



SFS Ireland
Piloting a Pathway to Net-Zero



IRELAND'S SUSTAINABLE AVIATION FUEL OPPORTUNITY



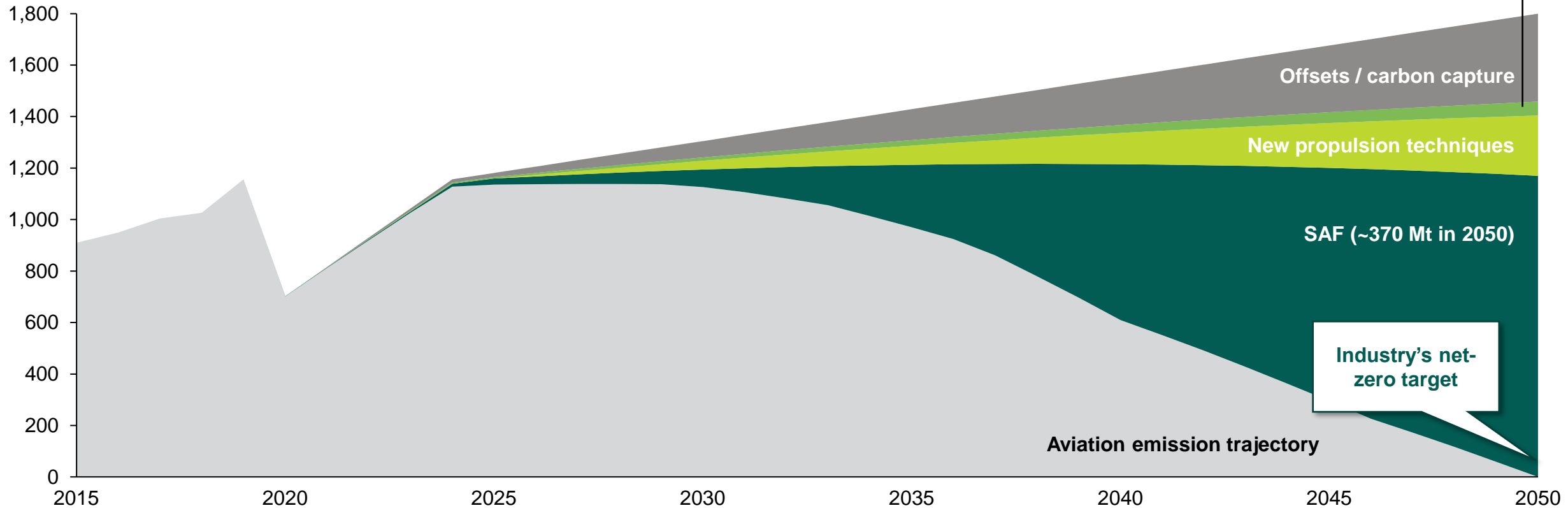
25 October 2023

In partnership with:



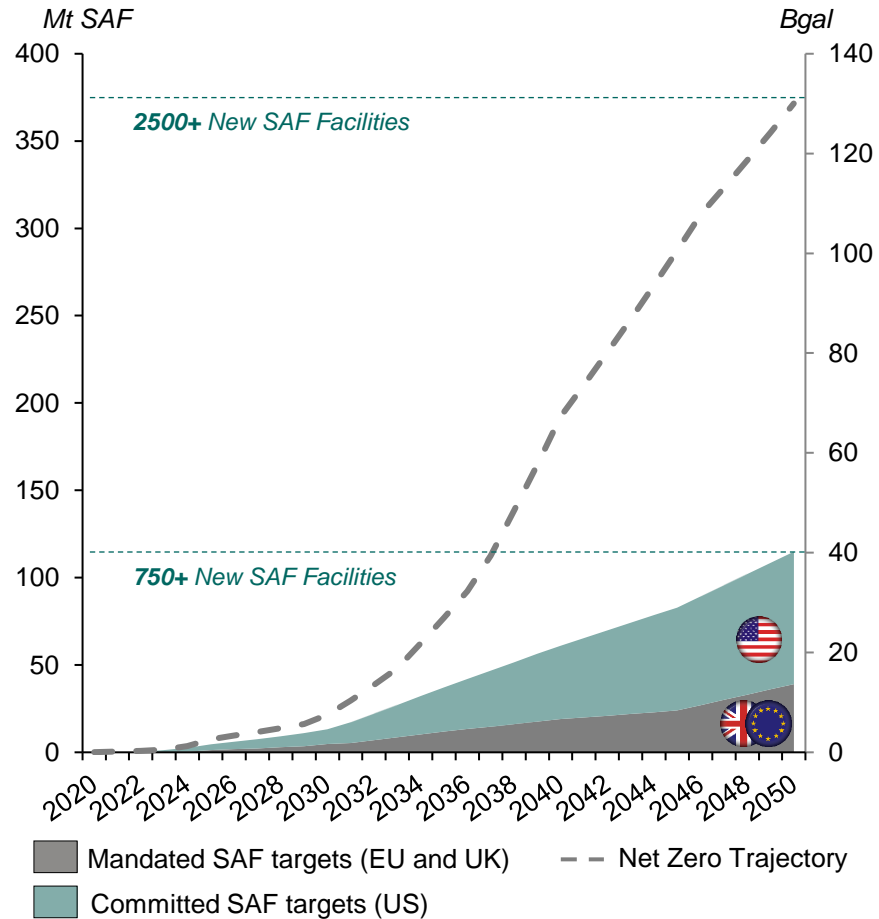
SAF IS CRUCIAL TO REACH NET-ZERO INDUSTRY TARGET BY 2050

Global aviation emissions (Mt CO₂)



SAF market expected to grow from €0.2B today to €50B in 2030, to >€500B in 2050

SAF MARKET IS SET TO BECOME A SIGNIFICANT INVESTMENT OPPORTUNITY DRIVEN BY POLICY AND VOLUNTARY DEMAND



Regulatory underpinning

- US targets 100% SAF use in 2050
- ReFuelEU Aviation require a 70% blend by 2050
- UK mandated 10% SAF by 2030

Voluntary market

- IATA Net Zero 2050 target pledge includes a SAF contribution of 62% by 2050
- Airlines have set voluntary SAF targets totalling at 13 Mt in 2030
- Corporates are doubling down on their voluntary SAF commitments

Should The Market Grow to Achieve Net Zero

- 370Mt / 123Bgal** Total SAF demand in 2050
- ~€1.5tr** Addressable market
- €2.0tr** ESG Capex in new asset class



INTRODUCTION | A ONE-YEAR FEASIBILITY STUDY INTO LOCAL FEEDSTOCKS WAS EXECUTED TO UNDERSTAND THE IRISH SAF VIABILITY

Study context

- Goal: investigate the potential for a commercial scale SAF facility in Ireland based on local feedstock
- Project partners: Boeing, Avolon, Orix Aviation, Sustainable Flight Solutions, SkyNRG
- Timeline: April '22 to January '23

Boundary conditions SAF facility

- Timing: operational pre-2030 - meaning only ASTM-certified production pathways
- Scale: minimum 100.000 ton/year SAF production
- Sustainability: >80% GHG emissions reduction + EU mandate eligible feedstocks
- Location: Island of Ireland



EUROPEAN UNION SAF POLICY LANDSCAPE CONSISTS OF EU-ETS, RED III AND REFUELEU

Industrial Sectors

Transport Sector

Aviation Sector

EU-ETS

RED III

ReFuelEU Aviation

EU Emissions Trading System

Renewable Energy Directive III

A cap-and-trade system to reduce GHG emissions by **62%** in 2030 vs. 2005

A regulation to reach a **42.5% renewable energy share** in 2030

A regulation to reduce emissions from aviation by a **mandatory SAF uptake** of 6% in 2030, increasing to 70% in 2050

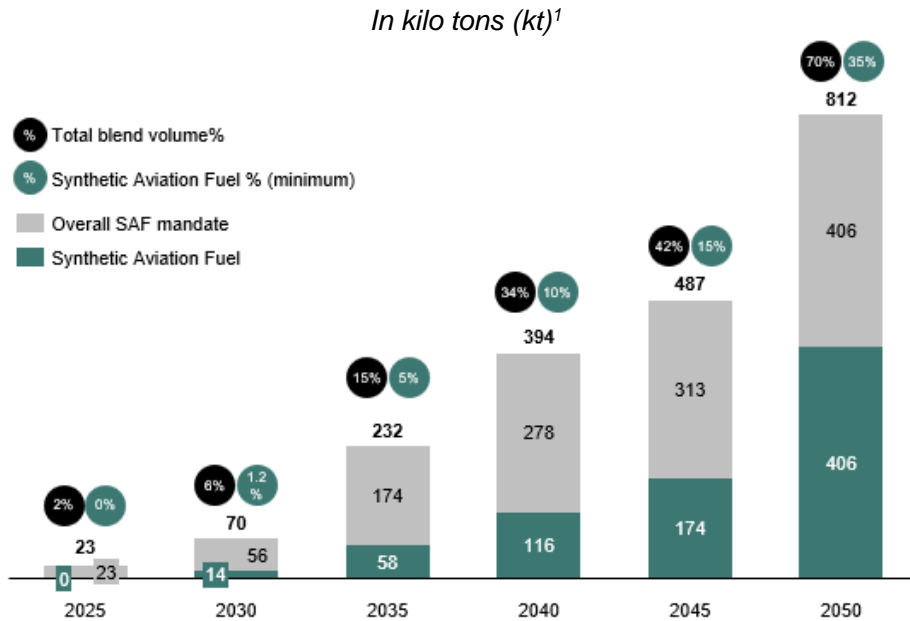
Type | _____ Regulatory _____

Enabler | _____ Demand _____ Supply _____

Cost | _____ Industry _____

SAF IN IRELAND | A MULTI-BILLION EURO BUSINESS IN IRELAND BUT DEVELOPMENT INITIATIVES ARE LACKING

ReFuel EU SAF mandate volumes for Ireland


















Domestic Market opportunity

	Today	2035	2050
Mandated volume (kt)	0	~230	~800
# of SAF plants ²	0	3	10
Economic value ³	0	€800M	€2,550M

The Irish SAF industry could generate revenue of €2.55bn by 2050 and provide up to 1,000 high-skilled jobs

1. Based on the constant 2019 jet fuel uptake of 1.16 million ton per year;
 2. ~80 kt each
 3. Based on a avg. SAF value of €3,500/ton

RESULTS | PTL AND RNG SEEM MOST PROMISING WHILE SUPPORT IS STILL NEEDED TO DEVELOP THESE INDUSTRIES

	Feedstock	Availability		Challenges	Opportunities
		Today	2030+		
 Oils	Used Cooking Oil / Tallow			<ul style="list-style-type: none"> Saturated market Usage capped by EU policies 	<ul style="list-style-type: none"> Commercial technology
 Solid biomass	Agri + Forestry wastes			<ul style="list-style-type: none"> Grassland dominates; limited crop residues Fragmented feedstock and forestry products already utilized 	<ul style="list-style-type: none"> Energy crops promising, not yet established
	Municipal Solid Waste			<ul style="list-style-type: none"> Increasing recycling rates resulting in minimal residues 	<ul style="list-style-type: none"> Biogenic CO₂ source from biomass fraction also an input for PtL
	Renewable Natural Gas			<ul style="list-style-type: none"> Grass not SAF policy compliant (REDIII) Competition from other industries 	<ul style="list-style-type: none"> Ambitious national target for RNG development
 PtL	Green hydrogen			<ul style="list-style-type: none"> Offshore floating wind is expensive source No H₂ projects or infrastructure in development 	<ul style="list-style-type: none"> Large potential due to stable wind profile and scaling optionality
	Biogenic CO₂			<ul style="list-style-type: none"> Biogenic CO₂: limited point sources with long lifetime Fossil CO₂: policy doesn't allow beyond 2035 	<ul style="list-style-type: none"> Gas grid operator seems determined to support and connect RNG suppliers

THERE IS SIGNIFICANT FUTURE ECONOMIC SAF POTENTIAL IN IRELAND

/ INDICATIVE

Current state – SAF



Low TRL and limited technologies



High risk for SAF producers



Low number of SAF producers



Low SAF availability



No mandates in place EU wide

Current state – Ireland

- **No Irish SAF Policy** (CAP23, Roadmap, Strategy, etc)
- **Awareness is slowly building around SAF** (latest H₂ strategy mentions the potential for e-Fuels, DOT Climate Roadmap mentions alternate fuels for air transport fleet)
- **Renewable energy progress:** Policy initiatives in place to drive high levels of offshore wind power generation by 2030 will support domestic eSAF production
- **All jet fuel used in aviation is imported** to the State

Envisioned state



High TRL and several technologies



Low risk for SAF producers



High number of SAF producers



High SAF availability and competition



Strong policy through RefuelEU

**The Opportunity: Energy independence; Economic opportunity;
Consolidate Ireland's position as a global leader in aviation**

RECOMMENDATIONS TO GROW THE IRISH SAF INDUSTRY

- 1. Incentivize** (e.g. capital allowances, tax credits, pricing guarantees) to boost SAF and H₂ development for a viable PtL business case. Cross-departmental relationships are essential (DECC, DOT, DAFM) to ensure comprehensive policy framework
- 2. Fund R&D** through Irish institutions and government bodies (e.g. Enterprise Ireland, Science Foundation Ireland, SEAI)
- 3. Revamp planning** for SAF plants with an eye on future energy parks and circular economy growth
- 4. Invest** in H₂ storage and transport, address grid congestion issues
- 5. Include aviation targets** to climate action plans to enhance Ireland's position as a renewable fuel aviation hub.
- 6. Collaboration between public and private sector** is critical to mobilize the required investments



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In partnership with:

