Cerulogy

The UK's SAF Mandate

Presentation for ICARUS Workshop 2024-07-09

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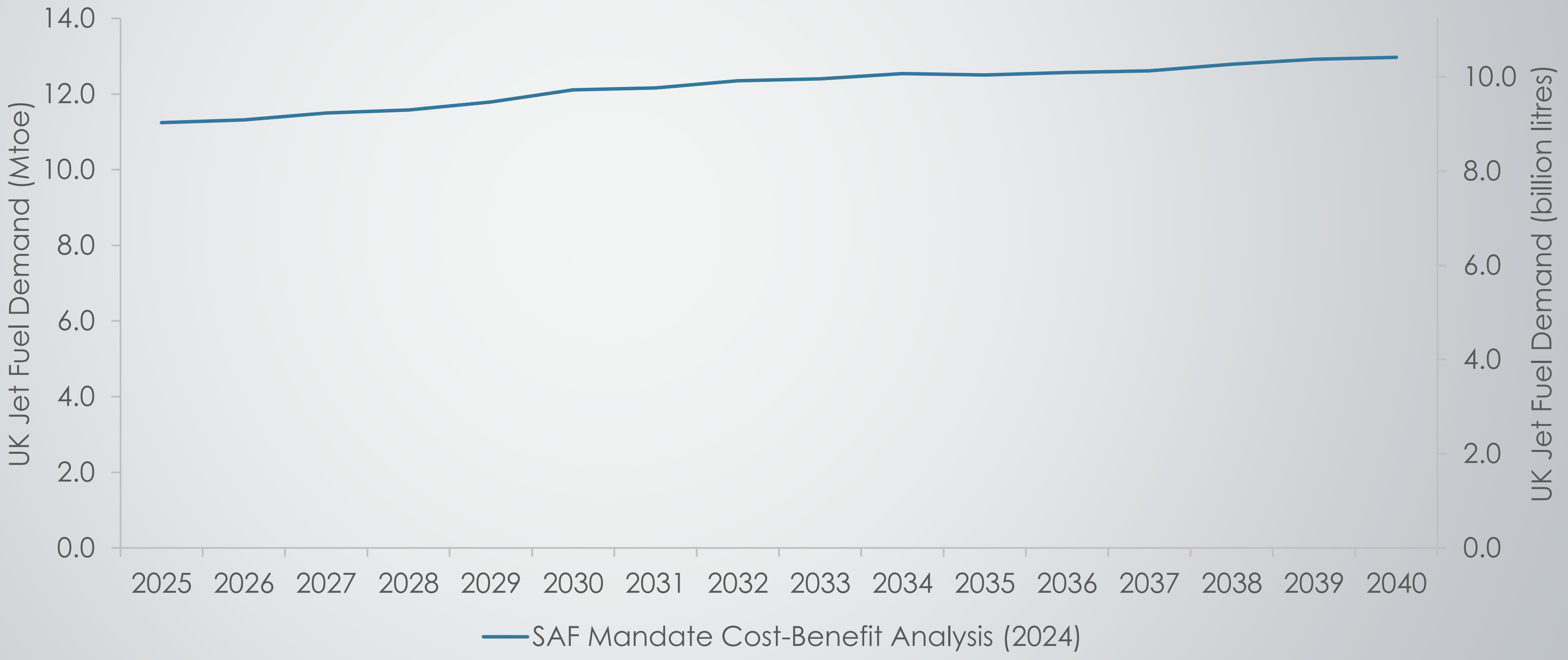
About me & Cerulogy

- I have a background in physics (soft condensed matter at NYU)…
- …then solar mini-grids with Smart Power India…
- …and now climate change policy, data, and modelling at Cerulogy

- Cerulogy is a small UK-based consultancy led by Chris Malins
- Evidence-driven research for international NGOs, industry, government
- Domains of expertise include:

Alternative fuels	Renewable energy policy	Credit markets	Land use change	Feedstock production	Habitats and biodiversity	Technology innovation	Carbon removals

Aviation in the UK



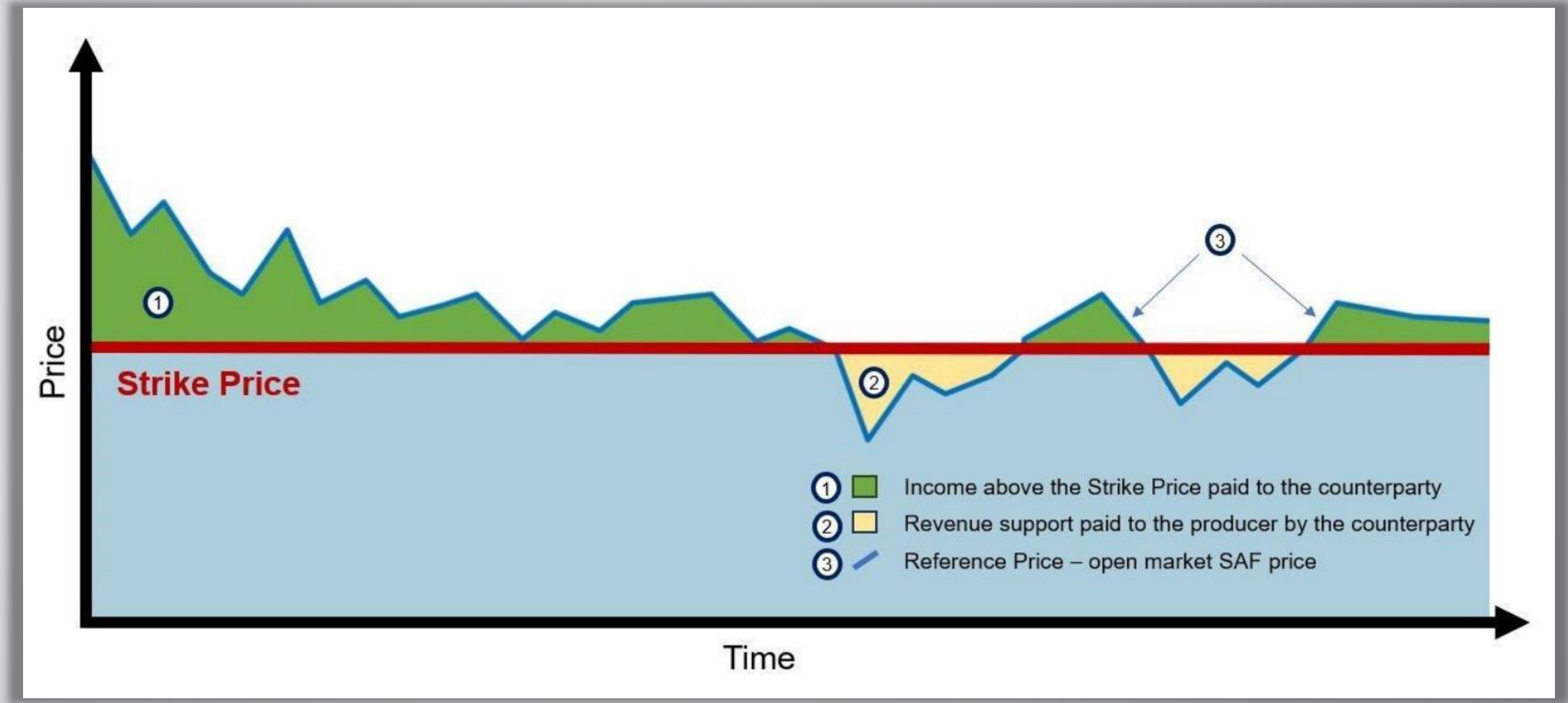
Source: UK DfT "Sustainable Aviation Fuel Mandate Final stage Cost Benefit Analysis" (2024)

