

NOVA PANGAEA TECHNOLOGIES

BIOMASS WASTE AS AN ENABLER TO AVIATION NET ZERO

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JONATHAN WOOD
NOVA PANGAEA TECHNOLOGIES
INNOVATE UK SAFE CAFE
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AVIATION HAS COMMITTED TO ACHIEVING NET ZERO

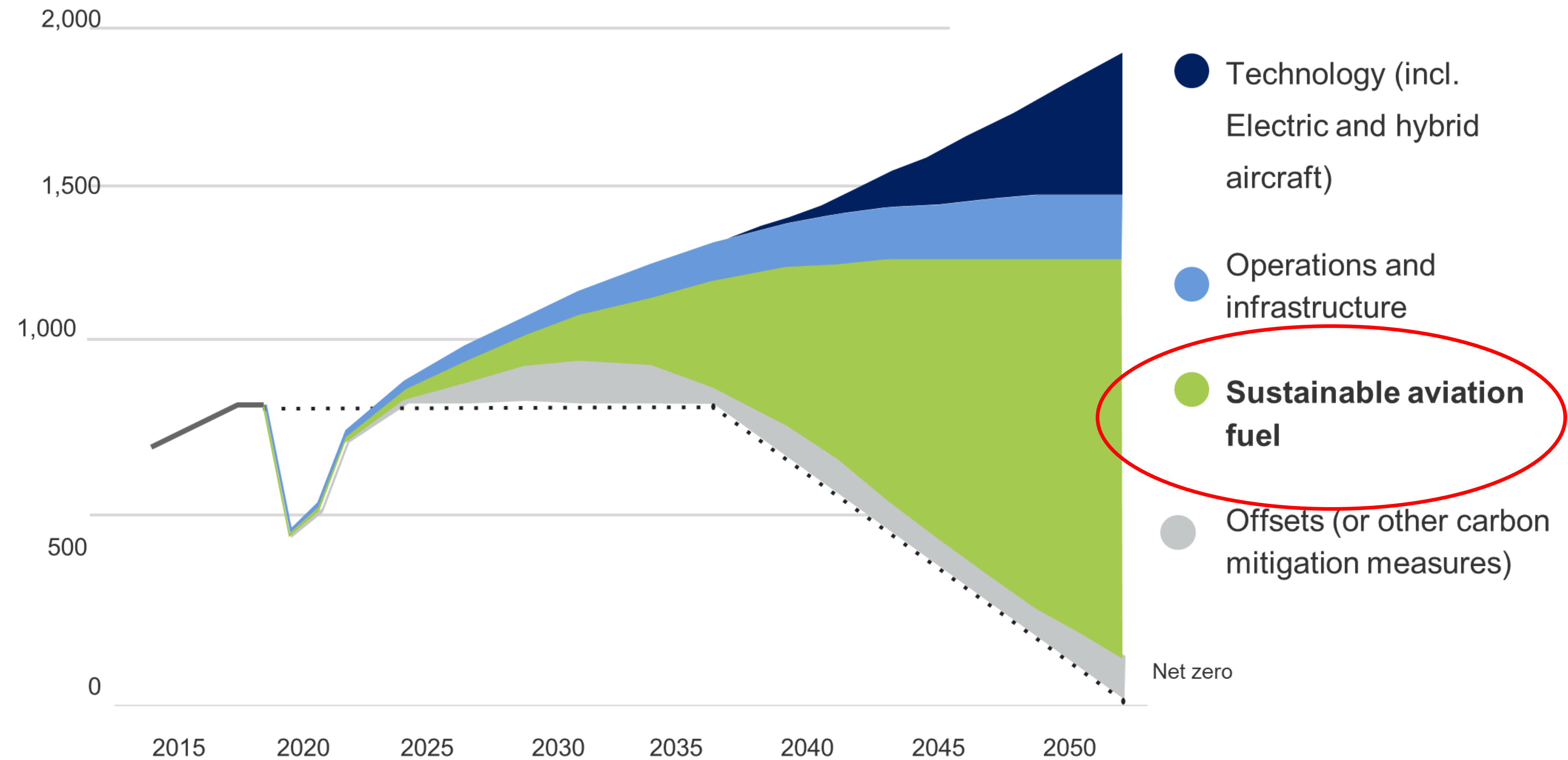
How are we doing and how will we get there

