CSIRO

Scaling Powerfuels

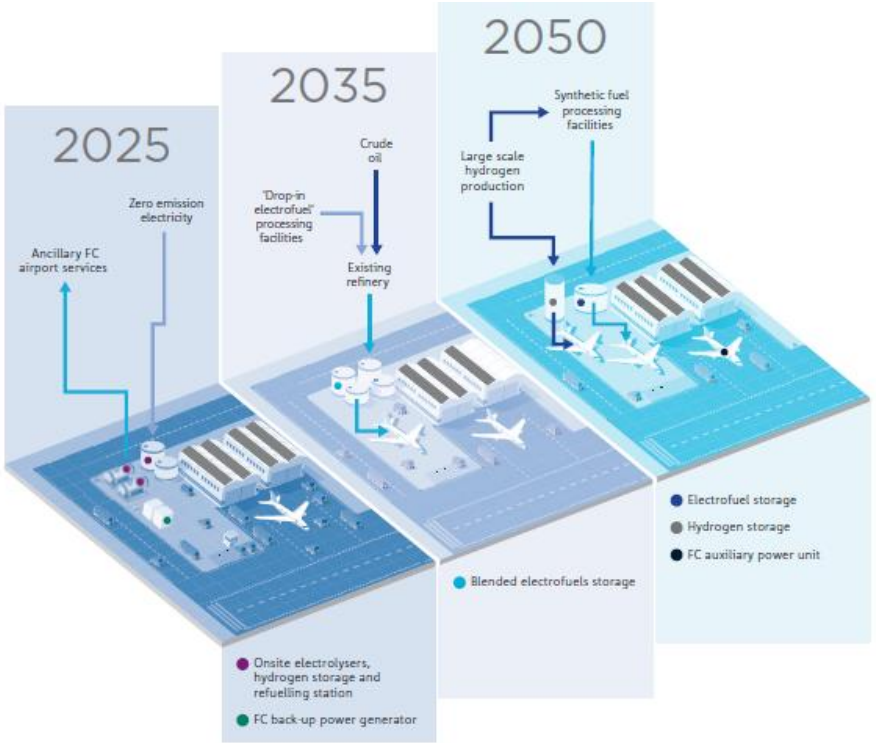
Australia-Germany Workshop
October 2020

Introduction

Opportunities for clean hydrogen

- Applications broken down into three primary technology categories:
  1. On/adjacent airport
  2. **Existing infrastructure (PtL)**
  3. Emerging infrastructure

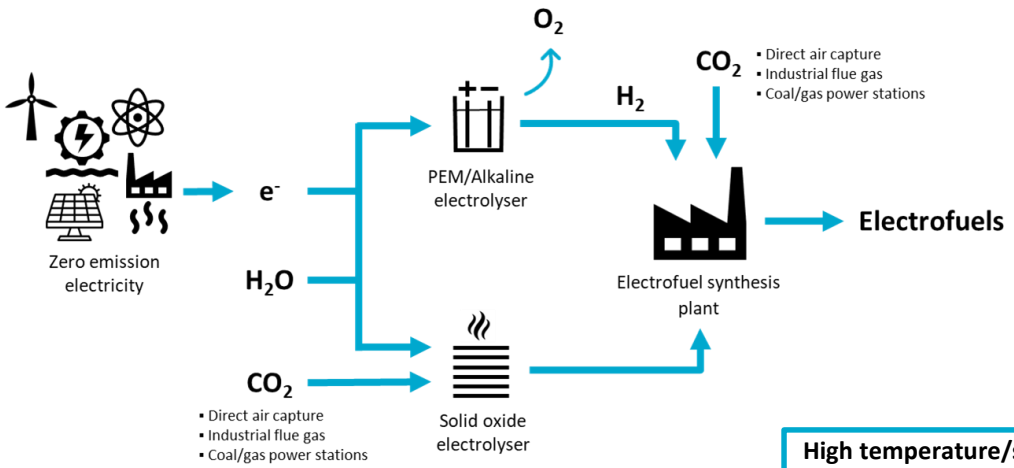
- Implicit time component that reflects maturity of the technology



Investment priorities

Existing infrastructure (Electrofuels)

- **Given the low rate of asset turnover within the aviation sector, PtL represent one of the primary ways in which hydrogen can be used to achieve meaningful decarbonisation before 2050 without extensive changes in infrastructure.**



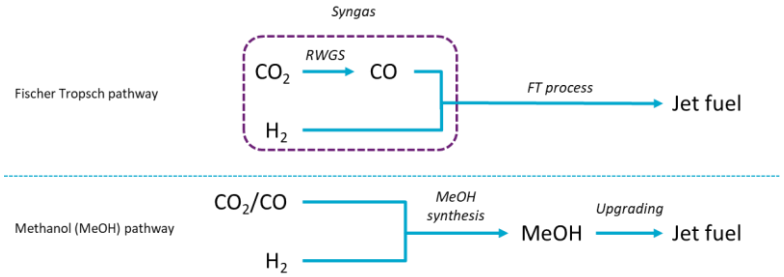
High temperature/solid-oxide electrolysis has a lower TRL (6-7) but critical in utilising upstream waste heat

Investment priorities

Existing infrastructure: Electrofuel production pathways

- **No end-to-end commercial jet fuel synthesis to date but a strong technology and regulatory base that can be built upon**

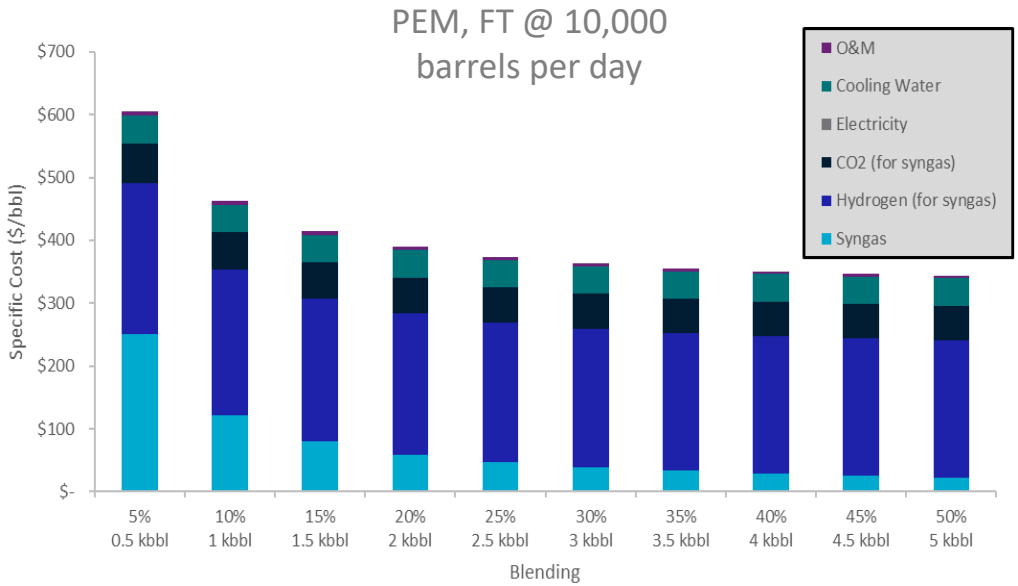
- 2 primary production pathways
  - Both start at ˜8 times (8x) the pre-COVID cost of kerosene
  - So far, only FT pathway approved up to blends of 50 vol% under ASTM D7566
  - MeOH more targeted so requires less feedstock but no movement on certification to date



Investment priorities

Existing infrastructure: Scale and blending

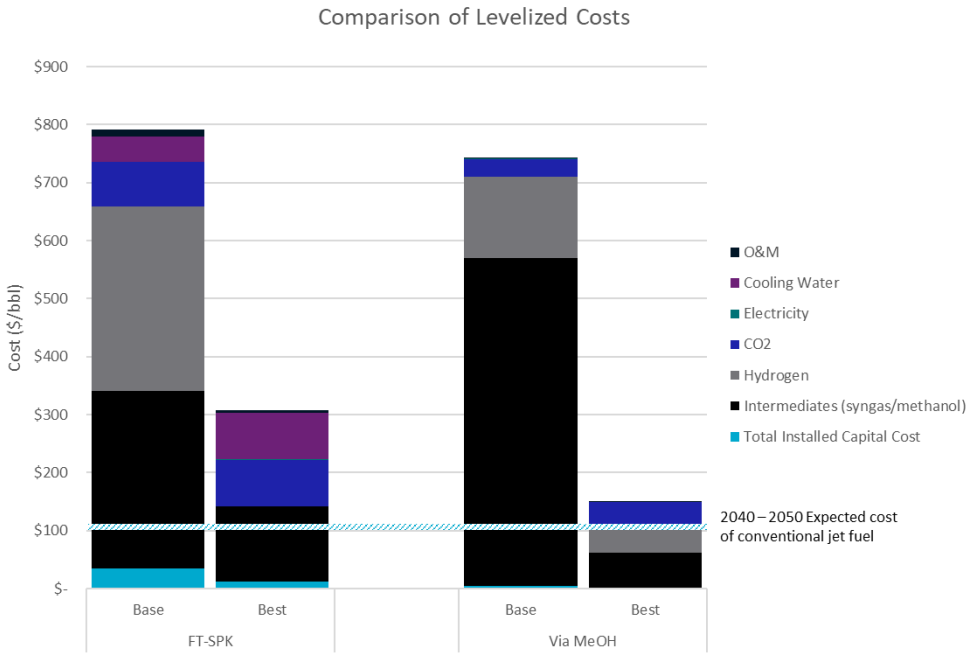
- Scale is critical
- Electrofuel blending quotas imposed on jet fuel producers that increase over time
  - Commensurate with industry resources and capacity
  - Determined by key advisory bodies
  - Consistency across jurisdictions to prevent market distortions



Investment priorities

Existing infrastructure: Base case and best case

- Electrofuels only reach 1.25 – 2.5x (the projected cost of kerosene) once a 50% blend is achieved
- Best case includes direct-air capture of CO_2 and solid oxide electrolysis
- Blending at this rate is likely to only occur after 2040 given the lead times required
- Effort required on part of industry and government to limit cost-pass through



Thank you

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