Government initiatives

- ‘Jet Zero Strategy’ (UK Department for Transport, 2022)
  - Net zero aviation greenhouse gas emissions in 2050
  - Alternative fuel, efficiency improvements, offsetting
  - Does not directly address non-CO_2 warming from contrails and NO_x
- Grant support for alternative fuel production
  - Advanced Fuels Fund (AFF) allocated £135m to 13 FOAK and demo projects
  - Commitment to have five commercial plants under construction in 2025…
- Revenue certainty mechanism for UK-based aviation fuel producers
  - Options under consideration, to be decided in 2026

Guaranteed Strike Price (GSP)

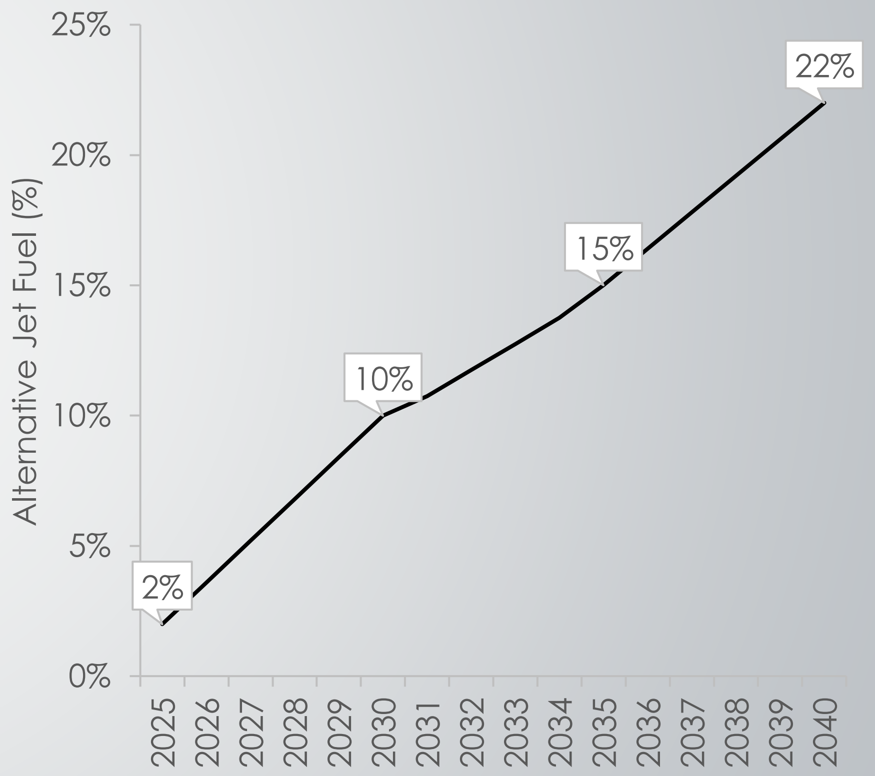
A.k.a. contract-for-difference (CfD)



Source: Jet Zero Council presentation 2024
Cf. the analysis of CfDs in [“Fuelling Development” (2021)]