- Net zero is ambitious, we are making progress but need to accelerate – lots of projects pre FID
- Energy transition is about sustainability, supply security, and affordability
- What do we need to deliver
 - Supply – material low-cost feedstock pools, production technology scale up
 - Demand – mandated and voluntary
 - Regulatory policy and frameworks
 - Investment \$
- All solutions/portfolio approach, partnership, pragmatism are needed – the 3 Ps
- **Biomass residues, AtJ and specifically NPT's Refnova technology can play a material role**
- **UK project Speedbird is a great showcase – will deliver GHG reduction equivalent to 2% mandate**

AVIATION HAS COMMITTED TO ACHIEVING NET ZERO

And using Sustainable Aviation Fuel is critical to achieve its 2050 targets

Aviation CO₂ emissions trajectory and reductions by measure (Mt CO₂e)



Governments, airlines and regulatory bodies have committed to Net Zero 2050

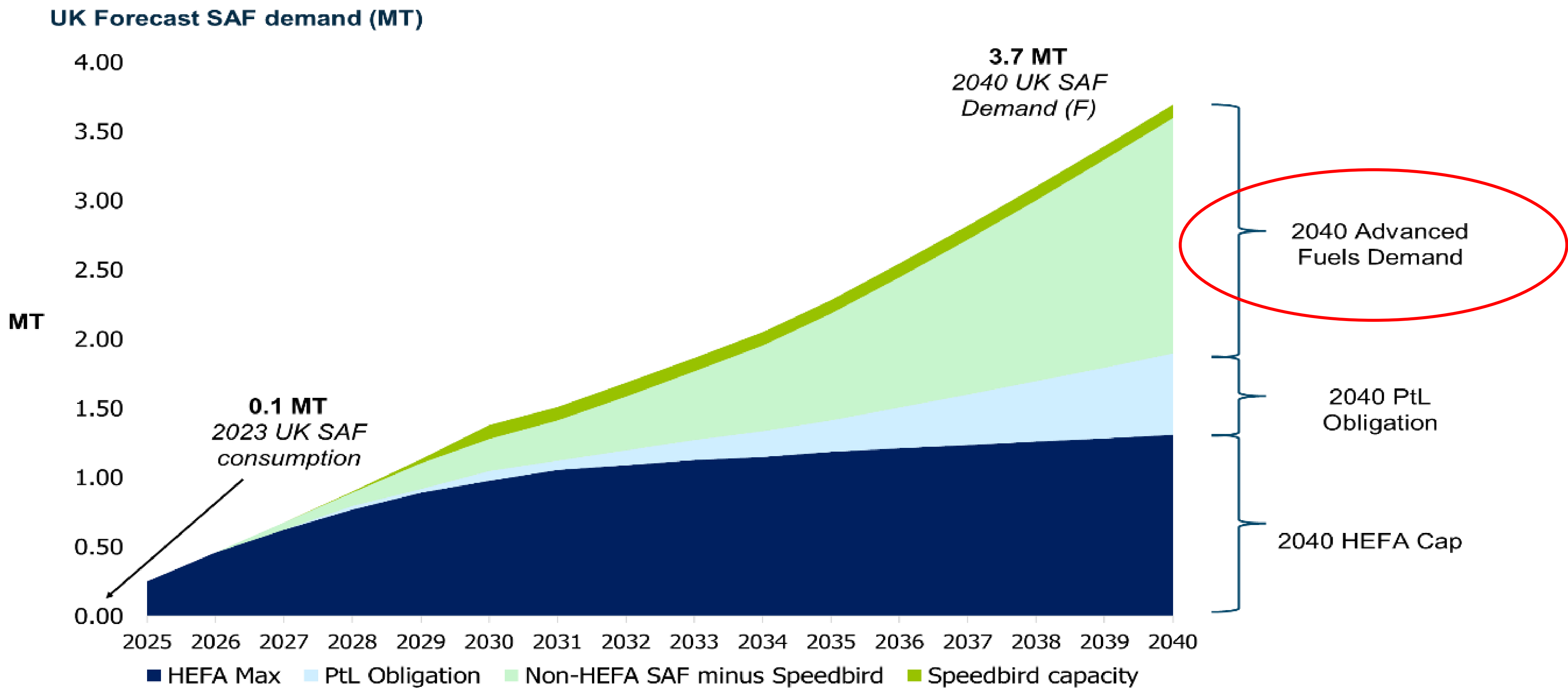
SAF will be the leading solution; as 'drop-in' fuel it used in existing aviation infrastructure

