COMMITTED TO SUSTAINABLE AVIATION FUELS

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Green Liquid Fuels of the Future – February 11-12, 2021

Institute of Energy for SE Europe

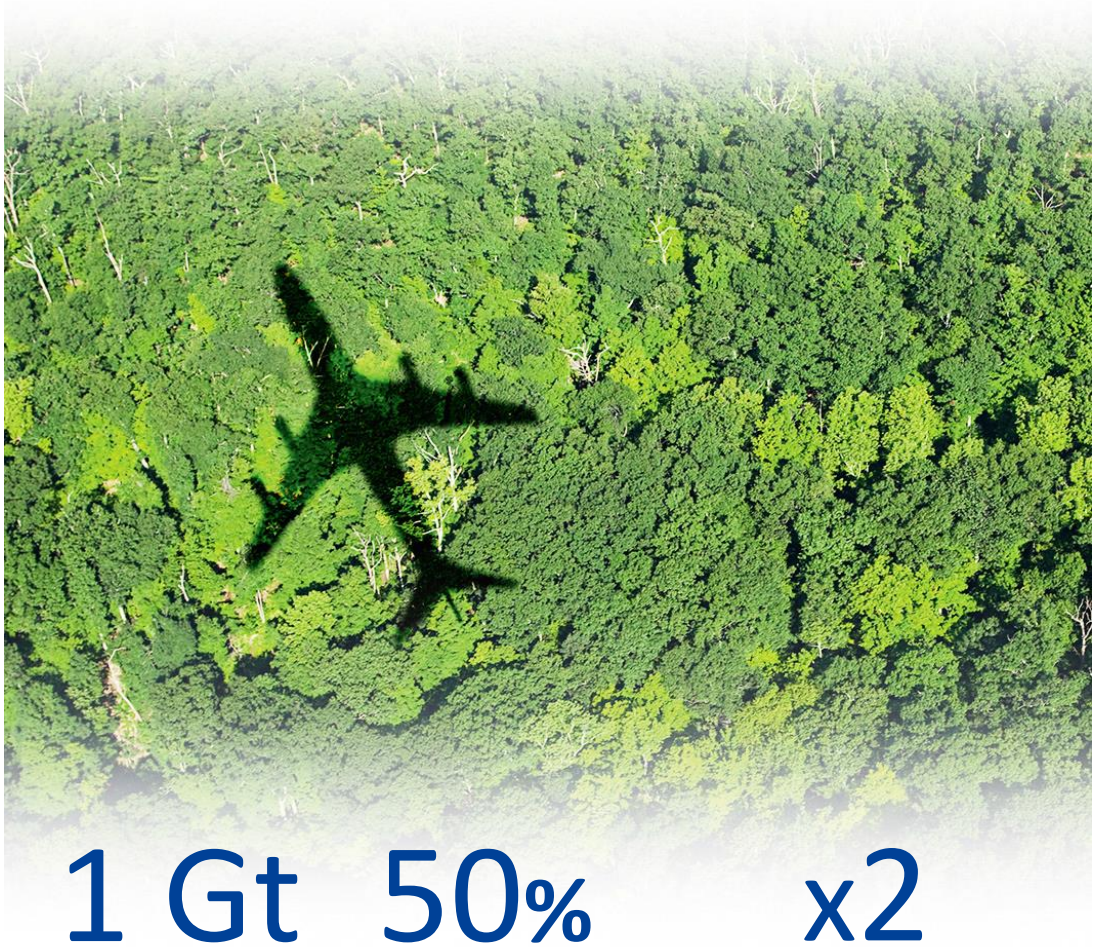
Our Ambition : Getting to Net Zero

Total shares the ambition to get to Net Zero by 2050 together with society for its global business (Scope 1+2+3)

3 major steps to get Total to Net Zero

1	**Net Zero on Operations by 2050 or sooner** (Scope 1+2)
2	**Net Zero in Europe by 2050 or sooner** (Scope 1+2+3)
3	**60% or more Net Carbon Intensity reduction by 2050** (Scope 1+2+3)

