

EXCLUSIVE REPORT

by Biofuels International



Biofuels leaders share their thoughts on the year ahead.

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Leading biofuel figures highlight the opportunities and challenges that lay ahead for the industry over the coming 12 months

What's in store for the year ahead?

► Biofuels outlook – Implementation of RED III kicks in

by **Liisa Ranta, Director, Sustainability and Market Development, UPM Biorefining**



IMPLEMENTATION OF the third Renewable Energy Directive (RED III) will take place in EU member states by May this year.

This marks a significant step forward in the EU's extensive plans to achieve energy transformation while respecting environmental considerations. The question, however, is will the member states deliver on time and what will be the level of ambition in different countries? How many will set more ambitious goals above the EU requirement?

In addition to monitoring the implementation of the agreed Green Deal decisions, it is interesting to follow the potential considerations the EU Commission is making towards a possible framework and strategy for renewable and low carbon fuels beyond 2030. Will these developments further boost and consolidate the position of advanced biofuels in transport defossilisation?

Getting RED III implemented swiftly is important for industry

The primary goal is to achieve a 42.5% share of renewable energy in the EU's overall energy consumption by 2030, with an ultimate target of 45%.

Targets for the transport sector have been raised significantly, increasing the required renewable energy usage from 14% to 29% and introducing new sectoral targets.

Instead of energetic mandates, member states can also set mandates based on the GHG intensity of the fuel (14.5% reduction), creating the possibility to attract fuels with low GHG intensity.

The Directive mandates a minimum of 5.5% usage of advanced biofuels and renewable fuels of non-biological origin (mainly hydrogen and its derivatives). Notably, while mandates for renewable or low-emission fuels previously applied only to road transport, they now also cover waterborne and aviation transport.

Member states need to oblige fuel suppliers to meet the set goals. However, they have some flexibility in national implementation. In practice this might mean setting higher targets for fuel suppliers.

It will be interesting to see what opportunities this flexibility in national implementation will bring. On the other hand, it clearly does not bring simplicity, as there are various options for implementation.

RED III complements the previously adopted Fit for 55 package, collectively charting the course for renewable energy development in Europe.

ReFuel Aviation initiative commences this year

The ReFuel Aviation initiative promotes the increased use of sustainable aviation fuels (SAF) and it is the single most powerful tool to decrease aviation CO₂ emissions.

This measure is part of the Fit for 55 package to meet the emission reduction target of 55% by 2030.

Starting this year, aviation fuel suppliers at EU airports are required to ensure that all aviation fuels contain a minimum share of SAF – and a minimum sub-share of synthetic aviation fuels from 2030 onwards.

This mandate begins with a 2% SAF inclusion in 2025, increasing to 6% by 2030 and reaching 20% by 2035.

Previously, the use of SAF was driven by voluntary demand. Pioneers like KLM

Royal Dutch Airlines and Air France in the EU have been using SAF since 2011. Both airlines aim at incorporating at least 10% SAF in their flights by 2030, exceeding the mandated requirements. The increasing mandatory trajectory for SAF blending is very important generally for the overall advanced biofuels industry.

Credibility and transparency in value chains remains a key topic

In 2024 two major issues have dominated EU discussions regarding the credibility and transparency of biofuel value chains.

Firstly, deliveries of advanced biodiesel imported from Asia have been suspected of partial fraudulence. Secondly, Upstream Emission Reduction (UER) projects outside of Europe are also under suspicion of fraud.

The EU Commission imposed antidumping duties on Chinese biodiesel and HVO exports due to an influx of mislabeled advanced biodiesel, leading to a significant drop in Chinese biodiesel volumes over the past couple of months.

Simultaneously, authorities are investigating several, mainly Chinese UER projects for fraud. The German Federal Environment Agency (UBA) revealed that 45 out of 66 projects are suspicious, with plans to reverse at least 32, securing around 4 million tonnes of CO₂ in unauthorised UER certificates.

These fraudulent cases have significant consequences for the biofuels industry, including reduced market reliance

“The ReFuel Aviation initiative promotes the increased use of sustainable aviation fuels and it is the single most powerful tool to decrease aviation CO₂ emissions”

and trust in sustainability, leading to reduced profitability and competitiveness for European producers.

The situation is also an opportunity for companies like UPM to stand out with credible and transparent practices.

EU's Union Database for Biofuels rolled out gradually

The Union Database for Biofuels (UDB) is a global traceability tool developed and managed by the European Commission.

Its purpose is to trace biofuel consignments and their raw materials from origin to final consumption in the EU market, replacing the current paper-based proof of sustainability.

Economic operators must digitally report their transactions when selling liquid biofuels into the European market, starting from the point of origin through the entire supply chain to the final operator.

The UDB aims to ensure market transparency and traceability in the biofuel supply chain. Eventually it is expected to mitigate risks of irregularities and fraud – making it a much-needed tool to support efforts to meet the ambitious EU defossilisation targets.

The actual implementation schedule of the UDB is currently being reviewed by member

states and the Commission, leading to it being fully operational in the future.

For the successful implementation of the UDB into use in the industry, a gradual rollout with enhanced system capabilities and accessibility is needed to ensure the initial targets for traceability, avoiding double counting and addressing fraud concerns, are met.

Opportunities and challenges ahead

As these initiatives unfold, the flexibility in national implementation of RED III will present both opportunities and challenges for member states. It is now more important than ever that the value chains are transparent, regulations must be clear, and monitoring is robust, so that we can trust the markets and their operators. The collective efforts of the EU and its member states will be crucial in navigating these complexities and achieving the ambitious renewable energy targets set for the coming years.

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Visit upmbiofuels.com



➤ Renewable diesel and SAF continue to play key role in transport sector defossilisation

by Carl Nyberg, Senior Vice President Commercial, Renewable Products at Neste



LAST YEAR was a dynamic one especially for the biofuels industry with production capacity outpacing demand growth.

This could be seen in the market for renewable diesel as well as in the sustainable aviation fuel (SAF) market.

With the current volatility, predicting market development is hard. One thing is clear, however, the need for climate action has never been more urgent.

The latest reports show that limiting global warming to 1.5°C is creeping out of reach with 2024 setting a new record as the first year above 1.5°C.

The role of renewable fuels

We need to fully embrace the solutions we have available today to defossilise and reduce emissions, while working on the solutions for tomorrow.

Renewable fuels such as renewable diesel and SAF offer an available pathway to support the decarbonisation of the transportation sector, but ramping up production capacity remains one of the biggest, if not the biggest challenge for the next decade.

Production capacity for renewable fuels increased

significantly in 2024, but it remains to be seen if this trend will continue in 2025 as the competitive and regulatory environment develops. Neste, the world's leading producer of renewable diesel and sustainable aviation fuel, has now ramped up its production capability on three continents to 5.5 million tonnes per annum and is on track to continue expanding to 6.8 million tonnes with the ongoing expansion of its existing renewables refinery in Rotterdam, the Netherlands.

This expansion will at the same time it increases its SAF production capability to 2.2 million tonnes per annum.

These increased production capabilities will enable companies globally to start reducing their greenhouse gas emissions.

Airlines will be able to significantly increase SAF usage to reduce aviation emissions and meet regulations like the ReFuelEU Aviation Regulation.

At the same time, they provide a solid basis for customers to reduce road transportation related emissions, for example in countries like France and Germany, which have now allowed for a broader use of renewable diesel.

Supporting policies remain key to growth

Government policies and regulations play a crucial role in accelerating the adoption of renewable diesel and SAF.

In the EU, the Renewable Energy Directive (RED) and the ReFuelEU Aviation regulation mandate the supply of renewable fuels in transportation, with ReFuelEU now mandating the supply of minimal 2% SAF of total jet fuel supply at Union airports this year.

