Sustainable Aviation Fuel (SAF) Development in Kazakhstan

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AIRPORTS COUNCIL INTERNATIONAL
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Amantay Kenzheali

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Yuliya Lim

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Assel Aitkulova

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Yasar Yetiskin

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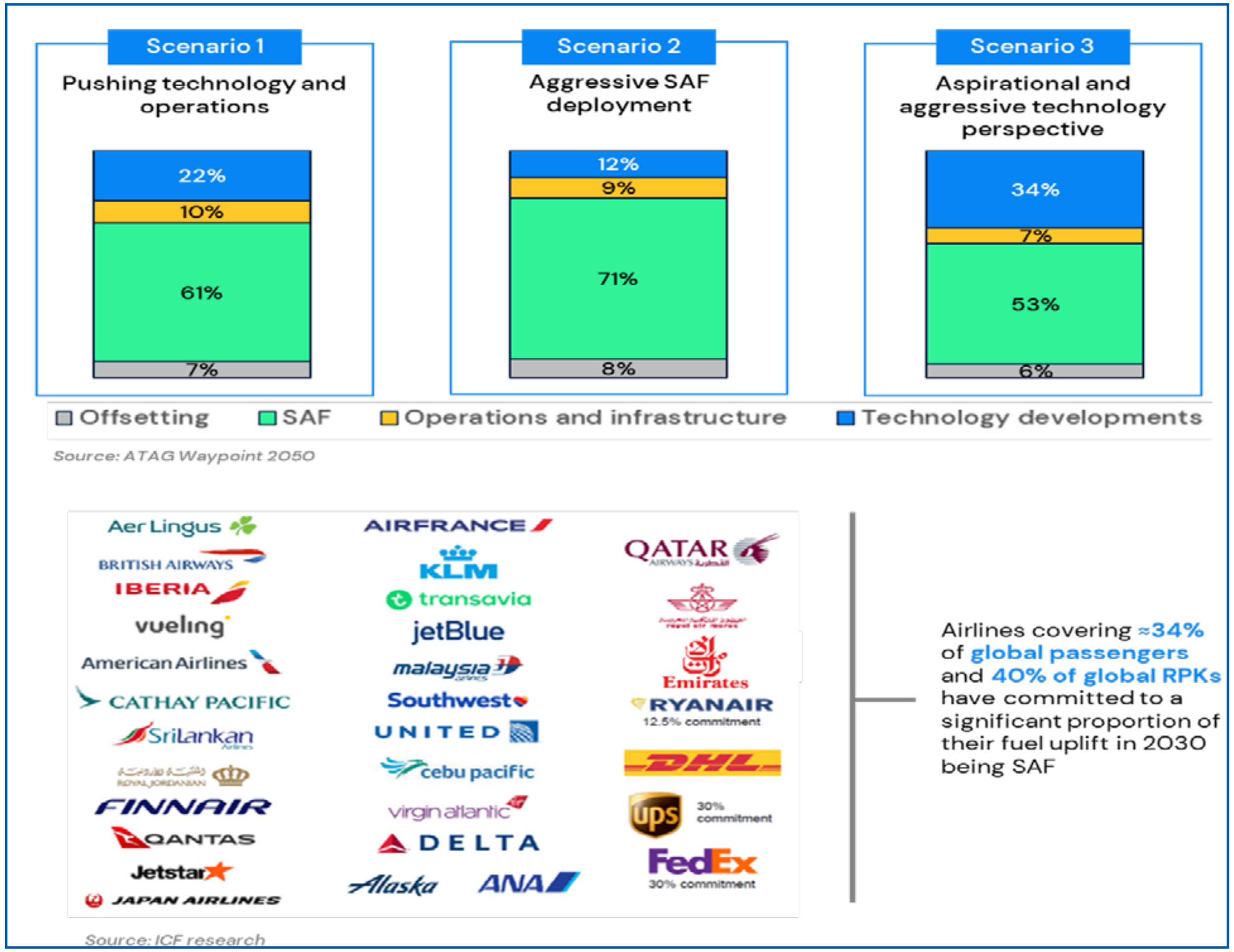
Project Background

Amantay Kenzheali
EBRD

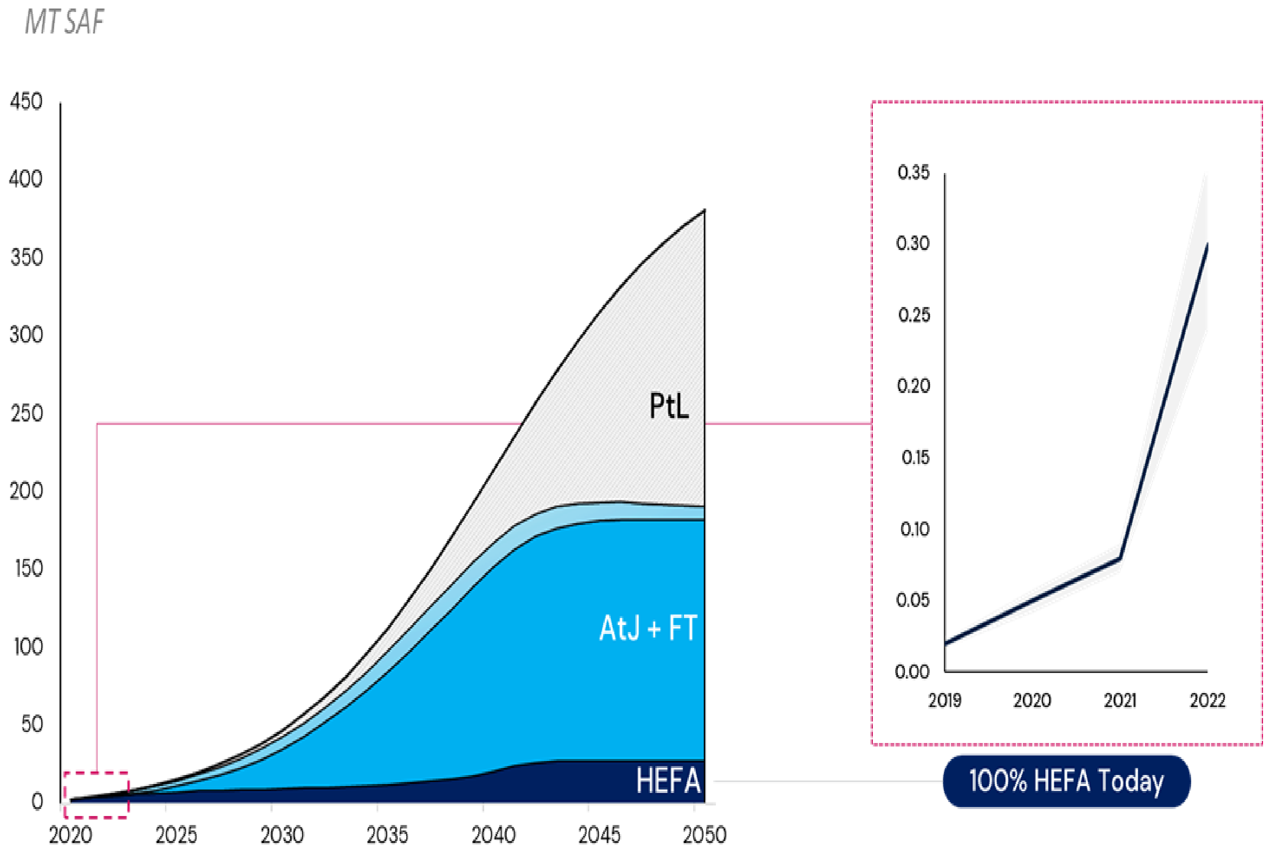
SAF Market Drivers – Aviation Sector

- Aviation industry accounts for about 3% of global greenhouse gas emissions, and this share could rise to 22% by 2050 if no decarbonisation actions are taken due to the industry growth and the decarbonisation of the other sectors.
- Among the solutions available, SAF is the most important lever for decarbonising aviation.
- Despite the collective acknowledgment of SAF's pivotal role in decarbonising the sector, production volumes are currently insufficient to represent significant levels of carbon abatement: current production is less than 0.5 Mtpa compared to a market size of ~400 Mtpa.
- Airlines covering 40% of the global revenue passenger-kilometer have voluntarily committed to at least 10% SAF by 2030.



SAF Market Drivers – Fuel Producers

- There is a significant increase in the volume of SAF production capacity expected to come online in the near term. Most of this will be produced via the HEFA pathway, although a small number of facilities using other pathways.
- UK and EU have strict regulations for the feedstock, which only allows using waste liquid lipids (used cooking oil and animal fat category 1 and 2) for SAF production. However, ICAO's CORSIA Eligible Fuel criteria allow utilisation of crop-based feedstock for SAF production. This resulted in large scale HEFA projects across the world, including the US, which are expected to utilise soybean oil, rapeseed oil and other food and energy crops.
- It is expected that HEFA capacity will plateau in 2030s, while AtJ and FT SAF supply increasing substantially.



ATAG Waypoint 2050, ICF analysis

Scope and Stakeholders Involved

Decarbonisation strategies

- Explore decarbonisation targets for the aviation sector
- Present the global SAF landscape
- Compare current targets in Kazakhstan with the relevant benchmarks and provide recommendations for increased ambition

SAF market analysis

- Demand and supply analysis
- Feedstock availability

SAF project definition

- Technology overview
- Technoeconomic assessment and pathway selection
- Project definition

Offtake and regulation

- Develop a SAF offtake template
- Suggest regulatory reforms to develop SAF

Stakeholders

European Bank for Reconstruction and Development

air astana

AVIATION ADMINISTRATION OF KAZAKHSTAN

ҚазМұнайГаз NATIONAL COMPANY ҰЛТТЫҚ КОМПАНИЯСЫ

Consultant

ICF

Funded by the Japan - EBRD Cooperation Fund

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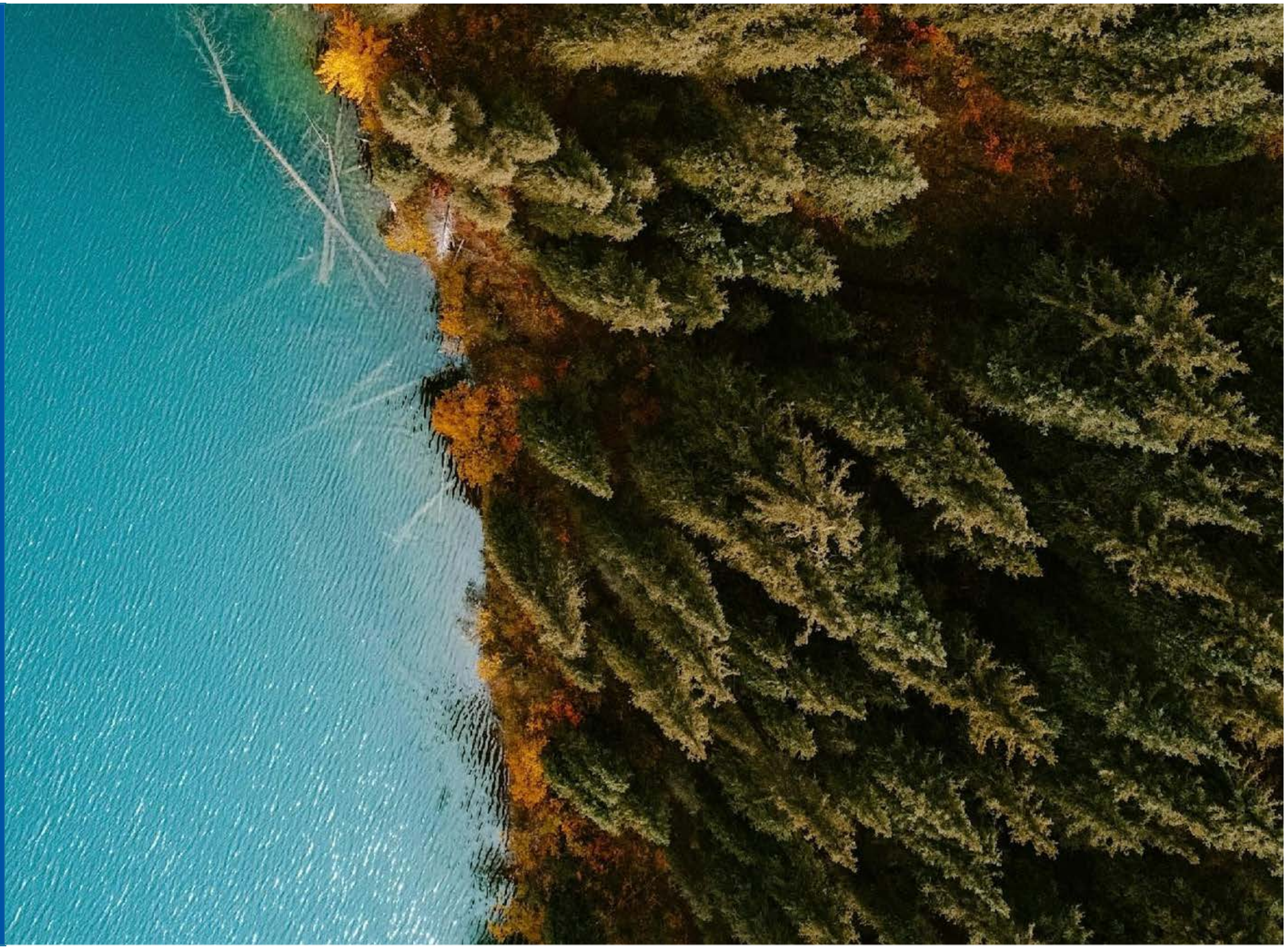
Actions Taken by Key Stakeholders

Yuliya Lim
Air Astana



TWO BRANDS

FlyArystan air astana

54 AIRCRAFTS

~5,3 YRS AVERAGE FLEET AGE

42 DESTINATIONS

93 ROUTES

As of and for the period ended June 30, 2024

Air Astana Group: Our approach to sustainability

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Air Astana Group: Our Approach to Sustainability – LCDP

- AA has developed a Low-Carbon Development Programme (LCDP) for 2023–2032. This includes:
    - Investing in fuel-efficient aircraft
    - Optimising flight routes
    - Implementing sustainable practices
    - Reducing waste and single-use plastics
    - Resource conservation, such as energy
- AA is currently compliant with EU ETS and CORSIA – Carbon Offsetting and Reduction Scheme for International Aviation (includes all international flights between signatory nations).
- Within the next months, the AA plans to update its LCDP and consider a commitment to **net zero by 2050** in line with the long-term goal adopted by the ICAO, accompanied by near-term targets for the next five years.
- In line with the recent Association of Asia Pacific Airlines resolution, the Group has also set a target of achieving a collective **5% SAF blending by 2030** (subject to SAF availability on the market).

SAF development from civil aviation organization perspective

Aviation Administration of Kazakhstan

Civil Aviation Committee and ICAO signed ACT - SAF Agreement

SAF development from civil aviation organization perspective

Aviation Administration of Kazakhstan

State Action Plan to reduce CO_2 emissions

- Stakeholders:

A. Civil Aviation Committee
B. Airlines
C. Airports
D. Fuel producers
E. Verification bodies
F. Involved ministries

- Specific actions:

A. SAF uplifting %
B. Airports' renovations
C. Due dates
D. Future projects

AVIATION ADMINISTRATION OF KAZAKHSTAN

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Regulatory Requirements and Policy Options

Assel Aitkulova
AAK

SAF Market Drivers – Regulation

Canada

Federal Clean Fuel Standard and 10% SAF by 2030 target

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2022: Established long-term goal of net-zero carbon emission by 2050, supported through CORSIA.
2023 (CAAF/3): Adopted short-term goal aiming to reduce carbon intensity by 5% by 2030.

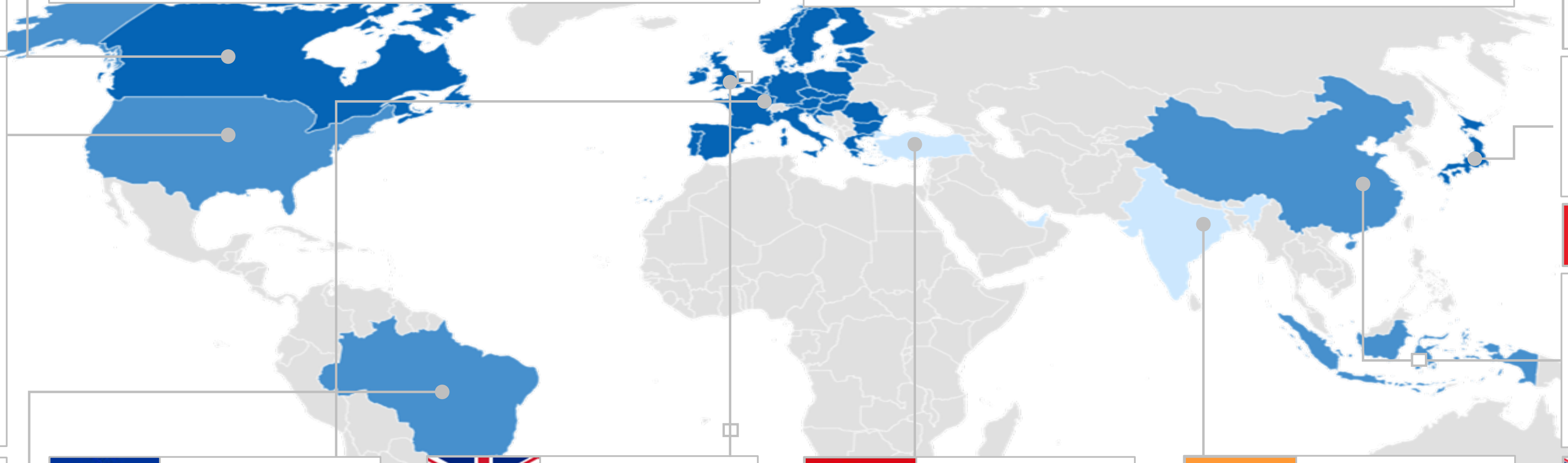
Int. Air Transport Association

Representing 290 airlines, IATA committed for global air transportation to achieve net-zero emissions by 2050.

Sweden, France and Norway SAF mandate in place since 2020 (<2%)

United States

- Renewable Fuel Standard (RFS)
- Inflation Reduction Act (IRA)
  - Clean Fuel Production Credit (CFPC)
  - 45Q/V Credits
- California, Oregon and Washington Clean Fuel Programs
- State tax credits



Japan

Announced 10% SAF target by 2030, ¥30/litre SAF tax credit

China

Target of c. 0.05 MT SAF in 2030, ongoing discussion to extend the ETS to aviation

Brazil

SAF facility plans, SAF mandate to reduce 1% emissions by 2027

The EU

EU ETS, Fit for 55: ReFuelEU Mandate for 6% SAF by 2030

The UK

UK ETS, Mandate for 10% SAF by 2030, RCM in discussion

Türkiye

SAF Mandate in discussion

India

SAF mandate in discussion

Australia

Jet Net Zero council established, first facility announced

Governmental policy support is essential to kick-start SAF production and demand in Kazakhstan

- Policy options
  - Supply side measures
    - Fund and promote RD&D
    - De-risk first-of-a-kind SAF production plants
    - Prioritise feedstock for SAF & optimize fuel plant production slates
  - Demand side measures
    - Introduce a SAF blending mandate
    - Provide direct capital subsidies for SAF
    - Include SAF in public procurement
  - Enabling measures
    - Explore establishing a SAF council

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Technical Aspects

Yasar Yetiskin
ICF

Several Approved Routes are Available for SAF Production

Pathway	Common name	Feedstock	Blending limit
FT-SPK	FT	Biomass (e.g. trash/rubbish, forestry residues, grasses)	50%
FT-SPK / A	FT	Same feedstock as FT-SPK, but slightly different process	10%
HEFA SPK	HEFA	Lipids & fats, oils, greases (e.g. Used Cooking Oil (UCO), tallow, DCO)	50%
HFS SIP	-	Sugars to hydrocarbon (e.g. molasses, sugar beet, corn dextrose)	50%
ATJ-SPK	ATJ	Agricultural waste (e.g. forestry slash, crop straws), waste CO_2	50%
ATJ-SK / A	ATJ	Same feedstock as ATJ-SPK, but slightly different process	10%
CH-HK	-	Plant and animal fats, oils and greases (FOGs)	50%
HC-HEFA SPK	HEFA	Bio-derived hydrocarbons, fatty acid esters	10%
Co-processed HEFA*	Co-processing	Fats, oils, and greases (FOG) co-processed with petroleum	5%
Co-processed FT*	Co-processing	Fischer-Tropsch hydrocarbons co-processed with petroleum	5%
Co-processed biomass*	Co-processing	Biomass co-processed with petroleum	5%

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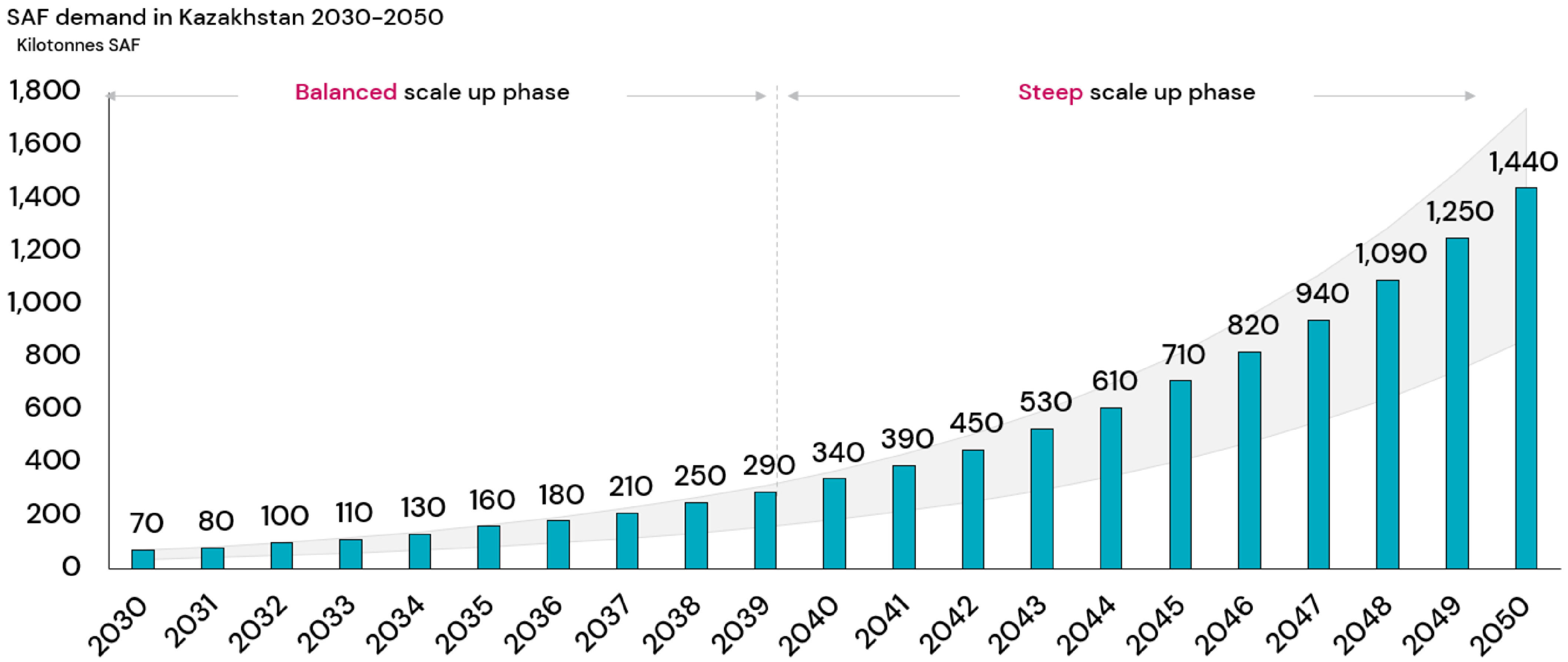
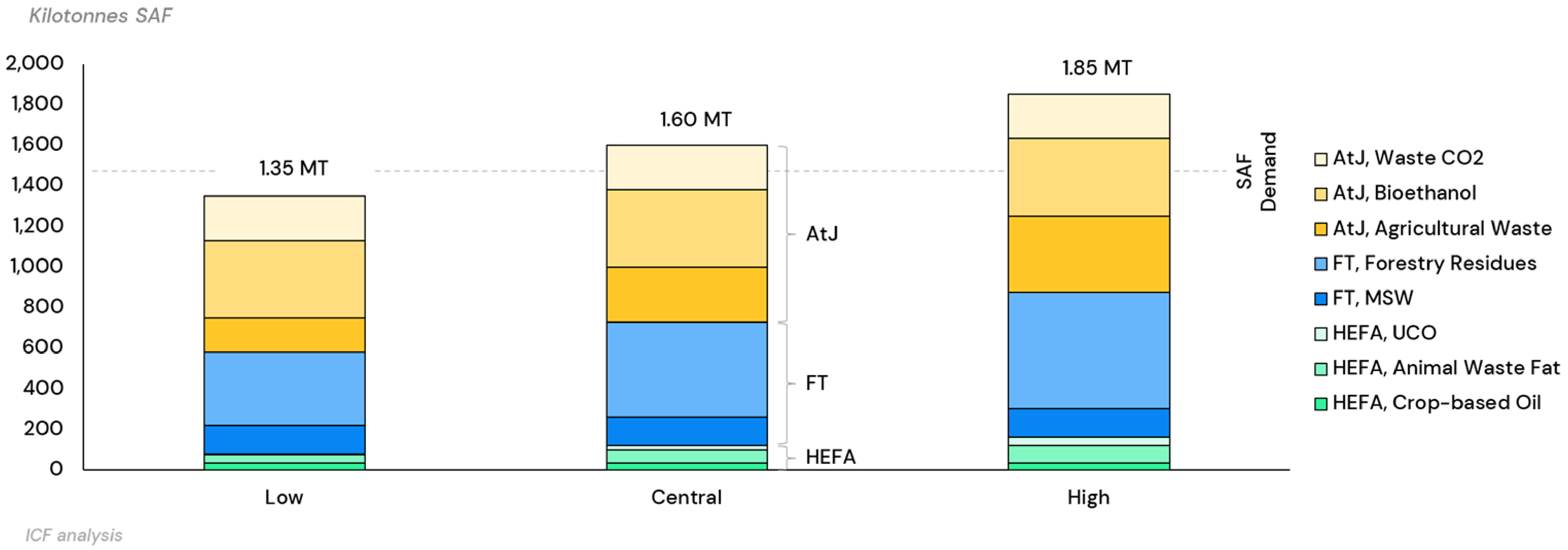
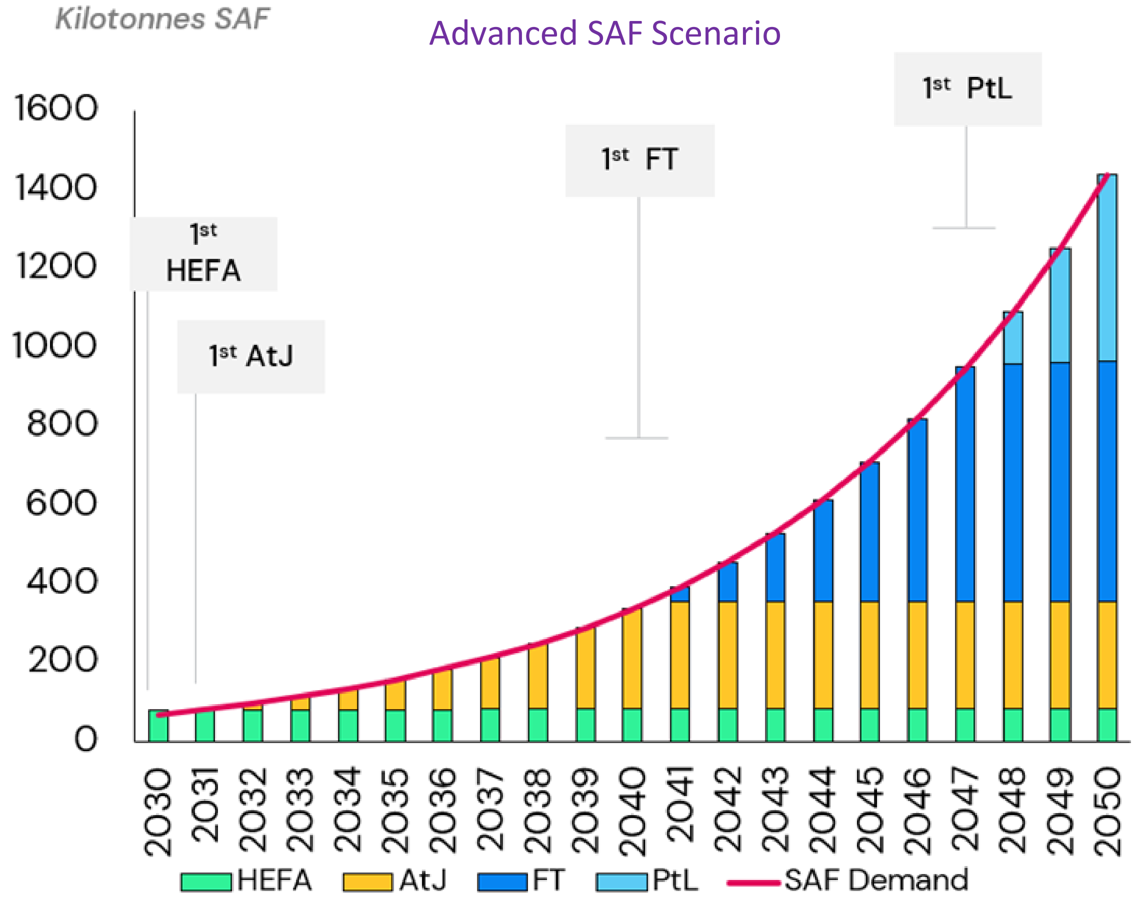
SAF demand in KZ is expected to grow

