been slow to adopt SAF, and the timescales are long. Our recently announced agreement with Infinium took two years from first conversations to announcement, and it will be another two years until their facility is running. We have to accelerate these timeframes. Attention, people, and resources help. We are doing what we can to manage costs and achieve our targets but we need all stakeholders in the aviation ecosystem to work together. But it's not just about surface-level issues like money. It's about solving deeper root-causes like risk aversion in airlines and financiers: 'Why should I take a second step to decarbonize if my competitors haven't taken a first step?' That's why regulations like mandates are helpful. They're not particularly efficient, but they do enable joint action, as opposed to waiting on voluntary action to slowly happen.

### **Any final thoughts on SAF price expectations over the next few years and volume availability?**

I think there will be plenty of SAF volume available to meet mandates. The challenge is that it won't all be in the right places. There may be a lot of SAF in some countries, but mandates require it elsewhere. This is where Book and Claim becomes critical. Because different mandates and incentives apply to some types of SAF and not others, prices will react to that imbalance, and we'll see a wide range of price dispersion. Some SAF will be expensive, some will be low-cost; some will concentrate in certain countries or markets, and that imbalance will persist for quite some time. Ultimately, this is not that different from my earlier ambitions in network planning—but optimizing SAF rather than aircraft. Importantly, as an industry leader, we have a clear pathway to achieving these targets and our work extends beyond our company and helps drive the entire industry forward.

## **Cirium-Analysis: The Net Zero financing challenge**

By Oliver Clark



*Oliver Clark  
Cirium (Premium Content Editor EMEA)*

The Montana Renewables refinery, which sits on a bend in the Missouri River in the city of Great Falls, can trace its history back 100 years to the boom years of the US oil industry. The Great Falls refinery started producing petroleum in 1922, but today there is a new focus on biofuels, including the production of sustainable aviation fuel. Its SAF capabilities are now in line for a major expansion after Montana Renewables and its parent Calumet secured a conditional commitment to a loan guarantee of up to \$1.44 billion from the U.S. Department of Energy and its Loan Programs Office. The funding will allow the companies to increase production of biofuels from about 140 million gallons per year to an estimated 315 million, most of it SAF.

If approved, the loan, which is being provided under the Biden administration's Investing in America scheme, comes with attractive financing terms, including a 15-year tenor loan at US Treasury rates plus 0.38%. Servicing of the principal and interest will be deferred until commissioning of the expansion work, targeted for 2028. The total also includes a \$150 million equity investment by the DOE. Retained earnings from the expanded facilities will supplement DOE funds to maintain a 55:45 debt-to-equity ratio during the construction phase.

Bruce Fleming, chief executive of Montana Renewables, tells Cirium that without the government backed loan guarantee the company would not have pursued the project. “We would not have elected to proceed. You know, we’ve taken a substantial risk – and by risk, I mean, we’re expecting a return on our capital investment, but we may not get it,” he says. Fleming says the company financed previous phases of expansion with private capital loans which came with a coupon of around 13%. Such is the cost of capital in the newly developing SAF space that Fleming is blunt about the prospects of success if there are no guarantees in place to partially help de-risk such projects: “Nobody’s getting financed. Banks aren’t lending; private equity investors generally aren’t investing because they’re not satisfied as to the risk. And the risk goes on many, many levels.”

The perception of it being risky to invest in the aviation sector’s ambitions to reach Net Zero by 2050 is understandable. Development of SAF, electric take-off and landing aircraft (eVTOLs) and hydrogen power involve emerging technologies which require large capital outlays in their start-up phase and have an indistinct demand profile. One source in the SAF sector tells Cirium that some venture capitalists are seeking returns of 20% to invest in the sector. They say offtake agreements alone do not provide sufficient comfort to investors.

IATA estimates that for the aviation sector to transition to Net Zero between now and 2050 will cost \$4.7 trillion. However, the capital investment to develop new SAF plants is even higher. The airline association estimates an outlay of \$3.9-8.1 trillion.

## Investors

Even with US incentives such as the tax credits for SAF use and production under the Inflation Reduction Act, much of the early investment in SAF and other Net Zero initiatives will need to come from private equity sources. In February, Swedish hybrid-electric aircraft developer Heart Aerospace successfully raised \$107 million of Series B funding.

At the ALI Sustainability Day in Dublin on 12 November, Heart non-executive chairman John Slattery noted that several strategic venture funds had participated in that fundraising, including Lowercarbon Capital, the Bill Gates-backed Breakthrough Energy Venture, and EQT. He says that to secure investors there has to be value proposition for the aircraft being developed, adding: “It’s not just that it’s greener. “Investors have a focus on this area of decarbonization”, he notes, “and let’s just be unambiguous about this – you have to make money.”

Slattery also observes that investors want to see a “value proposition for the product that’s better than what’s in the market today, without subsidies, so no green premium.” Speaking in the aftermath of the collapse of eVTOL developer Lilium, Slattery warned that more start-ups in the space were likely to fail. “From a Darwinian perspective, that’s not a bad thing. So that the capital that is in the market will rally around the obvious technology leaders, and at the end of the day, it’s the best technology that’s going to win,” he says.



Alcohol-to-jet synthetic SAF producer Gevo has recently been awarded DOE loan guarantees, and its chief customer, marketing and brand officer Andy Shafer says it can produce the fossil-fuel alternative at a cash conversion cost “not that different” from petroleum if the cost of oil is \$70-100 per barrel. “The difference is, we’re investing in assets that are new plants... and in the last five years, we’ve seen inflation drive the cost of those plants through the roof. It’s more than tripled,” says Shafer. “So, the investment [equation] that we need to make is: how do we pay for the capital for those plants when we’re competing against refineries for petroleum and Jet-A that were invested in 50-100 years ago?”

This, he adds, is an “ecosystem problem”, with the European Union’s SAF mandate scheme RefuelEU and the USA’s Inflation Reduction Act just a “piece” of the solution. Fleming likens investing in aviation’s Net Zero transition to Maslow’s hierarchy, which models human actions as being motivated by certain physiological and psychological needs that progress from basic to complex.

“He [Maslow] made a stack pyramid, and the original was: a person will not move up to the next level until the level they’re on is satisfied, and the level they’re on is very, very basic. If you don’t have food and clothing and shelter, you’re not going to be very interested in the things that come later, and the very top of that is when you’ve got the luxury to indulge anything at all, and I think maybe the world is indulging in an energy transition. “Then it’s going to turn into investors want their money back with interest, thank you. And if they don’t think that’s going to happen, they’re not going to put us to work that way, because there’s something else they can always do with it.”

