Global Bioenergies

A potential **game changer** in the SAF landscape

Euronext Paris: ALGBE

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Global warming, global warning

Human CO_2 emissions led in 50 years to a 1.5°C increase in temperature globally

If we don't really act, we will be at +4°C in 2100, in a dystopian scenario

Consequences are already obvious: deadly heatwaves, hurricanes, floods…

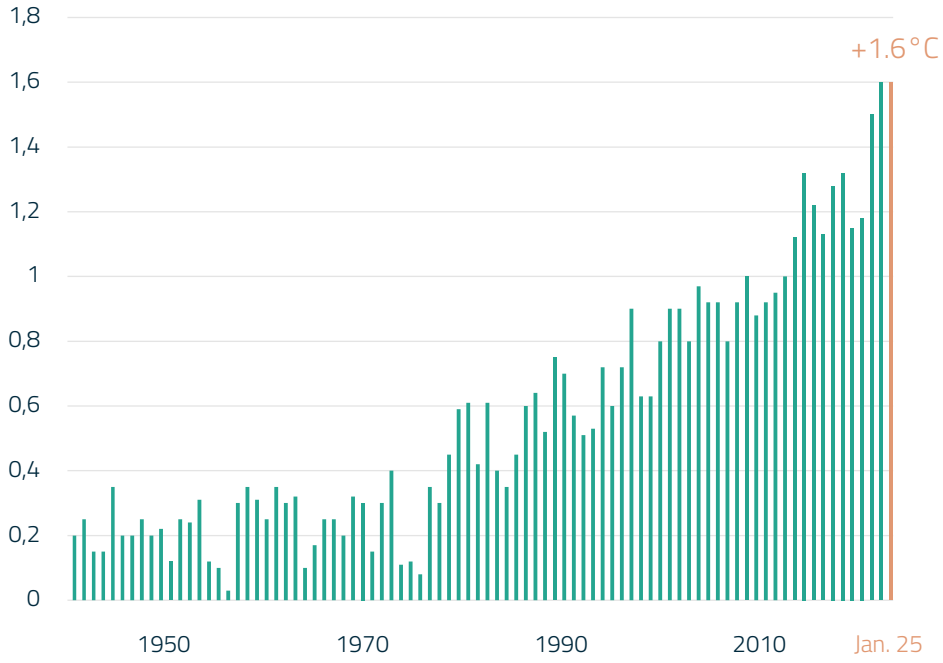
The only viable path is a combination of sobriety and new technologies

Actions are very insufficient: yearly CO_2 emissions still increasing

Developing such new technologies is among the first priorities of humankind

GLOBAL BIOENERGIES' MISSION IS TO DEVELOP AND DEPLOY ITS INNOVATIVE PROCESS TO REDUCE CO_2 EMISSIONS OF AIR TRANSPORT

2024 ON TRACK TO BE THE WARMEST YEAR AND FIRST YEAR ABOVE 1.5°C



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Why focusing on Sustainable Aviation Fuels (SAF)?

AIR TRANSPORT ACCOUNTS FOR 5% OF GLOBAL WARMING

Impact comes from CO_2 emissions and from contrails

Impact should double by 2040 due to increase in air traffic

AIR TRANSPORT CUSTOMERS HAVE FINANCIAL MEANS TO PAY FOR DECARBONATION EFFORTS

Only 10% of the world's population regularly flies

The richest 1% generate half of air transport global emissions

AIR TRANSPORT EMISSIONS ARE HARD TO ABATE

Developing new technologies (electric, hydrogen) will take decades and entails tremendous infrastructure changes

SAF is the most important lever to reduce CO_2 emissions up until 2050

SAF MARKET IS ALREADY GETTING ON TRACK

European Union: dedicated incorporation mandates starting in 2025

USA: global incentive policies already in place

Global Bioenergies at a glance

A UNIQUE PROCESS TO PRODUCE SUSTAINABLE AVIATION FUEL (SAF) BASED ON RENEWABLE RESOURCES & AMONGST THE VERY FEW TECHNOLOGIES WORLDWIDE ALREADY ASTM CERTIFIED

