

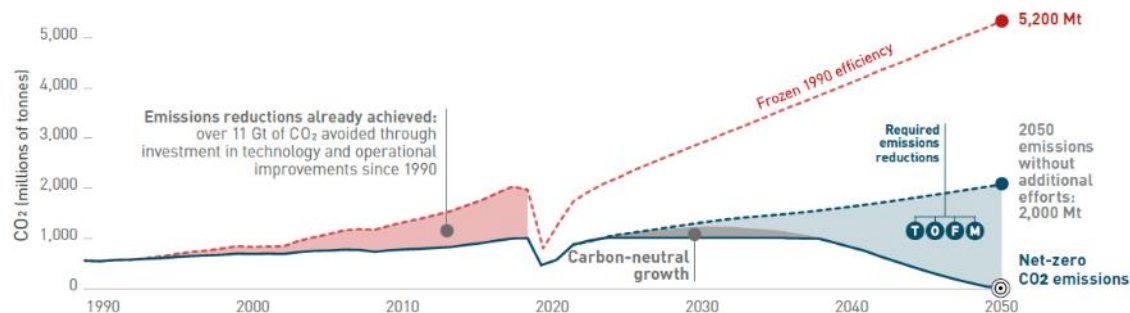


## **SAFRAN : AN OEM VISION OF THE DEPLOYMENT OF SAF (SUSTAINABLE AVIATION FUELS) AND LOW CARBON FUELS**

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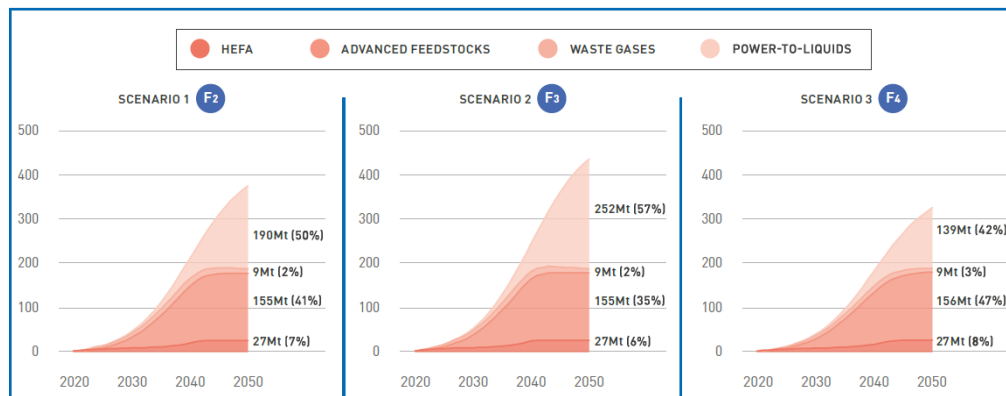
# Safran global SAF commitment



- Safran supports the carbon neutrality targets in 2050 : the new ATAG target and the European Destination 2050 target

In this decarbonization journey, SAF play a critical role, with massive incorporation rate needed in the years to come in all scenarios

- Beside this incorporation rate increase, SAF properties will also have a critical role to play, especially on non-CO<sub>2</sub> emissions. The correct choice of future SAF specification will be key.



## Focus on SAF : Safran Holistic approach



### Validate

Validate the full compatibility of SAF with all Safran products.



### Assess

Assess the global potential of SAF (environmental, including non-CO2 effect, operational, economical...)



### Develop

Propose technologies fully compatible with SAF (up to 100%) and study the global SAF/aircraft optimization



### Demonstrate

Demonstrate, through ground or flight tests, the potential of SAF



### Support

Support, through global initiatives but also offtakes, the development of SAF



### Advocate

Advocate for SAF crucial interest for aviation and support global partnerships dedicated to SAF massive deployment



## Main statement

- **SAF (including PtL) are critical for the carbon neutrality target of aviation**
- **Hydrogen aircrafts will be developed in the future, but 1) these developments will take time and 2) the most important CO<sub>2</sub> emitters (Middle/Long range aircrafts) may not be accessible to these technologies at 2050 time horizon.**
- **Aviation industry will make all the efforts in order to remove any potential technical limitation that could slower SAF introduction. In addition, a strong coordination has to be set at EU Level in order to :**
  - Assess the global potential of SAF, at short (2030) and long (2050) term
  - Ensure that the comprehensive political framework is set (incorporation targets, support framework...) and that this framework takes into account aviation specific constraints
  - Support development of production units
- **The future Renewable and low carbon fuels value chain Alliance must have a dedicated aviation cluster/pillar to discuss all these topics and the needs of the aviation sector.**
  - ◆ The whole value chain, from energy and fuel producers to airlines, ready to work as of today (ESAF initiative)



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## SAF and hydrogen : 2 fully complementarity pathways with no competition