## Lessors and banks

Aircraft leasing companies and banks see a role in helping to support the aviation sector toward its Net Zero targets. Speaking at the ALI event, SMBC Aviation Capital chief executive Peter Barrett observed that lessors could deploy their “financial firepower” by establishing a market for SAF. One example of such a contribution could be lessors “making a market” for SAF by utilizing their expertise “in financial markets or future markets in terms of trading these types of what’s going to be a very new asset class.”

Avolon Chief Risk Officer Jim Morrison tells Cirium that wind and solar energy has had more than \$5 trillion of investment, showing that is it “feasible” but challenging. He believes providing capital for aircraft fleet renewal is one of several ways the leasing sector can contribute.

US lessor Jackson Square Aviation recently partnered with SAF production accelerator Future Energy Global. Jackson Square says that under this collaboration, carriers will gain access to a “powerful new decarbonization lever”, combining its own financial solutions with FEG’s future SAF deliveries and partner network of corporate SAF buyers, suppliers and analytics providers.

Natasha Mann, chief executive of Future Energy Global, tells Cirium that while it is relatively straightforward to source the SAF and delivery it to an airline, what’s “not so easy” is “everything that comes after that.” “SAF pricing isn’t fixed, so while prices are very attractive right now, they can go up, they can go down, or they can do a number of things in between those two, between the time of contract and delivery with the airline.

“And what the airline wants, of course, is the most favourable price, particularly when they’re locking in corporates. So that’s where we then come into a financial solution... It’s all about treasury.” Mann says airlines are looking to lock in SAF at a certain price but she warns that “that date might not be the right date that lines up with everything else, so potentially you might need some sort of financial solution in place until you actually take deliverance of the SAF.”

She adds: “That’s where Jackson Square comes in, because Jackson Square is partnered to over 60 airlines, and so instead of bringing in a new financial partner that an airline doesn’t know, we’re bringing in a financial partner that the airline does know. They finance not only the aircraft, but they finance other things to the airlines as well... so this is just another add-on to what they’re already offering to the airline.” While there are banks and financiers willing to invest in SAF, she believes it is corporations that will ultimately pay for the transition via their contributions to offset their Scope 3 emissions. “The scope 3 market is the corporate in-setting market. That’s really what needs to be developed. So, if you have large companies that are that are using aviation for the better of their business, they should also be contributing to this service.

“Up until this point, carbon offsets have been a great solution, but we now have a solution within sector, which is SAF. So, you know, there should be some mix of SAF and carbon offsets, and once that market starts to develop, the premium then gets paid, and then the market should accelerate.”

Banks are also working to encourage airlines and lessors to finance assets within sustainable parameters. During the ALI event, MUFG managing director and head of aviation advisory Michael Halaby said the Japanese bank had its own decarbonizing target and noted that the first step for the financing sector was to recognise there is an issue to address. He says MUFG previously financed airlines without considering their ESG profiles, but this is something the bank now does with “every single loan.”

Sustainability-linked financing structures are designed to “to nudge people the right way”, Halaby notes, but he adds: “It’s not a question of price anymore, that you get a discount if you perform; it’s [that] you don’t have access to the market if you don’t perform.” He estimates the number of sustainability-linked financings at a dozen in 2023 and similar this year. Meanwhile, the deals that do get done are by the “same folks over and over again.” There needs to be a “more consistent approach” to sustainable financing, with more incentives to encourage greater uptake, warns Halaby.

### **The Trump Effect**

The election of a climate-change sceptic as the next US president has called into question whether the country’s commitment to decarbonization incentives will endure. Donald Trump could seek to repeal the Inflation Reduction Act, or more likely scale it back, but equally some elements of the legislation, such as creating greater energy independence for the USA, might fit his political agenda.

Cirium spoke to Montana Renewables’ Fleming in October, before the presidential election, and he said a “pretty high bar” would be needed to overturn the current legislation. “This does not yield to an executive order from the White House. The law in question is the IRA legislation from 2022 which gives us the credits to support the higher cost of manufacturing the SAF.

So you'd have to change the law." Shafer acknowledges that there was "certainly a lot of rhetoric" about the Inflation Reduction Act during the election campaign, but points out that Gevo will employ 1,000 people to build its SAF plant in South Dakota and create 100 "high paying" jobs at the facility. "So, we're bringing economic prosperity and development and diversification to the rural communities. We will pay farmers more for producing low-carbon-intensity, non-human-grade food products."

## European Regulation

The European Union has taken a different approach to the USA by making the mandated scaling-up of SAF use across the continent's airports a key plank of its efforts to decarbonise the aviation industry. The ReFuelEU programme targets a progressive increase in the use of SAF, starting with a 2% blend by 2025, escalating to 6% by 2030, and reaching 70% by 2050. Under the program, airport fuel suppliers are required to report their usage of SAF.

The European Commission has also looked at the financing angle of the challenge. It offers financial support to de-risk SAF production, through funding instruments such as Horizon Europe, Innovation Fund and InvestEU. Member states can also support the production of SAF, on condition that they do so without breaking state-aid guidelines. The bloc also argues that it provides direct financial support for the uptake of SAF by narrowing the price gap with fossil kerosene by providing allowances under the Emissions Trading System to aircraft operators.

However, efforts to modernize the Energy Taxation Directive to grant SAF preferential treatment remain stalled.

At the ALI event, the Commissions' Director-General for Mobility and Transport Magda Kopczynska reminded delegates of the findings of a report published by Italian economist Mario Draghi in September. This estimated that the aviation industry would need to invest €61 billion (\$64.6 billion) per year between 2031 and 2050 to reach Net Zero, which she says gave a "very clear indicator of how much money is needed." Kopczynska says the new Commission will be "very much focused on looking at this investment landscape" in the EU.

She emphasizes the importance of pulling together different sources of public and private financing to make this transition "workable and feasible", and discloses that the bloc's next budget will include public financing for aviation's decarbonization. The EU can also, she says, provide regulatory support to further "mobilize capital incentives and joint undertakings."

Gevo's Shafer sees an ongoing challenge for the EU in feedstock availability, and observes that "so much regulation" has been placed on what is a viable feedstock that it "forces the industry [toward] higher-cost feed stocks, and therefore raises the cost of the SAF." He believes that there are better opportunities to "accelerate and expand" the availability of feedstocks without having negative consequences on food stocks. "But the policies that we put in place here in Europe are hindering that development," he argues.

