avioxx

Sustainable Air Fuel

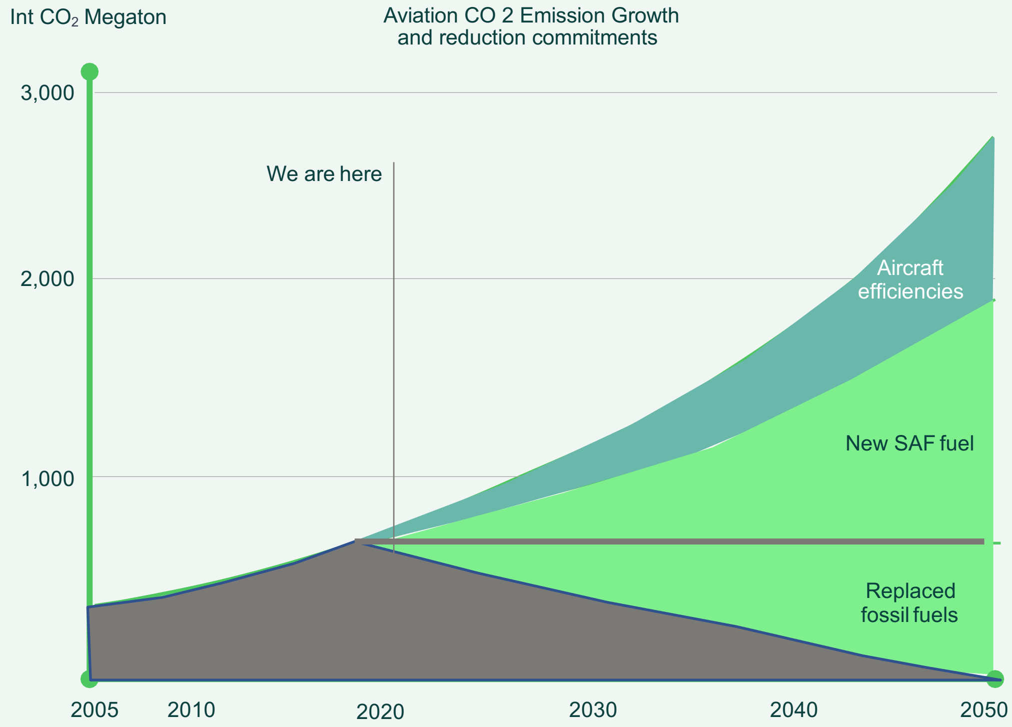
CLEAN TECH | WASTE HYDROCARBONS | MACHINE LEARNING | NETZERO

Patent : GB2431511 - Global Patent Pending: GB2303771.6

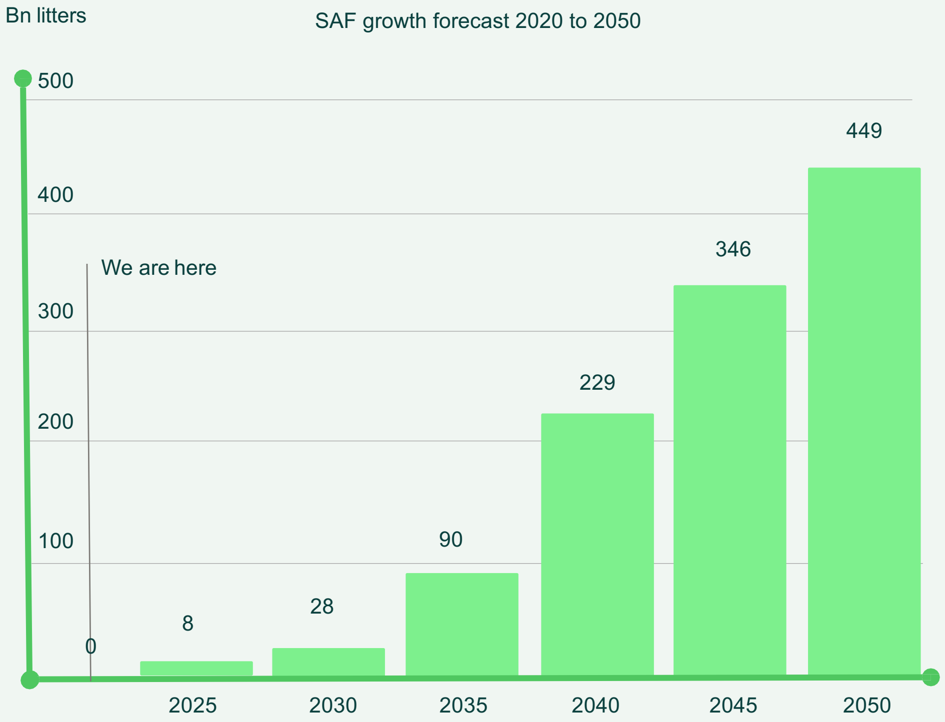
We are a leading producer of sustainable aviation fuel from waste materials using innovative technology to enable affordable net zero flight

