

# Sustainable aviation fuels: the solution to aviation's climate problem?

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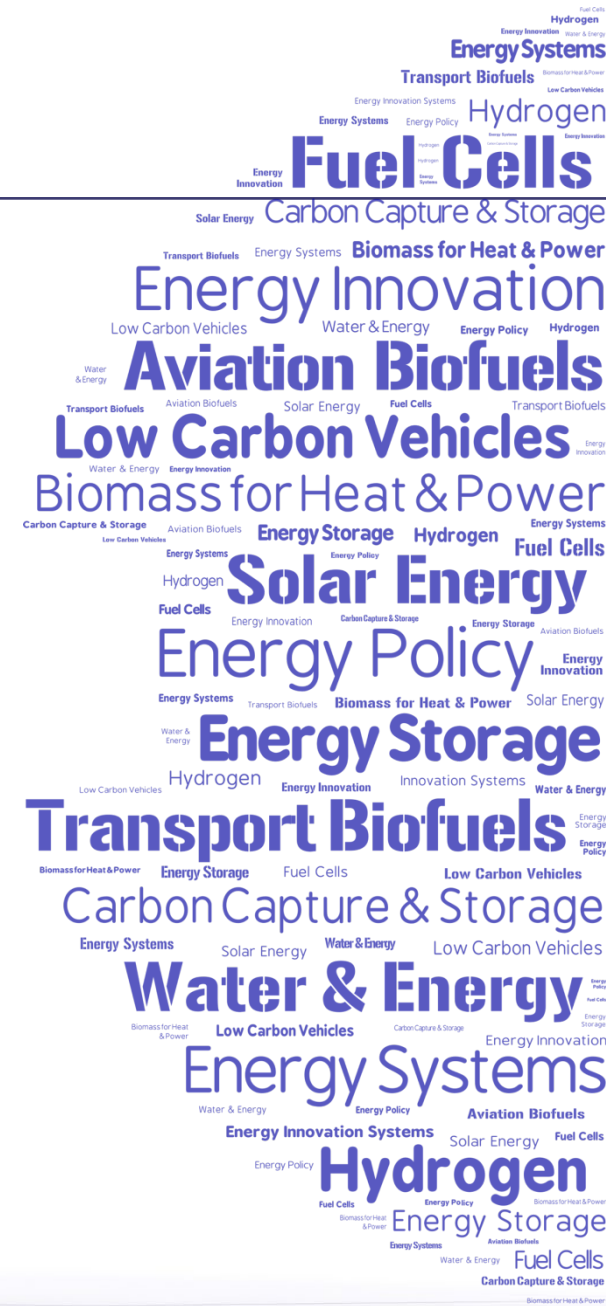
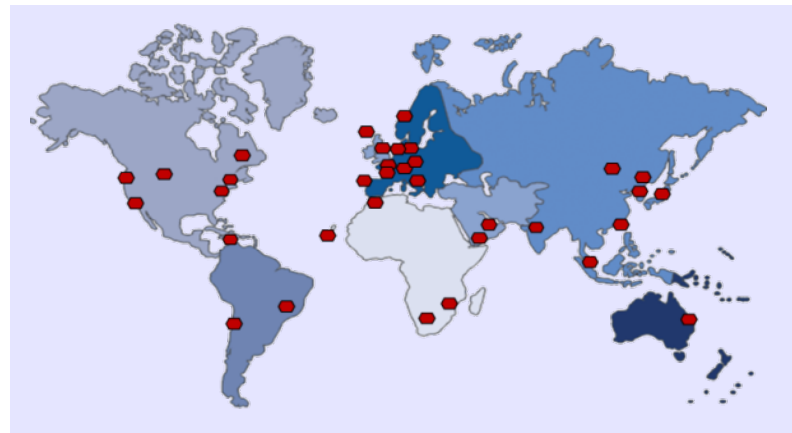
Jo Howes

Aviation & Covid: towards a green recovery?