- Created in 2008
- ~ 45 FTEs
- 3 sites in France: R&D lab (Evry), demoplant (Pomacle), SG&A (Paris)
- Listed on Euronext Growth (ALGBE)
- Exclusive rights on 30 patent families

A unique biological process

GBE HAS DEVELOPED A UNIQUE ALTERNATIVE TO PETROCHEMISTRY …

Renewable feedstocks

BIOLOGY
(innovative process)

Fermentation by a microorganism

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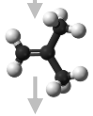
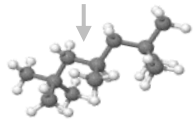
IP protected by 30 families of patents

Isobutene (IBN)



GREEN CHEMISTRY
(conventional technology)



Sustainable Aviation Fuels (SAF)
"IBN-SPK"

… BY LEVERAGING BREAKTHROUGH RESEARCH

- Process **unique in the world**
- **Drop-in substitute for petrochemical molecules**
- Produced from **various renewable feedstocks**
- **Gradual improvement** of process performance
- **Process protected by numerous patents**
- **ASTM certified** "Approval to fly"

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Focus on the product

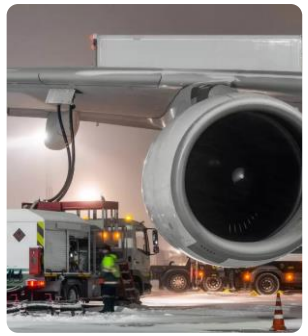
CHEMICAL PROPERTIES

C12/C16 isoalkanes (isoparaffins)

Specifically good cold flow properties
(does not freeze at very low temperature)

Injection
(behaves similarly as JetA1)

Combustion
(produces less particles)



Illustrative images only - the Company does not yet possess production capacity

PRODUCT RANGE

The same technology can produce two types of SAF:

Bio-SAF

From agricultural and forestry byproducts (beetroot, corn, sugar cane, wood chips..)

TARGETING THE US MARKET

e-SAF (1)

From captured CO_2 and renewable electricity, in our case through acetic acid

TARGETING THE EU MARKET

(1) Also named « Synthetic Fuel » or « RFNBO » or « Power-to-liquid » (PTL)

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ASTM Certified

ASTM IS THE ONLY REGULATORY BODY FOR AVIATION FUELS

5-years process to validate a new aviation fuel:

1. Work with FAA + two National Laboratories
2. Work with the OEMs (Airbus, Boeing, Safran, Pratt & Whitney, General Electrics, Rolls-Royce, Honeywell)
3. First Ballot with 500 voters (expert industrialists)
4. Main Ballot >1,500 voters across all the aviation industry - process certified when there is no negative vote

60 PARAMETERS MONITORED
ONLY 11 TECHNOLOGIES CERTIFIED WORLDWIDE

GBE'S SAF PROCESS WAS CERTIFIED IN OCTOBER 2023

Classified with Alcohol-to-Jet under Appendix 5 of D7566 regulation, now claiming that isobutene can be used as an intermediate to produce SAF

GBE'S SAF CAN NOW BE BLENDED UP TO 50% WITH JET FUEL AND USED IN ALL AIRPLANES WORLDWIDE

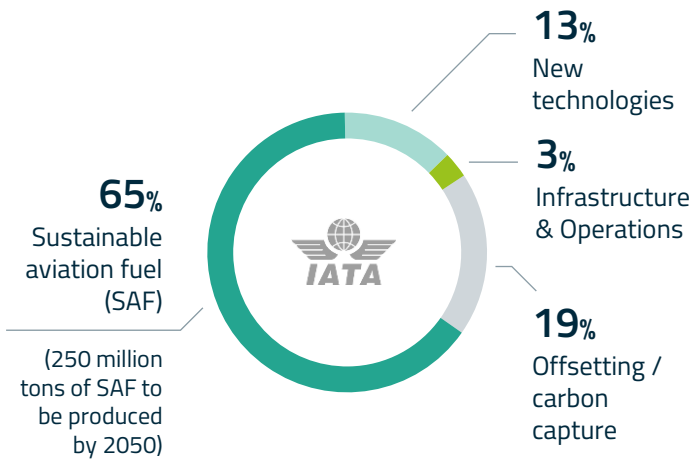
Without any change in equipment or infrastructure

