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**NET ZERO**

# PureSAF<sup>SM</sup>

## Unlocking Sustainable Aviation

Rakesh Singh, KBR  
5th World Future Fuel Summit, New Delhi, October 16, 2023

*Delivering Solutions, Changing the World.<sup>SM</sup>*

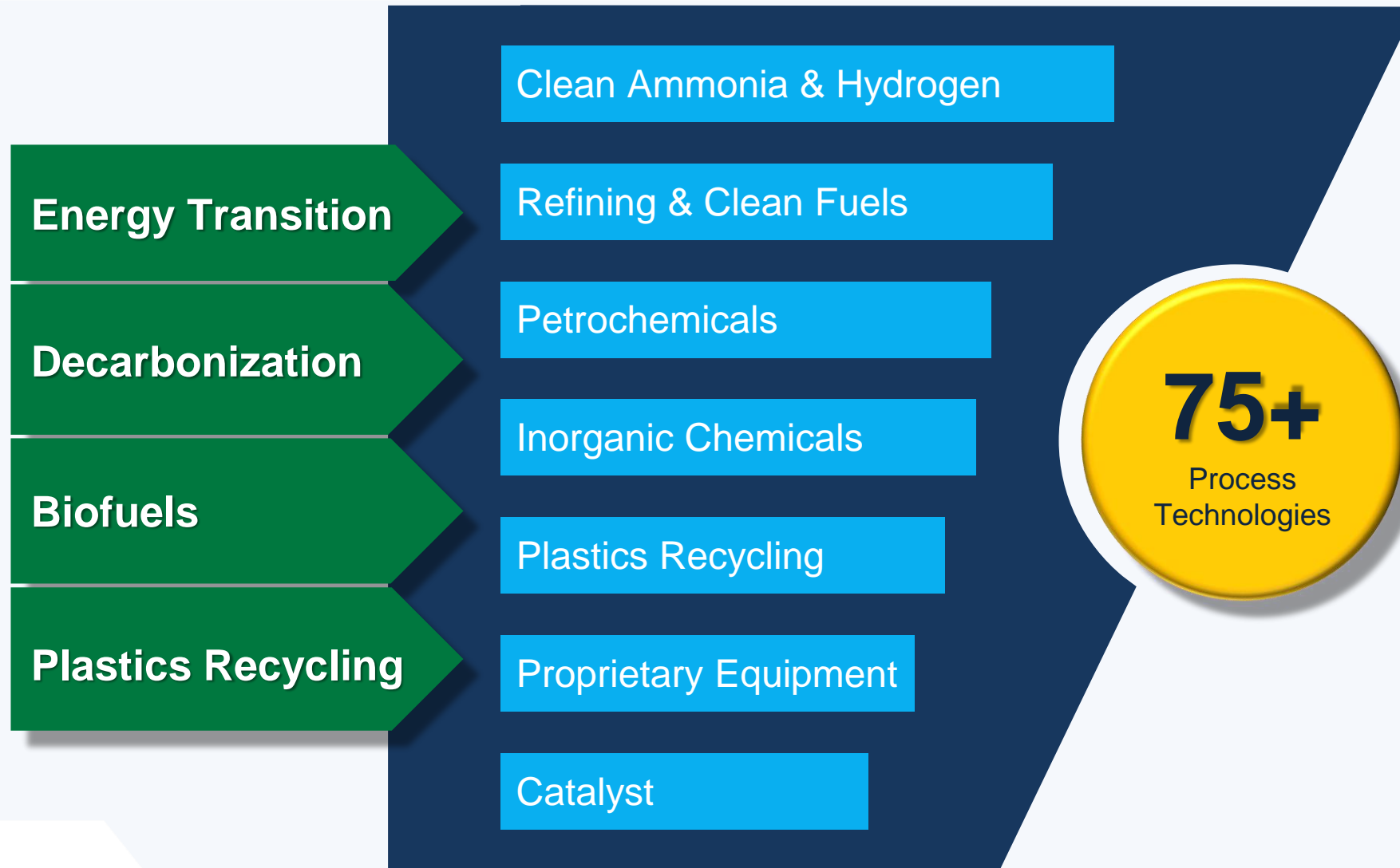


# Dr. Monica Normark

Director of Biofuels Technology, KBR



# Process Technologies from KBR



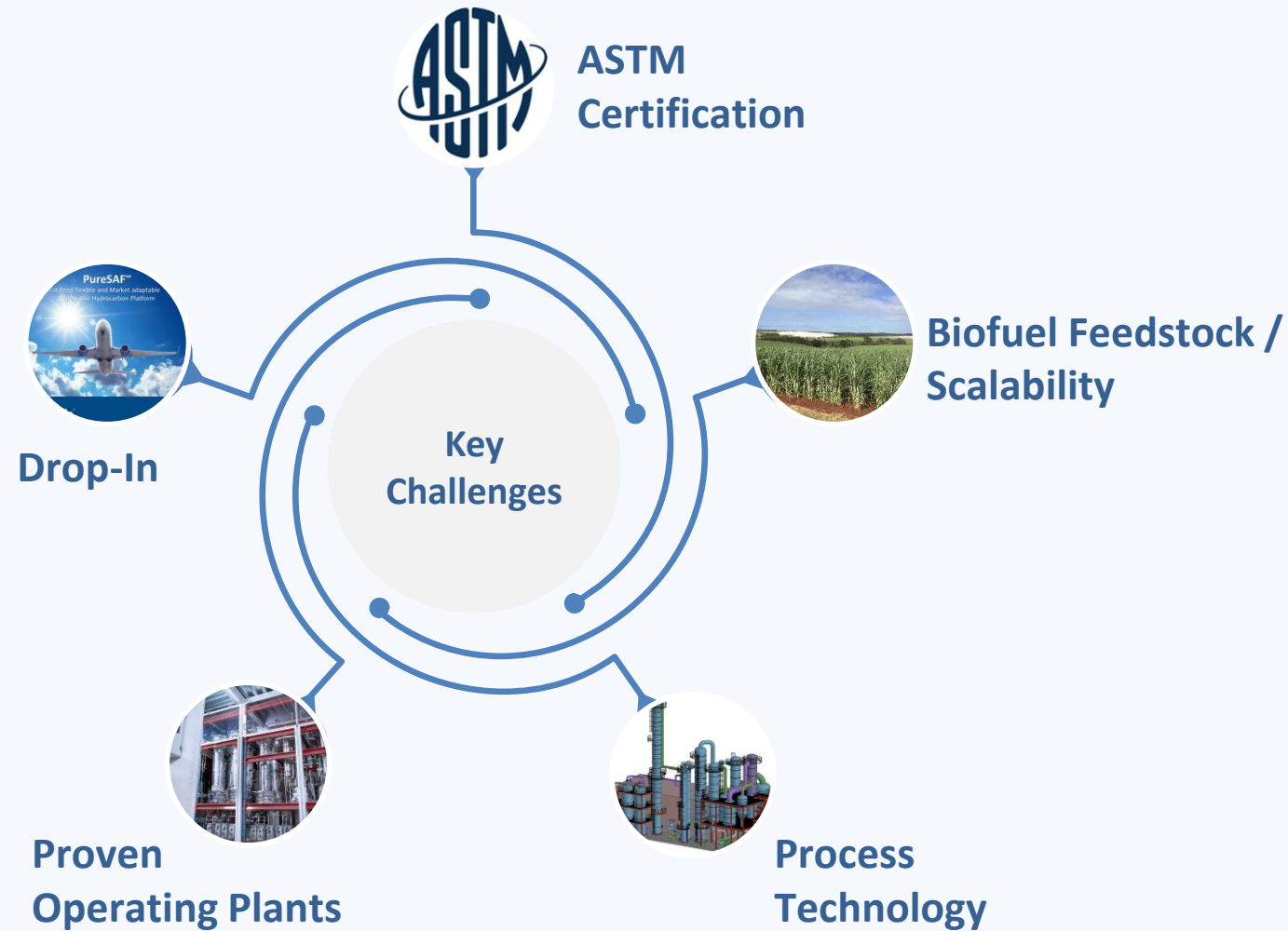
**According to IEA,  
aviation accounted for**