1<sup>st</sup> December 2020

# E4tech's perspective

- International consulting firm, offices in UK and Switzerland
- Focus on sustainable energy
- Established 1997, always independent
- Deep expertise in technology, business and strategy, market assessment, techno-economic modelling, policy support
- Spectrum of clients from start-ups to global corporations



# Sustainable aviation fuel (SAF) is likely to be essential to decarbonising the aviation industry

Sustainable aviation fuels include biofuels, RFNBOs and recycled carbon fuels

## Biofuel

Renewable fuels from biomass - food and feed crops, wood, agricultural residues, the biomass fraction of wastes

## RFNBO

Renewable fuels of **non-biological origin** - also called **e-fuels, Power to liquids, power to X**.

Synthetic fuels, where renewable hydrogen is combined with CO<sub>2</sub> (from waste/residue fossil carbon sources or atmospheric/naturally-occurring carbon sources).

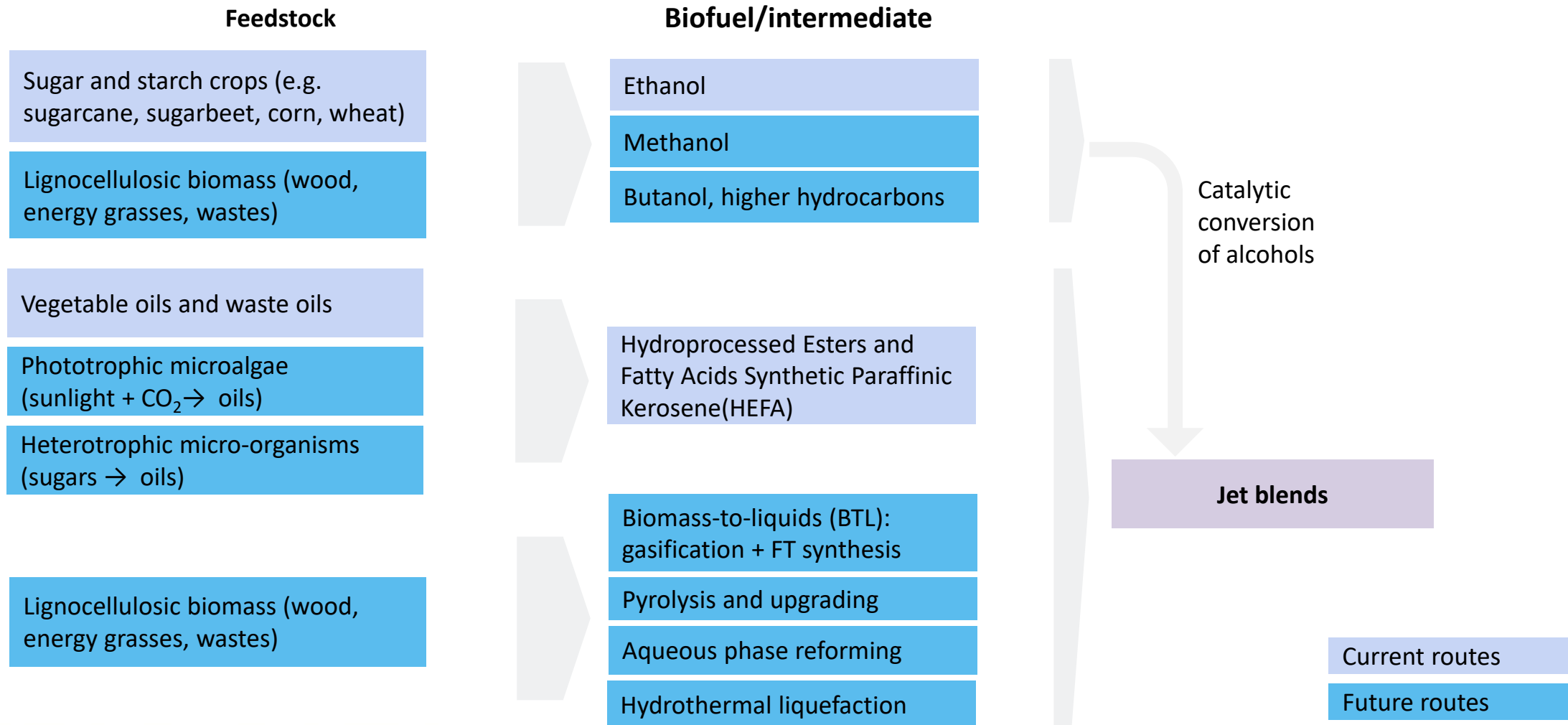
Would also include hydrogen and electricity in the future