- **SAF quick and massive deployment is a compulsory « no-regret » choice :**
- Compulsory in short term in order to decarbonize current aircraft fleets, and in long term for middle / long range aircrafts
- Immediately available, with no technical limitation (up to 50% blending ratio), with a clear roadmap towards 100% compatibility
- Still questions about availability / sustainability / competition with other usages when massive deployment will be reached
- **Hydrogen has a strong potential in terms of decarbonation**
- The only « 0 CO<sub>2</sub> at aircraft level » solution. Global CO<sub>2</sub> emissions close to 0 in case of decarbonized electricity use
- Synergy with the global trend around hydrogen
- Huge technical / infrastructure / economical gaps to be solved, inducing delays in the potential entry into service



Hydrogen to be seen as a **complement to SAF deployment** (LH<sub>2</sub> or PtL) in order to decrease the pressure on feedstock and allow to reach carbon neutrality  
A common point : crucial need for **ultra-efficient aircrafts / propulsion systems**



All Safran technologies are fully validated with up to 50% certified SAF



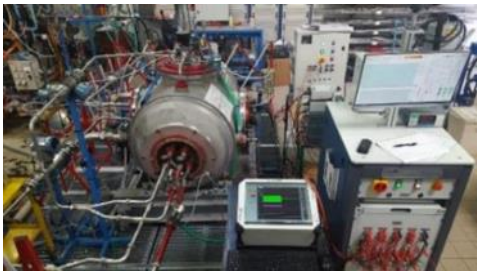
full compatibility with 100%SAF



Towards an optimized engine / fuel couple

- French DGAC « Volcan » project, led by Airbus
- Specific internal validations / developments

- Strategic partnership with TotalEnergies



Endurance test of a Safran Aerosystems fuel pump fed with 100%SAF (2020)



100%SAF helicopter engine ground test (2021)



100%SAF ground test of LEAP engine and in-flight demo A320 Volcan project (2021 - 2022)



Demonstrate



Support



Advocate



## Long duration flight tests with SAF



2014 : Lab'Line AF

2021 : projects to be announced soon, with 50%SAF

## Use of SAF for the test bed validation of all engines produced by SAFRAN in France

10% SAF in 2021

35+% SAF in 2025

Several millions €/yr overcost for Safran

Goals :

- Offtaker
- Market signal
- Safran environmental footprint reduction



## Promotion of a European SAF Alliance

> 30 industrial partners and trade associations from the whole SAF Value Chain





## Safran at the forefront of EU SAF initiatives

**14/07/2021: Fit for 55 regulatory package announcement, among which:**

- **Refuel EU Aviation draft regulation aiming at stimulating the production and use of SAFs, with a mandatory blending mandate:**

2% in 2025; 5% in 2030 (incl 0,7% of e-fuels); 20% in 2035 (incl 5% of e-fuels); 32% in 2040 (incl 8% of e-fuels); 38% in 2045 (incl 11% of e-fuels); 63% in 2050 (incl 28% d'e-fuels).

- **The fuel producers will have to provide the necessary volumes of eligible SAFS (sustainability criteria in REDII revised annex + ASTM certification), and EU airports to provide all necessary infrastructures.**
- **Safran is strongly involved in the EU discussions at all levels and has is considered as a key actor by EU institutions**
- **Safran is strongly involved in major initiatives around SAF / hydrogen for aviation in Europe (former Chair of ETIP Bioenergy WG3 (End Users), Chair of Hydrogen Europe RM13 (Aviation), Chair of ACARE (Advisory Council for Aviation Research in Europe) WG3 (Environment / fuels)...)**

## Conclusions



- **Safran is at the forefront of SAF deployment**
- **Our goals :**
  - remove all technical barriers for the rapid and massive deployment of SAF (up to 100%)
  - Propose ultra-efficient technologies in order to reduce the global cost for airlines : See RISE programme
  - Enhance the deployment of SAF through offtaking agreement and production projects support
  - Federate all actors through global initiatives (see ESAF alliance)
  - Reduce the pressure on SAF demand through ultra efficient technologies, but also new technologies development such as hydrogen (see Hyperion project with Airbus / ArianeGroup)



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# European Sustainable Aviation Fuels Alliance initiative (ESAF), the industrial pillar of ReFuel EU Aviation

- On 1st April, proposal to Com. Adina Valean from around 30 industrial partners to create an ESAF Alliance**
  - > ensure that SAF will actually be available on time with the volume needed;
  - > coordinate all the stakeholders along the entire value chain in compliance with antitrust rules;
  - > identify the R&D activities still needed to mature the already certified SAF pathways and new ones;
  - > identify a pipeline of SAF production projects in Europe ((i.e. building industrial capacities - e.g conversion units, plants- and infrastructures) and mobilize private and public funding,
- A commitment from the European SAF industry to boost the supply and demand for SAF in Europe:**
  - > A group of committed European industrial partners representing the whole value chain from energy producers and fuels producers to airlines;
  - > A dedicated structure devoted to the aviation specificities and industrial challenges;
  - > A market/Supply driven approach based on an ambitious production target to be set within the Alliance;
  - > An open an inclusive ecosystem to international cooperation and partners
- 14th July : Fit for 55 package and announcement of the « Renewable and low-carbon fuels value chain Alliance » covering both aviation and maritime sectors to be launched by end-2021 : need to secure a specific effort structure for aviation (i.e ESAF)**



# A core of European Industrial partners which is gradually expanding

