SUSTAINABLE LOGISTICS. SIMPLIFIED.

POWERING THE FUTURE OF LOGISTICS WITH SUSTAINABLE FUELS

23 June 2022
Introducing our experts…

Dr. Henrik von Storch  
Team Lead Clean Operations Office  
Deutsche Post DHL

Frederik van de Ven  
Global Sustainability Director  
Air France KLM Martinair Cargo

Kathrin Brost  
Global Head of GoGreen  
DHL Global Forwarding

Maria Savranska  
Global Marketing Director  
DHL Global Forwarding
Agenda

1. Welcome & Introduction

2. Sustainable Fuels in Logistics: where are we today?  
   Dr. Henrik von Storch, Team Lead Clean Operations Office,  
   Deutsche Post DHL

3. Sustainable Fuels in Practice  
   Frederik van de Ven, Global Sustainability Director,  
   Air France KLM Martinair Cargo

4. Sustainable Fuels: the Road ahead  
   Kathrin Brost, Global Head of GoGreen  
   DHL Global Forwarding

5. Q&A & Wrap up
The operational perspective on sustainable fuels: Feedstocks define availability and sustainability – the fuel type determines applicability in vehicles and vessels

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Fossil Fuels</th>
<th>Bio Fuels</th>
<th>Synthetic Fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drop-in</strong></td>
<td>• Kerosene</td>
<td>• Biokerosene</td>
<td>• E-kerosene</td>
</tr>
<tr>
<td>(No modification</td>
<td>• Diesel</td>
<td>• Biodiesel</td>
<td>• E-diesel</td>
</tr>
<tr>
<td>needed)</td>
<td>• Gasoline</td>
<td></td>
<td>• E-gasoline</td>
</tr>
<tr>
<td></td>
<td>• Heavy Fuel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil (HFO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Non-drop-in</strong></td>
<td>• Hydrogen</td>
<td>• Hydrogen</td>
<td>• Hydrogen</td>
</tr>
<tr>
<td>(Modification to</td>
<td>• LNG / CNG</td>
<td>• Bio-LNG</td>
<td>• E-LNG / E-CNG</td>
</tr>
<tr>
<td>engine and</td>
<td>• Methanol</td>
<td>/ Bio-CNG</td>
<td>• E-methanol</td>
</tr>
<tr>
<td>infrastructure</td>
<td>• Ammonia</td>
<td>• Bio-methanol</td>
<td>• E-Ammonia</td>
</tr>
<tr>
<td>needed)</td>
<td></td>
<td>• Bio-ammonia</td>
<td>• Direct power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ethanol</td>
<td>usage</td>
</tr>
</tbody>
</table>

**Key takeaways**

- **Different feedstocks** can produce the same fuel products (e.g., Diesel, Biodiesel, E-diesel)
- The **fuel origin determines** the fuel type and sustainability
- The physical / chemical fuel characteristics determines the applicability
The various aspects of sustainable fuels form a complex landscape of energy sources, feedstock used, production technologies and resulting fuel types

**Simplified landscape of SF production routes – details cf. Appendix chapter 1**

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>Biomass &amp; Waste</th>
<th>Exhaust gas/ Air</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oils e.g. rape, soya, palm, jatropha</td>
<td>Sugar/Starch e.g. cane, beet, corn, wheat, rye</td>
<td>Waste e.g. sludge, manure</td>
<td>Carbon Capture (point source vs. ambient air)</td>
</tr>
<tr>
<td>Woody/Herbaceous/Algae e.g. residues, willow, poplar, straw, grass, micro algae</td>
<td></td>
<td></td>
<td>N₂ from air</td>
</tr>
<tr>
<td>Waste e.g. sludge, manure</td>
<td></td>
<td></td>
<td>Electricity e.g. wind, PV, hydro</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Logistics</th>
<th>Fuel Production</th>
<th>Main Fuel Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local sourcing/logistics &amp; treatment</td>
<td>Co-processing in existing refineries (max. 5%)</td>
<td>&quot;Blended SAF&quot; SAF blend based on co-processing</td>
</tr>
<tr>
<td></td>
<td>Esterification (FAME) Limited to oils and fats as feedstocks; leads to lower value fuel / not suitable for SAF</td>
<td>Biofuels Biodiesel (FAME) Biomethane (Biogas)</td>
</tr>
<tr>
<td></td>
<td>Hydrotreating / Isomerization Limited to oils and fats as feedstocks; higher value fuel, requires significant amounts of H₂ (today from natural-gas)</td>
<td>Advanced Biofuels Hydrotreat. Veg. oil / fats (HVO / HEFA) Alcohol to jet</td>
</tr>
<tr>
<td></td>
<td>Alcohol to Jet-Conversion Can use more diverse feedstocks; higher value fuels, less mature technology</td>
<td>Powerfuels Power-to-liquid Power-to-gas</td>
</tr>
<tr>
<td></td>
<td>Synthesis Broader base of feedstock, also suitable for power to liquid; requires H₂ from electrolysis</td>
<td></td>
</tr>
</tbody>
</table>