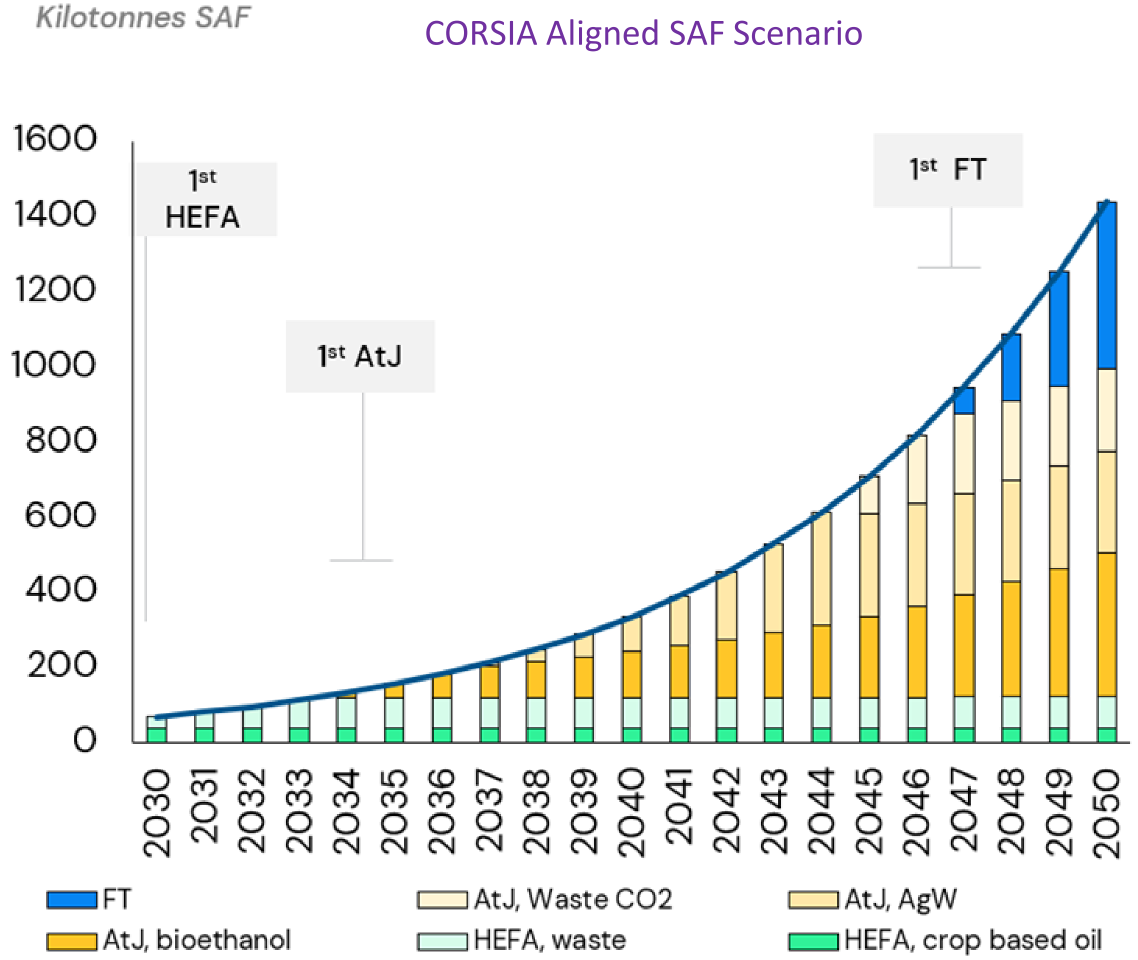


Feedstock availability drives technology selection



A combination of technologies will be required to scale up SAF





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SAF production technology selection for the first facility

Must have criteria

		SAF Yield	Consumer Proximity	Technology Readiness Level (TRL)	CAPEX	Production Cost	Feedstock Availability	ASTM-approved
HEFA	Co-processing	High	Far	High	Low	Low	Low	✓
	Stand-Alone	High	Close	High	Low	Low	Low	✓
AtJ	Co-processing	High	Far	Low	Mid	Mid	High	✗
	Stand-Alone	High	Close	Mid	Mid	Mid	High	✓
	Waste CO_2 Capture	High	Close	Low to Mid	High to Mid	High to Mid	High	✓
FT	Gasification	Low	Close	Low	High	High	High	✓

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SAF production technology selection for the first facility

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		SAF Yield	Consumer Proximity	Technology Readiness Level (TRL)	CAPEX	Production Cost	Feedstock Availability	ASTM-approved
HEFA	Co-processing	High	Far	High	Low	Low	Low	✓
HEFA	Stand-Alone	High	Close	High	Low	Low	Low	✓
AtJ	Co-processing	High	Far	Low	Mid	Mid	High	✗
AtJ	Stand-Alone	High	Close	Mid	Mid	Mid	High	✓
AtJ	Waste CO_2 Capture	High	Close	Low to Mid	High to Mid	High to Mid	High	✓
FT	Gasification	Low	Close	Low	High	High	High	✓

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5 recommendations to scale up SAF in KZ

Agree on the ambition through public private collaboration

Establish a national SAF committee across the SAF value chain and use this to develop a national SAF target. Analysis showed that 4% SAF by 2030 and 65% SAF by 2050 is feasible in KZ.

Develop the regulatory framework

Policy support is key for scaling up SAF, especially at the early stages. Explore and assess potential such as incentives and/or mandates to support scaling up of SAF in KZ.

Establish Kazakhstan SAF Roadmap feedstock supply chain

KZ has the potential to produce up to 1.8 million tonnes of SAF through domestic feedstock. Invest in developing the national supply chain for collection of these feedstocks, and work towards increasing availability.

Kick-start SAF production

Focus on the first SAF facility.
Alcohol to jet seems to have potential thanks to the existing the existing bioethanol industry.

Scale up supply with new technologies

Achieving aviation decarbonisation in KZ will require 1.4 Mt SAF by 2050. This requires the penetration of advanced SAF production technologies, but at a later stage than rest of the world, enabling cost advantage.

Thank you

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Thank You

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