Business opportunity: €45 bn in 2030

SAF ARE KEY TO DECARBONIZING THE GLOBAL AVIATION

SAF are the **main technological solution to** decarbonize aviation and have the potential to **reduce CO_2 emissions by up to 80%**

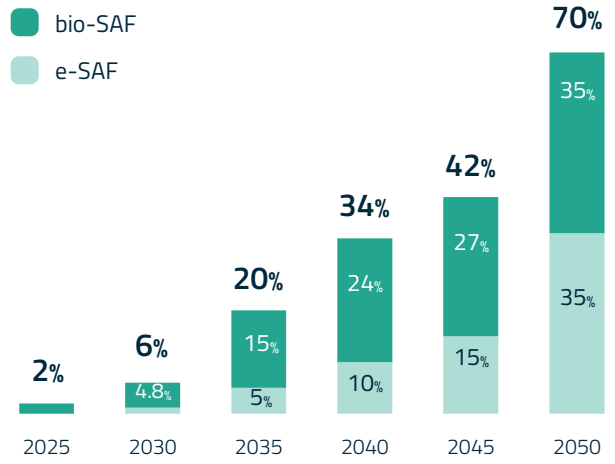
ACHIEVING NET ZERO CARBON BY 2050



PUBLIC REGULATION WILL CAUSE THE SAF MARKET TO SOAR IN THE NEXT YEARS

Public regulations are driving an **exponential market growth from 2030 onwards**: ReFuelEU Aviation initiative in the EU, IRS financial incentives in the US

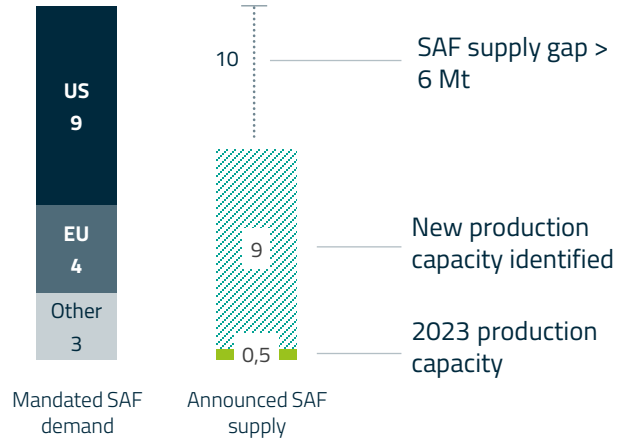
MANDATED SHARE OF SAF IN THE EU



THE SAF MARKET IS MASSIVE AND LARGELY UNADDRESSED

The **global SAF market will amount to c.€45bn in 2030**[(1)]. Out of those, **€16bn are not identified today**. In Europe, reaching 2050 objectives means deploying **c.150 SAF refineries**