The SAF Mandate

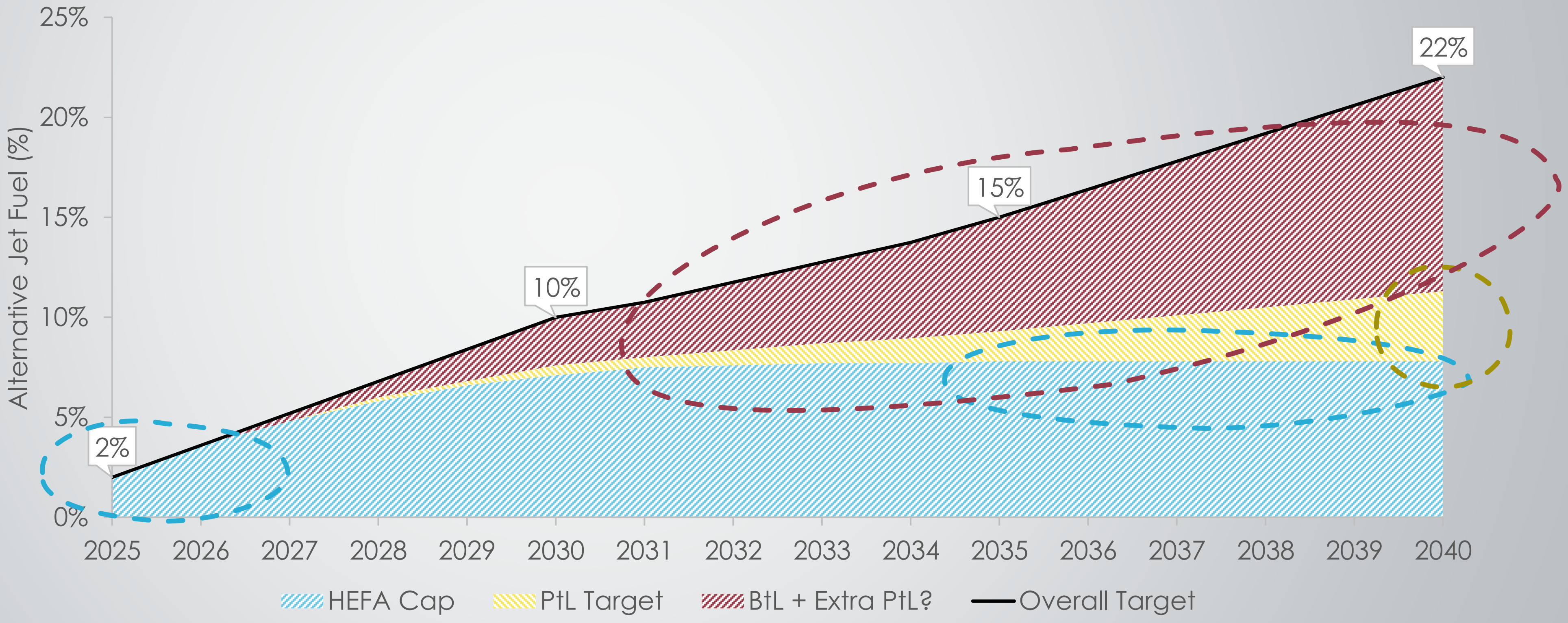
- Finalised in April 2024*
- Aviation fuel suppliers must meet blending targets
- Tradeable ‘SAF Certificates’
- Weighted by emissions intensity
- Criteria:
  - Minimum 40% greenhouse gas saving (cf. fossil 89 gCO_2e/MJ)
  - Biofuels from wastes and residues
  - PtL from ‘low-carbon’ electricity



** But has yet to become law*

Source: UK DfT *“Supporting the transition to Jet Zero: creating the UK SAF mandate” (2024)*