**2%**

**of global energy-related CO<sub>2</sub>  
emissions in 2022**



# Sustainable Aviation Fuel: Challenges & Opportunities



# PureSAF<sup>SM</sup>

**Sustainable Aviation Fuel Process Technology  
Developed by Swedish Biofuels  
and Globally Licensed by KBR**

# Why PureSAF<sup>SM</sup>?

- **Validated and tested by US government**  
Through its Defence Advanced Research Projects Agency (DARPA)
- **ASTM Certified**
- **Pilot plant with 30 TPY capacity - operating for 55,000+ operating hours**
  - Using a variety of feedstocks
  - Demonstrated the production of various biofuels that meet commercial requirements.

# Unlocking Sustainable Aviation With SAF

## Alcohol-to-Jet Technology

### Developer



- Technology owner and developer w/ 20+ years of R&D
- ASTM certified process mixed ATJ-SPK since 2018
- Pilot plant in operation since 2009
- Commercial demonstration by US Dept. of Defense (DARPA)

### Licensors



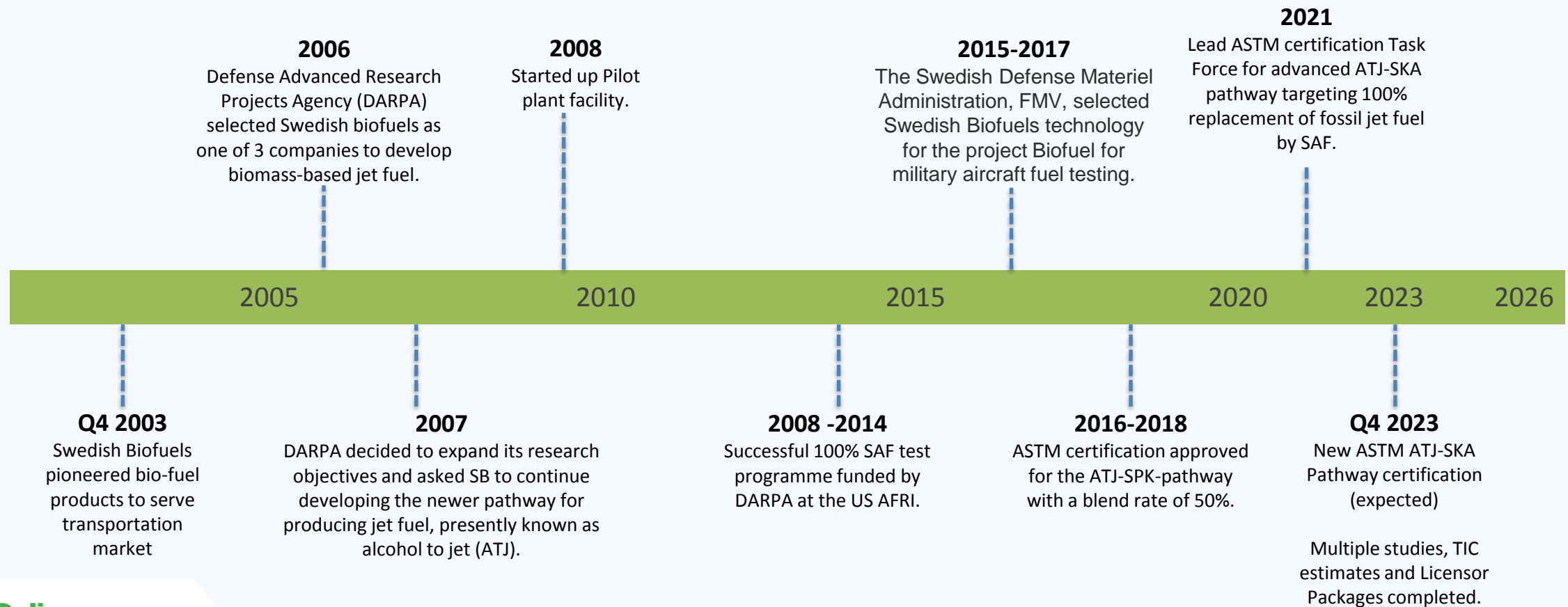
- Global licensing partner (MSCI AAA Rating for ESG)
- 75+ Process technologies licensed by KBR
- Scale-Up, integrate, and project delivery
- Leverage market leadership in climate related technologies