The aviation sector in the UK accounts for 7% of it's total greenhouse gas emissions

- The International Air Transport Association has set a firm goal of achieving carbon net zero air travel by 2050.
- Replacing fossil-based Jet A1 fuel is complex but a huge opportunity for innovation and new scalable solutions.
- Current alternatives to fossil-based Jet A1 fuel are expensive due to the cost of the source material and nascent technology.
- The UK incinerates or sends to landfill 28.8m tonnes of solid waste hydrocarbons every year.



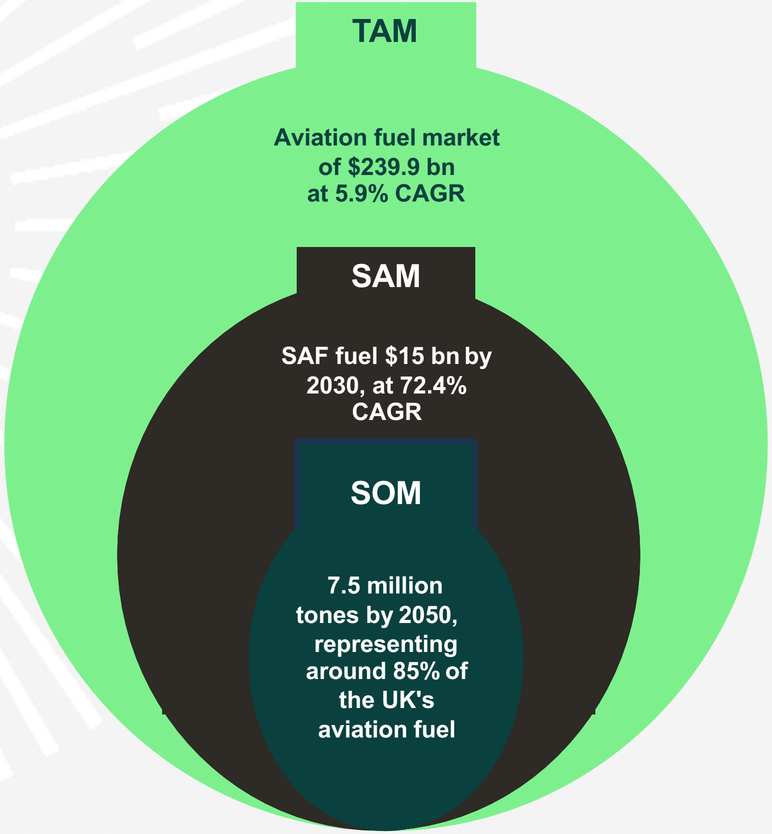
Sustainable aviation fuel from waste hydrocarbons can help achieve net zero air travel by 2050



