IEA Bioenergy
Technology Collaboration Programme

Task 39
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Progress in commercialization of biojet /Sustainable Aviation Fuels (SAF):

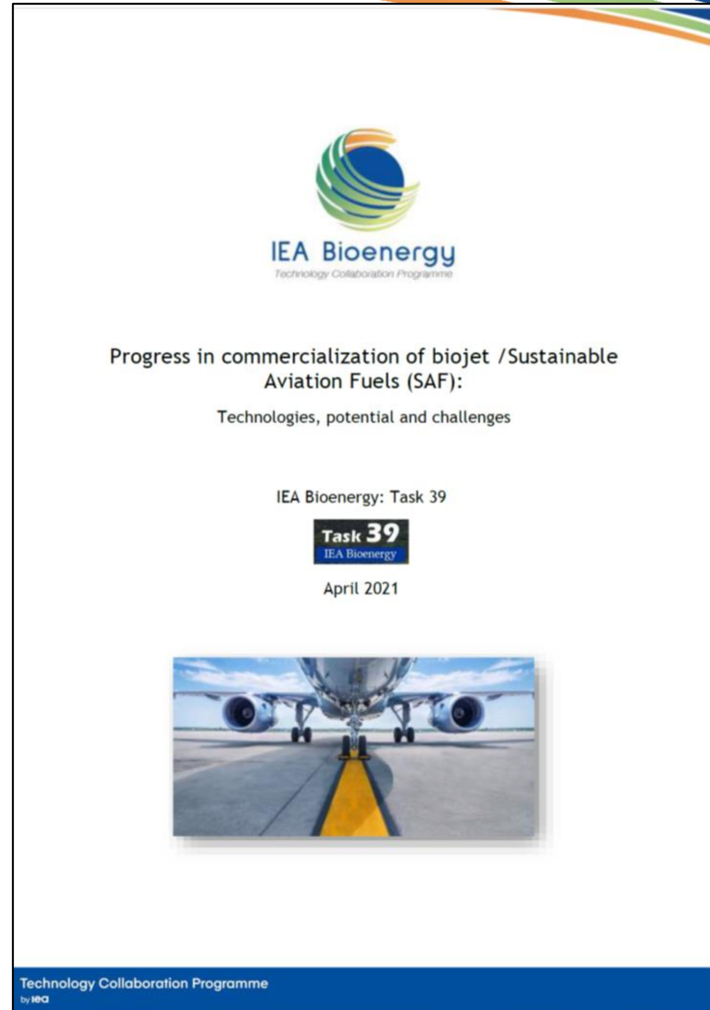
Technologies, potential and challenges

Susan van Dyk & Jack Saddler,

April 2021

Report content

- Introduction
- ASTM certification process
- Status of biojet fuel commercialization
- Technologies for biojet production – challenges and opportunities
    - HEFA
    - Gasification/FT
    - Pyrolysis/HTL & upgrading
    - Catalytic hydrothermolysis
    - Biochemical processes – focus on Alcohol-to-Jet
    - Electrofuels/Power-to-Liquids
    - Co-processing strategies
- Conclusions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A WEBINAR will be held on this report!