Christine Rovelli, Chief Revenue Officer at Finnair, notes during the ALI event that the Nordic carrier had been looking at different offtake agreements, but she warned that the price was a problem. She notes that at Helsinki airport, for example, there is only one SAF tank available, which means the airline needs to rely on the airport operator and the supplier to get the blend it is looking for. Under the ReFuelEU blending mandate, she adds, it's "not that easy" to get offtake agreements given the prices that Finnair is being quoted by suppliers. "The problem is, the prices that make the offtake possible now are the prices that actually make the investment attractive, but if there's no offtake because it's too expensive, then the investment is not going to make the return that it needs." So we're kind of stuck in a no man's land when we talk about actually procuring the liquid SAF to use in an airplane, because the price where we would buy it at is not the price that gives the investor the return to actually construct the plant and the infrastructure."

## MUFG - The realities of the energy transition

By Ehsan Khoman and Conor Murphy



*Ehsan Khoman,  
Head of Research –  
Commodities, ESG and  
Emerging Markets (EMEA)*

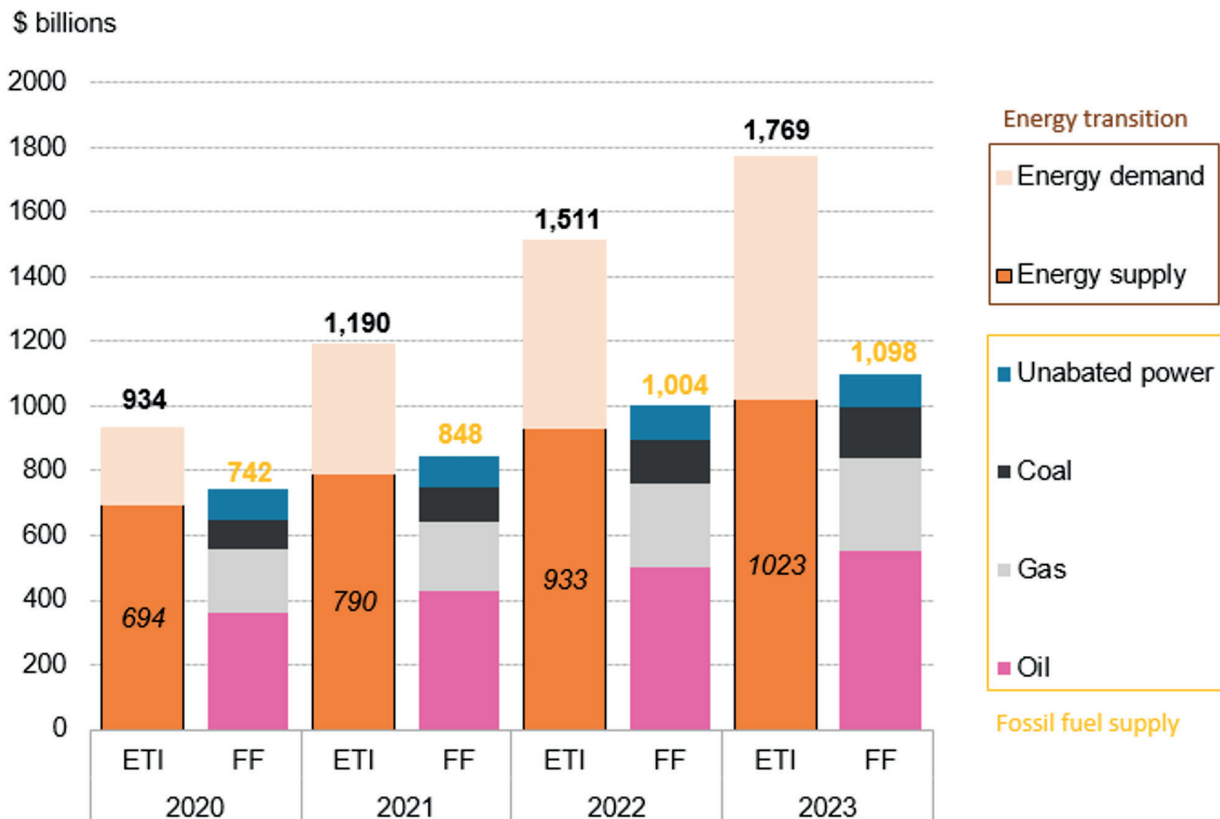


*Conor Murphy,  
Global Aviation Finance Office  
(EMEA)*

### Energy transition trends

Ten years after the landmark Paris Agreement and nearly halfway through what has been called a "decisive decade" for climate change, annual global investments in the energy transition continue to break all-time highs.

In 2023, USD1.8 trillion was spent across energy transition verticals, led by electrified transport and renewable energy. EMEA was the fastest growing region, posting a 38% year-on-year increase to USD542 billion, on the back of a strong year for solar in Europe and continued growth in the EV market, as well as strong upticks in hydrogen, carbon capture and storage (CCS) as well as clean energy. Encouragingly, global investment on energy transition technologies surpassed investment in fossil fuel supply by USD671 billion in 2023 – a testament of the lengths and seriousness both the public and private sector are taking to scale the energy transition.



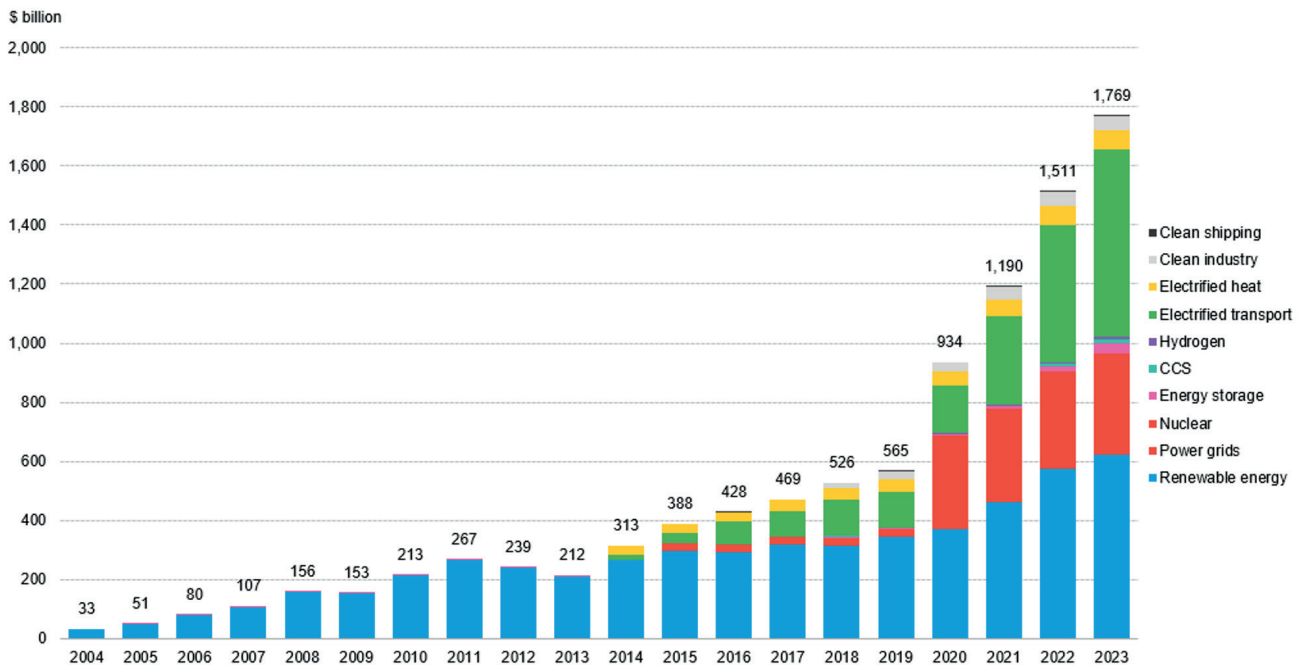
Source: Bloomberg (ETI – Energy Transition Investments, FF – Fossil Fuels)