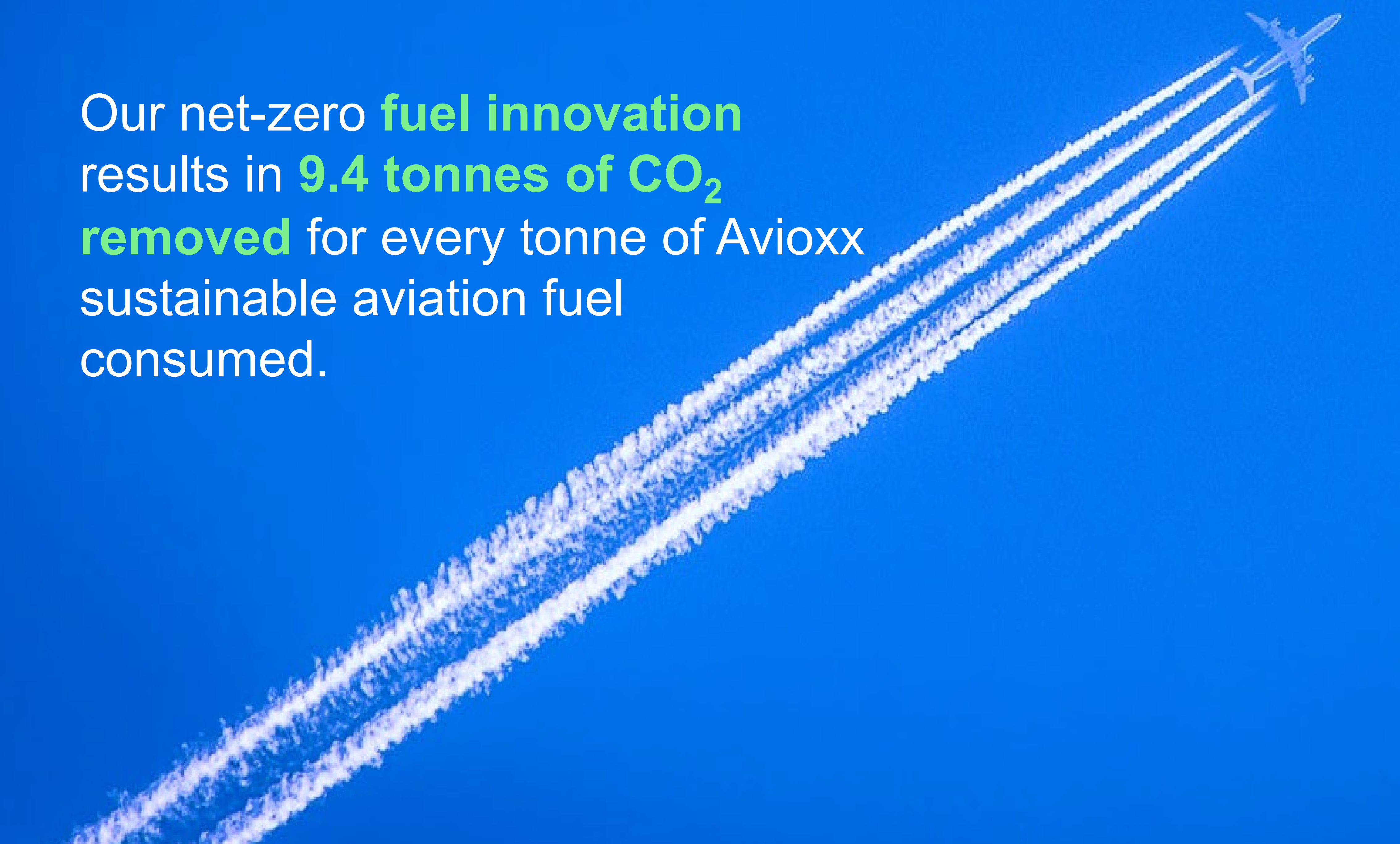
- The re-use of waste materials destined for incineration or sent to landfill creates a cost-competitive alternative to traditional fuel.
- The organic components within the waste materials provide a rich source of carbon for the production of sustainable aviation fuel (SAF).
- A key advantage of SAF in comparison to hydrogen or electric aircraft is the ability to use existing aircraft and infrastructure.
- The novel use of Solid Oxide Fuel Cells dramatically reduces the production cost and carbon emissions compared to existing processes.

Sustainable aviation fuel demand is growing at 72.4% CAGR to 2030

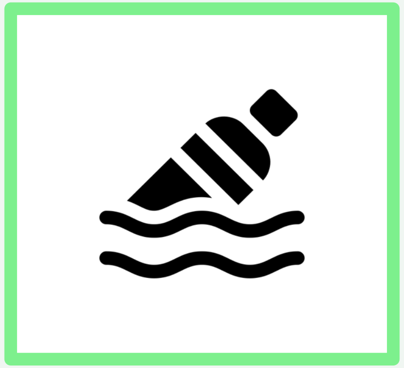
- The global aviation fuel market was valued at $239.9 bn in 2020 and is expected to reach $318.2 bn by 2025.
- Aviation fuel consumption is growing at 5.9% CAGR year on year.
- The demand for SAF is expected to increase significantly in the coming years.
- There is increasing demand to reduce carbon emissions from the aviation industry.