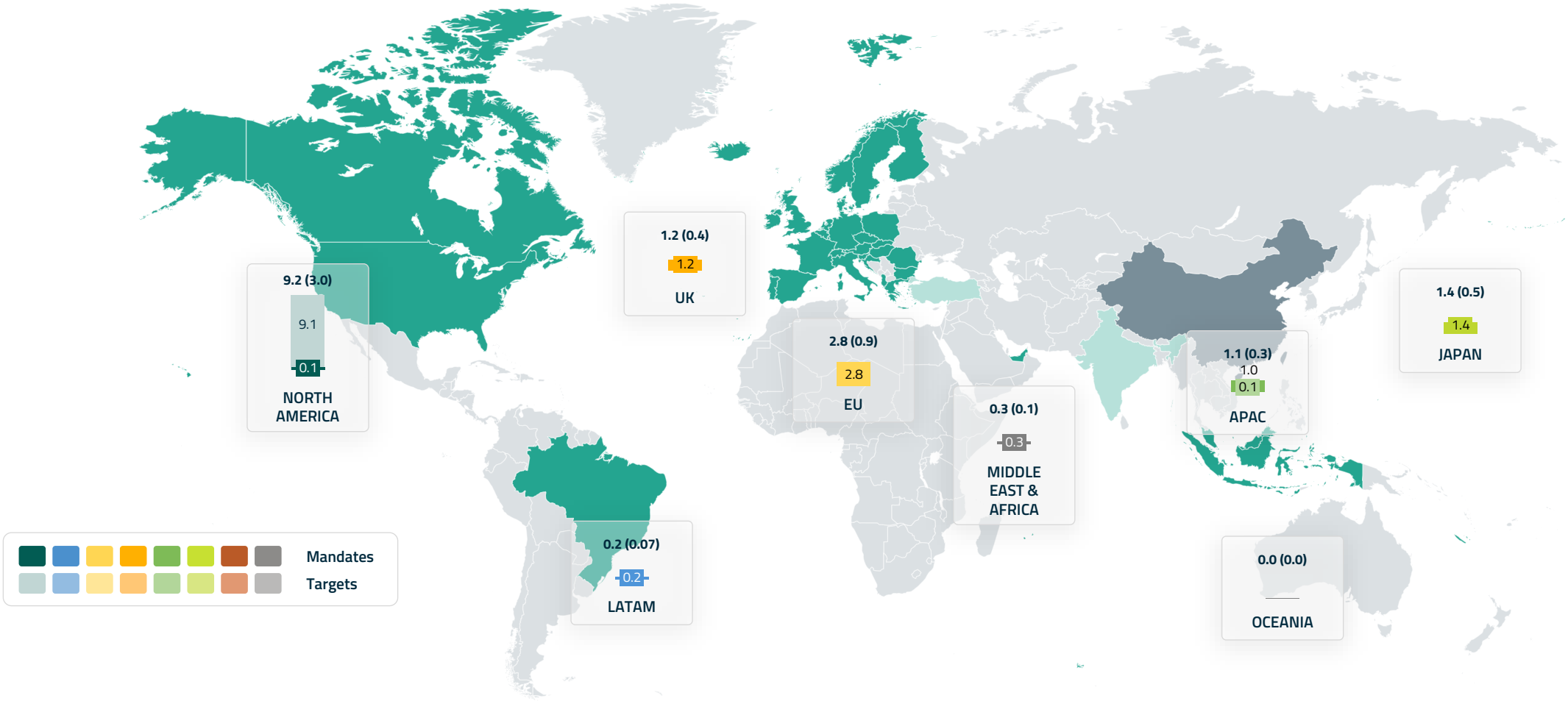
GLOBAL SAF SUPPLY GAP IN 2030 (IN MT)



Note: (1) assuming a sales price of €3/kg
Sources: IATA, SkyNRG 2023 SAF Market Outlook

The SAF market is created by policy

Mandates & targets now add up to 16 Mt



Source: 2024 SAF Market Outlook, SkyNRG, a global leader in Sustainable Aviation Fuels

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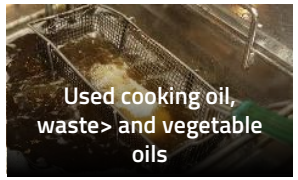
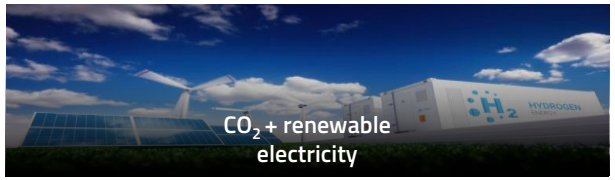
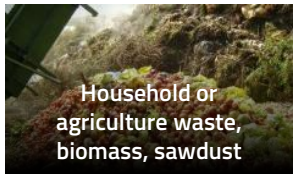
Competition landscape