These regulations provide a stable demand signal for producers and incentivise investment in biofuel production.

In the US, policies such as the Renewable Fuel Standard (RFS) and state-level Low Carbon Fuel Standards (LCFS) programmes drive the use of biofuels.

California's LCFS, for example, has been instrumental in promoting the production and use of renewable diesel in the state.

However, the Blender's Tax Credit (BTC) has not been extended and guidance on new Clean Fuels Production Credit (CFPC) is still lacking at the moment of writing this article.

The government in the US has now changed, but the implications for the biofuels industry remain to be seen.

While the biofuels industry is experiencing growth, international competition and trade dynamics are also shaping the market.

The EU is imposing anti-dumping duties on biodiesel and renewable diesel (HVO) imports from China to ensure a level playing field for European producers.

This action aims to prevent unfair competition and protect European biofuel industries. Competitiveness and sustainability ambitions should go hand-in-hand and a global level playing field is important especially for global industries such as aviation.

Challenges and opportunities

Despite the positive outlook for biofuels, especially in the longer term, the industry faces several challenges.

The availability and cost of sustainable raw materials, such as waste and residue oils and fats, impact production costs and scalability.

Technological advancements and the development of new raw materials, such as algae and novel vegetable oils from regenerative agriculture concepts, are, therefore, crucial to ensuring a long-term supply and sufficient availability of biofuels.

Neste, for example, has been working on developing

novel vegetable oils and currently has 60 pilots ongoing across the globe.

The biofuels industry also continues to need to address concerns about potential indirect land use change (ILUC) and ensure that biofuel production does not lead to deforestation or the displacement of food crops.

Sustainability certification schemes, such as ISCC, play a vital role in verifying the sustainability of biofuels and contribute to preventing fraudulent practices.

They also provide credibility and transparency of supply chains for end users such as corporates, which is crucial so they can also start using biofuels such as SAF to reduce their Scope 3 emissions generated by business travel and transport.

The EU has set bold targets for reducing emissions from transportation and under the new EU Commission, the EU Green Deal legislation will continue to be rolled out.

Several US and Canadian states took expected steps towards Low Carbon Fuels programmes, SAF credits and EV sales targets and supporting policies in Asia and Latin America are progressing. These developments clearly signal that governments are stepping up to the challenge.

The road ahead

As production ramps up, supportive policies are implemented and international cooperation strengthens, renewable fuels are expected to play an increasingly important role in defossilising transportation and keeping the 1.5°C in sight. So let's be positive and expect that 2025 will mark a turning point for the biofuels industry.

For more information:
Visit [neste.com](https://www.neste.com)

➤ Powering progress: Avfuel's vision for sustainable aviation fuel

by **C.R. Sincok II**,
Executive Vice President,
Avfuel Corporation



AS GLOBAL industries confront the pressing realities of climate change, the aviation sector is uniquely positioned to help sustainability take flight.

Long regarded as a challenging industry to decarbonise, aviation is now embracing innovative solutions to reduce its carbon footprint. Among these solutions, sustainable aviation fuel (SAF) stands out as a transformative force.

Key drivers

There's no doubt SAF has gained serious momentum in the last five years. No longer a distant concept, it has become an actionable solution and the most important tool to help business aviation reach its goal of net-zero operations by 2050.

Industry analysts predict 2025 could be a breakthrough year for SAF with production capabilities expanding and supply chains maturing (more on that later). This is along with an increase in adoption rates – at Avfuel, we see more aviation stakeholders setting ambitious ESG targets and relying on SAF.

In 2025, legislative action has the potential to be SAF's greatest opportunity or headwind. Government entities in the EU and UK have introduced

mandates to bolster SAF use (ReFuelEU and the SAF Mandate, respectively).

Furthermore, California's Climate Corporate Data Accountability Act will require large companies to report their greenhouse gas emissions beginning with 2025 data.

However, questions abound regarding how President Trump's administration will affect SAF incentives in the US.

Should the United States pass a suitable replacement for its expiring Blenders Tax Credit, the alignment of regulatory, production and environmental factors will set the stage for unprecedented market growth.

Alternatively, a lack of federal incentives in the US could slow progress on production, price reductions and adoption.

Low carbon fuel incentives are essential to keeping production costs manageable; in order to lower prices for fuel users and production must increase.

Despite the state of federal support for the SAF industry as a whole being in limbo in the US, Avfuel sees its own SAF growth persisting in 2025, particularly as we take advantage of new and renewed partnerships, and both recently-established and upcoming supply points.

Avfuel's commitment to expansion

Scaling SAF to meet the industry's ambitious goals remains a formidable challenge. Production and distribution infrastructure must expand rapidly and feedstock sourcing needs diversification.

It's a complex puzzle, but leading companies are already working on solutions. At Avfuel, we recognise meeting this challenge demands not just commitment, but also action – and in 2025, our actions will speak volumes.

Year over year, Avfuel is on track to triple its SAF supply gallons, reflecting our dedication to scaling up sustainable fuel solutions.

This growth comes from both expanded and new

“Production capacity for renewable fuels increased significantly in 2024”

partnerships with SAF producers – specifically, an expanded agreement with Neste and new supply from Valero Marketing & Supply Company, securing SAF on America’s East Coast.

With these supply agreements, Avfuel plans to significantly expand SAF access geographically. In 2025, new supply locations in both eastern and western regions will come online, utilising both truck and pipeline delivery methods to break down logistical barriers and enable broader access to SAF.

This expansion is about more than meeting demand – it’s about leveraging infrastructure that supports sustained growth in sustainable aviation.

This year’s ambitious outlook builds on years of exponential growth in SAF distribution, reflecting both increased market demand and the Avfuel’s proactive strategy. Our goal is to make SAF more accessible and practical for operators, empowering the aviation industry to make tangible strides toward decarbonisation.

Fueling innovation with investments

Beyond supply expansion, Avfuel continues to invest in groundbreaking fuel technologies. Collaborations with innovators like AIR Company, Alder Renewables and VerdeGo Aero will help diversify SAF feedstocks and power solutions.

Specifically, AIR Company’s carbon conversion technology offers a promising path to producing SAF from CO₂, and Alder Renewables remains focused on the sustainable benefits of woody biomass.

Meanwhile, VerdeGo Aero is advancing hybrid-electric propulsion systems. These investments help stimulate technological advancements and ensure Avfuel remains at the cutting edge of sustainable fuel innovation, including early access to products.

We’ve also invested significantly in internal processes, programmes and solutions, like AvfuelZero.

Central to our sustainability efforts, AvfuelZero is a comprehensive programme designed to help customers achieve net-zero emissions.

Through it, we offer a suite of solutions – including carbon offsetting, SAF supply, ESG reporting tools and more – tailored to support operators in meeting their environmental goals.

As part of this effort, we also invested significant time and resources into developing a proprietary book-and-claim system to seamlessly sell “neat SAF attributes” – the emissions reduction benefits of SAF introduced into a supply chain – to any customer at any location around the world, making SAF a more accessible sustainable solution.

By integrating these solutions with our growing SAF supply, we provide a holistic approach to sustainability, empowering customers to make measurable progress.

At Avfuel, we understand investments in SAF production facilities, supply chains, technological innovations and sustainable solutions not only help aviation reach its goals, but also contribute to a sustainable economy while reducing dependence on fossil fuels.

As production scales and technology matures, SAF presents significant opportunities for job creation, infrastructure development and regional economic growth – this makes investing in its development all the more important.

The path forward: Industry-wide collaboration

To fully realise SAF’s benefits, the entire aviation industry must collaborate.

Regulatory bodies must continue to provide clear guidance and incentives, while producers and suppliers must work together to scale production sustainably. The challenges are significant, but the opportunities are even greater.