Electrification and Hydrogen fuel are nascent and are not expected to materially contribute to aviation net zero by 2050

1.8 billion tons p/a of carbon must be abated in the aviation sector by 2050 to achieve Net Zero

AVIATION HAS COMMITTED TO ACHIEVING NET ZERO - UK

And using Advanced Sustainable Aviation Fuel is critical to achieve its 2050 targets

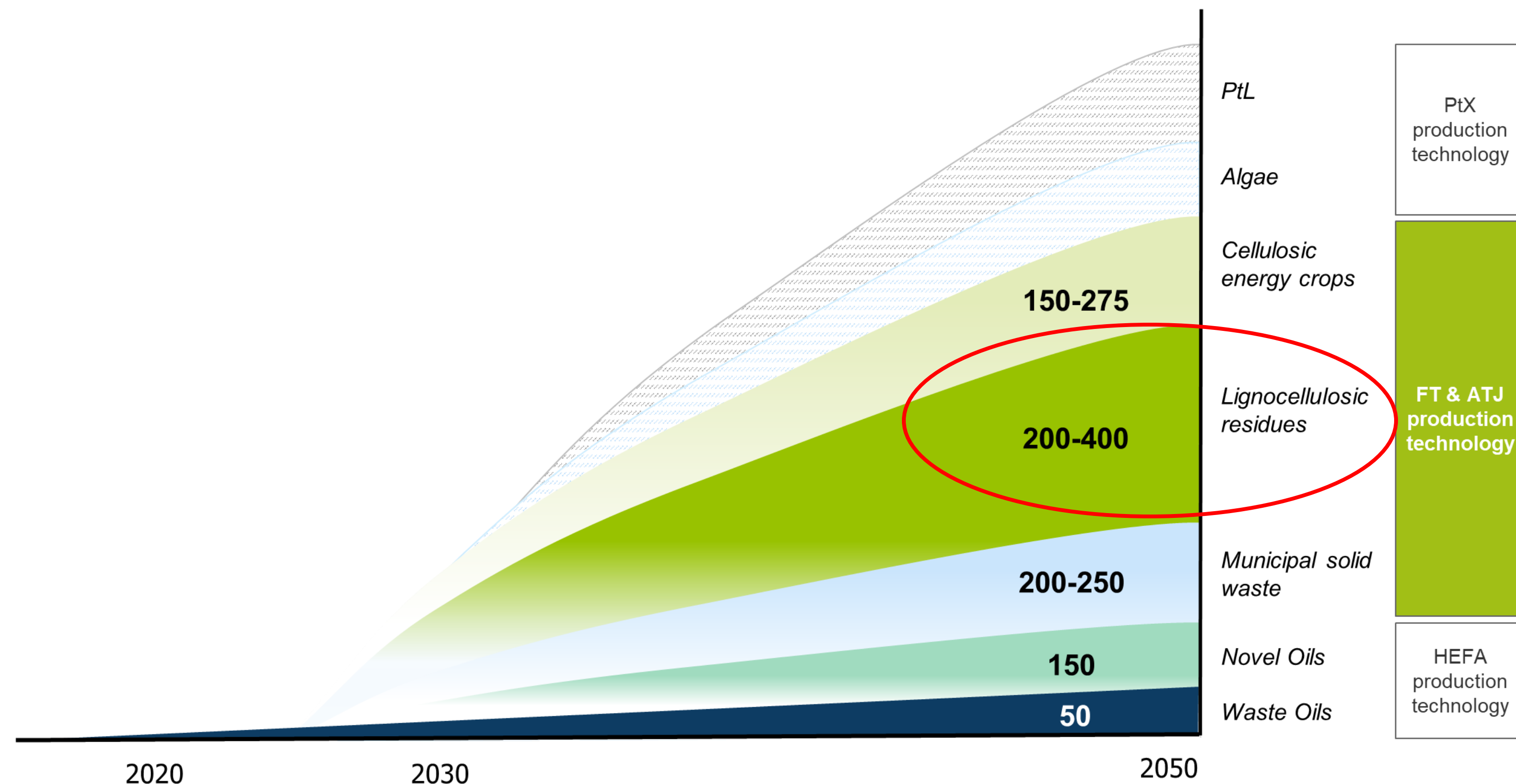


Source: UK BEIS, UK Energy in Brief 2022, Department for Transport, Supporting the Transition to Net Zero: Creating the UK SAF Mandate, 2022, NPT Management Analysis