## RCF

**Recycled Carbon Fuels**

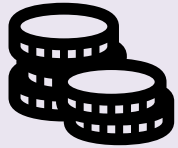
Derived from recycled gaseous or solid fossil wastes

# There are multiple options even within biofuels alone...



# ...with very different characteristics

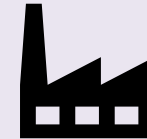
Cost



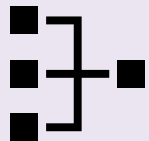
Sustainability



Stage of commercialisation



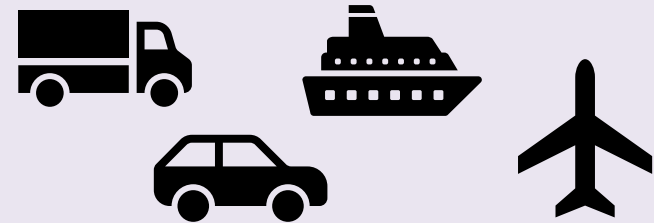
Supply chain



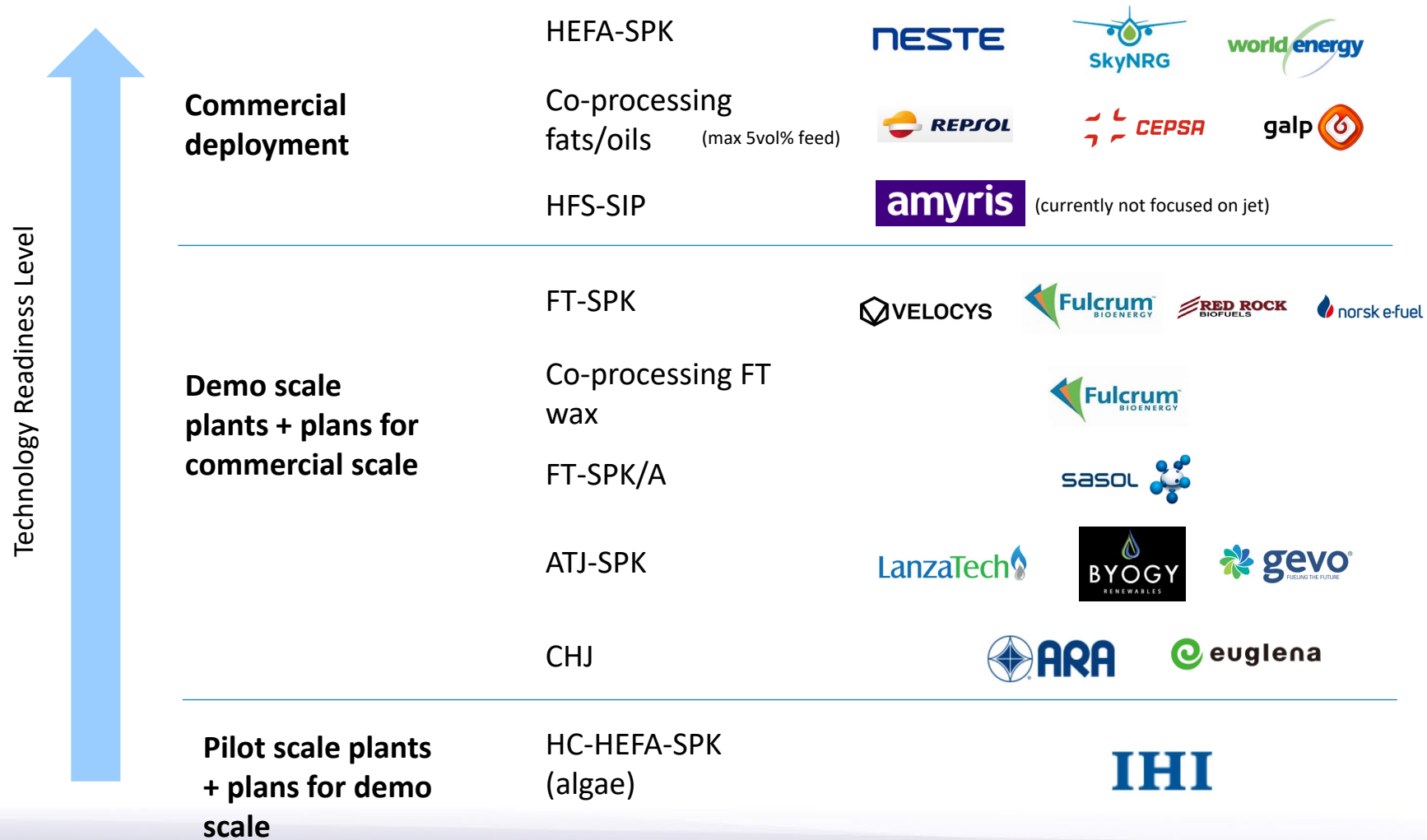
Resource potential



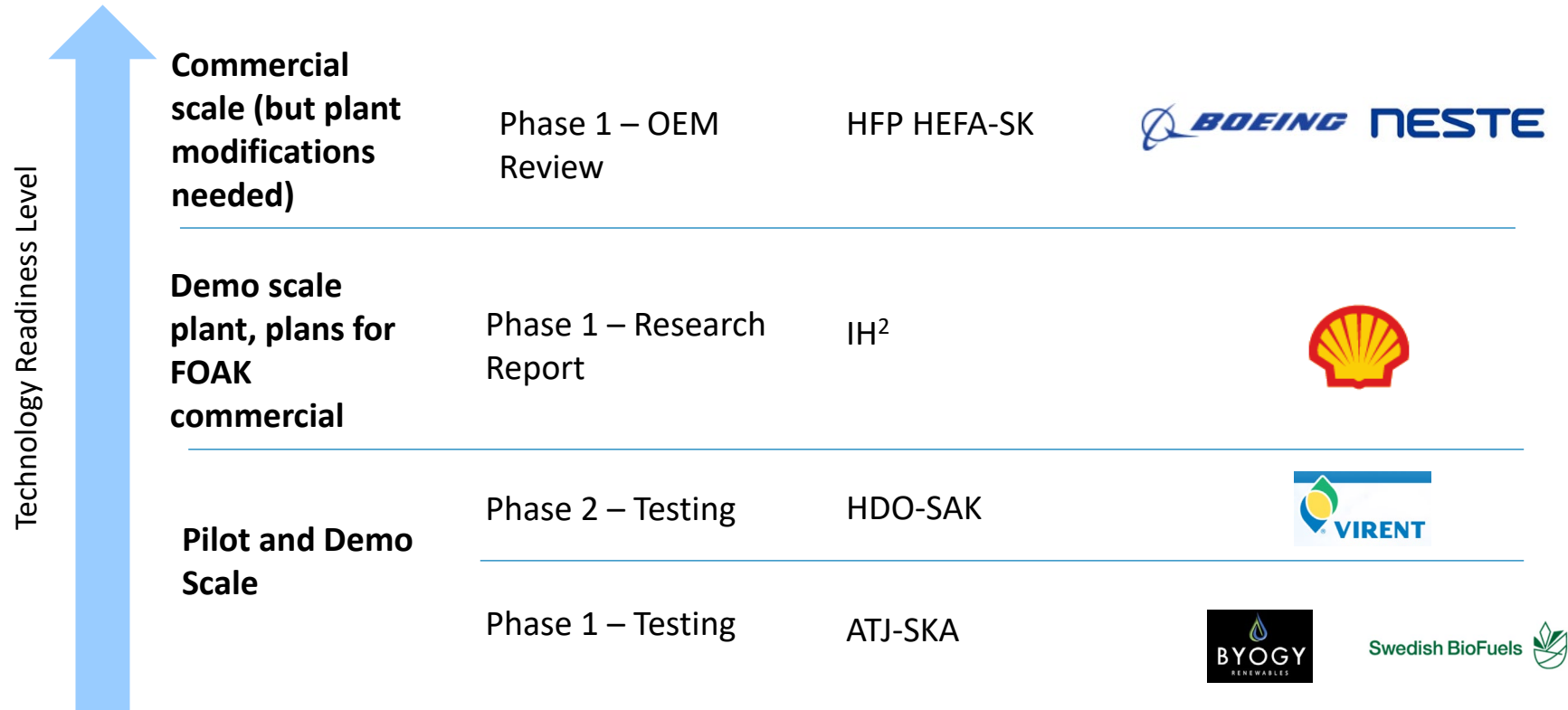
Competing end uses



# Certified routes: HEFA is most mature route, but there could be several FT-SPK and ATJ plants in the next 5 years

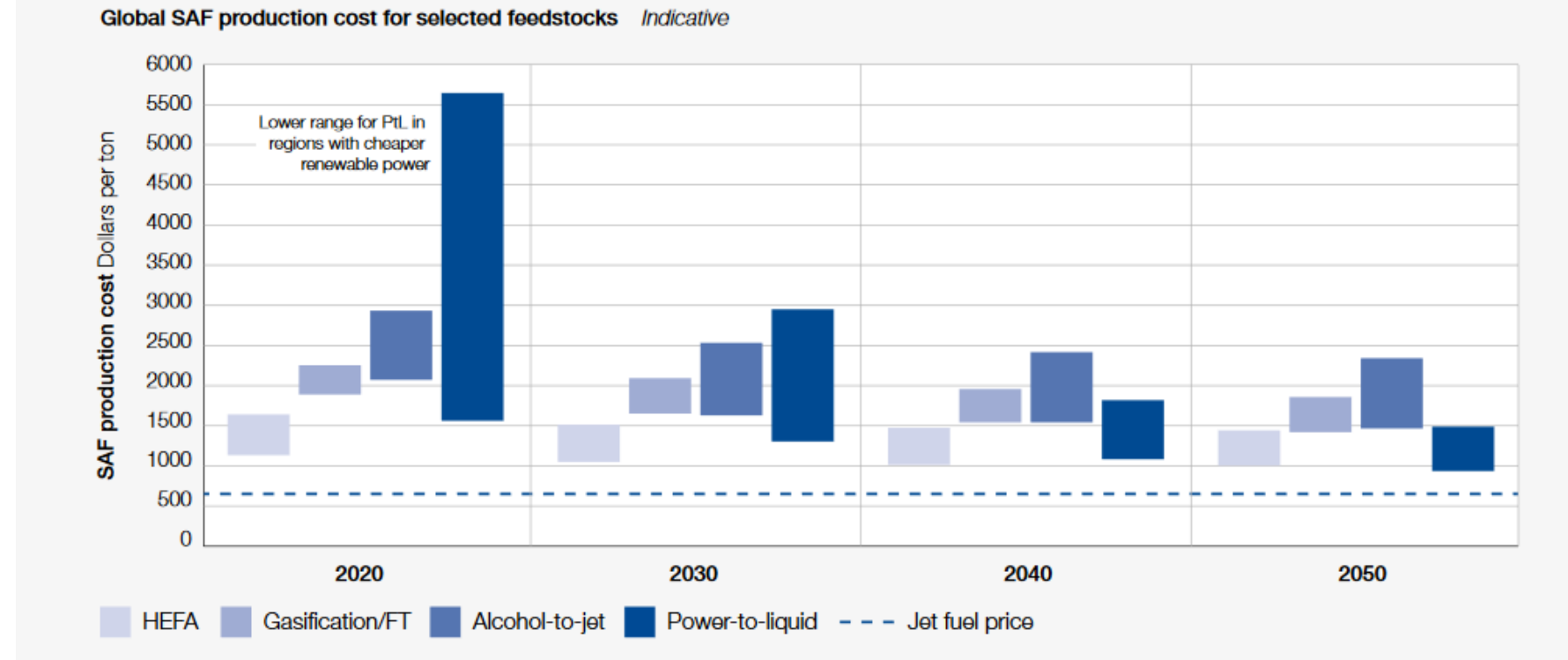


# Qualification Stage: Fewer players in this area, but HFP-HEFA and IH2 routes could be deployed soon if certified



# All routes are more expensive than fossil jet, and are expected to remain so, despite cost reduction potential

- Production cost is ~2-5 times fossil jet; price is even higher
- Lowest cost route is HEFA, which has high GHG savings when waste oils are used



Source: McKinsey

- However, waste oil feedstocks are limited: other higher cost routes must be commercialized for higher deployment and GHG savings
- How will the cost gap be bridged?