PATHWAY	Oleochemistry	Fermentation (Annex 5 of ASTM D7566)		Thermochemistry	
MANDATE	**bio-SAF**		**e-SAF**		**bio-SAF**
TECHNO	Hydrotreated Esters and Fatty Acids (HEFA)	Alcohol-to-Jet (ETJ-SPK)	**GLOBAL BIOENERGIES** **bio-IBN-SPK + e-IBN-SPK**	Power-to-Liquid (PtL)	Fischer-Tropsch (FT)
FEEDSTOCK	 Used cooking oil, waste> and vegetable oils	 1G (US only): corn, cane sugar 2G: wood chips (e.g., birch trees)	 CO_2 + renewable electricity		 Household or agriculture waste, biomass, sawdust
MATURITY	2020 Technology already implemented at large scale	2024 First 30kT plant project in commissioning	2028 Unique, flexible and complementary solution to expand both in Europe and in the USA	2030 First small-scale pilot plants starting	2030 Several industrial scale projects

Production to plateau at ~10 million tons in 2030

Production expected to ramp up in sugar and ethanol-producing countries (USA, Brazil, SE Asia...)

The only long-term option for regions where vegetal resources are scarce (Europe, China...)

Industrial scale-up difficulties

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Current market analysis - worldwide

HEFA TECHNOLOGY BASED ON USED COOKING OIL (UCO):

- Is the only technology commercialized as of today
- Process is efficient in CAPEX, OPEX and CI-score
- But relies on used cooking oil harvested from restaurants which are limited in quantity

Great solution BUT limited by the feedstock availability: production should plateau around 2030

The big question in the industry is: **what comes next?**

USA

Focus on biofuels mainly from Alcohol-to-Jet to convert corn into SAF

bio-IBN-SPK addresses this market

EU

Focus on e-SAF, produced from captured CO_2 and green electricity

e-IBN-SPK addresses this market

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USA: We ambition to become best-in-class in bio-SAF

SAF 2030 GRAND CHALLENGE

TARGET 3BN GALLONS, I.E. 9 MILLION TONS BY 2030

Sustainable Aviation Fuel Grand Challenge

HOW TO GET THERE?

ETHANOL-TO-JET (ETJ-SPK) IS CURRENTLY MORE ADVANCED THAN WE ARE:

- Lanzajet is presently commissionning the very first ETJ plant (30kT plant in Georgia)
- Gevo just got a $1.4b loan guarantee to build a large FOAK plant

BUT OUR BIO-IBN-SPK HAS THE POTENTIAL TO BECOME THE BEST-IN-CLASS OPTION

- CAPEX significantly reduced
- OPEX lowered due to less production steps
- CI-Score improved through reduced energy consumption