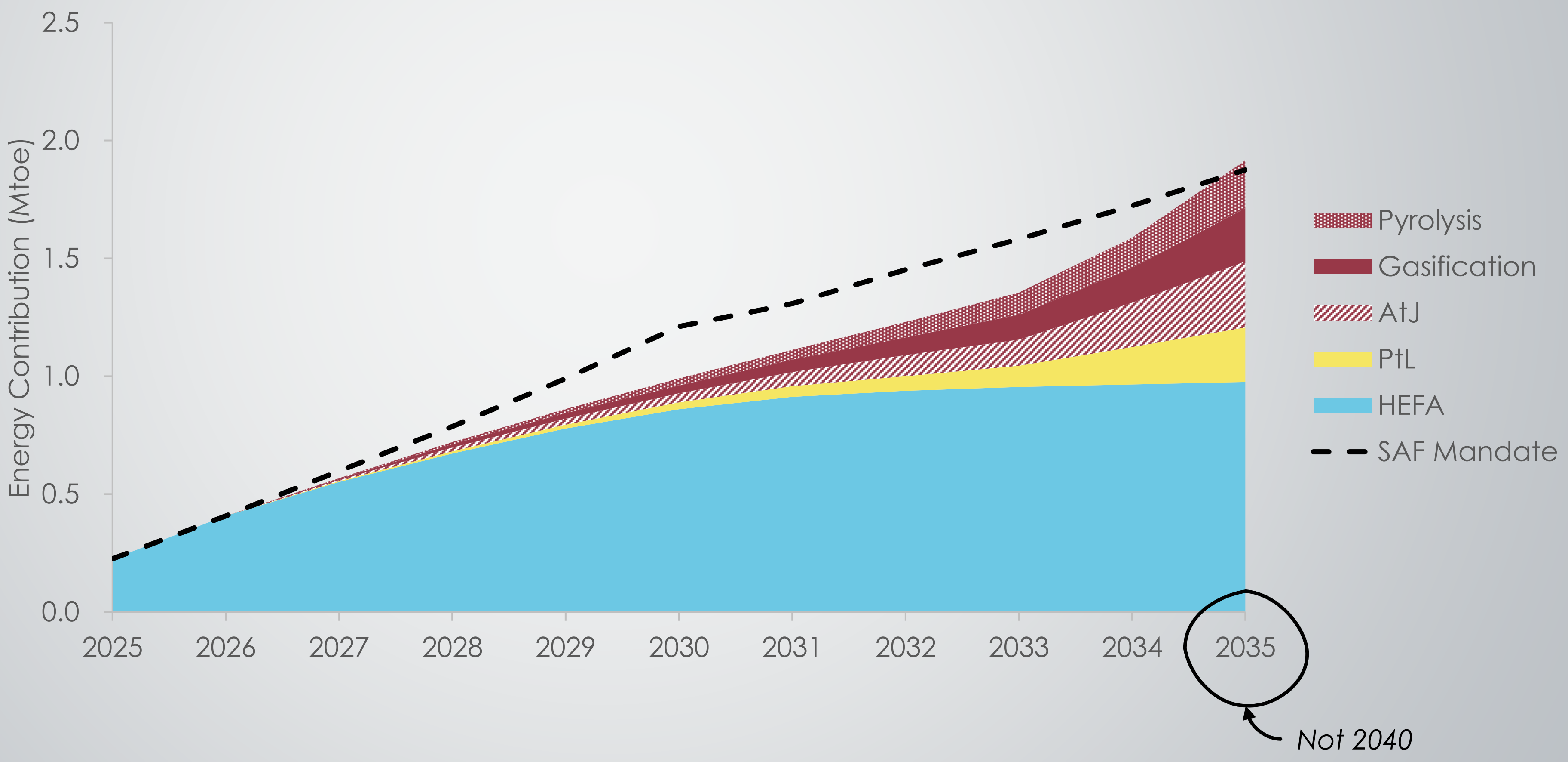
HEFA cap and PtL sub-mandate



Source: UK DfT *"Supporting the transition to Jet Zero: creating the UK SAF mandate" (2024)*