DECARBONIZING AIR TRANSPORT OFFERS NEW OPPORTUNITIES FOR SUSTAINABLE LIQUID FUELS



1 Gt

CO_2 emissions in 2019

50%

voluntary CO2 emissions reduction by 2050[1]

x2

fleet in operations over next 20 years

Airlines are **making commitments** to **CO_2** emission **reduction**

Liquid fuels hard to substitute for long haul flights

Renewable liquid fuel is the **only available solution** to reduce CO_2 emissions

First regulatory mandates in Europe:

- Norway 0.5% in 2020
- France 2% in 2025, 5% in 2030
- Europe to come

1 Source IATA, vs. 2005

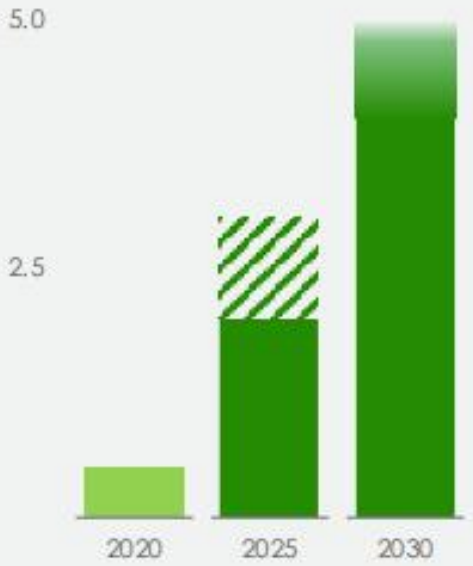
Becoming a leader in renewable diesel

Capturing synergies with existing assets

Converting existing assets	Co-processing	Developing on existing platforms
La Mède: **500 kt/y** **Zero oil platform**, **400 kt/y** bio-refinery in **Grandpuits**, start-up 2024 600-750 $/t Capex	**300 kt/y** in Europe, starting-up over 2022-24 Evaluating project in **Port Arthur** refinery in US ~500 $/t Capex	Evaluating **500 kt/y** project on Daesan integrated platform in **South Korea** ~750 $/t Capex

Low Capex vs. greenfield development (> 1,000 $/t)
Designing assets to allow feedstock flexibility

Renewable diesel production
Mt/y



KEY TAKE AWAYS 1/2

Growing need for the aviation sector to decarbonize its activity.

Liquid fuels are hard to substitute especially for long haul flights. Sustainable Aviation Fuels (SAF) are alternative to Conventional Aviation Fuels. They contribute in **reducing CO_2 emissions** and **do not require changes in existing infrastructures & aircrafts**.

SAF solutions will be a mix of technological development with strict sustainability criteria for advanced biofuels and synthetic fuels. Among the seven SAF approved pathways, **HEFA** is the only commercial and the **least expensive technology to produce today**. However, its development could be limited by the feedstock availability (need to secure oil waste & residues feedstock).

Total R&D concentrate efforts in developing three routes:

(1) Hydroprocessed Esters & Fatty Acids to support assets development

(2) Other pathways including Alcohol to Jet and Fischer Tropsch

(3) E-fuels, even if currently limited by availability of cheap renewable power.

Total aims at becoming a leader in renewable diesel / jet production. Grandpuits bio-refinery expected to produce 170kt SAF by 2024 using residual oils hydrotreatment technology (HEFA). We are exploring alternative routes to bring SAF to markets as early as 2021

KEY TAKE AWAYS 2/2

Cost of **SAF is at least 3 to 4 times higher than fossil jet market price**. **SAF development requires a supporting regulation**. First regulatory mandates are appearing in Europe. With appropriate legislation and technology development, SAF market could exceed 200Mt by 2050 (40% of the forecasted jetfuel market).

A **significant uptake of SAF should take place before 2030** in the path towards 2050, with obligation on the aviation demand side.

Reinforce EU regulatory framework on SAF, regulatory intervention best addressed at EU level vs national or international level.

EU authorities to decide whether the priority for aviation is to **wait for advanced biofuels availability or to start with sustainable biofuels** mostly based on RED's Annex IX-B that would already produce immediate emission reductions and prepare the sector for the future offtake of SAF


THANK YOU FOR YOUR ATTENTION