Our net-zero **fuel innovation** results in **9.4 tonnes of CO_2 removed** for every tonne of Avioxx sustainable aviation fuel consumed.

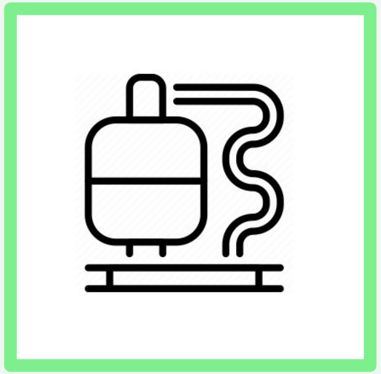


We've developed a patented system to transform low-cost waste hydrocarbons into jet fuel



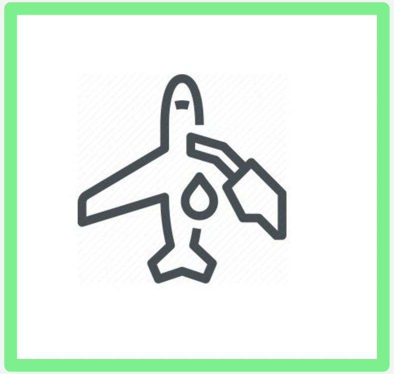
Step 1

Generating electricity and H_2 and CO gas from waste hydrocarbons and plastics.



Step 2

Production of CO_2 as a concentrated stream which is captured and stored.



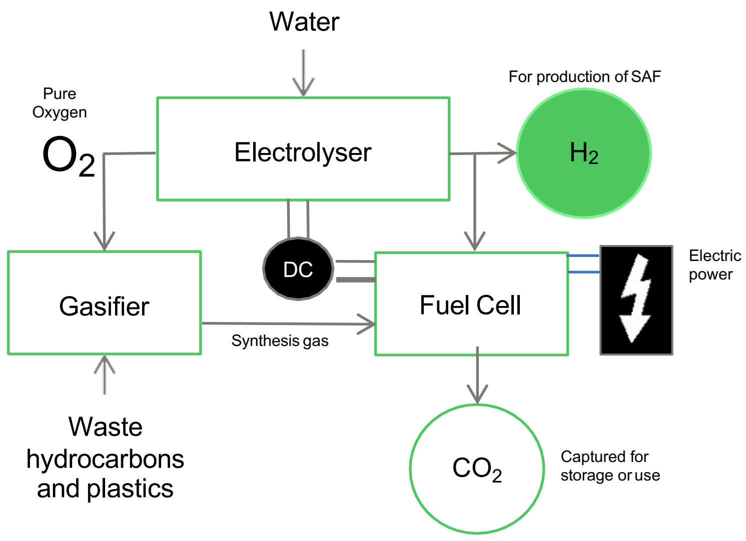
Step 3

The H_2 and CO are used as inputs for the synthesis of the jet fuel.

Our patented process focuses on the input stage of the sustainable aviation fuel production

- This initial stage involves breaking down the wastes to form electrolytic H_2 and CO.
- The H_2 and CO from this initial stage are then converted into long-chain hydrocarbons.
- The hydrocarbons can then be fine-tuned to obtain synthetic Jet A1 fuel.
- We use machine learning and AI to optimise the process in dynamically.

The diagram shows the patented stage of the process which prepares waste hydrocarbons for the use in SAF production.



We uniquely harness solid oxide fuel cells to produce jet fuel from waste materials and leverage electrolysis to dramatically optimise the process.