For more information: Visit avfuel.com

► Blue sky thinking for a brighter aviation future

by **Matti Lievonen, Chief Executive Officer of EcoCeres**



THE WORLD is flying again.

In the first nine months of 2024, around 1.1 billion tourists boarded planes for overseas breaks – taking flight levels back to 98% of pre-pandemic levels, according to the latest World Tourism Barometer from UN Tourism.

Despite ongoing economic and geopolitical turbulence, the global tourism industry is expected to make a full recovery by the end of 2024 and will most likely climb to new highs, more than eliminating the environmental gains of those pandemic times.

However, while the rebound in aviation has been impressive, its level of sustainability has been distinctly unimpressive.

Only around one million tonnes of sustainable aviation fuel (SAF) was produced in 2024, far below earlier projections of 2.5 million tonnes.

The International Air Transport Association says SAF volumes are increasing “disappointingly slowly” as oil companies struggling with tight margins prioritise short-term profit over long-term investment in sustainable solutions.

Aviation accounts for approximately 2-3% of global greenhouse emissions and, if unchecked, that ratio could triple by 2050, driven by rising passenger numbers and freight demand.

The potential impact of SAF was inadvertently demonstrated

five years ago this spring, when people stopped travelling, tourism and international business stalled and more than 80% of airplanes were grounded as we fell into the grip of a global pandemic.

Cleaner climate

One bright spot in dark and troubling times, however, was a dramatic fall in pollution and greenhouse gas emissions.

As the terrifying virus raced across every continent, humankind stood still, and the doomsday clock of global warming was temporarily stalled.

Lockdowns and travel restrictions led to cleaner air and clearer skies.

Nature began to recover in ways not seen for decades. For a fleeting moment, we were shown the profound impact of human behaviour on our planet and the effect of changing our ways.

The temporary reduction in emissions was compelling evidence of nature’s ability to recover when we take action that helps it to do so.

It is our collective duty to take heed of that lesson and find ways to make the temporary reduction a permanent one.

The higher cost of SAF compared with conventional jet fuel is a barrier to its adoption with factors including feedstock costs, processing technologies and limited economies of scale contributing to the price disparity.

Airlines are hesitant to invest in SAF without government incentives or mandates to support the transition. In the absence of information, ignorance and disinterest about the benefits of SAF is widespread.

Economies of scale

Above all, SAF must be economically viable to encourage its widespread adoption. It needs significant investment and support – because without it, the aviation industry will almost certainly struggle to become more sustainable.

Greater public understanding and acceptance of SAF is crucial

to drive demand. Governments have a key role to play in this transition by providing clear policies and financial incentives, like those given to the solar and wind energy sectors.

While some have questioned early-generation forms of SAF for its sources and the effectiveness of its mixtures, they have overlooked the potential it holds and the benefits it can deliver.

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) framework allows for feedstocks including cooking oil, by-products and palm oil mill effluent (POME) to be repurposed, expanding options for greater production volumes.

Continuing improvements in production methods and feedstock selection can further enhance emissions reduction and boost the sustainability of SAF.

It is vital we take advantage of these opportunities and take our first steps towards sustainable aviation.

Collaborative efforts between governments, airlines and fuel producers are essential to create a supportive environment for the development of SAF and that is the approach we energetically advocate at EcoCeres.

EcoCeres produces SAF made exclusively by repurposing waste feedstock. Our SAF is derived from 100% waste-based biomass and can achieve up to a 90% reduction in greenhouse gas emissions compared to conventional jet fuel.

By focusing on waste feedstock, EcoCeres not only contributes to reducing emissions, but also helps address waste management issues. We are also developing systematic tools to enhance traceability in our supply chain to ensure compliance with sustainability standards.

Our new plant in Malaysia is expected to be completed by the end of this year which will enable us to increase our total annual production to 770,000 metric tonnes of renewable fuels, the majority of which will be SAF.

We recently teamed up

with HSBC Hong Kong and Cathay Pacific to establish a SAF ecosystem in Hong Kong, promoting innovation and improving the traceability of the travel supply chain.

Under the arrangement, HSCB entered into a one-time purchase agreement for SAF produced by EcoCeres, which will be used to refuel Cathay Pacific aircraft flying out of Hong Kong.

The partnership allows HSCB and Cathay Pacific to share the costs of SAF while generating carbon offsetting benefits for both of them, creating a viable economic model for businesses and airlines to work together towards aviation decarbonisation.

We hope this groundbreaking initiative will inspire global efforts towards meaningful decarbonisation in the aviation sector.

However, much work remains to be done to generate the amount of interest and partnerships needed to make this possible.

The outlook for SAF is both challenging and hopeful. While the price of SAF is expected to remain relatively high in the foreseeable future, ongoing research and development in SAF production technologies can lead to more cost-effective processes.

Despite the obstacles, the potential benefits of SAF in addressing climate change and promoting sustainable aviation are immense.

The journey towards widespread adoption requires cooperation, innovation and commitment – but the rewards in sustainability, economic growth, and energy security will make it well worth the effort.

Bear in mind those days five years ago when our skies became bluer, and the air we breathed a little cleaner. That was a vision not only of the past but of the future if we are brave enough to innovate, cooperate, and change for the good of generations to come.

For more information:
Visit ecoceres.com

➤ Feedstock diversity and flexibility are key to sustainable fuels

by **Conor Madigan, CEO of Aether Fuels, a next-generation sustainable fuels and climate technology company**



FULLY-SCALED production of sustainable aviation fuel (SAF) will enable the aviation industry to achieve its net-zero ambitions, but how to do this remains an unsolved challenge.

At the same time, the last decade has seen intense innovation in the SAF industry, with major breakthroughs in production technology and new feedstock utilisation pathways.

If these innovations can translate into commercial projects, we will experience a step change in SAF adoption.

One of the keys to this step change is a smart feedstock strategy that emphasises flexibility to unlock the full potential of the world's abundant waste carbon streams and accelerate scale up.

The need for feedstock diversity

Many SAF projects struggle with feedstocks that are too expensive, too scarce, or both.

Today SAF is overwhelmingly produced using the hydro-processed esters and fatty acids (HEFA) process, which converts waste fats, oils and greases from sources like used cooking oil and animal fats.

(Some synthetic jet fuel is also produced via the HEFA process using crop-based feeds like canola and soybean oil, but because such feeds compete with food production, these are usually not considered part of the long term SAF solution).

HEFA-based SAF has been a huge step forward for the industry, but we are already running out of feedstocks for this process and SAF adoption is still in the low single digit percent range.

Developing new (and more scalable) carbon feedstock streams, and the process technologies to convert them cost-efficiently into fuel, is a core requirement of the next phase of SAF growth.

It is also worth noting that increasingly, the maritime industry is also coming into focus as a critical consumer of sustainable fuels.

Ships can utilise fuels produced from waste fats and oils via both the HEFA and the lower cost FAME (fatty acid methylester) routes.

Since both rely on the same feedstock streams, both industries face the same scaling challenge.

A recent report from DNV, the world's leading classification society, highlighted the tight supply of feedstocks for these pathways as a significant concern, particularly as – the report argued – shipping will be behind aviation in the queue for HEFA/FAME-based fuel due to the higher market value currently assigned to sustainability in the aviation industry.

So, what are the alternative (and more abundant) waste feedstocks we can use to meet the massive need from these industries?

When considering waste feedstocks it is first essential to ensure they are genuinely sustainable.

To qualify, the feedstock must meet a number of conditions.

First, it must be genuine waste. Second, it must not compete with food production,

“Technologies that are unable to achieve economical large-scale production for many years will fall behind technologies that can”

and finally, it must not degrade the land use to produce it.