# PureSAF<sup>SM</sup> Technology Development Timeline

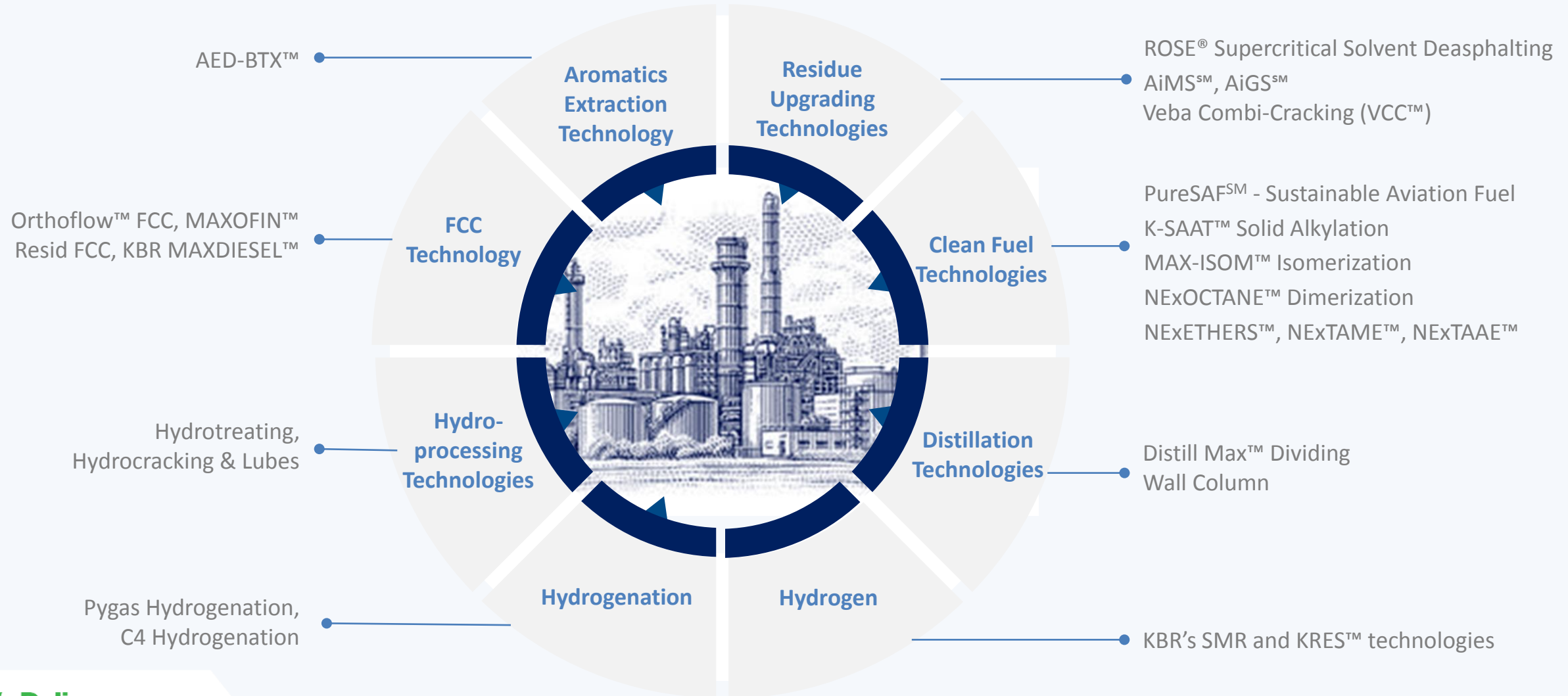


20 years of cutting-edge research and development of sustainable biofuels



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# Refining and Clean Fuels Technologies from KBR



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# KBR

# 100 Years of History

AED-BTX™

ROSE® Supercritical Solvent Deasphalting

AiMS™, AiGS™

Veba Combi-Cracking (VCC™)