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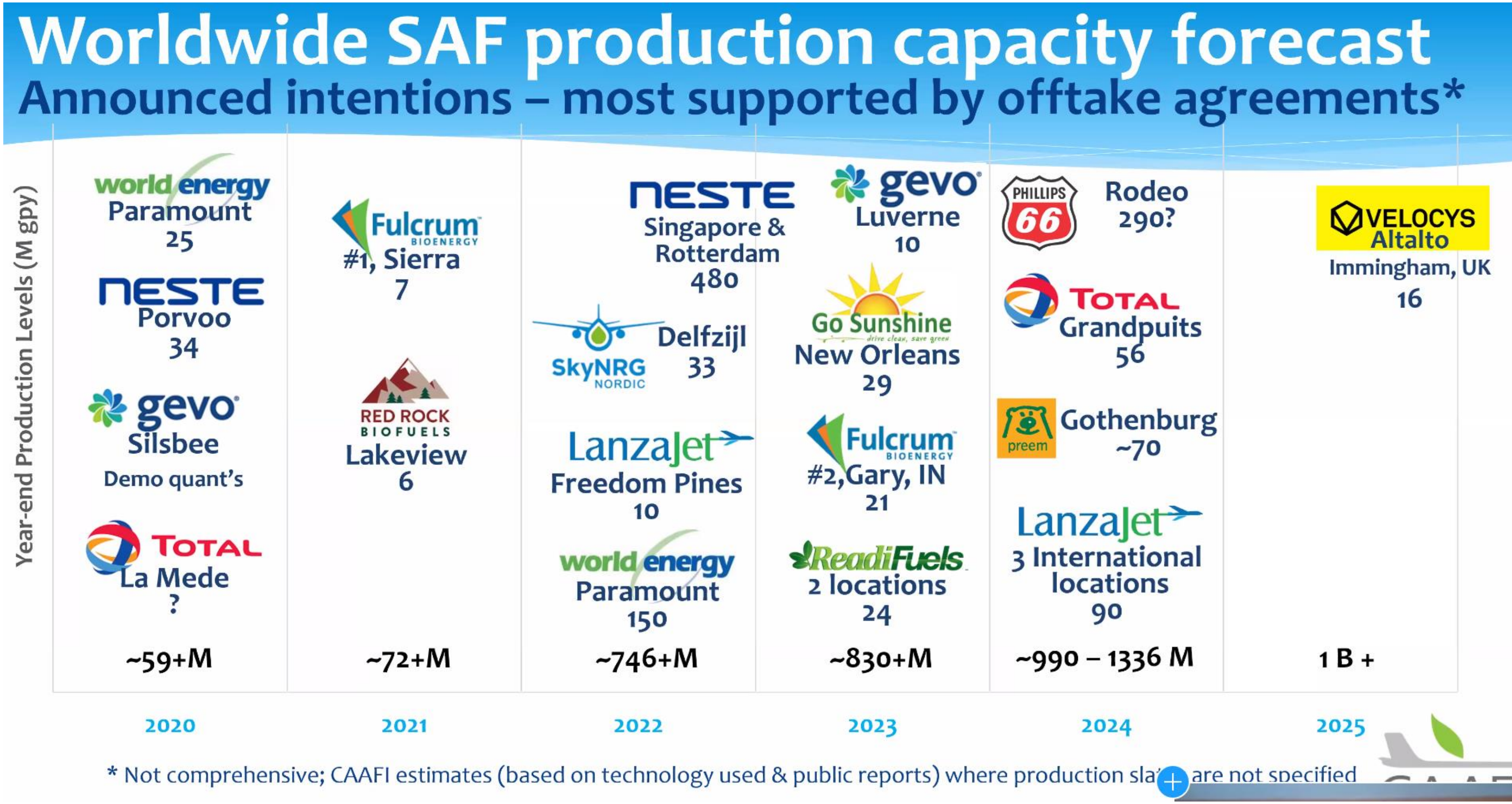
SAF development (information from CAAFI)