Take forestry waste, for example. For this to meet the above criteria, it must be true waste in the form of residues and wood processing waste which does not further contribute to deforestation.

Other potential waste streams include biogas from anaerobically digested waste, or agricultural waste, such as sugar cane bagasse, empty fruit bunches from palm oil production, rice husks, corn stover/stalks or wheat straw derived from crops cultivated in existing agricultural land.

In addition, one can utilise industrial waste gas – the gasses emitted by various industrial processes – that have no alternative economic use (other than to burn for heat/energy).

One can also utilise municipal solid waste (MSW), which includes trash like plastics, paper, yard trimmings and food scraps that are disposed in landfill. Finally, one can use waste carbon, carbon dioxide captured by direct air capture.

Collectively these waste streams are vastly more abundant than waste fats and oils and are sufficient to meet the world’s demand for sustainable fuels.

Unlocking the potential of diverse feedstocks

Direct air captured (DAC) CO₂ has theoretically unlimited availability, but it requires large amounts of relatively expensive hydrogen and today it has relatively uncompetitive production costs.

This limits the near term potential for this route to scale, but in the long run this route has huge potential.

Ideally, one would like to have a process technology

that can efficiently convert CO₂ and H₂ feeds, to take full advantage of that route once DAC CO₂ and H₂ costs come down, but which can also be applied today to convert other more economical feedstocks.

This way the industry can get access to more economical fuels in the near term, gaining the critical learning (and resulting cost efficiencies) that comes with many repeat builds of large-scale production facilities.

Crucially, technologies that are unable to achieve economical large-scale production for many years will necessarily fall behind those technologies that can get into economical large scale production now.

Even if one has such “feedstock flexible” technology, if one wants to actually utilise a diverse range of waste feedstocks, they must tackle the implications of collecting, aggregating and transporting the many different feedstocks.

For instance, transporting some feedstocks, such as solid waste feedstocks, can incur steep economic and environmental costs.

Similarly, transporting industrial waste gases long distances is also often ill-advised due to the need to build dedicated pipelines for such transport.

For such feeds, it is necessary to utilise the waste streams near where the waste is produced, and at a scale that matches the waste generation rate.

In some cases, the scale of such plants will be too small to be economically competitive.

Even when some long-distance transport is viable – for example, for biomethane/renewable natural gas utilising existing natural gas pipeline networks – one is still faced with geographic constraints that mean that what works

in one geography will not, necessarily, work in another.

However, this merely reinforces the value of having a conversion technology that can be used to convert a wide range of feedstocks and which, thus, can be deployed in more plants across the world.

While it is simple to say that we should utilise a wide range of feedstocks, it is important to carefully prioritise which to tackle first.

The present cost challenge with DAC CO₂ and H₂ feedstocks argues for scaling that route once feedstock costs come down.

Municipal solid waste is an exciting feedstock that can solve both the sustainable fuels problem and the waste problem, but it is also notoriously difficult to process compared to other feedstocks that can be used first with less technical risk.

Which feedstocks to utilise should be carefully evaluated not only based on availability and cost, but also on technical difficulty, regulatory support and existing supply chains/ infrastructure for aggregation.

Feedstock diversification and process flexibility is not just an economic imperative to produce enough SAF to meet the coming market demand; it is also a practical strategy for innovators in the field to build technology solutions that better address existing market forces.

Particularly solutions that utilise a wide range of relatively economic feedstocks today, while still being optimised for CO₂ and H₂ conversion, can build to scale now to gain critical technology learning sooner, and then can be better positioned to capitalise on the CO₂ and H₂ route once the feedstocks costs are reasonable.

Therefore, the industry can get the benefit of more economical sustainable fuels sooner – creating a win-win.

For more information:
Visit aetherfuels.com

➤ Will 2025 be the year Europe catches up with the rest of the world?

by David Carpintero, the Director General of ePURE, the European renewable ethanol association



AFTER A tumultuous year in European politics and transatlantic relations, the EU’s new policy buzzwords are ‘competitiveness’ and ‘strategic autonomy’ – and the coming months will see some recalibrating of key legislation on climate change, energy, trade and transport.

The question as 2025 begins is whether policymakers will be willing to put words into actions with a more pragmatic approach when it comes to biofuels.

That is certainly what other countries around the world have been doing – not just countries such as Brazil and the US that have long seen the value of biofuels, but also Japan, Indonesia and India, which have all instituted policies making more effective use of sustainable biofuels in the effort to reduce emissions in transport.

Innovative technologies

In Japan, for example, Toyota is developing innovative technology for new internal combustion engines that run on green fuel including renewable ethanol.

India has ramped up its support for a domestic ethanol industry; Brazil and the US have reconfirmed their

consistent policies to support renewable ethanol industries.

In Europe, not so much. The EU is still placing all of its transport decarbonisation bets on one technology – electrification – even though the European Court of Auditors has warned that this could leave the EU vulnerable to over-reliance on battery technology and raw materials whose supply is not guaranteed.

It is not just a matter of finding the best way to achieve the ambitious targets the EU has set for itself in the fight against climate change; it is also a matter of rising to the challenge of staying economically competitive.

This was underlined dramatically recently in a report to the Commission from Mario Draghi, who said the EU should take a more pragmatic, technology-open approach to achieving its

Fit for 55 goals and unleash the potential of sustainable low-carbon alternative fuels such as renewable ethanol.

The Draghi report also noted that while the EU has been a world leader in developing renewable energy, thanks in part to the use of sustainable biofuels, its recent policy choices put it at a competitive disadvantage against the rest of the world going forward.

Opening up to the contribution of renewable fuels as early as possible will not only help broaden the range of solutions and preserve affordable mobility for all EU citizens, but it will also lead to faster emissions reduction instead of waiting for

sales of battery electric vehicles to grow and the infrastructure they require to develop.

To succeed, we need all solutions – this includes both electrification and renewable fuels.

In the coming months, as the EU moves to clarify its definition of CO₂-neutral fuels, it should take this reality into consideration.

It should also consider the major innovations in production that are already increasing the GHG-savings score of renewable ethanol, in some cases to more than 90% compared to fossil fuel.

All renewable ethanol that is compliant with the Renewable Energy Directive (RED) should

be included in the definition of CO₂-neutral fuels.

Such a technology-open approach is essential, as Draghi pointed out. “The technological neutrality principle, which has been a guiding principle of EU legislation, has not always been applied in the automotive sector,” his report stated. It noted the upcoming review of the CO₂ for cars regulation “should follow a technologically neutral approach and should take stock of market and technological developments.”

The question now is whether the new Commission and Parliament will take these persuasive arguments into consideration and make it easier for the EU to meet transport decarbonisation goals everyone supports.

“The EU is still placing all of its transport decarbonisation bets on one technology – electrification”

For more information:
Visit epure.org

➤ What awaits SAF in the months ahead

by **Milica Folić**,
Director, Topsoe



ON 22 JULY last year, my local airport, Copenhagen Airport, witnessed a record-breaking 115,000 passengers in a single day, surpassing pre-pandemic levels.

July 2024 became the busiest month in the airport’s 99-year history, reflecting a global trend.

In fact, ICAO projects that air transport demand will continue to rise by an average of 4.3% annually over the next two decades.

When the ReFuelEU mandate states that 70% of aviation fuel must be SAF by 2050, that is not 70% of the 2024 fuel total, but of the projected demand in 2050. We have some challenges ahead.

Progress is happening

Some of the trends we are seeing emerge, will continue in 2025 and beyond. Emerging markets are showing significant interest in producing SAF, and are aiming to export to regulated zones while gradually implementing domestic mandates.

The EU is actively promoting innovation, securing funding and creating supportive regulatory frameworks to make eSAF a reality.