Yet, whilst investments in green energy have seen significant growth, the green “new economy” revolution is still too nascent for green capex alone to drive global growth without sufficient carbon intensive investment. To put this into perspective, fossil fuel’s share of primary energy is still north of 80%. As such, the carbon-intensive “old economy” still needs investment until the green transition is complete, otherwise the global economy risks hitting capacity constraints on growth.

### Physical realities of the energy transition

There are a number of physical challenges which make the energy transition particularly hard to move forward. First, some use cases lack established low-emissions technologies that can deliver the same performance as high-emissions ones. Second, the most demanding challenges depend on addressing other difficult ones, calling for a systemic approach (e.g. third generation SAF requires green hydrogen derived from renewable energy and carbon capture). Finally, the sheer scale of the deployment required is tough, given constraints and the lack of a track record (again SAF being a prime example of limited track record and requiring sizeable investment to scale-up).

Understanding these physical challenges can enable CEOs and policy makers to navigate a successful transition. They can determine where to play offense to capture viable opportunities today, where to anticipate and address bottlenecks, and how best to tackle the most demanding challenges through a blend of innovation and system reconfiguration.



Source: Bloomberg

Looking ahead, Net Zero by 2050 is an ambition unprecedented in scale. But it's just not happening fast enough. Achieving it depends on significant investment in existing technologies. We believe the global economy today faces a scaling problem, not an innovation problem. One lens to contextualise this is that 90% of the abatement that we need can come from technologies that are already proven, yet only 10% can come from technologies that are commercially mature. So our challenge is to work out how to scale things that work to things that work at scale.

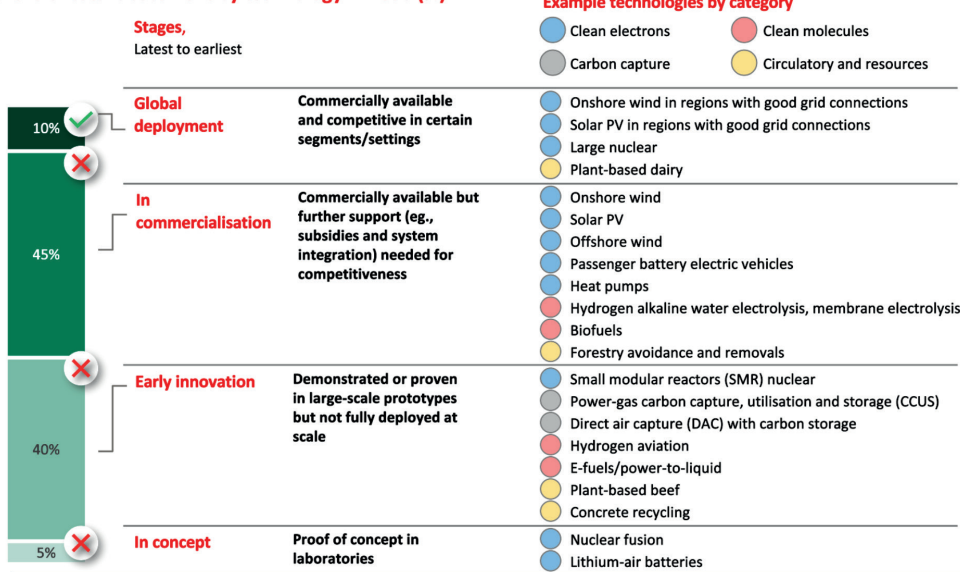


## Energy transition commercial viability | 90/10 rule curtailing scaling

Recognition needs to be given that we face a scaling problem, not an innovation problem. 90% of the abatement can come from technologies that are already proven, yet only 10% can come from technologies that are commercially mature.

### Most high potential climate technologies are at advanced maturity levels, but only ~10% are commercially competitive

Share of total abatement by technology in 2050 (%)



### Cost reductions for climate technologies require a innovation and scaling

- **Gap between technical readiness and commercial maturity.** Encouragingly, climate technologies are reaching maturity faster than in the past, and many of them – especially technologically mature ones such as solar, wind and batteries – have been on impressive growth trajectories.
- **Innovations in technologies, processes, and business models contribute to this acceleration.** For mature technologies, innovation focuses on accelerated deployment\*\*. Less-mature climate technologies require more fundamental technological innovation to improve performance and efficiency, as well as to help bring novel solutions to market\*\*\*.

Source: MUFG Research

There are three emerging areas that should now be prioritised in the scaling conundrum: (i) building up resilient supply chains; (ii) addressing an emerging skills gap; and (iii) a more holistic approach for financing and investments.

### Aviation decarbonization

Though the aviation industry has committed to achieving Net Zero by 2050, its path to reaching that goal is not linear. The industry has aligned on most of the important actions needed to decarbonize, such as, fleet renewal, disruptive propulsion technologies, operational efficiency, sustainable aviation fuel (SAF) usage, and carbon offsetting. However, whilst the aviation industry has improved fuel efficiency, its absolute growth of emissions is larger than efficiency gains to date. Looking ahead, the journey to Net Zero through a cost-effective method requires the entire ecosystem to be agile across a wide range of carbon mitigation measures as well as having a clear focus on short-term versus long-term initiatives.

At a minimum, corporates should be mapping out the sequence of actions they need to prioritise in order to yield the greatest impact and for a cost-optimal path to Net Zero emissions. They also need to start working together in a concerted way to bridge the knowledge and investment gaps that currently exist.