- The introduction of new solid oxide fuel cells (SOFC) into the process dramatically increases efficiency of fuel production.
- Avioxx generates FREE electricity, unlike competitors, to power the production of oxygen and hydrogen used in making the fuel.
- Gasification of waste in pure oxygen, not air, leads to more efficient carbon capture. Gasses from waste power the SOFCs.
- Avioxx is the highest performing system that produces fuel at the lowest cost with the highest emissions reduction.
- Energy and mass balance models demonstrate the feasibility of a significant increase in efficiency compared with other systems.

New Solid Oxide Fuel Cells tested on Mars to produce Oxygen from the Martian atmosphere.

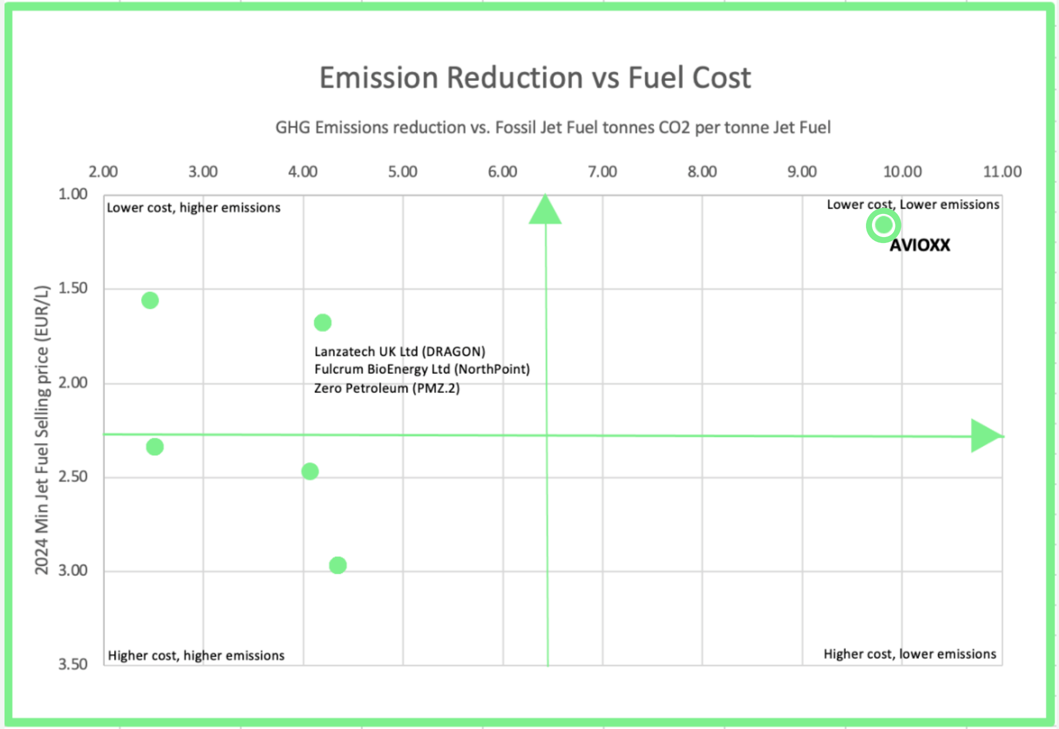
The analysis of fuel cost vs emissions reduction based on varying technologies and feedstocks shows the Avioxx system outperforms all competitor processes.