Orthoflow™ FCC, MAXOFIN™  
Resid FCC, KBR MAXDIESEL™

FCC  
Technology

Clean Fuel  
Technologies

PureSAF™ - Sustainable Aviation Fuel

K-SAAT™ Solid Alkylation

MAX-ISOM™ Isomerization

NExOCTANE™ Dimerization

NExETHERS™, NExTAME™, NExTAAE™

Hydrotreating  
Hydrocracking & Lubrication

Hydro  
processing  
Technologies

Distillation  
Technologies

Pygas Hydrogenation,  
C4 Hydrogenation

Hydrogenation

Hydrogen

KBR's SMR and KRES™ technologies



# Why PureSAF<sup>SM</sup>?

Flexible, future-looking and cost-effective production solutions

## Feedstock

- Ability to process a **variety of feedstocks** (C2-C5 Alcohols, Syngas, CO<sub>2</sub>, biogas)
- Requires **no additional hydrogen** for ATJ

## Products

- **100% sustainable** fuel with or without aromatics
- New specification for fully formulated aviation fuel with aromatics - key for **100% drop-in replacement SAF**

## Commercialization

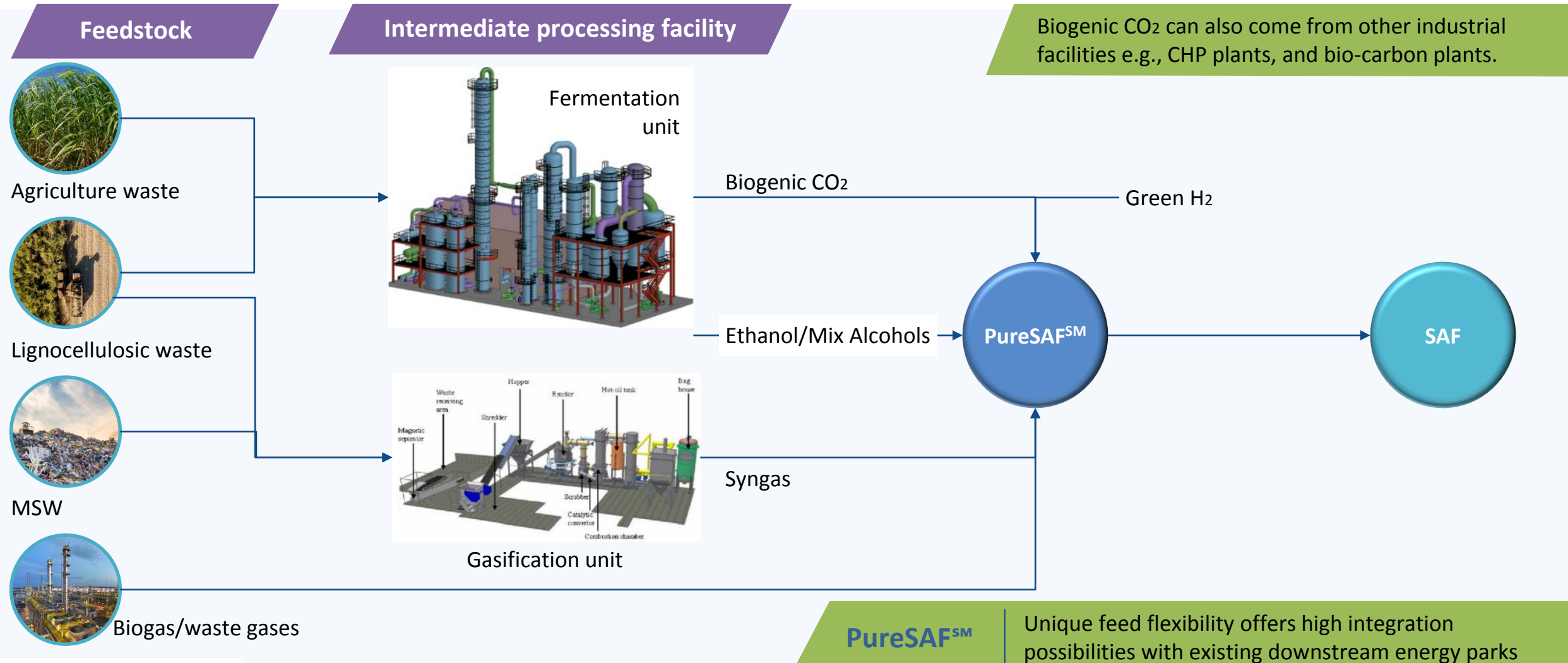
- **DARPA/USAF** validated and tested PureSAF<sup>SM</sup> as a 100% drop-in fuel for military – Same spec used by NATO
- New pathway ATJ-SKA (to add CO<sub>2</sub>, biogas, Syngas as feedstock)