*Includes Fischer-Tropsch, Ammonia or Methanol Synthesis

DHL | Powering the Future of Logistics with Sustainable Fuels | June 2022
Feedstock focus: Availability of sustainable fuels is determined by three factors – Availability of feedstock, technology readiness and production capacity

**Availability of sustainable energy/feedstock**
- Limited to few waste-materials
- Competition with other uses (e.g. HVO/FAME)

**Readiness of technology**
- Fully available at scale
- Marginal improvements expected

**Capacity Ramp-up perspective**
- Continuous ramp-up to two-digit MT capacity in 2030

**HEFA/HVO/FAME**

**AtJ & FT**
- Several waste materials eligible
- Less competition with other uses
- Proven technologies, demonstration at scale underway
- Subject to successful demonstration facilities exponential growth

**Power to Liquid (incl. Ammonia)**
- Unlimited potential
- Relevant competition with other sectors for green power
- Proven technologies, demonstration at scale expected in 2020’s
- In 2020’s first demo facilities
- Exponential growth expected after 2030
Fuel Type Focus: Non-drop-in fuels will be relevant for clean road & ocean transport – in aviation drop-in solutions will remain predominant until 2050

(Near)-Drop-in Fuels

HVO available in some countries but focus on non-drop-in solutions

HVO/FAME Available and approved for blending in many ocean vessels

Several SAF pathways approved for 50% blending – aiming for 100%

Non-drop-in fuels & technologies

Several promising options: Battery-Electric, Bio-CNG/LNG partially available today; H₂ expected towards 2030

For e-fuels focus is on Ammonia and Methanol towards 2030

No impact Battery-Electric and H₂ aircraft expected for 2030 targets – for 2050 uncertain

Focus of decarbonization activities until 2050
Agenda

1. Welcome & Introduction

2. Sustainable Fuels in Logistics: where are we today?
   Dr. Henrik von Storch, Team Lead Clean Operations Office, Deutsche Post DHL

3. Sustainable Fuels in Practice
   Frederik van de Ven, Global Sustainability Director, Air France KLM Martinair Cargo

4. Sustainable Fuels: the Road ahead
   Kathrin Brost, Global Head of GoGreen DHL Global Forwarding

5. Q&A & Wrap up
AFKL CARGO SAF PROGRAMME

1. Supply chain of SAF vs Book & Claim
2. SAF Supply & Demand
3. SAF premium
SAF SUPPLY CHAIN FROM RAW MATERIALS TO AIRPLANE
BOOK & CLAIM – SAF FUELING SYSTEM

- SAF physical
- Fossil Jet
- SAF Book & Claim sale

SAF producer

Jet fuel supplier

Airport

Registry

Sustainability claim by airline or corporate

No claim

SAF supplier

Airport
CHALLENGING SUPPLY AND DEMAND DYNAMICS TOWARDS 2030

WE HAVE TO INTEGRATE SAF IN ALL OUR BUSINESS MODELS

SCANDINAVIA

Norway: SAF mandate in place (0.6%), 30% target for 2030
Sweden: Law proposal on SAF mandate start in 2021 (-0.8% GHG; -27% GHG in 2030)

FINLAND

Ministry proposal: 2022 start; 30% in 2030

Netherlands

Ministry proposal on SAF mandate: 2023 start, 14% in 2030

EUROPEAN UNION

ReFuelEU Aviation SAF mandate: Consultation on-going

FRANCE

SAF mandate: 1% in 2022; 5% in 2030
HELP CREATE SCALE OF PRODUCTION CAPACITY AND BECOME A PIONEER IN YOUR INDUSTRY

The premium price has reduced drastically since the 1st flight in 2009.

SAF Premium over conventional jet fuel

SAF REPRESENTS < 1% OF TOTAL JET FUEL DEMAND

PRICE
There is a significant gap between SAF and conventional jet fuel.

POLICY
Stable, effective and supportive policies are still lacking.

SUPPLY
Scale is needed to create economies of scale and further reduce the SAF price.

