

Innovate UK

Knowledge Transfer Network

Sustainable Aviation Fuel for Clean Growth

COMPETITION GUIDANCE

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1. OVERVIEW

This guide provides information on applying to the Sustainable Aviation Fuel for Clean Growth (SAFCG) competition launched on 12th July 2018.

This document should be read in advance of submitting any application, and should be referred to throughout the competition process. If applicants have any questions relating to the competition they should send these to SAFCG@KTN-UK.ORG.

The objectives of the competition are to:

- Stimulate R&D in sustainable aviation fuels and enable the first steps towards commercialisation by identifying technical risk;
- Reduce market entry risk for new sustainable aviation fuels;
- Increase the UK knowledge base and expertise in the development and testing of sustainable aviation fuels;
- Coordinate and support the development, evaluation and certification of sustainable fuels;
- Broker collaboration and partnerships between industry, fuel experts and fuel producing communities.

The competition has two streams:

Stream 1. Fuel producers (either producing aviation fuel, middle distillates or intend to develop sustainable aviation fuel) can apply to access ***fuel technical consultancy and testing*** from Chris Lewis Fuels Consultancy Ltd (CFLC), The University of Sheffield, JETSCREEN and Sustainable Aviation (SA) members Airbus, Boeing and Rolls Royce;

Stream 2. Bid to ***secure an Auxiliary Power Unit (APU)*** with the intention to create a facility for fuel and engine system performance testing.

2. COMPETITION BACKGROUND

2.1 Strategic Context

This competition is timely as the aviation sector is fully committed to decarbonisation and in alignment to the Government's portfolio of initiatives on Clean Growth: Clean Growth Strategy, Industrial Strategy and the imminent Bioeconomy Strategy.

The aviation sector's UN Body, International Civil Aviation Organisation (ICAO), is set to implement a new climate regulation – the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). From 2021, the regulations will recognise the use of sustainable aviation fuel, opening up a global market for new fuel technologies.

Combined with the amendments to the Department for Transport's Renewable Transport Fuel Obligation (RTFO) defining sub-targets for development fuel (including SAF), the positive sustainability and renewables agenda presents an unprecedented opportunity for the UK to position itself and become a world leader in the development, evaluation and certification of SAF.

2.2 Technical Context

Fuel properties can have a profound effect on aircraft and engine performance, efficiency, emissions, cost of ownership, and critically safety. Fuel specifications form part of an aircraft's certification and must be adhered to.

Aviation jet fuel is a high-performance distillate fuel which must meet rigorous standards and quality assurance. It is a multipurpose fluid that serves many roles, including being the source of energy on an aircraft and a primary heat transfer fluid. There are a range of key requirements, including:

- high energy density and purity
- good cold flow properties down to -47°C
- ability to remain a liquid at high temperatures
- good thermal stability

- compatibility to enable contact with a wide range of materials
- not causing unacceptable levels of smoke and emissions during combustion
- careful control of any additives used to modify characteristics of the fuel

In short, new fuels must perform as well or better than existing fossil jet fuel and it is therefore **essential that new fuel producers engage with the Original Equipment Manufacturers (OEM) as early as possible** as they ultimately support the approval of the fuel.

This competition is a mechanism for fuel producers to seek that early consultation and potentially gain some early testing and analysis on their fuel.

To build the fuel testing capability within the UK, this competition also offers the opportunity for a company or research organisation to acquire an Auxiliary Power Unit (APU) with the intention of creating a facility for fuel testing.

3. COMPETITION SCOPE

3.1 Overview

The competition is being run in partnership with Sustainable Aviation (SA), The University of Sheffield, JETSCREEN and Chris Lewis Fuels Consultancy Ltd (CLFC) and has two support streams.

Stream 1 - Fuel consultancy and testing

Applications are invited from businesses or Research & Training Organisations (RTO) who are producing or targeting jet fuel derived from a renewable raw material and could benefit from support and testing to inform their progression through the ASTM D4054 process, potentially leading to approval for use in commercial aircraft by inclusion in ASTM D7566 and ASTM D1655.

Based on the information provided by you in the application process (see Criteria in Table 1), the Competition Partners will select applicants with the most promising commercial and technical business plan then develop and deliver a support package to assist you.

Following a review of applications (based on e.g. raw material, processing, volume of fuel) some of the support available to you include:

- Guidance on technical analyses
- Interpretation of test data
- Guidance on ASTM D4054 and Federal Aviation Administration's Clearing House
- Evaluation of blendstock potential based on ASTM D1655 & ASTM D7566 specification
- Thermal stability performance
- Lubricity testing
- Purity testing
- Elastomeric material compatibility assessment
- Fuel systems advice (including guidance on the different compatibility requirements for Airbus and Boeing airframes)

Stream 2 - Creating a facility for fuel and engine system performance testing

An auxiliary power unit (APU) is being donated by British Airways and is available to apply for. Applications are invited from research organisations, RTOs and businesses with a strong business case demonstrating a clear plan to support fuel producers in the UK and overseas with their fuel/engine testing requirements.

The APU will be donated to the strongest applicant and will include delivery and support from British Airways.

All projects and final reporting must be completed **by Friday 8th February 2019**.

3.2 Eligibility Criteria

3.2.1 General eligibility for support

You must:

- be registered or based in the UK.

- participate in the process from within the UK (though a project partner may conduct an aspect of the in-kind support overseas: e.g. Boeing).

3.2.2 Support Stream 1 eligibility

- applications must be led by industry.
- applicants must be producing (or have the potential to produce) sustainable aviation fuel or middle distillates.

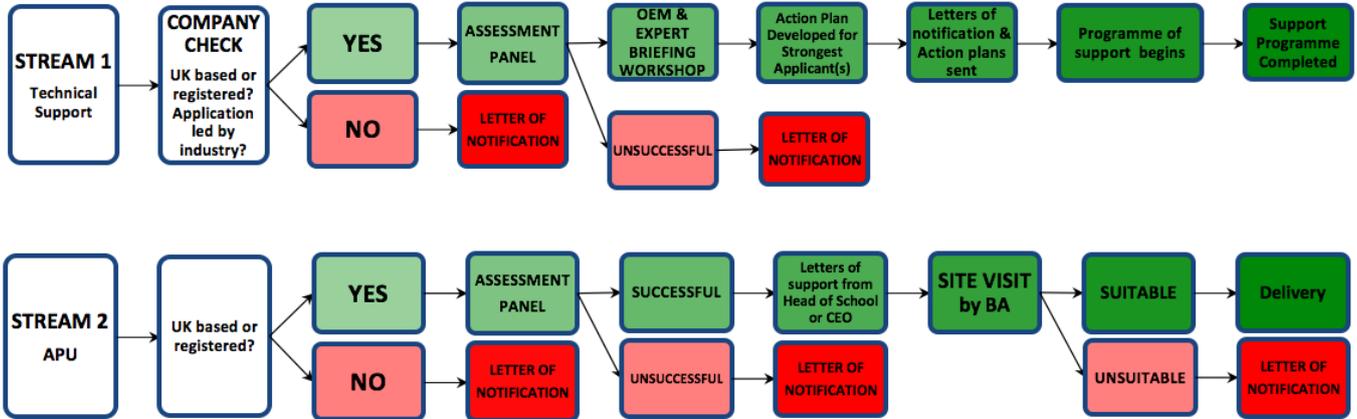
3.2.3 Support Stream 2 eligibility

- applicants must describe a robust plan to deliver fuel testing support to stakeholders within the UK and internationally as well as supporting their own research needs;
- applicants must demonstrate that the skills and expertise exist within the organisation to support the early stage implementation of a facility; and
- applications may be led by a research organisation, RTO or business.

3.4 Competition Dates

Activity	Date
Competition Launch & Briefing Event	12 th July 2018
Webinar: Competition Briefing	13 th July 2018 13:00
Submission Deadline	Noon (UK time) 17 th August 2018
Applicants notified	17-20 th September 2018
Stream 1 only: OEM & expert briefing workshop	Date & location TBC 25-28 September 2018
Programme of support starts	October 2018
Project completion documents received by KTN	8 th February 2019

3.5 Competition Process



4. APPLICATION GUIDANCE

4.1 The Application Process

Applications must be submitted using our online submission form:

Support Stream 1: Fuel consultancy and testing.