Robust regulations supporting SAF supply and demand are being enforced in the EU, UK, US and Brazil, with countries like China, Japan, India, Malaysia, Indonesia, and the UAE developing their own frameworks.

Investment in SAF projects has grown, reflecting increasing confidence in the sector.

Airlines, cargo companies, and various corporations are

making voluntary commitments to use SAF to reduce Scope 3 emissions, complementing regulatory efforts.

Not all blue skies

The path to SAF is not without turbulence. We have seen renewable projects cancelled or postponed due to various factors, including a preference for short-term investments in refining, higher margins in fossil fuels, mid-term uncertainties in the SAF market and pricing and a lack of meaningful offtake agreements.

It also crossed a spectrum of players from Shell and bp to Fulcrum BioEnergy and Oceania Biofuels – and it is possible we will see a few more delayed or cancelled projects this year.

However, it is important to note that some projects are simply on hold, awaiting a more stable market and pricing structure as SAF production scales.

A more discernable pattern that will be carried into 2025 is the extension of project timelines, with increased dialogue time and time to Final Investment Decisions (FID).

Legislators need to further strengthen support to help accelerate progress. Current regulations still lack sufficient impact to drive SAF demand globally. While EU mandates starting in 2025 will help, a more widespread regulatory approach is needed to meaningfully boost demand and close existing regulatory gaps.

A promising market

Despite some delays, the SAF market remains promising, with mandates growing and demand consistently outpacing supply.

At Topsoe, for instance, we are engaged in discussions for over 320,000 barrels per stream day (bpsd) in licensed projects at various development stages.

Success will come through continued collaboration. Currently, we have five renewable diesel or SAF projects at FID and 21 in operation, with an additional 40 renewable projects in the pipeline, excluding co-processing.

In synfuels, we are advancing four biofuels projects and two eFuels projects, including one at the demonstration



stage, which shows strong potential to proceed.

The market looks strong and active from our perspective as we enter the final five years of the decade.

De-risking technology

De-risking in general continues to be a major factor for SAF producers and when it comes to de-risking technology, it will continue to be top of our priorities for our customers.

Topsoe is involved in technology projects that conservatively represent about one-third of the SAF market.

Our longest-running renewable fuel reference has been operational for over 14 years, with our HydroFlex™ technology. So, for processing a variety of renewable feedstocks, we have reliable technology with a good yield. However, in such an active space, we are not resting.

It is crucial for solution providers like us to focus on preparing catalysts and technology for life beyond Hydrotreated Esters and Fatty Acids (HEFA). Solid waste and third generation feedstocks, expected to reach 3.4 billion tonnes by 2050, represent a much more abundant and sustainable resource. We must be prepared.

The technology outlook

For solid feedstocks, we are seeing growing interest in

“The path to SAF is not without turbulence. We have seen renewable projects cancelled or postponed due to various factors”

solutions like G2L™ Biofuels for synthetic- and gas-based SAF and G2L™ eFuels for renewable energy-based production.

In 2025, we will continue to advance MTJet™ Biofuels and MTJet™ eFuels, methanol-to-jet technologies.

eSAF holds vast potential, but this faces logistical challenges, requiring affordable hydrogen and biogenic CO₂.

Achieving economies of scale will depend on first movers, mandates and subsidies – it’s a matter of time, but we may see some meaningful movement this year.

Elsewhere, our ETJ technology is not yet branded or ready for rollout, but we are developing a differentiated solution with strong potential for future SAF pathways – details will follow soon.

Processes like gasification and pyrolysis need further maturity for broad roll out, but Topsoe is actively engaging in projects to prepare for commercial viability, with promising progress ahead.

Looking further ahead

If we want to look further than 2025, we still need a crystal ball. Our stance on feedstocks and pathways

is simple – test, de-risk, be ready and remain flexible. Central to this is working in knowledge-based partnerships, collaborating meaningfully across the value chain.

In a fast-growing SAF space, it will be important to share experience and best practices with both new entrants and established fuel producers.

This means not only ensuring the best solution and catalysts are delivered for each unique project, but also assisting customers in reaching FID and enabling cost-efficient, future-proofed SAF production.

The SAF space is buzzing, and we are very optimistic heading into this year.

The industry has progressed from what might be possible to the point where we are making it happen and ironing out the creases for further production pathways. Our journey has begun.

De-risking technology pathways, staying agile in feedstock processing and working in collaboration will help us overcome the barriers that still exist.

For more information:
Visit [topsoe.com](https://www.topsoe.com)

➤ An overview of global biofuel markets forecast for the year ahead

by **Aida Gonzalez Palomino**, Chief Analyst at **SGS INSPIRE**



THE GLOBAL biofuels market is expected to grow and diversify in 2025 thanks to efforts to reduce carbon emissions and build more sustainable energy systems. However, the growth will be uneven depending on regional policies, infrastructure and economic factors.

The European Union, the US, Asia Pacific and Latin America, especially Brazil, will likely see biofuel uptake.

This is due to their advanced biofuel markets, supportive policies and subsidies. Moreover, concerns over biofuel fraud will likely lead to enhanced regulatory oversight in the EU this year.

However, in Africa, parts of Asia Pacific and other developing economies, biofuel adoption is increasing more slowly due to limited infrastructure, less policy support and higher costs.

Nevertheless, some countries are making significant strides with dedicated blending programmes.

Asia Pacific

According to SGS INSPIRE, bio-based fuels will continue to be part of efforts to reduce the fuel import bill in Asia Pacific.

Previously, China primarily exported biodiesel to international markets, but in 2024, largely driven by the impact of European anti-

dumping policies, the Chinese government began collaborating with local companies and authorities to promote the use of biodiesel in on-road vehicles and inland marine sectors.

In Indonesia, plans are underway to increase the biodiesel blend to B40 for regular diesel and to introduce a 5% renewable diesel blend in premium diesel from this January.

Additionally, there is a proposal to implement a 50% palm oil-based biodiesel blend (B50) by early 2025, though industry experts suggest this may be more feasible by the end of the year due to required testing and capacity enhancements.

The Malaysian government planned to expand the B20 biodiesel blend nationwide in 2024.

However, it is currently supplied only in specific regions, including Langkawi and Sarawak.

In 2025, the government may introduce the B30 biodiesel blend in the latter half of the year, depending on biodiesel availability.

While India may slightly miss its 20% ethanol blending target by the end of the first quarter of 2025, it is expected to achieve this goal in the second half of the year, facilitated by the introduction of Ethanol-100 and flex-fuel vehicles.

In the Philippines, an increase in the biodiesel mandate to B4 is anticipated in the fourth quarter, alongside the availability of E20 in the market. Thailand plans to phase out the E10 regular grade, focusing on E20 and B7 as primary biofuel grades.

Europe

The European demand for advanced biofuels has been growing since 2018 and will keep growing in 2025 for use in transport fuels.

EU's production of advanced biofuels is expected to rise, driven by the transposition of the Renewable Energy Directive III (RED III) into national laws by 2025, the implementation of sustainable aviation fuel (SAF) mandates,

and GHG intensity reduction targets in the marine sector.

A SAF mandate in the UK started on January 1 with several projects receiving government funding to boost domestic SAF production.

The Union Database for Biofuels (UDB), launched in 2024 to combat certification fraud, may face a delayed mandatory implementation to January 1, 2026, due to technical challenges after 16 EU member states, including France, Germany, Italy and Spain, requested the delay.

In early March 2023, there were reports of fraudulent imports of biodiesel from China, which were then sold as advanced biofuels on the European market.

Consequently, the Netherlands, France and Germany have insisted on anti-fraud investigations into imported biofuels and reinforcement of the governance systems, including granting EU member states the right to demand inspection access.