Competitors

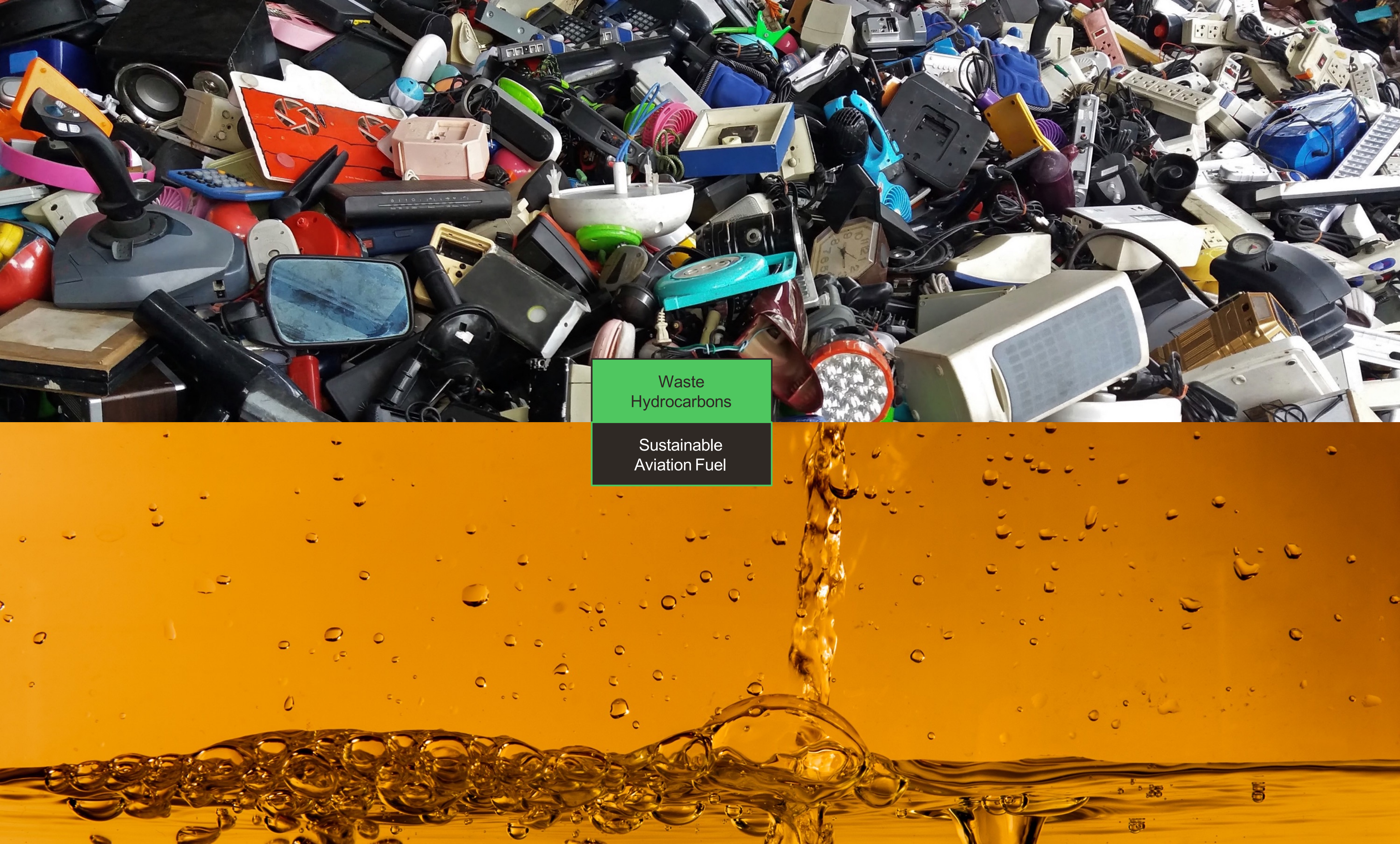
	Technology	2024 Min Jet Fuel Selling price (EUR/L)	GHG Emissions reduction vs. Fossil Jet Fuel T CO2 /t JetA1
AVIOXX	**FT-MSW+SOFC**	**1.16**	**9.82**
Velocys plc (Altalto)	PtL	2.97	4.35
Lanzatech UK Ltd (DRAGON)	FT-MSW	1.68	4.20
Alfanar Energy Ltd (Lighthouse Green Fuels)	AtJ	2.34	2.52
Fulcrum BioEnergy Ltd (NorthPoint)	FT-MSW	1.68	4.20
Zero Petroleum (PMZ.2)	FT-MSW	1.68	4.20
Willis Sustainable Fuels (Carbonshift PtL)	PtL	2.97	4.35
OXCCU Tech (OXEFUEL BIOGENIC)	PtL	2.97	4.35
Nova Pangaea Technologies (Project Speedbird)	PtL	2.97	4.35
Esso Petroleum Company (Solent SAF)	AtJ	2.34	2.52
Carbon Neutral Fuels (ASAP-DAC)	AtJ	2.34	2.52
Arcadia e-Fuels (NABOO)	PtL	2.97	4.35
Alfanar Energy (Lighthouse Green Fuels)	PtL	2.97	4.35
Abundia Biomass-to-Liquids (A-Jet UK)	FT	2.47	4.07
Phillips 66 Humber Refinery	HEFA	1.56	2.47

PtL – (Power-to-Liquid) / FT-MSW (Fischer-Tropsch & Municipal Solid Waste), AtJ – (Alcohol-to-Jet), HEFA – (Hydroprocessed esters and fatty acids), SOFC – (Solid Oxide Fuel Cell).