## Heart Aerospace - The industry's new goals: Redefining the path to Net Zero

By Christina Zander



*Christina Zander  
Head of Communication at Heart Aerospace*

To achieve the aviation industry's Net Zero emissions goal by 2050, the industry narrative must shift dramatically. In this article for **impact**, new propulsion aircraft developer Heart Aerospace argues for a fundamental rethinking of how the industry approaches its Net Zero challenge – from investing in innovative production processes to fostering increased collaboration.

The aviation industry is rapidly approaching a crossroads, where its growth ambitions clash with the urgent need for decarbonization. By committing to Net Zero carbon dioxide (CO<sub>2</sub>) emissions by 2050, airlines and aircraft manufacturers have acknowledged the need for action in the face of an unfolding climate crisis. But there is a troubling disconnect between these commitments and the reality of current industry practices.

A study by the International Council on Clean Transportation (ICCT)\* paints a stark picture. According to this research, the global fleet already in service today is projected to emit about 9 billion tonnes of CO<sub>2</sub> before these aircraft are retired, consuming almost half of the remaining carbon budget for the aviation industry. Perhaps more alarming, under the most optimistic scenarios, which assume significant advances in sustainable aviation fuels (SAFs) and fuel efficiency, emissions from new aircraft delivered up to 2042 will exhaust the remaining carbon budget by 2037.

These findings reveal that the industry's narrative – focusing on incremental improvements and small efficiency gains as credible paths to Net Zero – is misleading, creating a false impression that current emission-reduction efforts will suffice when current delivery projections fall far short of the 2050 Net Zero emissions goal. As an industry, we need to move beyond this limited narrative and begin discussing the comprehensive transformation required in aircraft design, production, and operation to achieve meaningful change.

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\* [Lifetime emissions from aircraft under a net-zero carbon budget - International Council on Clean Transportation \(theicct.org\)](https://theicct.org)

The pace of innovation in aerospace must match that of the automotive and space industries if the industry's goal is to be achieved. If electric cars and reusable rockets can make leaps in just a few years, so too can aviation.

Heart Aerospace's hybrid-electric ES-30, for instance, represents the kind of innovation that could play a pivotal role in transforming regional air travel. For routes up to 200 km, it virtually eliminates emissions. Even on longer flights, it achieves substantial fuel savings compared to the most efficient turboprops. And these figures are just the beginning – as battery technology advances, the ES-30's zero-emission range will continue to improve. The aircraft's batteries will be replaced every two years, further enhancing its environmental impact.

By offering lower operating costs compared to conventional fuel-powered planes, electric and hybrid-electric aircraft present a major opportunity for regional aviation. However, while this is a promising step forward, it only begins to address the industry's broader decarbonization challenges.

### **The ICCT report estimates a market for at least 10,000 zero-emission planes (ZEPs) by 2042**

The ZEP challenge is not just about developing new technologies—it's also a manufacturing challenge. Companies must invest in production processes that can scale up rapidly to deliver these advanced aircraft in time to make a real impact. Heart Aerospace has embraced this challenge by recently unveiling its first full-scale demonstrator airplane, the Heart X1, a key milestone in the development of the ES-30. Built almost entirely in-house at Heart's Gothenburg facilities, the demonstrator reflects the company's strategy of integrating design and production processes closely. This approach is critical for those introducing ground-breaking technologies like electric propulsion. A tightly integrated development process allows for rapid learning, risk-taking, and fast problem-solving, which are essential to driving technological advancement.

Drawing on its experience with the Heart X1, Heart is now focused on building a state-of-the-art aircraft manufacturing process to support the development of the ES-30, with a data-driven assembly line that prioritizes automation, high repeatability, and non-destructive inspection. The next step in the development of the ES-30 is the creation of the pre-production prototype, the Heart X2, which will further refine both the aircraft design and the production methods, ensuring the rapid deployment of next-generation aircraft.

However, this transformation cannot happen in isolation. Achieving the goal will require unprecedented collaboration between airlines, manufacturers, governments, and regulatory bodies. Without this collective effort, the aviation industry risks not only failing to meet its climate targets but also losing its social license to operate in an increasingly carbon-conscious world.

The aerospace industry has always been a leader in technological innovation. Now, it must harness that pioneering spirit to address its greatest challenge: creating a sustainable future for aviation. Only by abandoning the illusion of incremental change and embracing bold transformation can the industry reach its goals by 2050.

## Ishka - Update on decarbonization targets set by banks

By Eduardo Mariz



Eduardo Mariz  
Senior Analyst & Sustainability Lead, Ishka

### Progress by banks in setting 2030 aviation emissions intensity targets

As many as 31 banks have now set aviation emissions intensity targets, and at least a further four are expected to announce aviation targets soon, based on an analysis by Ishka SAVi of 96 global banks and their sustainability reporting. The number of banks setting aviation targets has doubled in the past 12 months, with most responding to target-setting deadlines by the Net Zero Banking Alliance (NZBA), a global alliance of banks committed to Net Zero by 2050.

The 31 banks with aviation decarbonization targets are aiming to reduce the emissions intensity for their aviation lending portfolio by an average of 28% by 2030 versus 2019 through 2023 baselines. However, how banks define emissions intensity for aviation varies both in the emissions captured (CO<sub>2</sub>, various definitions of CO<sub>2</sub>e, and various scopes) and in the benchmarked capacity measurements (revenue passenger kilometre, revenue tonne kilometre, passenger kilometre, etc.). This briefing explores why banks are setting emissions intensity targets and how they may impact lending decisions in the coming years.

### Recap: Why are banks setting emissions intensity targets?

Emissions target-setting for aviation by banks has picked up pace since 2023 as several lenders crossed the 18-month mark since joining the NZBA. NZBA membership requires the setting of initial interim 2030 emissions intensity targets for high emissions-intensive sectors relevant to each lender within 18 months of joining the alliance. For many banks, transportation (aviation included) is one of the largest sources of financed emissions and it is one of nine climate-intensive sectors identified by the NZBA. Even if transportation (including aviation) only accounts for a small portion of a bank's total lending, its high associated emissions may be enough to warrant target-setting.

### How prominent are aviation emissions targets among lenders?

The sample of analysed banks (96) encompasses institutions with large global footprints, meaningful transportation or aviation exposure, a track record in sustainable finance within aviation, or a combination of the three. Smaller banks with aviation decarbonization targets (e.g. ABanca, a Spanish lender) are also included on an ad-hoc basis.

Many of the analysed banks are members of the NZBA, which covers over 130 banks in 41 countries with over 40% of global banking assets. Considering that the 96 institutions analysed include some of NZBA's largest members, in addition to other large non-NZBA member banks, this analysis should cover a representative part of the global banking sector.