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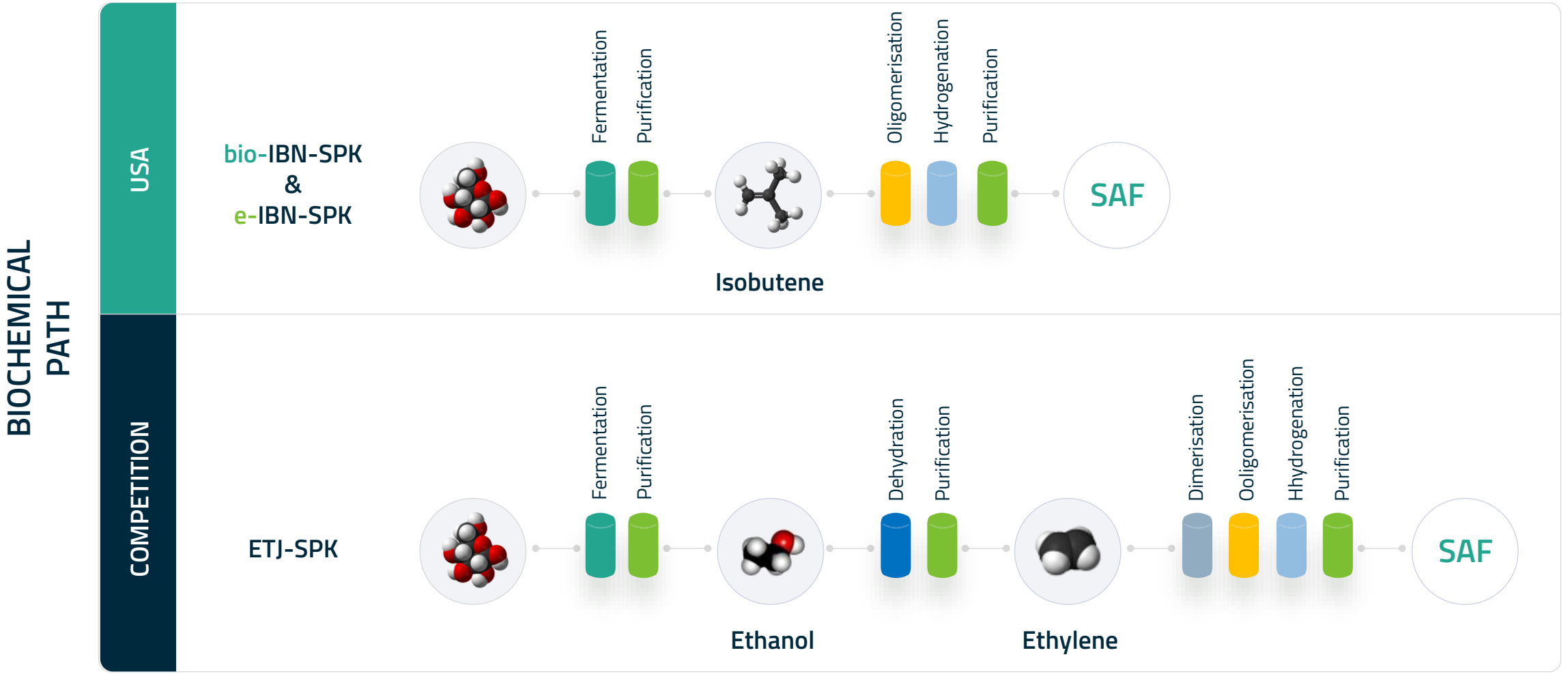
USA: Fewer steps than competitive technologies



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European Union: priority on e-SAF

REFUELEU
DUE TO SCARCE BIO-RESOURCES, THE EU IS HIGHLY PROMOTING E-SAF WITH A SPECIFIC SUBMANDATE

E-SAF SHOULD REPRESENT
50% OF SAF IN THE EU BY 2050

ReFuelEU AVIATION

HOW TO GET THERE?

- e-SAF is very challenging because of the cost of electricity
- No-one knows as of today if e-SAF will really happen, i.e. if the cost of e-SAF will really be compatible with demand
- But if it happens, the best-in-class technology, associated with the lowest cost, should win the game
- The market will open in 2030 with the 1.2% e-SAF submandate in Europe (i.e. market of about 500 ktons/year), and we expect to be part of this emerging market

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Business model: creating an ecosystem of multi-axis partners

