



SAF and Aviation Sustainability Innovation

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General Concepts Related to Sustainable Aviation Fuels (SAF)

Sustainable Aviation Fuels (SAF) is a sustainable, alternative fuel made from non-petroleum feedstocks that reduces emissions from air transport.



Conditions



Meet the technical standards that prove they have the same properties as the A-1 jet
(ASTM D7566, ASTM 1655, DEFSTAN-91-91)

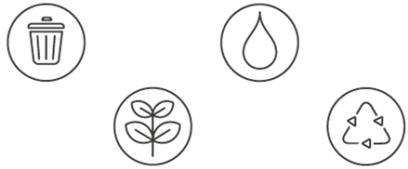


Meet certain sustainability criteria, which have been verified by an independent entity.

General Concepts Related to Sustainable Aviation Fuels (SAF)

SUSTAINABLE...

Renewable feedstocks and production processes



Must respect sustainability criteria

Average of 80% of CO₂ reduction

...AVIATION FUEL

Drop in blended Aviation Jet Fuel...



Certified against recognized specifications such as:

ASTM D1655 - Jet A/A1
GB 6537-2018 - Jet N°3
Def Stan 91-091 - Jet A1

Must contain at least 50%
petroleum oil derived fuel

Why is blending required ?



Due to their properties, **aromatics are beneficial** to ensure **fuel system** expected **performance**.



As such, Aviation Jet Fuel contains aromatics to meet international fuel certification specifications.



In **none** of the different **Synthetic Paraffinic Kerosene (SPK)** production processes (HEFA, AtJ, FT) are aromatics synthesized.

Therefore, none of the **SPKs** can be uplied as such in the aircraft.



Aromatics must be added to any **SPK**.



Full view approved ASTM pathways and maximum blending ratio

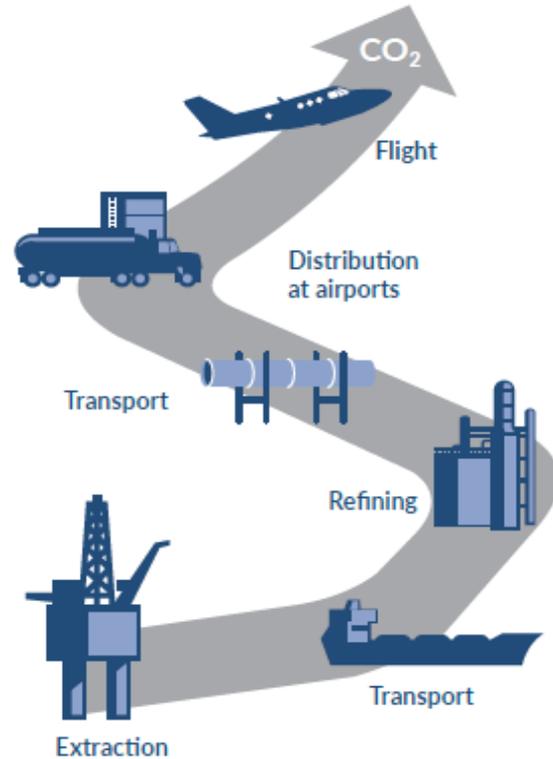
ASTM reference	Conversion process	Abbreviation	Possible Feedstocks	Maximum Blend Ratio
ASTM D7566 Annex A1	Fischer-Tropsch hydroprocessed synthesized paraffinic kerosene	FT	Coal, natural gas, biomass	50%
ASTM D7566 Annex A2	Synthesized paraffinic kerosene from hydroprocessed esters and fatty acids	HEFA	Vegetable oils, animal fats, used cooking oils	50%
ASTM D7566 Annex A3	Synthesized iso-paraffins from hydroprocessed fermented sugars	SIP	Biomass used for sugar production	10%
ASTM D7566 Annex A4	Synthesized kerosene with aromatics derived by alkylation of light aromatics from non-petroleum sources	FT-SKA	Coal, natural gas, biomass	50%
ASTM D7566 Annex A5	Alcohol to jet synthetic paraffinic kerosene	ATJ-SPK	Ethanol, isobutanol and isobutene from biomass	50%
ASTM D7566 Annex A6	Catalytic hydrothermolysis jet fuel	CHJ	Vegetable oils, animal fats, used cooking oils	50%
ASTM D7566 Annex A7	Synthesized paraffinic kerosene from hydrocarbon - hydroprocessed esters and fatty acids	HC-HEFA-SPK	Algae	10%
ASTM D7566 Annex A8	Synthetic Paraffinic Kerosene with Aromatics	ATJ-SKA	C2-C5 alcohols from biomass'	
ASTM D1655 Annex A1	co-hydroprocessing of esters and fatty acids in a conventional petroleum refinery		Vegetable oils, animal fats, used cooking oils from biomass processed with petroleum'	5%
ASTM D1655 Annex A1	co-hydroprocessing of Fischer-Tropsch hydrocarbons in a conventional petroleum refinery		Fischer-Tropsch hydrocarbons co-processed with petroleum	5%
ASTM D1655 Annex A1	Co-Processing of HEFA	Hydroprocessed esters/fatty acids from biomass'		10%