Current volumes ~ 140 million litres/yr

Potentially ~ 6 billion litres by 2030

Technology platforms – ASTM certification

APPROVED

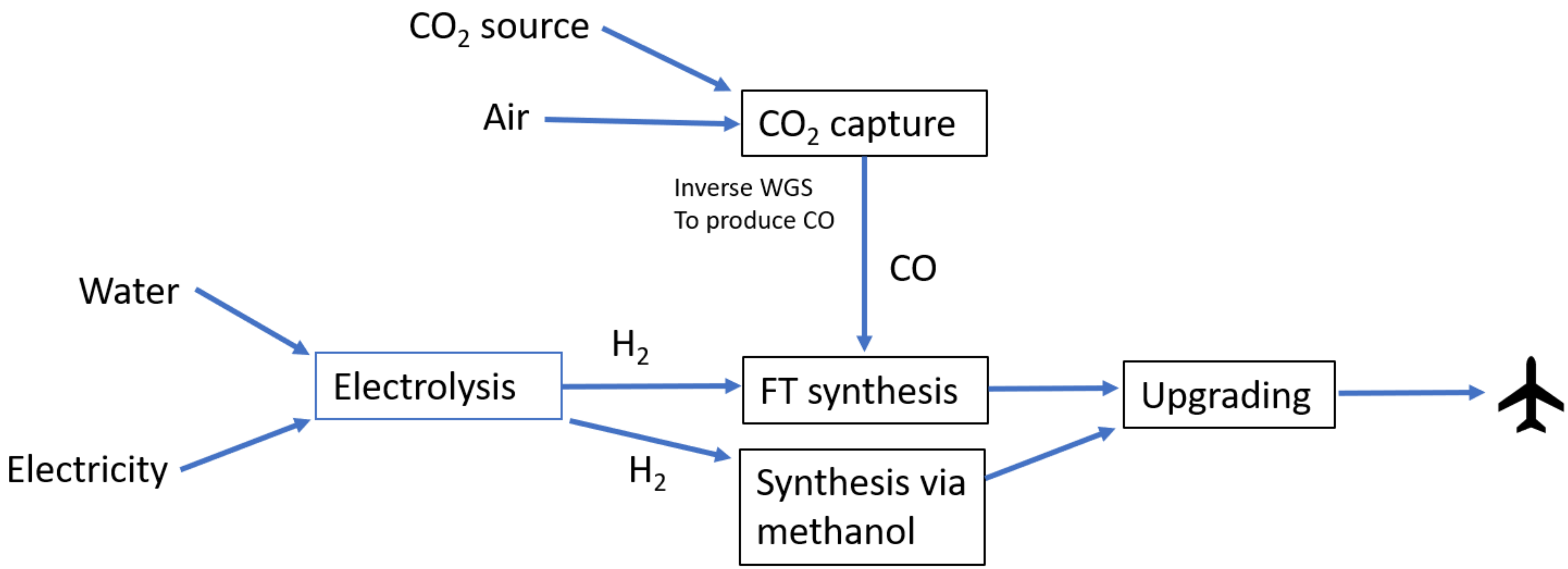
- Fischer-Tropsch SPK & SKA (2009) (50%)
- HEFA SPK (2011) (50%)
- Synthesized Iso-paraffins (SIP) (2014) (10%)
- Alcohol to jet SPK (isobutanol (2016), ethanol (2018))
- Catalytic hydro-thermolysis of lipids to jet fuel (50%)
- HC-HEFA-SPK – lipids from *Botryococcus braunii* algae (10%)
- Co-processing of lipids (5%)

In progress

- Synthetic kerosene/synthetic aromatic kerosene – Shell/Virent
- HEFA+ - HEFA with improved cold flow properties – Boeing
- Pyrolysis from lignocellulosic feedstocks – UOP, Kior (stalled)
- & 15 others in pre-certification stage

100% Sustainable Aviation Fuels?
Power-to-liquids?

Power-to-liquids jet fuel



Implications for ASTM certification

Conclusions

- Many biojet technologies have received ASTM certification and are being commercialized. The certification process has improved but safety requires a cautious approach.
- HEFA provides the only substantial commercial volumes – will continue to be the main commercial provider of biojet for the next 5-10 years.
- Within the next 5 years, technologies such as alcohol-to-jet (Gevo and Lanzajet) and gasification/FT (Fulcrum and Red Rock) will begin producing commercial volumes of biojet.
- Success of pioneer facilities will be important to pave the way for accelerated development.
- Low CI jet through technology pathways such as coprocessing of lipids in the hydrotreater should become available.

Conclusions (cont)

- Technical challenges remain for many technologies such as pyrolysis/HTL to jet
- But high investment cost for construction and high price difference with conventional jet fuel remains the biggest obstacle.
- Policy will play the biggest role in biojet development
- With limited investment all renewable diesel facilities can produce at least 15% biojet fraction or more if economically beneficial (policy NB)
- Technology commercialization on all fronts are required to reach climate goals

Thanks!

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