ADVANCED FUELS FROM BIOMASS RESIDUES ARE CRITICAL TO SCALING SAF DEMAND

Lignocellulosic feedstock-based production technologies such as REFNOVA are critical to scaling SAF long-term

Global raw material potential for renewable fuels (Mtoe)



Lignocellulosic feedstock advantages

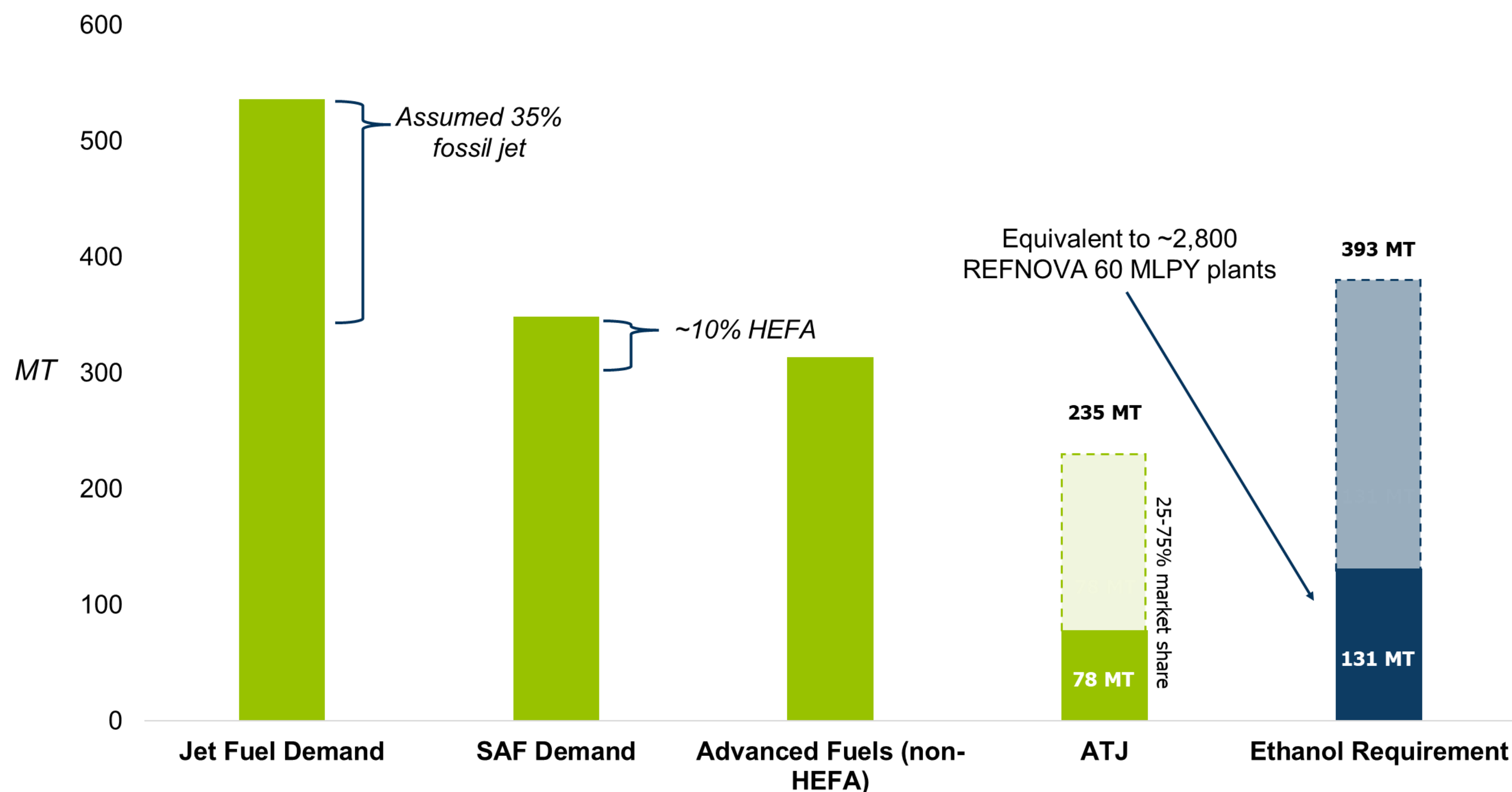
- Does not compete for food crops
- Does not require land-use change
- Uses biomass residue from existing agriculture and forestry processes
- Less risk of contaminants and variation compared to MSW
- Ready supply availability
- Additional source of income for rural/less developed farming communities

