Update on Waste and Residues Based Sustainable Aviation Fuels under CORSIA

Dr Norbert Schmitz, Managing Director, ISCC System GmbH
ISCC Technical Stakeholder Meeting “Waste, Residues and Advanced Low Carbon Fuels”, 01 September 2020
The International Air Travel Organization (IATA) forecasts that the global passenger traffic will not return to pre-COVID-19 levels until 2024.

Number of scheduled passengers boarded by the global airline industry (in millions)

COVID-19 Pandemic
54–60% decline in passengers

Forecasts depend on various factors, e.g., further duration and magnitude of the COVID-19 outbreak.

Post-COVID-19 recovery of the aviation industry needs to focus on emissions reduction and investment in sustainable aviation fuels (SAF)

“SAF is our biggest emissions reduction opportunity. The time is right to push it forward so that, together, we can achieve major carbon reductions on the way towards fossil fuel-free flight.”

Alexandre de Juniac, Director General and CEO, International Air Transport Association (IATA)
(Date: 9 June 2020)

Source: https://www.iata.org/en/pressroom/pr/2020-07-09-01/
Sustainable aviation fuels (SAF) are becoming more important in the European legislative framework

- Scandinavian countries push for binding regulatory requirements
  - Example Norway: Since January 2020, jet fuel supplier in Norway must blend 0.5% of SAF in all their aviation fuel

- The “ReFuelEU Aviation” Initiative, organised by the DG MOVE – Aviation Policy Unit of the European Union currently discusses a **SAF blending mandate** for the EU
  - A possible mandate would consist of imposing a minimum share of SAF, which would gradually increase over time
Ambitious targets of ICAO Member States: carbon-neutral growth from 2020 (baseline: 2019 emissions) and 50% emissions reduction by 2050

### Timeline for ICAO’s Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Period</th>
<th>Nature</th>
<th>Exemption Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot phase</td>
<td>2021 - 2023</td>
<td>VOLUNTARY</td>
<td>States are volunteering to be part of the scheme from 2021</td>
</tr>
<tr>
<td>First phase</td>
<td>2024 - 2026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second phase</td>
<td>2027 - 2035</td>
<td>MANDATORY</td>
<td>With exemption for: Small islands, least developed countries, landlocked developed countries and States with less than 0.5% of international air traffic in the year 2018 (although they can volunteer)</td>
</tr>
</tbody>
</table>

- **81 states** (including all EU Member States), representing around **80% of international aviation** intend to participate in CORSIA*
- **The majority of airlines** will be affected by these developments

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Compared to fossil fuels, SAF have the potential to cut emissions substantially

- According to the ICAO 2016 trends assessment, a 100% substitution of fossil fuels with SAF could **reduce 63% of the baseline CO2 emissions** from international flights in 2050*

- **Using existing schemes will help to make commercial volumes available.** It reduces the organisational and cost burden on companies in the supply chain and thus will increase acceptance

- **SAF production capacity forecast:** 6.3 million m$^3$ of SAF production capacity available by 2025 and 8 million m$^3$ in 2032**

- Beyond sustainable aviation fuels, the concept of “**Lower Carbon Aviation Fuels**” (LCAF) is based on prospective technologies that may allow the production of fossil fuels with a lower carbon footprint.

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**Source: [https://www.icao.int/environmental-protection/pages/SAF.aspx](https://www.icao.int/environmental-protection/pages/SAF.aspx)
ISCC is a well experienced certification scheme with innovative tools to verify sustainability requirements set for the aviation sector.

Currently, more than 4,000 companies in over 100 countries use ISCC.

Major fuel producers are active users of the ISCC certification system.

Over 12 million tons of certified waste and residues feedstock mainly used for the production of fuels.

ISCC has comprehensive experiences in the road transportation market and supports the certification of recycled carbon fuels and RFNBOs.

Comprehensive experience with reliable greenhouse gas (GHG) emissions calculations – over 1,600 certificates based on actual GHG values.

*Numbers as of 2019
Waste and residues can be used for the production of CORSIA eligible SAF

CORSIA Sustainability Criteria 1 requires at least **10% net GHG emissions reductions** for a SAF to be recognised under CORSIA

To calculate the *life cycle emission value of a SAF*, GHG values are forwarded in the supply chain step by step:

- **Point of Origin**
- **Collecting Point**
- **Trader/Storage**
- **HVO Plant**
- **HEFA Plant**
- **Final Supplier (blending)**
- **Fuel Operator at Airport**
- **Airline**

**Feedstock collection**
- Zero emissions for w/r feedstock
- Upstream transport (from collection) $e_{ld}$

**Processing Unit**
- Processing $e_p$
- Upstream transport $e_{ld}$
- Excess electricity $e_{ee}$
- CCR $e_{ccr}$
- CCS $e_{ccs}$

**Final Processing**
- Processing $e_p$
- Upstream & downstream transport & distribution $e_{ld}$
- Excess electricity $e_{ee}$
- CCR $e_{ccr}$
- CCS $e_{ccs}$

CCR: Carbon Capture and Replacement
CCS: Carbon Capture and Storage
ICAO has published a positive list of materials classified as residues, wastes or by-products for CORSIA eligible fuels

<table>
<thead>
<tr>
<th>Processing residues</th>
<th>Wastes</th>
<th>Agricultural and forestry residues</th>
<th>By-products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty palm fruit bunches</td>
<td>Tall oil</td>
<td>Used cooking oil (UCO)</td>
<td>Cobs</td>
</tr>
<tr>
<td>Palm oil mill effluent (POME)</td>
<td>Sewage sludge</td>
<td>Municipal solid waste</td>
<td>Manure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bark</td>
<td>Branches</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tallow</td>
</tr>
</tbody>
</table>