Source (2023): A critical review. Energies, 16(4), 1904.



Avioxx will outperform other systems in development due to the introduction of solid oxide fuel cells which power the generation of oxygen and hydrogen.


Waste Hydrocarbons
Sustainable Aviation Fuel

A highly experienced executive team covering the academic, industry and commercial sides

Stephen J Wilkinson (formerly Prof. of Chem Eng., M.A. (Cantab), Ph.D. (I.C. London), M.I.Chem.E., C.Eng.)

Director of Process Design, Innovation and Engineering

Steve is a chartered Chemical Engineer with 25 years of experience in industry and academia.. He is a Doctor of Philosophy (PhD) from Imperial College. He is an acknowledged expert in optimisation, mathematical modelling and simulation.

Chris JM Hancock (B.Eng Environmental Engineering)

Chief Executive Officer

Chris is a founder and CEO of multiple award winning tech companies like Crowd2Fund and FinBlocks. He is experienced in raising capital, growing businesses, and facilitating the delivery of exceptional work that drives real world impact. He is former HSBC Private Bank, Coca-Cola and BBC.

A board of directors and advisors providing oversight on innovation and growth

Dr Michael D Hancock
(Ph.D. (Cantab), C.Eng, F.I.Chem.E., F.E.I)

Chairman

Mike is a chemical engineer with a background in the petrochemical industry. Inventor and process developer, he is a lead assessor for the UK's statutory Energy Savings Opportunities Scheme (ESOS) and he is an auditor for ISO50001 Energy Management Standard.

The runway is 24 months of design, development and licensing, with profitability by 2027

1 Feasibility
Research the process and market, model potential capacity, agree different waste sources and optimisation of flow scheme. Outline cost estimate for production cost. Competitor analysis, marketing and brand development. 12 months, £317,000

2 Design
Front end engineering design, process design and layout, control systems, safety analysis, operational practices, full cost validation. Secure all intellectual property and partner relationships.
12 months, £300,000.

3 Prototype
Build demonstration unit and produce first sample SAF fuel ready for licensing.

6 months, £100,000

4 Licensing
Achieve full SAF approval and licensing to produce 10% SAF fuel at scale. supply chain partnerships, logistics analysis, contracts.

12 months, £200,000

5 Production
Full scale process licensing, contracts, approval, building, commissioning and launch of 5,000tpa production facility,

24 months, £12m

6 Expansion
Scale up production to 40m L SAF fuel p.a and £35.4m rev.

April 2023 — April 2024 — April 2025 — April 2026 — April 2027 — April 2028

1. Planning and discovery
2. Process deign and optimisation
3. Production of sample fuel
4. Achieve required licensing
5. 5,000 tonne per year production
6. 32,000 tonne per year production

Total pre development investment of £917,000 for feasibility, design, prototype, licensing & sample fuel.