UPSTREAM PARTNERSHIPS

FEEDSTOCK PROVIDERS

Residues from beetroot, wheat, corn, wood chips…

Acetic acid providers

INDUSTRIAL PARTNERSHIPS

FEEDSTOCK CONVERSION

ISOBUTENE PRODUCTION

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CORE TECHNOLOGY

ISOBUTENE CONVERSION INTO SAF

Chemical industry

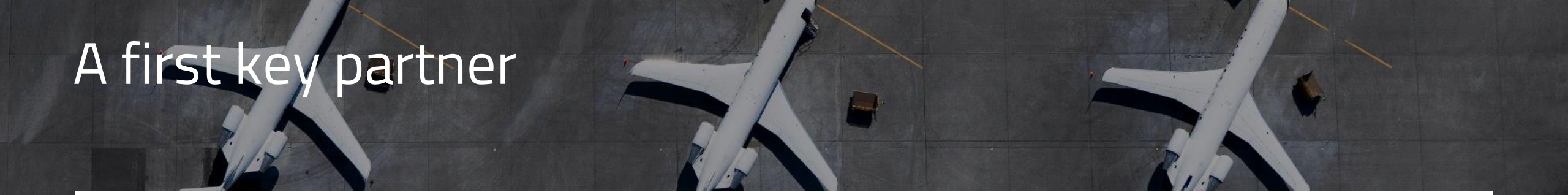
DOWNSTREAM PARTNERSHIPS

SAF CONSUMERS

Obligated parties: Big Oil

End clients: Airlines

SAF Ecosystem: Airports



A first key partner

INDUSTRIAL PARTNERSHIPS

FEEDSTOCK CONVERSION

↕

ISOBUTENE PRODUCTION

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CHARACTERISTICS

Combination of GBE's process with the existing technology of a large international industrialist (undisclosed)

New combined process using existing biorefinery assets such as corn dry mills for IBN production

STATUS

Early proof of concept reached

Term sheet signed

Technology to be implemented at large scale by 2030

ADVANTAGES

Much lower CAPEX: 4 times lower than other competitive SAF technologies

Much lower OPEX

Improved CO_2 savings

Niche cosmetics market is a steppingstone to ramp up the SAF process

**THE PRODUCT DEVELOPED FOR SAF PURPOSES IS MADE OF BIOBASED IDD AND IHD.
IT TURNS OUT THAT PETROCHEMICAL IDD AND IHD ARE WIDELY USED IN COSMETICS, AND OUR BIOBASED PRODUCT IS THE PERFECT NATURAL SUBSTITUTE FOR THESE OIL BASED INGREDIENTS**

L'ORÉAL FIRST SHAREHOLDER OF THE COMPANY

L'ORÉAL **13.5%**

IDD AND IHD ARE KEY PETROCHEMICAL INGREDIENTS IN COSMETICS

IDD and IHD are among the **widest used ingredients** in cosmetics
- **20kT** existing market

IDD's strongest case is in long-wear, waterproof and no transfer in make-up and skin care

MAKE UP

Mascara, lipstick, foundation

SKIN CARE

Anti-ageing, moisturizing creams

ISONATURANE™ IS A PERFECT REPLACEMENT FOR PETROCHEMICAL IDD/IHD

With the same molecular composition and properties, GBE's Isonaturane™ can replace petrochemical IDD/IHD on a like-for-like basis and is also a good alternative to cyclic silicones (CS)

Switching from petrochemical IDD to GBE's natural product enables a strong marketing claim and product differentiation for cosmetic brands

SEVERAL LETTERS OF INTENTS AT HIGH PRICES ALREADY RECEIVED

Various cosmetics players worldwide have already sent us LOIs totaling a volume of 4,000 tons/year

ISONATURANE ™

- Powerful solvent
- Aerial emollient
- Highly volatile
- ISO 16128

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Take home message

OUR SAF TECHNOLOGY IS ALREADY ASTM CERTIFIED AS APPROVAL TO FLY

- Bio-IBN-SPK for the US
- e-IBN-SPK for Europe

OUR SAF TECHNOLOGY HAS THE POTENTIAL TO BE THE BEST-IN-CLASS AFTER HEFA ON ALL 3 KEY PARAMETERS

- CAPEX
- OPEX
- CI Score

OUR SAF TECHNOLOGY IS HIGHLY SCALABLE AND MADE TO BE REPLICATED WIDELY

- Niche cosmetics market is a steppingstone to ramp up the SAF process
- Asset light model through licensing

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