# Current policies are not enough to bridge the cost gap between SAF and fossil jet in most EU Member States

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- **CORSIA** is not expected to drive uptake of SAF significantly, as offsetting is expected to be cheaper
- Some aviation is included in the **EU Emissions Trading Scheme**, through counting biofuels meeting RED sustainability criteria as having zero GHG emissions, but the credit price is low
- Under **EU RED II**, aviation is not included in the target, but Member States can choose to count renewable fuels in aviation:
  - Intra-EU aviation can be counted towards the 14% target for use of renewable energy in transport, but not towards the overall target for renewable energy use.
  - Biojet produced from non-food or feed crops feedstocks counts 1.2x towards the target – an overall multiplier of 2.4x because of double counting of those feedstocks.
  - However, not all MSs have or will include aviation fuels within their national policy that implements REDII

## Because of this, European countries started to develop their own policies

- Countries have been developing national aviation fuels policy, for example:
  - **Norway**: obligation for 0.5% biofuels in 2020, expected to increase to 30% by 2030.
  - UK: jet fuel suppliers can opt-in into the RTFO scheme but are not obligated. SAF mandate under discussion
  - **Netherlands**: jet fuel suppliers can opt-in to the HBE trading scheme, and a mandate may be introduced.
  - **Sweden**: proposed GHG reduction target for aviation fuels to be met through biofuels blending
  - **Finland**: SAF obligation increasing to 30% in 2030
  - **France**: SAF roadmap, which aims to have 2% SAF blended by 2025, 5% in 2030 and 50% by 2050. However this may be achieved through supply side support rather than a mandate
  - **Spain**: climate law, 2% in 2025
  - Germany: Proposal for 2% PtL in 2030
- The sum of targets in bold would result in a relatively limited market for SAF - estimated at 1.7mt/yr in 2030, around 3% of projected EU market in 2030 – but still over 8 times the SAF produced in 2019

# The ReFuelEU Aviation programme is considering options for EU policy

- Instruments could include a mandate, funding mechanisms, voluntary agreements, technical support etc
- Most consultation responses received from industry agreed that a mandate would be an effective option. However, many important questions still to be resolved:

## How will it work?

- **Scope:** Intra EEA only or Intra and Extra EEA?
- **Obligated party:** fuel suppliers or airlines?
- **Chain of custody:** requirement for physical supply of SAF at each airport, or book and claim system to allow obligated parties to comply through SAF use in a smaller number of airports/flights
- **Interaction with other policies:** RED II compliance, targets, caps on crops and waste oils, sustainability criteria, GHG threshold, national carbon budgets, CORSIA

## Which fuels will be supplied and when?

- **Metric for the target:** Volume based or GHG based?
- **Qualifying feedstocks and fuels:** crops, waste oils, advanced feedstocks, e-fuels, RCFs, LCAF?
- **Target levels over time:** speed of ramp up, levels of sub targets
- **Buy-out and enforcement:** presence and level of a buy out price or penalty price
- **Accompanying measures:** supply side support for less commercialised routes

# Advanced biofuels and e-fuels will require additional support beyond what is provided for HEFA

- **Wider policy clarity**
  - Long term vision from governments on how to decarbonise transport
  - Recognition of timing of markets for biomass and power-derived fuels and chemicals
  - Implementation of RED II
- **Market and revenue certainty** through market-based policy
  - Sub target for advanced biofuels and e-fuels
  - Floor price or contracts for difference
- **Access to finance** for demonstration and first of a kind commercial scale plants
  - Public support for plants e.g. capital grants, loan guarantees, direct equity investment, tax credits, green bonds
  - Private sector investment

# E4tech – Strategic thinking in sustainable energy

- For more information please visit our website:

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