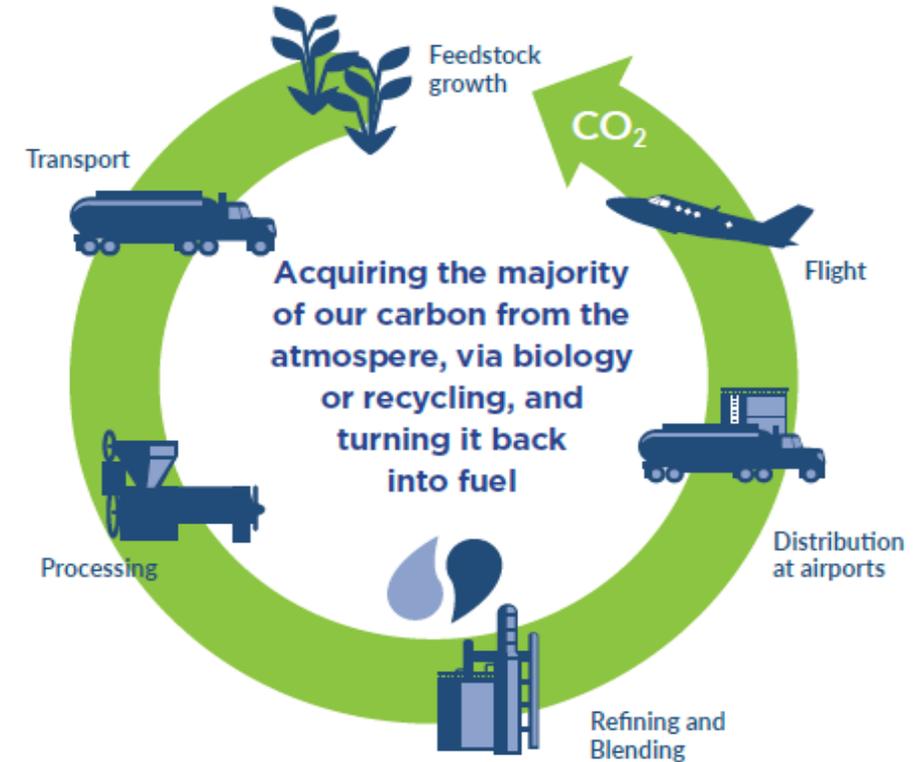
Sustainable Aviation Fuel – Environmental Benefits

PETROLEUM-BASED AVIATION FUEL

Continuing to pull additional carbon from the ground and releasing it into the atmosphere as CO₂



SUSTAINABLE AVIATION FUEL



RESULT IS A NET REDUCTION OF ADDITIONAL GHG (CO₂) BEING INTRODUCED INTO OUR BIOSPHERE.



LEAVE LESS – DO MORE



Our Approach is two-fold:

- **Leave Less** through our operations
 - ❖ Less carbon in our atmosphere
 - ❖ Less waste in our land and water
 - ❖ Less noise in our communities
- **Do More** to address environmental issues
 - ❖ More collaboration with industry partners
 - ❖ More contribution in communities
 - ❖ More connection and participation with our employees and customers

Air Canada's Climate Ambition

2050 GOAL

NET-ZERO

GHG emissions from all Air Canada operations

2030 TARGETS

20%

GHG reductions from flights operations compared to 2019 baseline

30%

GHG reductions from ground operations compared to 2019 baseline



2025 TARGET

1%

SAF out of total fuel consumption

\$50M

Investment Fund

Fleet & Operations

Innovation

SAF & Clean Energy

Carbon Reductions & Removals



Our history of climate change action

OUR ACHIEVEMENTS



Leave Less Travel Program



The Leave Less Travel Program offers corporate business travel customers and cargo customers effective options to offset or reduce greenhouse gas (GHG) emissions related to business travel or freight transportation and reduce their carbon footprint.

1

Air Canada tracks and calculates the GHG emissions associated with customers' business/freight travel.

2

Companies choose how they want to mitigate their GHG emissions associated with their flights: SAF and/or carbon offsets.

3

Air Canada purchases the required SAF volumes and facilitates the purchase of carbon offsets.

4

Companies contribute to their sustainability goals.



Air Canada SAF Agreements- Challenges

Air Canada SAF Uplifts

- AC have been uplifting SAF in California (SFO&LAX) and uplifted in some European airports in 2022, 2023
- More potential agreements with greater volumes in 2024
- Pathway: HEFA; Feedstock: UCO, Tallow

Challenges



SAF Price vs Conventional Jet Fuel

- Patchwork of measures (mandates, incentives) which translates into missed opportunities
- Mandates versus Incentives



Scaling Up Production

- Need for new facilities & scale-up production
- Need for more production pathways commercially viable (HEFA is the only one as of today).



Fast Evolving Accounting & Sustainability Requirements

- Various interpretations of sustainability criteria
- No common technical guidance for accounting
- Need for an aligned accounting structure and sustainability standards



Competition with Other Renewable Fuels

- SAF competes with other renewable fuels (e.g., for ground transportation) for feedstock and production
- Niche and complex product



Why is SAF so Important for Air Canada?

Main lever to obtain **significant in-sector GHG reductions** (short to medium terms).

SAF & Clean
Energy



Potential for larger contribution to our target (*vs Fleet & Operations Improvements*)

Direct in-sector GHG emissions reductions (*vs Carbon Offsets*)

Availability: short-to-medium horizon (*vs New Aircraft Technologies*)



Merci!
Thank you!

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