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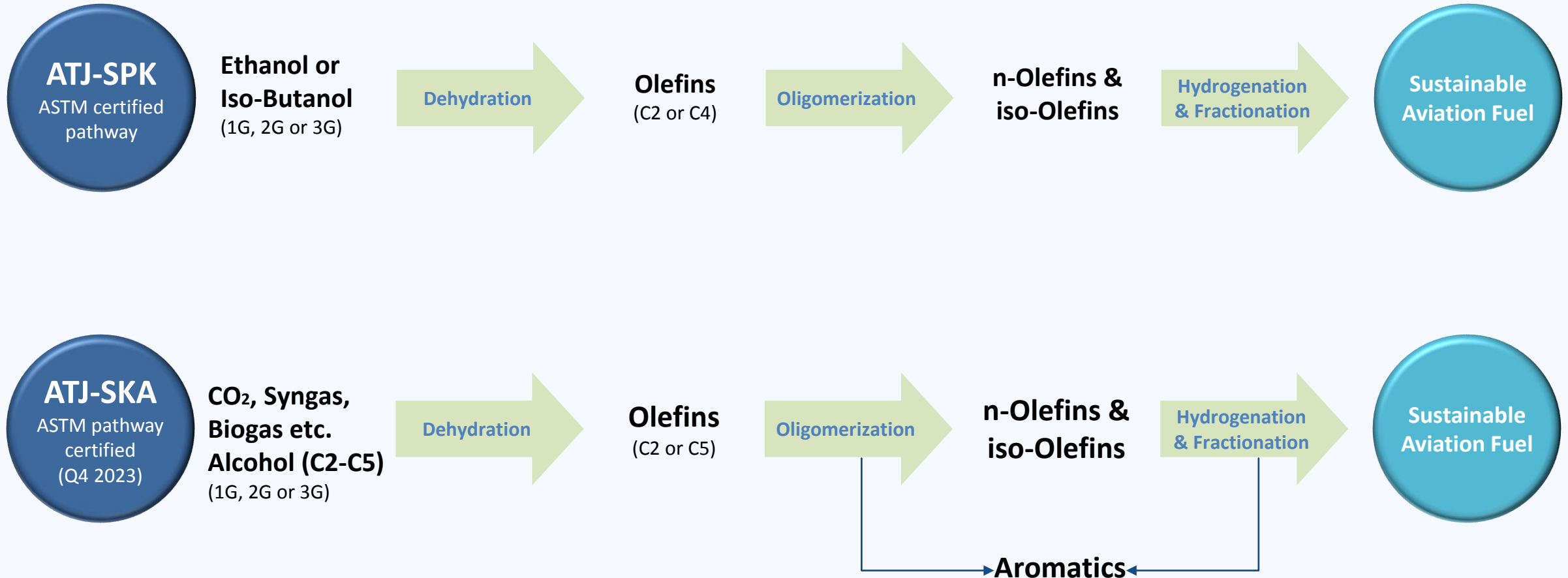