Source: Company analysis based on WEF Clean Skies for Tomorrow and other sources

ALCOHOL-TO-JET WILL BE A SIGNIFICANT SHARE OF THE SAF MARKET

2G ethanol is a critical pre-cursor to the AtJ pathway

Total Global Addressable Market Forecast - 2050



Market policies



UK - SAF Mandate from 2025



EU - SAF Mandate from 2025



North America - Regulatory incentives & credits promoting SAF usage



APAC - SAF targets emerging, eg India, Singapore, Japan

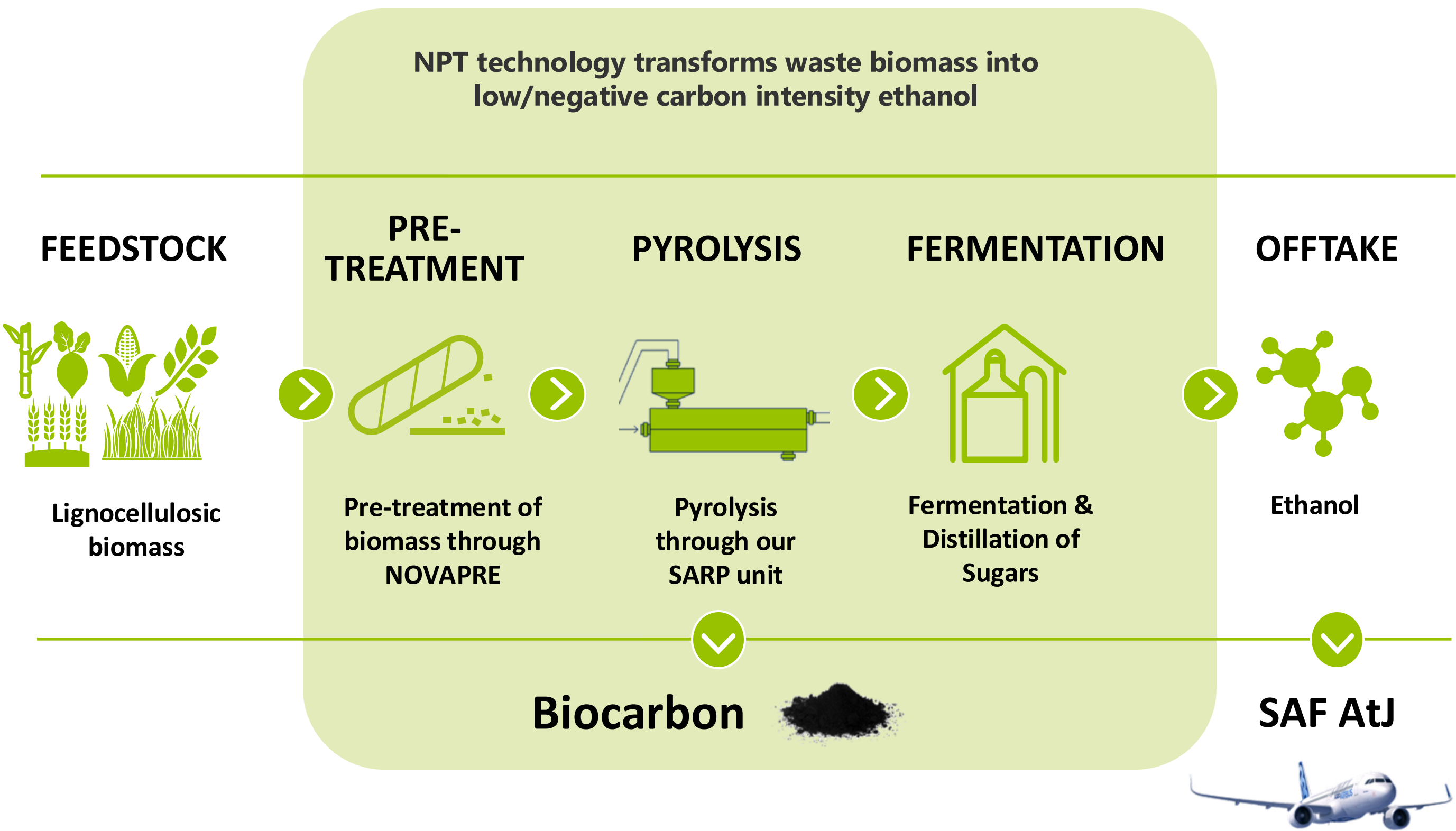


Brazil – SAF Mandate

Source: IATA: Fly Net Zero, U.S Energy Information Administration: Jet Fuel Consumption 2022, European Parliament: ReFuelEU Aviation 2023, SkyNRG: SAF Market Outlook 2024, Company Analysis

REFNOVA®

REFNOVA® is a novel patented technology that simplifies ethanol production using heat alone to convert woody and agricultural plant residues into two distinct co-products: Sustainable sugars and Biocarbon



- ✓ *Simplified process that avoids the use of enzymes; high-profile industry failures have been due to enzyme requirement during pre-processing*
- ✓ *Secondary revenue stream through biocarbon; other technologies struggle to valorise lignin into a commercial product*
- ✓ *Greater emissions reduction potential than market competitors due to sequestration potential of biochar*
- ✓ *Feedstock flexibility, with ability to process multiple types of lignocellulosic residue*
- ✓ *Progressing with Technical Readiness: >500 operating hours of our patented SARP® unit and >1000 on our pre-treatment units*
- ✓ *Scale 'up' then 'out' through modular, in-line process, significantly reducing scale risk and time to market*

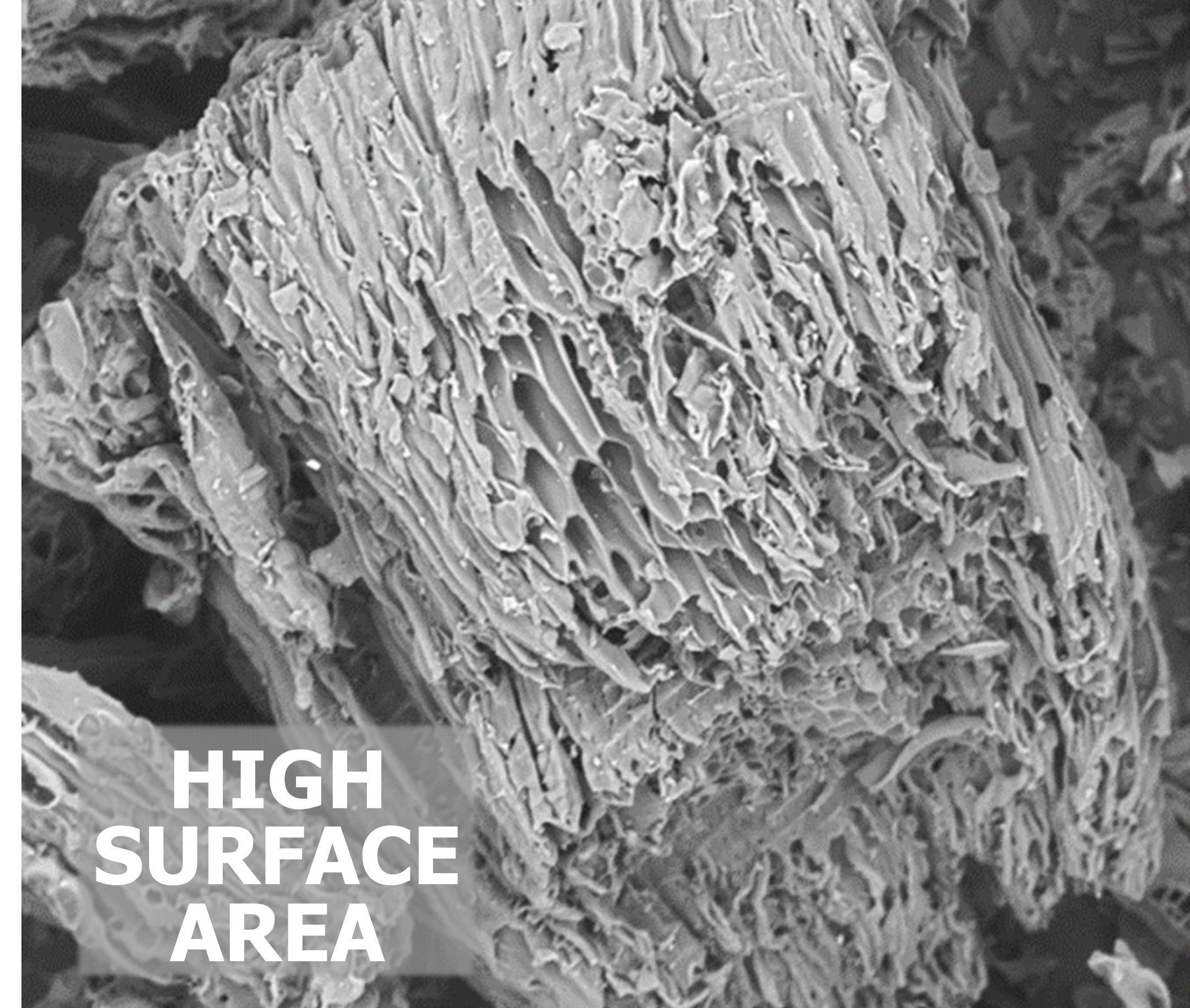
BIOCARBON

NPT's REFNOVA® process technology produces Biocarbon as a co-product alongside the cellulosic 2G ethanol. This Biocarbon has many applications as well as being a form of CO₂ sequestration

1 tonne of carbon in **NOVACHAR** = 3.6 tonnes CO₂ (before process emissions)

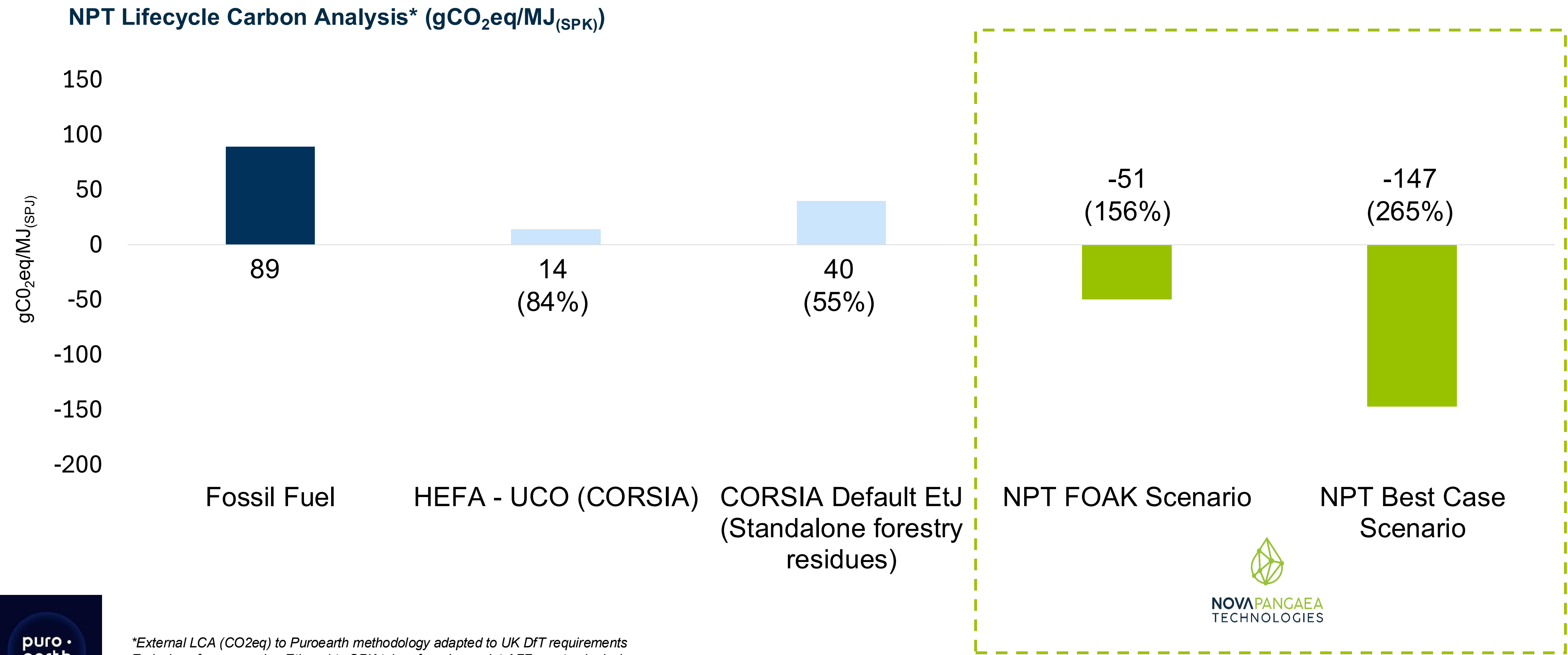
CARBON REMAINS FIXED – CO₂ is sequestered – **Net negative**

- **Soil enhancement**
Water retention and reduced fertiliser use
- **Filtration**
Water and air purification
- **As a filler in construction**
Cement and asphalt
- **Plastics and industrial applications**
As a filler/ colourant/ improved mechanical strength



REFNOVA® DELIVERING NET NEGATIVE CARBON INTENSITY

The *net negative emissions* which can be monetised through SAF, or via carbon credits



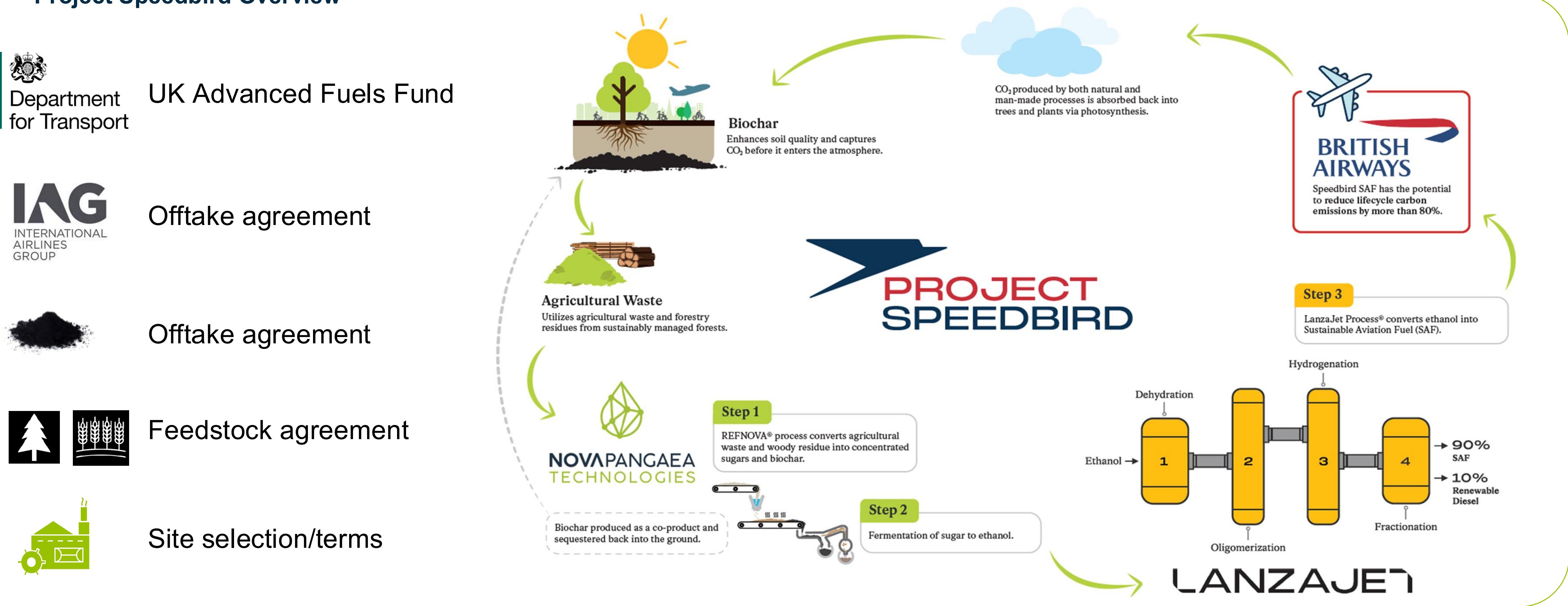
*External LCA (CO₂eq) to Puroearth methodology adapted to UK DfT requirements
Emissions for conversion Ethanol to SPK taken from LanzaJet AFF grant submission



UK PROJECT SPEEDBIRD IS A SHOWCASE FOR DEPLOYMENT

IAG flagship commercial project, delivering over 100 ml pa of fuel into the UK market by 2030

Project Speedbird Overview





**WE
PRODUCE
BIO
ETHANOL
(& SAF)**

**WE
LOWER
CARBON
INTENSITY**

SUMMARY



Carbon negative
2-3 x better carbon intensity than other SAFs
Key to delivering UK advanced SAF mandate ramp up



Feedstock availability
Uses non crop biomass residues
Flexible to different feedstock types



Patented, unique technology
SARP® unit fine tuned at demo plant since 2019



UK Speedbird
Strategic partners in place to stand up end to end value chain
Modular and scalable

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