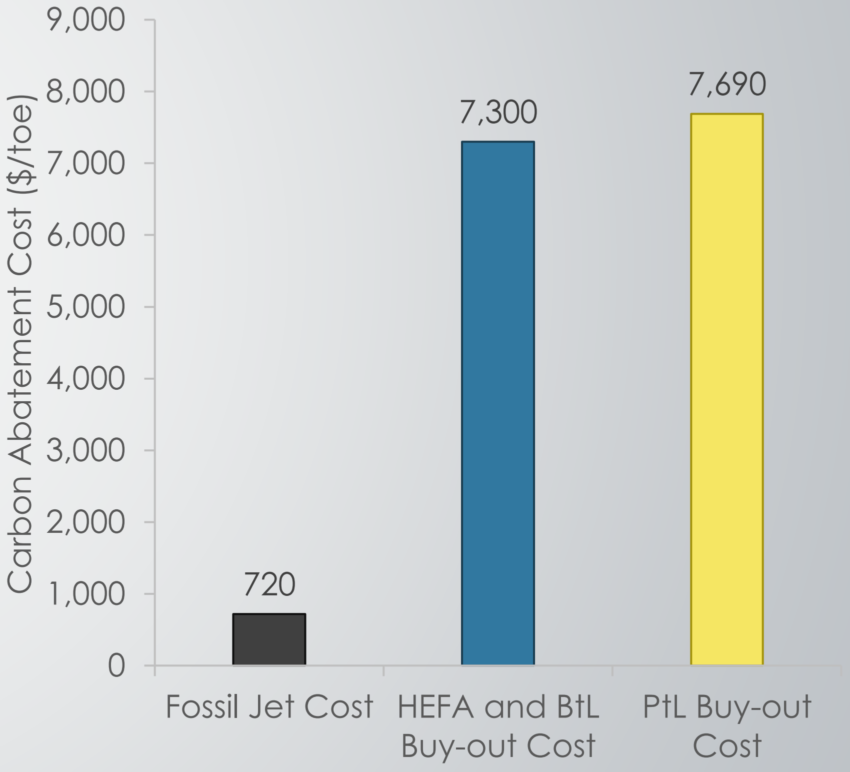
UK industrial development scenarios

(Modelled in Cerulogy's forthcoming report for ICCT)