SGS INSPIRE anticipates that although the UDB may have a limited initial impact on the market, it is likely to improve market transparency and help stabilise feedstock prices in the long run by eliminating counterfeit supplies.

North America

The US Environmental Protection Agency (EPA) has set renewable fuel volume targets for 2025, demonstrating steady policy support for biofuels.

These targets mandate minimum blending levels of renewable fuels, such as ethanol and biodiesel, into the national fuel supply and ensure predictable biofuel demand.

Renewable diesel production capacity in the US is projected to continue expanding, although slower than in recent years.

The US fuel ethanol industry is also anticipated to grow steadily, supported by potential year-round sales of E15 (a blend of 15% ethanol and 85% gasoline), domestic energy policies and



strong export demand from Canada, the UK and India.

However, SGS INSPIRE expects political and regulatory uncertainties to impact the biofuels sector trajectory.

Potential policy shifts due to changes in federal funding priorities deriving from the new administration could weaken renewable fuel mandates and reduce incentives for clean energy.

In Canada, the biofuels industry is projected to experience steady growth in 2025, driven by supportive policies like the Clean Fuel Regulations and increasing provincial mandates for renewable fuel blending.

Ethanol demand is expected to rise in provinces such as Ontario and Quebec that plan to raise their blending requirements to E11 and E12, respectively. This shift will likely lead to increased ethanol imports from the US.

Latin America

In Latin America, the market share of first generation biofuels will continue to be dominant in the short and medium term, with progressively stricter fuel quality specifications and vehicle exhaust emission standards.

The Brazilian biodiesel blending mandate is set to increase to 15% this year, with sugarcane and soybean oil maintaining their dominance as primary feedstocks for ethanol and biodiesel production, respectively.

The 10% biodiesel blending

mandate in fossil diesel is expected to be reinstated in 2025 in Colombia.

In Paraguay, fuel ethanol production is projected to reach 680 million litres, a 6% increase from 2024, with domestic consumption anticipated to rise by 9%, totaling 430 million litres.

Africa

In Africa, the biofuel demand will depend on the enforcement of biofuel mandates at national level in various countries this year.

The example of Uganda demonstrates the clash between policies and market.

The Biofuel Act from 2018 promoted the use of biofuels in transport fuels, but due to insufficient domestic ethanol production in the country, it was not implemented.

In 2020, there was another attempt at further promoting the use of biofuels through the Biofuel Act 2020, but the enforcement date was delayed to July 2022 and later to July 2024.

The ethanol mandate of 1% v/v in gasoline was not implemented in July 2024 and it is expected to be delayed until ethanol supply is sufficient to meet local demand.

Similarly, South Africa has been considering incentives to boost biofuels production, aiming to enforce ethanol and biodiesel mandates. They had been introduced in 2015, but, again, remained unimplemented due to supply constraints.

For more information:
Visit inspire.sgs.com

➤ Advancing SAF with latest technology

by Sarah Ellerby, CEO, Nova Pangaea Technologies



WE START this new year with unprecedented commitments to advancing sustainable aviation fuel (SAF) in the UK through the SAF mandate becoming law on 1st January – solidifying UK at the forefront of decarbonising aviation.

Anticipated in 2026 is the introduction of a bill to support SAF production through a Revenue Support Mechanism to encourage investment into the sector.

All of which is much needed and alongside investment for scale-ups and emerging clean technologies to progress, develop and deliver.

The UK government's legislative support coupled with investment initiatives such as the Advanced Fuels Fund have been instrumental in fostering progress within the sector.

These efforts are complemented by global commitments, as countries including the US, EU, Singapore and Japan adopt mandates to reduce aviation emissions.

Together, these actions signify a collective determination to address the pressing challenge of aviation decarbonisation.

“The UK government’s legislative support coupled with investment have been instrumental”

At Nova Pangaea Technologies our patented REFNOVA® technology transforms biomass wastes and residues into advanced second-generation (2G) ethanol, which can be converted into SAF. REFNOVA is one of few advanced innovative 2G technologies in the world with an ability to unlock lignocellulosic non-food derived biomass without the use of enzymes.

Our flagship project, Speedbird, in partnership with British Airways and LanzaJet, exemplifies the potential of sustainable innovation.

Project Speedbird is a key UK SAF plant and received £9 million (€10.6 million) from the UK government's Advanced Fuels Fund. The facility will produce 102 million litres of SAF annually, reducing CO₂ emissions, on a net lifecycle basis, by 230,000 tonnes a year.

As aviation decarbonisation becomes a global mandate, we are committed to providing a clean technology solution to address climate change.

REFNOVA reduces net carbon emissions by replacing fossil-based products and enables government and airlines to meet mandates, decarbonisation targets, and provide a pathway to net-zero.

Looking ahead, 2025 is a pivotal year for the company. As a scale-up, we embrace growth, evolution and adaptability.

Our progress reflects the resilience of our talented team and the strength of our partnerships. Scaling isn't merely about expansion; it's about learning, innovating and strengthening our impact. Together, we are shaping a sustainable future for aviation and beyond.

For more information:
Visit novapangaea.com

➤ What IATA is doing to promote the use of SAF

by Daniel Chereau, Head of Fuel at IATA



IATA HAS set an ambitious goal for the aviation industry to reach net-zero carbon emissions by 2050, with SAF playing a critical role.

IATA views SAF as the most viable near-term solutions for achieving this target, alongside operational efficiencies, new aircraft technologies and carbon offsetting mechanisms.

The organisation has adopted multi-faceted approaches to promoting SAF – through policy and public advocacy, sharing best practices for supply chain development, transparency tools, airline engagement – aimed at making SAF a mainstream, affordable and reliable solution for aviation's decarbonisation journey.

More recently, IATA has introduced two key initiatives to promote the use of sustainable aviation fuel (SAF) – the SAF Registry and the SAF Matchmaker.

These are important tools to reduce the barriers for different parties to enter the SAF market. The Registry ensures transparency and accountability in the SAF market, while the Matchmaker facilitates the efficient procurement of SAF.

Bringing costs down

SAF is already much more expensive than conventional aviation fuel (CAF), so the goal is to bring all transaction

costs down to reduce the burden on airlines and their users/passengers.

The aim is to make it easier for suppliers to sell their SAF and for airlines and customers to find and pay for it, and subsequently claim the environmental attributes associated with the SAF they have purchased.

IATA SAF Registry

The IATA SAF Registry is a global tracking and accounting system for SAF claims. Its purpose is to enhance credibility and trust in SAF transactions by providing a platform where airlines, fuel producers and other relevant stakeholders can register SAF purchases, track their use and claim associated carbon emission reductions. The SAF Registry will help:

- **Avoid double counting:** Ensuring that the environmental benefits of SAF (i.e. carbon emission reductions) are not unduly claimed by multiple parties.
- **Facilitate SAF transactions:** Allowing stakeholders to easily track and account for SAF purchases and their related emissions reductions.
- **Provide transparency:** Offering a trusted, auditable platform for recording SAF transactions, helping regulators, industry players and the public understand SAF's environmental contributions.

The IATA Registry is part of the broader effort to accelerate the use of SAF in achieving the aviation industry's carbon reduction goals, including IATA's target of net-zero emissions by 2050.

This tool aims to enable all stakeholders in the aviation value chain to make the claims they are eligible to make, using flexible and robust chain of custody mechanisms such as mass balance and book and claim.