## Emissions intensity targets for aviation announced to date

The ambitiousness of some of these emissions intensity targets (some as large as a 66% or 56% reduction from 2021 or 2020 to 2030) carries a clear message: an increased focus by lenders on best-in-class new technology aircraft with the lowest-possible per-passenger emissions. Achieving this by the end of the decade will require lenders to be selective, not just in asset types they finance, but also their associated operators, seat configurations, SAF usage, and route deployment.

Since July 2023, this list has doubled with the addition of 17 banks. Highlighted in blue, are **impact** member banks.

| 31 lenders have published emissions intensity reduction targets for aviation |                    |      |          |                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------|--------------------|------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bank                                                                         | Emission Intensity | Year | Baseline | Available details                                                                                                                                                                                                                                                 |
| ABanca                                                                       | -37%               | 2030 | 2021     | 1.269 kg CO <sub>2</sub> e/RTK (2019) to 0.799 kg CO <sub>2</sub> e/RTK (2030)                                                                                                                                                                                    |
| ANZ Bank                                                                     | -30%               | 2030 | 2019     | 902 gCO <sub>2</sub> -e/RTK in 2019 to 720 gCO <sub>2</sub> -e/RTK                                                                                                                                                                                                |
| Bank of America                                                              | -32%               | 2030 | 2022     | 1,007.8gCO <sub>2</sub> e/RT in 2021 K to 639gCO <sub>2</sub> e/RTK in 2030                                                                                                                                                                                       |
| Barclays                                                                     | -11%               | 2030 | 2022     | 882gCO <sub>2</sub> e/RTK in 2023 to 785gCO <sub>2</sub> e/RTK in 2030 (approximate based on an 11% reduction)                                                                                                                                                    |
| BBVA (Banco Bilbao Vizcaya Argentaria)                                       | -18%               | 2030 | 2022     | 88g CO <sub>2</sub> e/pkm in 2022 to 72g CO <sub>2</sub> e/pkm in 2030                                                                                                                                                                                            |
| BNP Paribas                                                                  | -18%               | 2030 | 2022     | 956 CO <sub>2</sub> eq emissions per RTK in 2022 to 785 CO <sub>2</sub> eq emissions per RTK in 2030                                                                                                                                                              |
| Caixabank                                                                    | -30%               | 2030 | 2022     | 102 CO <sub>2</sub> eq emissions per RPK in 2022 to 71 CO <sub>2</sub> eq emissions per RTK in 2030                                                                                                                                                               |
| Commerzbank                                                                  | -12%               | 2030 | 2020     | The bank only notes that sectoral targets are based on SBTi-reduction paths                                                                                                                                                                                       |
| Commonwealth Bank of Australia (CBA)                                         | -26%               | 2030 | 2023     | 103 gCO <sub>2</sub> /revenue passenger km in 2023 to 76 gCO <sub>2</sub> /revenue passenger km in 2030                                                                                                                                                           |
| Crédit Agricole CIB                                                          | -25%               | 2030 | 2019     | 937.5 CO <sub>2</sub> eq emissions per RTK (approximated by Ishka) in 2019 to 750 CO <sub>2</sub> eq                                                                                                                                                              |
| DBS Bank                                                                     | -16%               | 2030 | 2020     | 0.088 kgCO <sub>2</sub> /p-km (2019) to 0.074 kgCO <sub>2</sub> /p-km (2030)                                                                                                                                                                                      |
| Deutsche Bank*                                                               | -32%               | 2030 | 2022     | 32% reduction by 2030, 91% reduction by 2050                                                                                                                                                                                                                      |
| DZ Bank                                                                      | -17%               | 2030 | 2022     | 0.094 kg CO <sub>2</sub> e/pkm in 2022 to 0.078 kg CO <sub>2</sub> e/pkm in 2030                                                                                                                                                                                  |
| First Abu Dhabi Bank P.J.S.C.                                                | -15%               | 2030 | 2019     | 83gCO <sub>2</sub> e per passenger-km (2019) to 71gCO <sub>2</sub> e per passenger-km (2030)                                                                                                                                                                      |
| HSBC                                                                         | -25%               | 2030 | 2019     | 84 tCO <sub>2</sub> /m RPK in 2019 to 63 tCO <sub>2</sub> /m RPK in 2030                                                                                                                                                                                          |
| ING                                                                          | -33%               | 2030 | 2019     | 88.2 g CO <sub>2</sub> / passenger km in 2019 to 59.1 g CO <sub>2</sub> / passenger km in 2030 (calculated by Ishka based on baseline portfolio value reported in ING's 2022 Climate Report)                                                                      |
| JP Morgan Chase                                                              | -36%               | 2030 | 2021     | 972.6 g CO <sub>2</sub> / RTK in 2021 to 625 g CO <sub>2</sub> / RTK in 2030                                                                                                                                                                                      |
| La Banque Postale                                                            | -56%               | 2030 | 2020     | 143 gCO <sub>2</sub> e per passenger per kilometre to 63 gCO <sub>2</sub> e/p.km                                                                                                                                                                                  |
| Landesbank Baden-Würt                                                        | -25%               | 2030 | 2021     | 88g CO <sub>2</sub> /pkm in 2021 to 66g CO <sub>2</sub> /pkm in 2030                                                                                                                                                                                              |
| Lloyds Banking Group                                                         | -31%               | 2030 | 2019     | 918 gCO <sub>2</sub> e/RTK in 2019 to 633 gCO <sub>2</sub> e/RTK by 2030                                                                                                                                                                                          |
| MUFG                                                                         | -45%               | 2030 | 2021     | 130gCO <sub>2</sub> -e/RTK in 2021 to 71gCO <sub>2</sub> -e/RTK                                                                                                                                                                                                   |
| National Australia Bank Limited                                              | -26%               | 2030 | 2019     | 104 gCO <sub>2</sub> -e/pkm in 2019 to 77 gCO <sub>2</sub> -e/pkm in 2030                                                                                                                                                                                         |
| NatWest Group                                                                | -28%               | 2030 | 2019     | No carbon intensity reduction figures made available. NatWest Group is targeting to align its scope 1 + 2 + 3 portfolio temperature score by loan value from the corporate loan Other sectors (including aviation) portfolio from 3.2°C in 2019 to 2.3°C by 2030. |
| OCBC Bank                                                                    | -66%               | 2030 | 2021     | 0.261 kgCO <sub>2</sub> /passenger-km in 2021 to 0.088 kgCO <sub>2</sub> /passenger-km in 2030                                                                                                                                                                    |
| Rabobank**                                                                   | -37%               | 2030 | 2020     |                                                                                                                                                                                                                                                                   |
| Santander                                                                    | -33%               | 2030 | 2019     | 92.47 grCO <sub>2</sub> e/m RPK in 2019 to 61.71 grCO <sub>2</sub> e/m RPK in 2030                                                                                                                                                                                |
| Societe Generale                                                             | -18%               | 2030 | 2019     | 950 gCO <sub>2</sub> e per RTK in 2019 to 775 gCO <sub>2</sub> e per RTK by 2030                                                                                                                                                                                  |
| Standard Chartered                                                           | -34%               | 2030 | 2022     | 1,152g CO <sub>2</sub> e/RTK in 2022 to (approximately, Ishka calculation) 760g CO <sub>2</sub> e/RTK in 2030                                                                                                                                                     |
| TD Bank Group                                                                | -8%                | 2030 | 2019     | 87 gCO <sub>2</sub> /pkm in 2019 to 80 gCO <sub>2</sub> /pkm in 2030                                                                                                                                                                                              |
| UK Export Finance (UKEF)                                                     | -35%               | 2035 | 2022     | Aviation financed emissions intensity – 'amount at risk' AAR basis (tCO <sub>2</sub> e/EAAR) 0.00                                                                                                                                                                 |
| Wells Fargo & Company                                                        | -20%               | 2030 | 2019     | 969 g CO <sub>2</sub> e/RTK in 2019 to 775 g CO <sub>2</sub> e/RTK in 2030                                                                                                                                                                                        |
| <b>Average</b>                                                               | <b>-28%</b>        |      |          |                                                                                                                                                                                                                                                                   |

Source: Ishka SAVI, based on disclosures by 95 banks. Units are included as-reported by each institution. Impact members have been highlighted in blue.  
\*Provisional target \*\*Target for transportation, not just aviation



**The 96 banks analyzed by Ishka comprise:**

ABanca, ABN AMRO BANK N.V., Agricultural Bank of China (ABC), AIB Group Plc, Australia & New Zealand Banking Group Limited (ANZ), Bank of America, Bank of China, Bank of Communications (BOCOM), Bank of Kyoto, Barclays, Bayern LB, BBVA (Banco Bilbao Vizcaya Argentaria), BMO Financial Group, BNP Paribas, Caixabank, Chiba Bank, China CITIC Bank, China Construction Bank (CCB), China Development Bank (CDB), China Everbright Bank, China Guangfa Bank, China Merchants Bank, China Minsheng Bank, CIC, CIMB Bank Berhad, Citi, Commerzbank, Commonwealth Bank of Australia, Crédit Agricole CIB, Crédit Mutuel Group, Daiwa Securities Group, DBS Bank, DekaBank, Deutsche Bank, Development Bank of Japan (DBJ), DNB (DnB NOR Bank ASA), DZ Bank, E.SUN Commercial Bank, Erste Group Bank AG, First Abu Dhabi Bank P.J.S.C., Goldman Sachs, Haitong Securities, Hana Financial Group, Helaba, HSBC, Huatai Securities, ICBC (Industrial and Commercial Bank of China), ING, Intesa Sanpaolo, Investec, Íslandsbanki hf., JP Morgan Chase, KB Financial Group Inc., KfW IPEX-Bank, Korea Development Bank, La Banque Postale, Landesbank Baden-Württemberg (LBBW), Lloyds Banking Group, Macquarie Group, Maybank, Mizuho Financial Group, Morgan Stanley, MUFG Bank (Mitsubishi UFJ Financial Group), Nanto Bank, National Australia Bank Limited, National Bank of Canada, Natixis Corporate and Investment Banking, NatWest Group, Nishi-Nippon City Bank, Nomura Holdings, Inc., Nord LB, Nordea Bank Abp, OCBC Bank, Ping An Bank, PNC Financial Services, Rabobank, Reichmuth & Co Privatbankiers, Royal Bank of Canada, Santander Group, Scotiabank, Shanghai Pudong Development Bank, Skandinaviska Enskilda Banken (SEB), Societe Generale, Standard Chartered, Sumitomo Mitsui Financial Group, Inc. (SMFG), Sumitomo Mitsui Trust Holdings, Inc., Swedbank AB, TD Bank Group, The Bank of East Asia, Türkiye İş Bankası A.Ş. (İşbank), UBS AG, UK Export Finance (UKEF), UniCredit, UOB, Wells Fargo & Company, WOORI FINANCIAL GROUP.



## Experts featured in 2024 impact members' calls

### "EU ETS for aviation update and airline SAF contracts"



*Damien Meadows  
Advisor on European and  
International Carbon Markets  
European Commission,  
DG Climate Action*



*Barry Moss  
Managing Director  
AVOCET and Co-Chair &  
Founder of PACE*

In this presentation, Damien provided an update on EU ETS support for the use of alternative fuels, i.e. through the Innovation Fund. Barry introduced the EU ETS free SAF allowances and current market pricing system.

### "SkyFuelH2 – what does it take to enable a future of SAF beyond HEFA"



*Catherine Smitt-Meyer  
Innovation Manager, Uniper*

The ReFuelEU Aviation regulation was adopted in 2023, mandating a minimum share of SAF in 2025, and introducing sub-quotas for synthetic fuels from 2030, with heavy penalties for non-compliance. This talk focused on what it takes to make production of the next generation of SAF possible. Catherine laid out concrete steps in one of Uniper's projects, from finding the right site, establishment of raw material supply chains, partnerships, and preparing the project for project financing.

## “Ishka SAVi introduction and recent trends”



*Eduardo Mariz  
Senior Analyst & Sustainability Lead, Ishka*

Upon members' request, Eduardo Mariz, Sustainability Lead at Ishka, introduced Ishka SAVi, a data and intelligence platform dedicated to aviation sustainability launched at the start of 2024. In his talk, Eduardo presented the functionalities of the SAVi platform and provided an overview of analytical reports and data dashboards, particularly those focusing on SAF. He also provided a quick overview of recent developments in aircraft technologies and trends in aviation ESG data.

## “Reducing Emissions: Near-term solutions”



*Isaiah Cox  
CEO  
WheelTug*



*Santi Lopez Barrena  
Sustainability Manager  
Vueling Airlines*

Vueling and WheelTug shared practical, cost-effective, and near-term ways to reduce fuel burn and emissions. E-Taxi (aircraft ground taxiing using electrical power) makes operations cleaner and greener and enhances aircraft residual value.

Vueling is actively working to achieve Net Zero emissions by 2050 and is doing so by working on supplying more Sustainable Aviation Fuel (SAF), working on operational efficiency measures, and improving the efficiency of the fleet. Vueling has also partnered with WheelTug to accelerate the development of its electric taxiing device as part of the many operational measures the airline has in place or is planning to implement.

## **“The real cost of green aviation – ramp-up, mark-up, prerequisites”**



*Dirk Niemeier  
Director & Lead for Clean  
Hydrogen Solutions  
Strategy& PwC*



*Anna Went  
Senior Associate  
Strategy& PwC*

Everyone is talking about sustainable aviation fuels (SAF) and their significance for emissions reduction. But what are the actual cost implications of SAF for European airlines and their customers? Based on a scenario analysis by PwC, Dirk and Anna made statements on possible cost break-even points, evaluated ramp up dynamics and calculated cost impacts for airlines and their customers.

## **“The challenges and opportunities to decarbonize aviation”**



*Andy Shafer  
Chief Customer, Marketing and Brand Officer  
Gevo*

Andy Shafer of Gevo provided an overview of the firm, a carbon abatement company, and perspectives on the challenges of decarbonizing aviation. Andy highlighted the various technical opportunities and the challenges each face, discussed the relative competitiveness of each of these technologies and compared them with incumbent jet fuel. Andy's talk also provided an overview of Gevo's Net Zero 1 SAF plant, expected to be the first commercial global scale Alcohol-to-Jet SAF production plant. The talk also examined Gevo's Verity Carbon Tracking business, an integral part of ensuring and validating carbon abatement.

## **“Towards an investible SAF sector: The role of price support mechanisms”**



*Josh Garton  
Head of Financial & Investment Analysis  
Green Finance Institute*

Josh provided a review of the investment risks associated with SAF production, with a focus on price risk and the price support mechanism the UK government is considering to address price risks.

## **“Regenerating regional flying: An introduction to Heart Aerospace and the ES-30”**



*Simon Newitt  
President & CCO  
Heart Aerospace*

The regional aviation segment is shrinking and faces existential pressures, meanwhile battery-electric and hybrid-electric aircraft provide a proposition to reverse this tide in the shortest time. Electrification is already underway, creating a more manageable path to operational reality.

## **“Next generation hydrogen and cellulosic waste-to-fuels for aviation”**



*Chris Chaput  
President & CFO  
DG Fuels*

Chris provided an update on DG Fuel's SAF plant project and discussed real-life challenges on the path to project implementation. DG Fuels is executing on its plan to be the most scalable and lowest cost zero carbon SAF producer. Its high carbon conversion efficiency approach allows it to meet these goals while providing an attractive return to capital investors with substantial growth potential. The company plans on producing SAF from biomass and waste feedstocks combined with the use of hydrogen.

## **“CSRD Overview and reporting”**



*Lorraine McCann  
Managing Director Sustainable Futures,  
KPMG Ireland*

Lorraine specialises in supporting clients with sustainability regulatory compliance, including the Corporate Sustainability Reporting Directive (CSRD), International Sustainability Standards Board (ISSB), US Securities and Exchange Commission (SEC) Climate Disclosures, and Taskforce on Climate Related Financial Disclosures (TCFD), to name a few. In this talk, Lorraine provided an overview on the task ahead for companies in the scope of CSRD to become compliant.

## **“SkyNRG’s Sustainable Aviation Fuel Market Outlook 2024”**



*Anna Liznerova*  
*Senior Analyst Business Development*  
*SkyNRG*

The SkyNRG Sustainable Aviation Fuel Market Outlook covers the current state and trends of the Sustainable Aviation Fuel (SAF) market in the EU and UK, the US and rest of the world by assessing announcements of SAF projects and mapping out the capacity until 2050. This global outlook covers upcoming mandates and regional developments offering comprehensive insights.

## **“Sustainability at Fraport AG”**



*Dr. Jennifer Berz*  
*VP Strategy and Sustainability*  
*Fraport AG*



*Christoph Nanke*  
*Senior Vice President, Head of Finance & Investor Relations*  
*Fraport AG*

Fraport AG is aware of its responsibility and sees sustainability as a strategic priority. For Fraport AG, sustainability means thinking now about how we should live, work, and do business in the future. The objective is clearly defined: By 2045 at the latest, Fraport AG will achieve zero-carbon operations (Scope 1 and 2) at all Group locations where it holds a majority interest. The Group’s main focus here is on making its operating processes sustainable. To achieve this, Fraport focuses on a set of clearly defined key measures such as electrification, photovoltaic systems and wind power.



## **“Delivering the SAF targets: Removing barriers in SAF financing”**



*Yasar Yetiskin*  
*Senior Consultant, Sustainable Aviation*  
*ICF*

SAF is recognized as a key tool for decarbonizing the aviation industry, and there has been substantial activity setting SAF targets and scaling up capacities requiring billions of US dollars of investments in SAF facilities by 2030. Identifying and removing policy, market and technology driven challenges remain a key priority for unlocking the access to large scale SAF investments, through reducing risks to a reasonable level. This presentation will explore these challenges, and will provide mechanisms and approaches that could be utilized for removing such barriers.

## **“The role of Carbon Dioxide Removal for Aviation’s Decarbonization”**



*Laurent Müller*  
*Director Strategic Partnerships Management*  
*Climeworks*

According to most Net Zero roadmaps, Carbon Dioxide Removal (CDR) will play a significant role in the decarbonization of the sector. Similarly to the SAF industry, scaling the required capacity for high-integrity CDR (like Direct Air Capture) will take time. It is therefore crucial that we create new collaborations to accelerate the deployment of CDR in the aviation industry.

## “Can carbon prices bridge the SAF cost gap”



*Emma Coker*  
*Head of European Carbon Market Research*  
*BloombergNEF*

The presentation covered the history of the European Emissions Trading Scheme and highlighted the upcoming changes for aviation within the scheme and what is happening with carbon markets globally.

Key takeaways: (i) Carbon pricing is effective at reducing emissions and is ramping up in the EU with prices expected to hit around €150 by 2030. (ii) It is a technology agnostic mechanism but the focus will shift from cheaper power sector abatement to industrials as compliance becomes more difficult. (iii) It is ramping up globally with compliance markets now covering almost a quarter of global emissions.

**impact** is a non-profit platform for investors in and financiers of airlines and aviation infrastructure aiming to be at the forefront of a new reality in aviation finance. **impact** is comprised of six collaborative working groups designed to deliver a credible and transparent roadmap to reduce CO<sub>2</sub> emissions from aviation to Net Zero by 2050. **impact** is funded by the pro bono contributions of members, including a group of leading global financiers in aviation.

**[impact-on-sustainable-aviation.org](https://impact-on-sustainable-aviation.org)**

impact on Sustainable Aviation e.V.  
Berliner Str. 72  
60311 Frankfurt am Main  
Germany

[info@impact-on-sustainable-aviation.org](mailto:info@impact-on-sustainable-aviation.org)