[Apply here:](#)

Support Stream 2: Auxiliary Power Unit.

[Apply here:](#)

Applications must be submitted by noon (UK time) on 17th August 2018.

4.2 Appraisal of Applications

- Applications will be logged and an acknowledgement email will be issued. All applications will be checked for validity (e.g. Company Registration). Only those that are considered to be valid will be fully assessed.
- Each application will be screened against the eligibility criteria and assessed by technical and commercial experts.
- All valid proposals will be appraised in relation to SAFCG objectives and specifically against the criteria in Tables 1 and 2 below.

4.3 Selection Criteria

The selection criteria for Stream 1 and Stream 2 are different. Ensure you refer to the correct stream and criteria to assist your application.

Table 1. Selection Criteria for applications to Support Stream 1 (Fuel consultancy and testing).

Business Case	Criteria
Products or fuel type <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • Is there an identifiable fuel in production or targeted? • Is any analysis available on the product? • Has the product been used or planned to be used for other types of fuel?
Technology Readiness Level <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • What is the current TRL of the product? (i.e. laboratory scale production, pilot scale etc.). • Is there a minimum of 5 litres of fuel being produced?
Commercial Potential <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • Is the process technology and raw material supply scalable? • Is there a clear plan to reach commercial scale?
Sustainability Potential <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • Is the raw material from a renewable source? • Is the raw material transported (sustainably) or has the potential to be? • Has any sustainability metrics (energy balance, environmental impact etc.) been assessed?
Flexibility of Technology <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • Is the technology limiting in terms of feedstock type, volume/availability etc.?

Table 2. Selection Criteria for applications to Support Stream 2 (APU).

Question	Criteria
Site suitability <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • Does the organisation have the infrastructure in place to support the running and monitoring of an APU?
Management and Operations <i>Maximum score: 5</i>	<ul style="list-style-type: none"> • Is there a clear plan on how the facility will be managed and operated? • Is there a clear management and reporting structure?

<p>Commercial Potential <i>Maximum score: 5</i></p>	<ul style="list-style-type: none"> • Is there a clear commercial plan in place to exploit the technology in the UK and overseas? • Is the plan ambitious yet realistic?
<p>Marketing Plan <i>Maximum score: 5</i></p>	<ul style="list-style-type: none"> • Is there a strong plan in place to promote the facility? • How do the applicants intend to attract business outside the UK?
<p>Risks <i>Maximum score: 5</i></p>	<ul style="list-style-type: none"> • Are the risks clearly defined with a clear and robust mitigation strategy? • What plans are in place to ensure HS&E requirements are met?
<p>Skills and Expertise <i>Maximum score: 5</i></p>	<ul style="list-style-type: none"> • Is clear evidence provided that the applicant and/or individuals within the organisation have experience operating combustion rig/small gas turbine technologies?

4.4 Successful Applications

If your application is successful, you will receive a confirmation letter. With respect to Stream 2, the letter may be subject to conditions that need to be met and together with BA's terms and conditions, form the agreement between your organisation and British Airways. You must sign the letter and return it to establish the agreement along with a pre-supplied confirmation agreement from the Head of School or CEO (or equivalent senior representative).

4.5 Reporting Requirements

Successful applicants will be required to complete a brief **final report** to be sent to KTN no later than **8th February 2019**. The final report will then form the basis of case studies to be disseminated by KTN. You will not be expected to disseminate commercially sensitive information.

4.6 Communication Requirements

Successful applicants are expected to give appropriate recognition to the provision of the support by the Competition Partners (Knowledge Transfer Network, Sustainable Aviation

The University of Sheffield, JETSCREEN and Chris Lewis Fuels Consultancy) in any press release or other contact with the media. Guidance on any communication is as follows:

Stream 1: Technical Support

“Successfully secured a portfolio of technical support through KTN’s Sustainable Aviation Fuel Special Interest Group’s competition, Sustainable Aviation Fuel for Clean Growth, with expert support from Sustainable Aviation, Chris Lewis, The University of Sheffield and JETSCREEN.” Further and more specific details on the nature of the support can be disseminated.