Examples

- Bark
- Branches
- Tallow
- Palm fatty acid distillate (PFAD)
- Cobs
- Manure
- Used cooking oil (UCO)
- Municipal solid waste
- Tall oil
- Tall oil
- Sewage sludge
- Empty palm fruit bunches
- Empty palm fruit bunches
- Sewage sludge
- Palm oil mill effluent (POME)
- Palm oil mill effluent (POME)
In comparison to agricultural feedstocks, waste and residues based SAF do not need to include an ILUC LCA value in their life cycle emissions value

- CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels available
- Airplane operators can also use actual life cycle values if a producer can demonstrate lower core life cycle emissions compared to the default values

### Example default values for HEFA

<table>
<thead>
<tr>
<th>Fuel Conversion Process</th>
<th>Region</th>
<th>Fuel Feedstock</th>
<th>Core LCA Value</th>
<th>ILUC LCA Value</th>
<th>LS&lt;sub&gt;f&lt;/sub&gt; (gCO&lt;sub&gt;2e&lt;/sub&gt;/MJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroprocessed esters and fatty acids (HEFA)</td>
<td>Global</td>
<td>Tallow</td>
<td>22.5</td>
<td>0.0</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>Global</td>
<td>Used cooking oil</td>
<td>13.9</td>
<td></td>
<td>13.9</td>
</tr>
<tr>
<td></td>
<td>Global</td>
<td>Palm fatty acid distillate</td>
<td>20.7</td>
<td></td>
<td>20.7</td>
</tr>
<tr>
<td></td>
<td>Global</td>
<td>Corn oil (from dry mill ethanol plant)</td>
<td>17.2</td>
<td></td>
<td>17.2</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>Soybean oil</td>
<td>40.4</td>
<td>24.5</td>
<td>64.9</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
<td>Soybean oil</td>
<td>40.4</td>
<td>27.0</td>
<td>67.4</td>
</tr>
<tr>
<td></td>
<td>EU</td>
<td>Rapeseed oil</td>
<td>47.4</td>
<td>24.1</td>
<td>71.5</td>
</tr>
<tr>
<td></td>
<td>Malaysia &amp; Indonesia</td>
<td>Palm oil – closed pond</td>
<td>37.4</td>
<td>39.1</td>
<td>76.5</td>
</tr>
<tr>
<td></td>
<td>Malaysia &amp; Indonesia</td>
<td>Palm oil – open pond</td>
<td>60.0</td>
<td>39.1</td>
<td>99.1</td>
</tr>
</tbody>
</table>

- The highest life cycle emissions factor (LS<sub>f</sub>) of a waste and residues based fuel is 22.5 (Tallow) and still well below the lowest emissions factor of an agricultural based fuel (US-soybean oil, LS<sub>f</sub> of 64.4)
- UCO only accounts for an LS<sub>f</sub> of 13.9
ISCC supports the deployment of SAF

- ISCC members and system users active in SAF
- At the time being, 4 SAF producers and traders ISCC certified
- KLM and Lufthansa already use(d) ISCC certified SAF
- ISCC is involved in a scientific project analysing reporting requirements in supply chains of multi-blends of fossil and SAF (German Federal Government)
ISCC has submitted its application to ICAO as a sustainability certification scheme under CORSIA

- For the recognition, ISCC has developed a new ISCC CORSIA Standard

- The ISCC CORSIA System Document 201-1 “Waste, Residues, By-Products” will provide detailed information on:
  - Definitions and Regulatory Framework
  - Certification Process
    - Sustainability Requirements
    - Life Cycle Greenhouse Gas Emissions
    - Traceability and Chain of Custody
    - Inclusion of Additional Materials
NEW: Virtual Stakeholder Meeting "Sustainable Aviation Fuels with ISCC"

- Date: 03 December 2020

- Content:
  - The new ISCC CORSIA Standard
  - Regulatory frameworks
  - Chances and challenges of the deployment of SAF
  - Next steps and stakeholder discussions

Information and registration on the ISCC website
More information can be found on the ISCC website, including updates on further developments, conferences and publications.

Sustainable Aviation Fuels Certification with ISCC

One of the greatest challenges of our time is the fight against climate change. The urgent need to lower greenhouse gas emissions has also been recognised by the International Civil Aviation Organization (ICAO) and the aviation industry. ICAO Member States have set ambitious targets to mitigate greenhouse gas emissions from air transport, including carbon-neutral growth from 2020 and beyond. CORSIA, the Carbon Offsetting and Reduction Scheme for International Aviation, is ICAO’s instrument to address the increase in total CO2 emissions from aviation.

The figures show that these targets are challenging. Until 2020, the global number of flights has been rising for decades. In 2018 alone, over 4.3 billion passengers got on a plane – 62% more than in 2010. Three main reasons are often cited to explain these developments: booming low-cost carriers, a growing global middle class, and an increasing airport infrastructure (led by the Asia Pacific region). It is expected that the global passenger traffic will return to pre-COVID levels in 2014, and continue to grow after that.
Many thanks for your attention!

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Stakeholder Discussion and Agreement on Next Steps

- Further points of discussion?

- Experience and feedback shared in the TC and in the Working Group(s) will be reflected in the revised scheme documents for re-recognition under RED II

- ISCC is willing to share experience and knowledge regarding certification, international supply chains, national regulations, and database development

- Next meeting of the TC: Early September 2021

- Feedback poll
Many thanks for your attention!

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