IATA SAF Matchmaker

The IATA SAF Matchmaker is a platform designed to connect

airlines and SAF producers or suppliers. Its primary objective is to facilitate the scaling up of SAF production and usage by linking interested airlines with existing and potential SAF suppliers. The platform will:

- **Bridge the supply-demand gap:** Airlines looking to reduce their carbon emissions will be able to find and collaborate with SAF producers to ensure a steady supply of fuel.
- **Accelerate SAF adoption:** By increasing the visibility of SAF producers, allowing airlines to diversify their fuel sourcing, thus allowing SAF to become a larger part of their fuel mix.
- **Support industry-wide collaboration:** Providing a centralised space for airlines and SAF suppliers to access information, helping to build a more sustainable supply chain for aviation fuel.

By bringing together airlines and suppliers on a single platform, the SAF Matchmaker can streamline the process of

finding and purchasing SAF. This can help to accelerate the adoption of SAF and contribute to the aviation industry's decarbonisation goals.

Both the IATA SAF Registry and the SAF Matchmaker are designed to address the challenges in scaling up SAF usage, ensuring that the aviation industry moves toward decarbonisation in a more structured and transparent way.

In addition to the ongoing work on these solutions, IATA also focuses on ongoing capacity building efforts, for instance through regional workshops around the world, to explain to airlines and policymakers the basics of SAF use from a policy and compliance perspective.

With the full implementation of CORSIA and the start of the European mandate around the corner, airlines need to understand their options and how to use their SAF purchases to reduce their obligations under CORSIA and/or EU ETS. The purpose of these workshops is to facilitate compliance.

For more information:
Visit iata.org

“SAF is already much more expensive than conventional aviation fuel (CAF), so the goal is to bring all transaction costs down to reduce the burden on airlines and their users/passengers”



➤ Another intense year for waste-based and advanced biofuels regulation

by **Angel Alvarez Alberdi**,
EWABA's Secretary General



THIS YEAR will be a particularly consequential year for the waste-based and advanced biofuels industry, if there ever was one.

On the regulatory front one cannot avoid but start by acknowledging the market impact of the obligations set forth in the FuelEU Maritime and ReFuelEU Aviation Regulations, effective as from 1 January, which are each expected to create roughly a million tonnes of extra demand of waste-based and advanced biofuel this year.

That is only the beginning as the mandates (GHG reduction and incorporation of renewable fuels, respectively) will increase on a yearly basis.

These increases of final product will be definitely helped by the proposed revision of Annex IX of the Renewable Energy Directive, which is adding a number of novel feedstocks to the EU eligibility list, most notably intermediate crops, including cover crops, which are particularly promising given the significant potential volumes at stake and their optimal physical properties for the purposes of biofuels production.

The transposition deadline

of the Annex IX revision expires on 14 September and for it to properly work and drive additional feedstock volumes to the market, the European Commission is expected to deliver sound regulatory guidance on how to apply the conditionality on cover crops (that is, detailing how cover crops can be grown and harvested for the purposes of RED compliance) and equally importantly, further improving the EU biofuels certification system to, among other issues, meet the inherent challenges of certifying cover crops, which are physically identical as conventional crops.

New legislation

The Commission will deliver on these two topics in a widely awaited implementing act due in the first half of this year.

We expect a draft of this secondary legislation to see the light roughly at the same time as the Commission agrees with member states the final date on which the union database for biofuels (UDB) becomes entirely operational, thus bringing a

“On the regulatory front one cannot avoid but start by acknowledging the market impact of the obligations set forth in the FuelEU Maritime and ReFuelEU Aviation Regulations, which are each expected to create roughly a million tonnes of extra demand of waste-based and advanced biofuel this year”

new layer of transparency and traceability to the market.

This year also marks the beginning in earnest of the second Von der Leyen Commission, whose regulatory output will be somewhat conditioned by the Draghi Report, which dictates that the new European agenda should aim to decarbonise at the same time as reindustrialise.

This dichotomy will have wide-ranging consequences. Most pieces of legislation affecting our industry will be revised before this term ends on 2029, from the RED III to the maritime and aviation regulations, to the CO₂ emission standards for cars, vans and heavy-duty vehicles.

The system of promotion of

renewable fuels will be once again up for grabs and our industry has a clear idea of what is needed to end past conceptual mistakes – ambitious targets should be coupled with made in EU provisions.

It simply cannot be anymore that the EU system promotes first and foremost third-country production to the detriment of the domestic industry.

Trade defence measures are not enough – we need a fundamental policy change, and its seed is being planted at the moment as preparatory work on legislative revisions is timidly starting.

Speaking about fundamental conceptual shifts, the EU’s approach to the promotion

of electromobility will also be readdressed following Draghi’s indications – the industry at large is working hard to prove that carbon-neutral fuels including biodiesel have a major role to play in the decarbonisation of the road transport sector well beyond 2035.

EU institutions will need to display cool-headed pragmatism when revising CO₂ emission standards, starting already this year as well, and deliver a truly technologically neutral solution that integrates our decarbonisation potential.

For more information:
Visit ewaba.eu

➤ Biosolids to SAF is the future

by **Kip Cleverley, Chief Sustainability Officer, Synagro Technologies, Inc.** and **James Hygate OBE, Chief Executive Officer, Firefly Green Fuels**



THE FUTURE for the sustainable aviation fuel (SAF) market looks very bright – demand is huge and motivation to meet international mandates remains high.

Even brighter is the future for one emerging pathway –



biosolids to jet fuel – pioneered by British company Firefly Green Fuels. The technology behind converting biosolids to biocrude has been proven and the fuel that this process produces is practically indistinguishable from fossil jet fuel.

Biosolids, it seems, are an ideal feedstock for creating SAF – sustainable, abundant and low value. This is fantastic news for the aviation industry, which is currently responsible for around 2.5% of global CO₂ emissions.

Synagro and Firefly partnership

The partnership between Synagro Technologies, Inc. and Firefly Green Fuels is working to bring Firefly’s innovative fuel-production techniques to the American market.

Firefly has developed a novel process to turn biosolids into biocrude. From there, Firefly is able to produce a product slate of highly sustainable, high-performance fuels, including SAF.

Synagro, North America’s

preeminent provider of sustainable solutions for biosolids, organics and residuals, will be the exclusive US supplier of feedstock used in Firefly’s novel process. Finding and employing beneficial uses for biosolids is core to Synagro’s business; you could say it is in their DNA.

This partnership will provide huge benefits to both companies and will enable Firefly’s groundbreaking technology to scale across the US.

Firefly’s waste-to-fuel process uses hydrothermal liquefaction, which chemically alters biosolids waste, breaking it down into biocrude and biochar. The crude is then upgraded into SAF and the remaining biochar goes to various other uses. Independent analysis by Cranfield University

has shown Firefly's SAF offers a highly significant 92% CO₂e saving versus fossil jet fuel.

Demand for SAF

SAF mandates have become increasingly common in recent years as countries seek to limit carbon emissions from the aviation industry.

Many major economies have now published a roadmap for future mandates, requiring flights to use a percentage blend of SAF in their fuels from 2030 onwards. In the US, the SAF Grand Challenge targets three billion gallons of domestic SAF by 2030 and 35 billion gallons of SAF to satisfy 100% of domestic demand by 2050. As these targets drive global demand, new SAF producers and pathways like Firefly's are needed in order to increase the availability of low-carbon fuels.

It's basic economics. As demand propels the construction of new SAF plants, supply chains will accelerate. In the US, Synagro brings its expertise and strong relationships with municipalities, where biosolids are sourced, along with its rail and other transportation solutions, to enable Firefly to create SAF for the US and global markets.

"The exciting thing about our pathway is that there is a huge amount of feedstock ready to use right away. Firefly's solution is very adaptable, it will easily plug in to Synagro's existing infrastructure and can be implemented anywhere in the world where biosolids are collected and processed. This partnership will be a win-win for all involved," said Firefly CEO James Hygate.