Stream 2: APU

“Successfully secured an Auxiliary Power Unit (APU) through KTN’s Sustainable Aviation Fuel Special Interest Group’s competition, Sustainable Aviation Fuel for Clean Growth.” Further details relating to the donor may be communicated but only under the following conditions (see full Terms and Conditions):

The APU recipient shall not make any announcement, public or otherwise, in relation to British Airways on any matter in connection with the receipt of the APU and associated engineering support without the prior written consent of British Airways except (i) with the agreement in writing of British Airways or (ii) as may be required by applicable law or governmental authority or (iii) to a Party’s financial advisors or legal and other professional advisors who are under equivalent duties of confidentiality and to its employees, (iv) to investors who have agreed to a nondisclosure or (v) where required by the rules of any stock exchange on which the shares or other securities of the Disclosing Party are listed.

5. ABOUT THE COMPETITION PARTNERS

5.1 Knowledge Transfer Network (KTN)

The Knowledge Transfer Network (KTN) helps businesses get the best out of creativity, ideas and the latest discoveries, to strengthen the UK economy and improve people’s lives. As a network partner of Innovate UK, KTN links new ideas and opportunities with expertise, markets and finance through our network of businesses, universities, funders and investors. From agri-food to autonomous systems and from energy to design, KTN combines

in-depth knowledge in all sectors with the ability to cross boundaries. Connecting with KTN can lead you to potential partners, horizon-expanding events, bespoke support and innovation insights relevant to your needs.

5.2 Sustainable Aviation Fuels Special Interest Group (SAF SIG)

The SAF SIG is a dedicated two-year programme delivered by KTN aimed at bringing together industry, academia and government behind a shared goal of stimulating a domestic sustainable aviation fuel supply chain.

The core objective of the SAF SIG is to facilitate UK sustainable aviation fuel development advancing to commercial scale deployment through multi-disciplinary science and technology-inspired innovation, and by better connecting academia and industry.

More information can be found at www.safsig.co.uk.

Sign up to the SAF SIG newsletter to keep up to date on latest funding competitions, news and events at www.safsig.co.uk and Follow us on Twitter [@KTN_SAFSIG](https://twitter.com/KTN_SAFSIG) and [LinkedIn](https://www.linkedin.com/company/ktn-safsig).

5.3 Sustainable Aviation

Sustainable Aviation is a long-term strategy which sets out the collective approach of UK aviation to tackling the challenge of ensuring a sustainable future for our industry. Launched in 2005, it is a world first bringing together major UK airlines, airports, manufacturers and air navigation service providers. We are focused on finding collaborative ways of improving our environmental performance and creating a balanced debate to ensure sustainable growth of our industry, which is crucial to the health of the UK's island trading economy. We continue to promote the principles of our strategy both within the UK and internationally.

Sustainable Aviation will be supporting Streams 1 & 2.

5.4 Chris Lewis Fuels Consultancy Ltd

Chris worked as a Fuel Technologist and Engineering Specialist at Rolls Royce for 37 years prior to starting his independent fuels consultancy in 2014. Chris works with a range of clients

on their fuel technical, quality, training and policy requirements. Chris is also visiting Professor in Aviation Fuels at The University of Sheffield and Fellow of the Energy Institute. Chris will be supporting Stream 1.

5.5 The University of Sheffield

Stream 1 of this competition is supported by staff within the Department of Mechanical Engineering where research strengths explore some of today's most challenging issues such as renewable energy, alternative fuels, strong and lightweight aerospace materials, advanced manufacturing and the mechanics of the human body. In 2014, The University of Sheffield was ranked 5th in Research Excellence in the Research Excellence Framework.

5.6 JETSCREEN

JETSCREEN is a European project funded under the Horizon 2020 programme and aims to develop an optimised platform enabling the integration of distributed design tools and experimental based validations to assess the risks and benefits of alternative fuels. The project aims to provide fuel producers, aircraft manufacturers, and engine and fuel system OEMs with knowledge-based tools that will:

- analyse and streamline the approval process for alternative aviation fuel
- assess the compatibility of fuel composition and properties with respect to the fuel system and the combustion system
- quantify the added value of alternative fuels
- optimise fuel formulation in order to attain the full environmental potential of synthetic and conventional fuels.

JETSCREEN will be supporting Stream 1.