# PureSAF<sup>SM</sup> Technology Overview



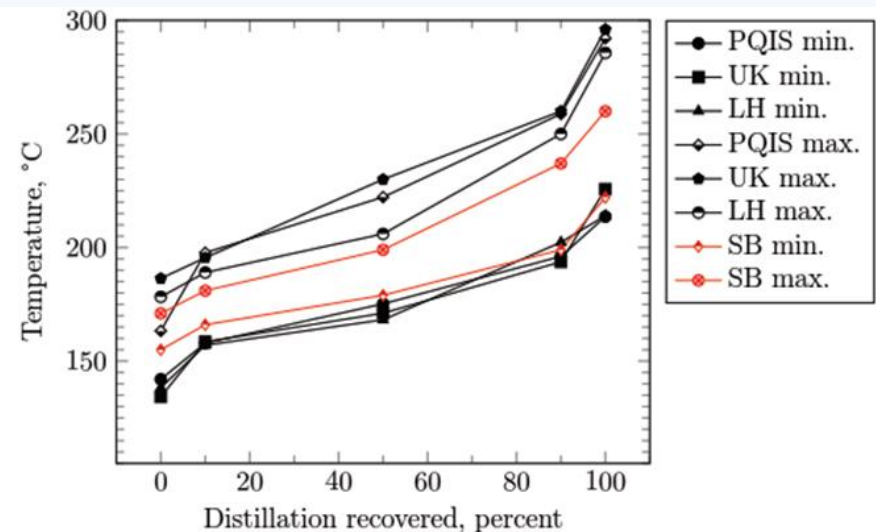
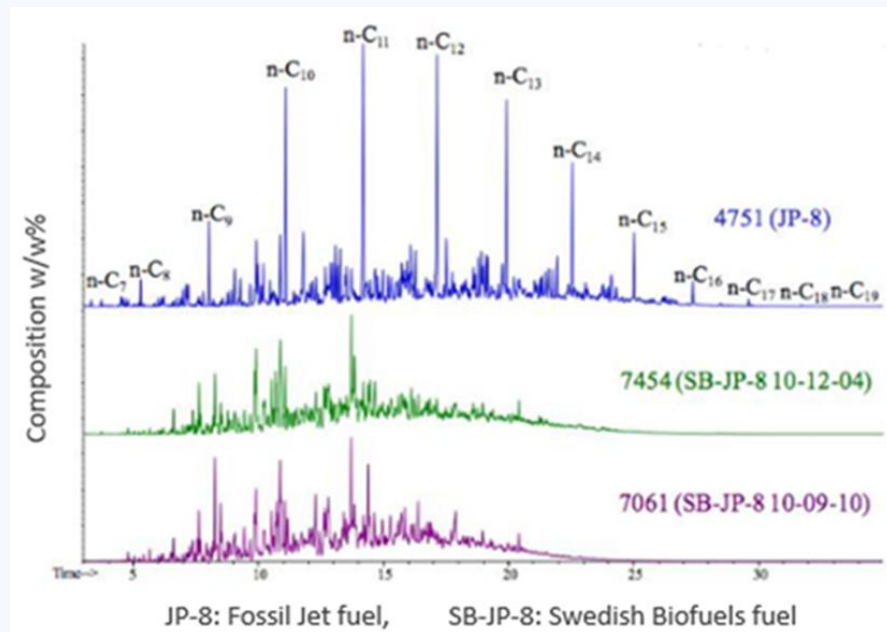
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# 100% SAF Certification Reachable With PureSAF<sup>SM</sup>



## PureSAF<sup>SM</sup> closely resembles conventional petroleum-based jet fuel

thanks to a more even distribution of hydrocarbon species and distillation in the final product



ASTM D86 boiling range data, minimum and maximum values.

Data of Swedish Biofuels fuel produced by Wright-Patterson USAF. Public release approved by DARPA

## PureSAF<sup>SM</sup>

- Ability to process a variety of feedstocks
- Shows credible pathway to Net Zero
- 100% sustainable fuel with or without aromatics
- Fully ASTM certified

A small, stylized globe with a green landscape, a blue river, and a white hot air balloon floating in the sky. The globe is tilted and has a soft, ethereal glow.

**Thank you**  
**[rakesh.singh2@kbr.com](mailto:rakesh.singh2@kbr.com)**



A thick green diagonal line that starts from the left edge of the slide and extends towards the top right, ending just before the name "Rakesh Singh".

## Rakesh Singh

Director of Global Marketing

Sustainable Technology Solutions, KBR

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