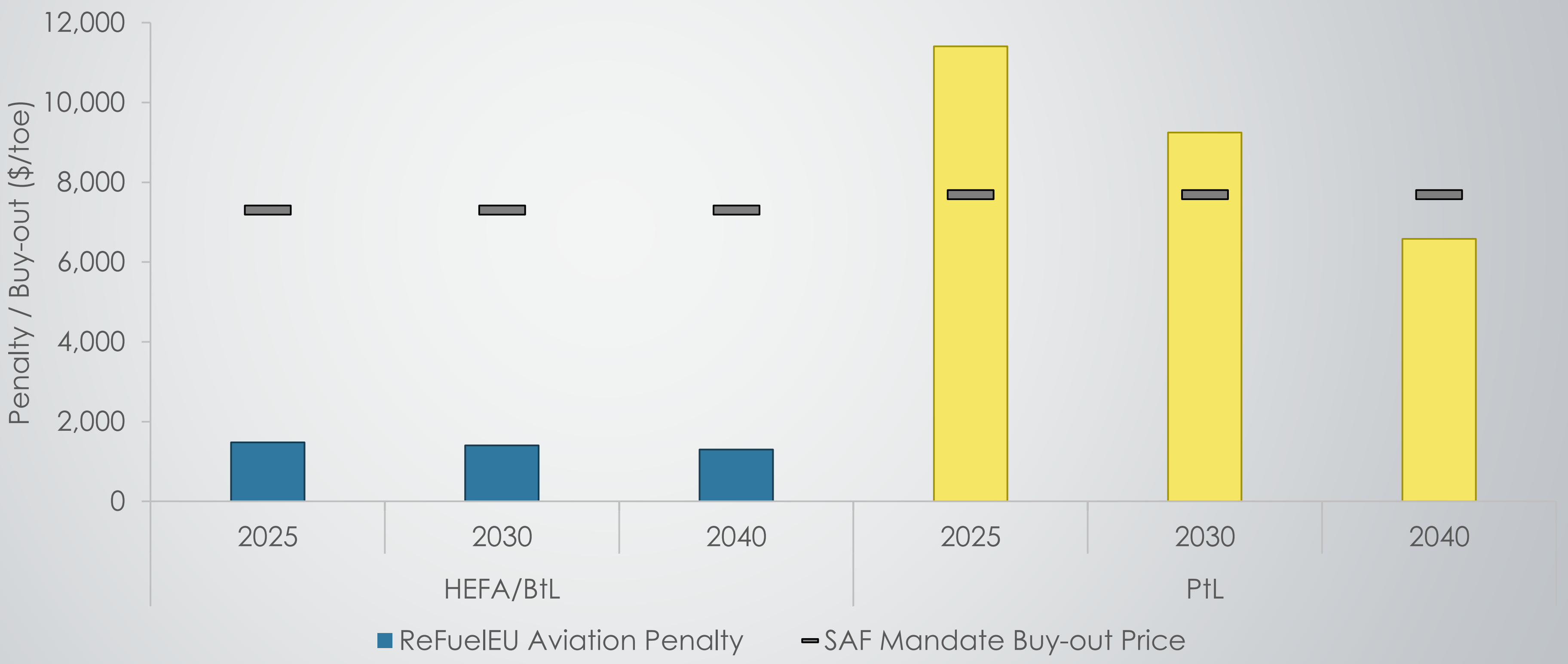


Buy-out

- Fuel suppliers have the option to 'buy out' of their obligation
- High adopted buy-out price should motivate fuel producers
  - Implied carbon abatement price ~2,800 $/tCO_2e$
- International competition: prices offered on other markets will determine where the fuel goes



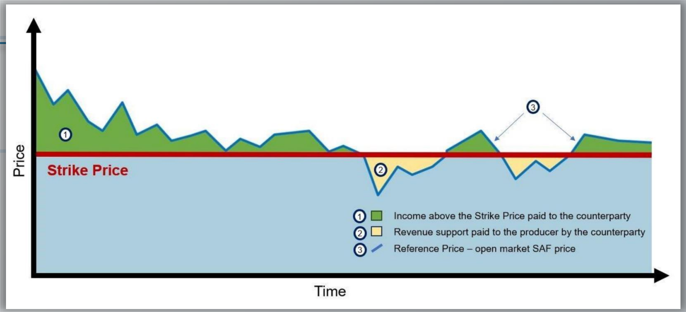
SAF Mandate buy-out (dashes) vs ReFuelEU Aviation penalty (columns)



ReFuelEU Aviation penalty estimated using the 'Central' fuel cost scenario in the SAF Mandate cost-benefit analysis. This does not take into account the deficit carry-over provision in ReFuelEU Aviation!

Outstanding concerns

Absolute emissions don't fall	Little or no reduction in absolute emissions from a growing aviation sector, which remain at ~40 $MtCO_2e$ per year
Net emissions might grow!	Lipids, renewable electricity, hydrogen, etc. diverted from other sectors, reducing overall efficiency
CO_2 abatement price	High cost compared to other sectors
Non-CO_2 warming	No mechanism to recognise warming from contrails and NO_x
Environmental safeguards	DfT say they will consider relaxing parameters/criteria to limit costs, but this would undermine the value signal for more sustainable fuels
Competition	Evolving international markets will raise prices; unclear how competitive the UK will be
Investor confidence	High CapEx requirement for BtL & PtL – will the SAF Mandate motivate investment?



In summary

- The UK is set to adopt binding targets for use of alternative fuels in aviation
  - 10% of energy in 2030, 22% in 2040
  - Separate target for power-to-jet fuel
  - Rewarding emissions performance as well as volume
- Fuel criteria focus on sustainable feedstocks and motivating BtL & PtL
  - Wastes and residues, renewable electricity, HEFA capped
- Cerulogy's forthcoming report for the ICCT explores various scenarios
  - Without demand reduction, UK aviation will remain a significant source of climate warming
  - Reliance on imports and/or buy-out as PtL and BtL production ramp up
- Investment assurance
  - Revenue certainty mechanism for UK producers (2026)
  - High buy-out price to make the UK an attractive market for global producers

Thanks!

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