Looking ahead in 2025

The two companies will begin preliminary work on developing the concept for a US-based plant in 2025-26, with plans to have key decisions such as site and scale shortly after. In the meantime, Firefly is moving ahead to build its first full, commercial-scale

"Biosolids, it seems, are an ideal feedstock for creating SAF – sustainable, abundant and low value"

facility in the UK, slated to be in production by 2028-29.

Once the fuel has been qualified by the American Society for Testing and Materials (ASTM), it can be used for commercial flights. Given the urgent market need, however, and the proven high-quality nature of Firefly's fuel, the team expect this process to move quickly. Firefly already have data from multiple, independent tests in US and EU labs that have confirmed Firefly's product to be near chemically indistinguishable from fossil jet fuel.

Once complete, the UK first-of-a-kind commercial-scale facility will provide a model and proof of concept for the second facility to be located in the US.

"This sustainable innovation will be a major milestone in our fight to mitigate climate change," said Kip Cleverley. "We are excited to work with Firefly to advance this project toward commercialisation for people and the planet."

For 2025 and 2026, project streams in the US include scoping the initial demonstration site, estimating scale, identifying offtakes and investigating the necessary permits. Discussions are ongoing, and the pieces are coming together. The goal is to bring this project to market as quickly as possible at maximum scale.

An exciting future

As mandates increase and competition for limited feedstocks shape the global market, it is likely that the demand for, and price of, SAF will continue to reflect these economic realities.

It is likely that SAF prices will continue to reflect these economic realities, but in the US, the structure of long-

term supply agreements have accordingly innovated by including multiple partners, and not just the airlines, that can benefit from the production process and carbon benefits.

Hence, the importance of this remarkable partnership. Biosolids are an inexpensive, highly abundant and sustainable material that have incredible promise as a SAF feedstock.

By working together and bringing more SAF production online, the partnership will help to better balance this supply and promote the longevity of the low carbon economy.

The SAF market in 2025 and beyond will continue to grow, with new facilities coming online every year and new offtake deals being struck between developers, airlines and others.

The International Air Transport Association estimates that the aviation industry will need 400 million tonnes of SAF per year by 2050 to reach net-zero carbon emissions. This is a substantial increase from the 0.5 million tonnes produced in 2023, demonstrating the scale of the challenge. Biosolids alone cannot bridge this gap, but can provide a significant step along the way.

The partnership between Synagro and Firefly is at the junction of energy independence and a low-carbon economy fueled by sustainable biosolids solutions. It cannot get any better.

Both companies' commitments to global sustainability are at the root of this effort and run in parallel. Biosolids to SAF is the future, and both Synagro and Firefly are passionate about leading the way.

Both Mr Cleverley and Mr Hygate will be speaking at our SAF Summit in Brussels on June 24-25

For ore information:
Visit synagro.com and flyfirefly.uk

> The road ahead for biofuels policy

by **Xavier Noyon, Secretary General of the European Biodiesel Board (EBB)**



A BRAND new European Commission, new faces in Parliament, elections in Germany, uncertainty in France, Trump 2.0 – there is so much to talk about.

As we are making our first strides into 2025, the EU biofuels policy landscape looks poised for both optimism and considerable challenges.

The convergence of geopolitical tensions, evolving EU policies and industry innovations will shape the trajectory of renewable fuels in ways that could either accelerate or slow down progress.

All models and projections are clear, the EU demand for renewable fuels is bound to increase – the Renewable Energy Directive (RED), the European Trading Scheme (ETS), the Effort Sharing Regulation, and the ReFuel EU regulations for maritime and aviation all command more biodiesel in all its diverse applications.

Our industry will need to grow its production capacities, to invest in new technologies and with the difficulties of the two last years, confidence has been hurt.

What we don't know: Uncertainty on the global stage

In our industry, a lot hinges on the (international) political climate. With the return of

President Donald Trump to the White House, trade dynamics are likely to shift. The weaponisation of trade defence measures is a scenario that could spark a trade war, particularly between the EU and the US.

One area of contention to look out for – renewable energy. However, it might also prompt the EU to take a harder look at trade defence and the World Trade Organisation (WTO) rules – not just because they can be improved, but also because sometimes it looks like the EU is the only one abiding by them.

A small but positive sign in this area is the recent adoption of automatic registration in anti-dumping cases. The EBB has long called for this and its formalisation is a step in the right direction for ensuring fair competition in the EU market.

China’s biofuel production is another area of uncertainty. Will the country continue to focus its growing biodiesel output on the EU market, or will it begin developing a domestic market for these fuels?

This remains to be seen, but it’s a critical issue for EU producers who are already grappling with competition from Chinese imports.

Another issue that the EBB has been addressing is non-compliance with the Renewable Energy Directive (RED) outside the EU.

It is hampering fair competition. As there is unequal enforcement of the same rules, there is an unequal market.

The EBB has proposed solutions that will need swift implementation in the upcoming policy revision.

The Commission, the EU member states, NGOs and even some South East Asian countries seem to be in agreement with us – this ambitious reform needs to happen in 2025.

What we look forward to: The open roads, seas and sky

As an ambitious new European Commission takes their seat, one of the most anticipated developments is the revision of the CO₂ emission standards for new road vehicles (cars, vans and trucks).

As discussions intensify around the role of renewable liquid fuels in decarbonising transport, we are seeing more positive political momentum than ever before. Thanks to the collective work of the Working Group on Monitoring Methodologies (WGMM), awareness is growing about the potential of vehicles running on 100% renewable fuels.

This could result in stronger regulatory support for biofuels as a prominent part of the solution to decarbonise road transport.

Additionally, we are poised for breakthroughs in other sectors. The maritime and aviation industries are increasingly recognising the role of renewable fuels, with mandatory objectives coming into play.

The use of HVO and FAME in these sectors could see significant growth, particularly as sustainability becomes a key consideration in global transport regulations.

Lastly, we also hope to see the promises of the revised Annex IX to the RED on intermediate crops and crops on degraded land materialise.

This new era will also be a return to the roots of biodiesel, which began as a renewable from food and feed crops.

A new year’s resolution for biofuels

As we step into 2025, one of our key resolutions is to better tell the story of the circular bioeconomy and highlight the broader value that biofuels bring to the table.

The narrative around biofuels needs to shift from being simply

a renewable energy source to being recognised as a vital part of the circular economy.

The utilisation of waste materials, the production of food and feed, the valorisation of by-products and the creation of valuable (bio)chemicals and energy all contribute to reducing our reliance on virgin resources.

HVO and FAME aren’t just renewable fuels – they are part of a larger, sustainable system that maximises the value of waste, residues and agricultural commodities. This process generates far more than just fuel. It’s a multifaceted approach that has the potential to drive lasting environmental and economic benefits.

A pivotal year for biofuels

This year is shaping up to be a pivotal year for the biofuels industry. On the one hand, geopolitical tensions and

trade disputes, particularly with the US and China, could present challenges that slow down progress.

On the other hand, EU policy revisions, growing recognition of renewable liquid fuels and new regulatory frameworks in aviation and maritime sectors are clear opportunities for growth.

What’s crucial now is for industry stakeholders, policymakers and the public to understand the broader benefits of biofuels – not just in terms of renewable energy, but as a whole.

If we navigate the next few years with foresight, collaboration, and an emphasis on innovation, biofuels will continue to play a central role in Europe’s transition to clean energy.

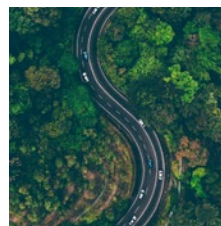
For more information:
Visit ebb-eu.org

“We hope to see the promises of the revised Annex IX to the RED”

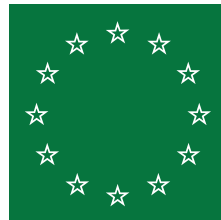
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