Phase	Description	Deliverable	From	To	Est £
Phase 1 - Feasibility	Planning, discovery, and proposition	- Set-up company, governance structure and initial agreements (Delivered) - Adaption of technology for sustainable aviation fuel production (Delivered) - Market analysis, brand development, marketing material, website (Delivered) - Submission of SEIS application, contracts and legal structure (Delivered) - Team recruitment, contact development, content creation (Delivered) - Feedstock research and analysis (Part-Delivered) - Chemical modelling (Part-Delivered) - Financial modelling (Part-Delivered) - Sales and business development (Part-Delivered) - NetZero and sustainability modelling	April 2023	March 2024	317,000
Phase 2 - Design	Process design, optimisation, detailed plant design	- Feedstock lab testing to prove composition, hydrocarbon value and ease of processing - Dynamic process and chemical model for different feedstocks and process configurations (Part-Delivered) - Detailed engineering design of the plant in preparation for development phase - Detailed plant costing and equipment specification which integrates with modelling - 3D CAD model of plant fully drafted and approved from compliance & health & safety - Intellectual property registration in the form of patents, designs, trademarks, modelling (Part-Delivered) - AI and machine learning control system design and specification - Feedstock preparation process design and testing (Part-Delivered)	July 2023	June 2024	300,000
Phase 3 - Prototype	Development of prototype and sample fuel 1kg/hr	- Design of lab-based system and reactor specification (Delivered) - Sourcing and preparation of catalyst (Delivered) - Construction and commissioning of lab-based system for initial fuel production (Delivered) - Integration of lab-based fuel cell and electrolysis reactors - Measurement and testing of different stages of the process - Preparation of fuel for licensing and testing	Jan 2024	June 2024	100,000
Phase 4 - Licensing	Achieve regulatory approval	- Initial registration and engagement with regulators (Delivered) - Definition of testing and approval programme (Part-Delivered) - Pre-screening testing and pre-qualification - Presentation of results and qualification - Presentation to Original equipment manufacturers - Monitoring and batch testing definition when commercially operable	June 2023	June 2024	200,000

Plant development will be funding with debt, grants and equity reducing investor dilution.

Phase	Description	Deliverable	From	To	Est £
Phase 5 - Build	Plant build and initial production at 5,000tpa	- Procurement and construction of the site, equipment and contractors. - Plant commissioning sequentially of each reactor - Implementation and testing and control systems - Plant and reactor optimisation and testing - Compliance, health and safety, environmental approvals - Operational staff hiring and training - Launch of plant and initial production and distribution - Measurement and insight gathering for scale up	July 2024	July 2026	14,000k
Phase 6 - Expansion	Detailed design of 32,000tpa plant - 40m litres/y	- Feasibility research of larger plant - Detailed design of 40ml plant - Revised dynamic process model - Revised specification for larger plant	July 2026	July 2027	200,000

One year of design, modelling & testing with two years of plant build. The 5,000 t/y plant launches April 26.

Annual P&L (£)	Year	1	2	3	4
		Yr to	Yr to	Yr to	Yr to
	Date	Mar '24	Mar '25	Mar '26	Mar '27
Revenue drivers	Feedstock weight (t)	0	0	0	37,289
	Weight of fuel (t)	0	0	0	5,000
	Volume of fuel (1000 l)	0	0	0	6,250
Gross revenue	Sales of SAF product	0	0	0	3,333,333
	Sale of other by-products	0	0	0	1,666,667
	Feedstock collection income	0	0	0	3,728,949
	Gross revenue - Total	0	0	0	8,728,949
	Variable costs - Total	0	0	0	(1,545,242)
	Net revenue	0	0	0	7,183,707
	Net revenue margin	N/a	N/a	N/a	82%
	Fixed costs - total	-72000	-108000	-360000	(3,768,399)
EBIT	EBITDA	-72000	-108000	-360000	3,415,308
	EBITDA margin	N/a	N/a	N/a	39%

The plant will generate £3.4m net profit from a £4m equity investment and £12m bank loan.

The business will be valued at around £50m based on industry benchmarks.

Become part of the sustainable air travel movement, clean up the environment and own a part of Avioxx

- We are raising £4m of pre–Series A equity capital.
- We have investor commitment from both private and institutional investors.
- A further £12m of asset backed debt capital is required for the development of the initial 5,000 tonne-per-year plant which will generate £3.4m per year in profit.
- We are participating in multiple UK Government grant applications, most notably the Advanced Fuel Fund.
- We will scale up to produce 32,000 tonnes of SAF per year, generating an estimated £35m in revenue per year .

Disclaimer

This Memorandum has been prepared to assist prospective investors in making their own preliminary evaluation of Avioxx limited ("The Company") and does not purport to contain all the information which a prospective investor may desire. In all cases, prospective candidates should conduct their own investigation and analysis of the Company and the data set forth in this Memorandum.

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There will usually be differences between estimated and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material.
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(2)the recipient will not copy, reproduce or distribute to any third party this Memorandum, in whole or in part, other than with the prior written consent; and
(3)any proposed actions by the recipient which are inconsistent in any manner with the foregoing will require the prior written consent of the Company.

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