Together, we can overcome challenges now to grow the market for SAF and reach climate goals.
THANK YOU
Agenda

1. Welcome & Introduction

2. Sustainable Fuels in Logistics: where are we today?
   Dr. Henrik von Storch, Team Lead Clean Operations Office, Deutsche Post DHL

3. Sustainable Fuels in Practice
   Frederik van de Ven, Global Sustainability Director, Air France KLM Martinair Cargo

4. Sustainable Fuels: the Road ahead
   Kathrin Brost, Global Head of GoGreen DHL Global Forwarding

5. Q&A & Wrap up
Context & Background

Insetting Standard, currently being developed by Smart Freight Centre in collaboration with WEF

Project deliverables:

- Establish a book and claim chain of custody system for tracking insetting emission reduction
- Write an accounting standard for insetting consistent with GLEC Framework & GHG Protocol

Project timeline:

- Public consultation in summer, afterwards revision of text, finalization and layout
- Expected publication: End of 2022
Common Language – Emission Categories

Well to Tank

Upstream
Energy Provision Emissions

Tank to Wake

Downstream
Operational Emissions
Common Language – Emission Scopes

**Scope 3**
- **Well to Tank**: 20% CO₂
- **Tank to Wake**: 80% CO₂

**Scope 1**
- **Airline**: 20% CO₂

**Airline**
- **Forwarder**
- **Shipper**
Sustainable Fuel Switch – Sharing CO₂ Reductions

- **Emission reduction** can be passed on along the value chain, just like Scope 3 emissions
- To overcome SAF availability constraints and to create a SAF market more **flexible reduction allocation mechanisms** are needed:
  - Mass-balance
  - Book & Claim
  - Insetting

**One-Atmosphere Approach**

To overcome geographical or physical biofuel constraints we need to look at the aviation industry as one entity

All aircrafts exhaust in the same atmosphere. **Therefore, it does not matter for our climate where or in which aircraft biofuel is used** instead of fossil fuel.
Sustainable Fuel Switch – Mechanisms/Schemes

Direct physical supply

Mass Balance
Airline buys SAF. SAF is delivered into the fuel farm and airline physically only receives it in diluted form but claims the entire amount. Airline can grant Scope 3 reduction to forwarders/shippers

Scope 1 Book & Claim
Airline pays for SAF Scope 1 reduction. Fuel supplier delivers SAF to an airport (no physical connection). SAF is accounted for purchased volume. Airline cannot pass Scope 3 reduction along value chain. Airline cannot grant Scope 3 reduction to others

Scope 3 Book & Claim
Forwarder or shipper purchases Scope 3 reduction form airline or directly from fuel provider. Forwarder can grant Scope 3 reduction to shippers

Offsetting

Scope 1 & 3 reductions can be granted separately
Insetting Frameworks – Discussion Items (selection)

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-modal</td>
<td>SAF insets can only be used to reduce emissions from air transport</td>
</tr>
<tr>
<td>Activity</td>
<td>You can’t inset more air freight than the amount you are responsible for</td>
</tr>
<tr>
<td>Additionally</td>
<td>Fuels introduced to the network to fulfill a blending mandate cannot be used for insets</td>
</tr>
<tr>
<td>Other</td>
<td>Under discussion: vintage requirement, contract constraint, geographic constraint etc</td>
</tr>
</tbody>
</table>

- ‘Insetting’ term might be changed
- Discussions on ‘insetting’ boundaries ongoing
- BUT need for ‘insetting’ mechanism recognized
- AND conservative approach mitigates risks
Book & Claim Solutions – Available Market Solution

Book & Claim

Accelerates **uptake of sustainable fuels** in all transport modes. Addresses **current supply & distribution issues**

- **BOOKING**
- **MANAGEMENT & VERIFICATION**
- **CLAIMING**

*Independent 3rd party auditor verifies carbon calculation and reduction allocation process. Audits supply & demand process*

SF Registry

System of **registration, allocation, accounting** and **reporting** of SF with **standardized documentation** and **tracking methods**

- Feedstock Supplier
- SAF Supplier
- Verifier/Auditor
- Public Authority
- Registry
- Airline
- Airline Customer
- Final Customer

*Entire value chain gets information from Registry and/or enters information: From feedstock supplier to final customer*
Q&A SESSION

If you have any further questions, contact your usual Account Manager or Customer Service Representative, or email us at GoGreen.DGF@dhl.com

Subscribe here to our Sustainability Newsletter
THANK YOU
Stay connected and be the first to receive relevant updates

FOLLOW US ON LINKEDIN:

SUBSCRIBE TO FORWARDING INSIGHTS: