



**Global  
Bioenergies**

**A growing player of the environmental transition**

**January 2023**

# Disclaimer

This presentation contains certain forward-looking statements that have been based on current expectations about future acts, events and circumstances. These forward-looking statements are, however, subject to risks, uncertainties and assumptions that could cause those acts, events and circumstances to differ materially from the expectations described in such forward-looking statements.

These factors include, among other things, commercial, technical and other risks e.g. associated with estimation of the price of carbohydrate resources, the meeting of development objectives and other investment considerations, as well as other matters not yet known to the Company or not currently considered material by the Company.

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## Our Company

- ✓ Founded in 2008
- ✓ ~50 employees in Paris area
- ✓ IPO in 2011 & listed on Euronext Growth Paris

## Our Technology

- ✓ A pioneer biotechnology to cut CO<sub>2</sub> emissions
- ✓ A unique & disruptive gaseous fermentation process
- ✓ Deeptech: synthetic biology x green chemistry
- ✓ Q4 2022: First commercial plant up and running

## Our Purpose

***‘To foster the environmental transition through biosciences’***

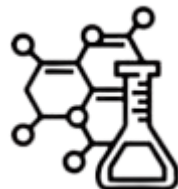
## Our Products

First renewable isobutene and derivatives

### Key molecules for cosmetics

used for decades in oil-based version

→ 2022: first orders from main industry players including L'Oréal (main shareholder since 2019)

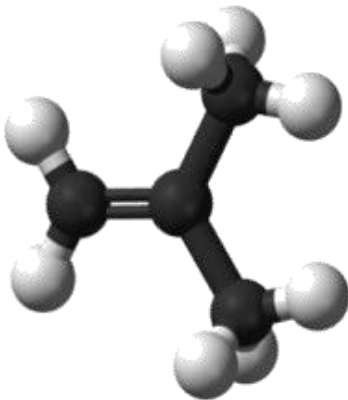


### Next molecules for sustainable fuels

ASTM certification under process

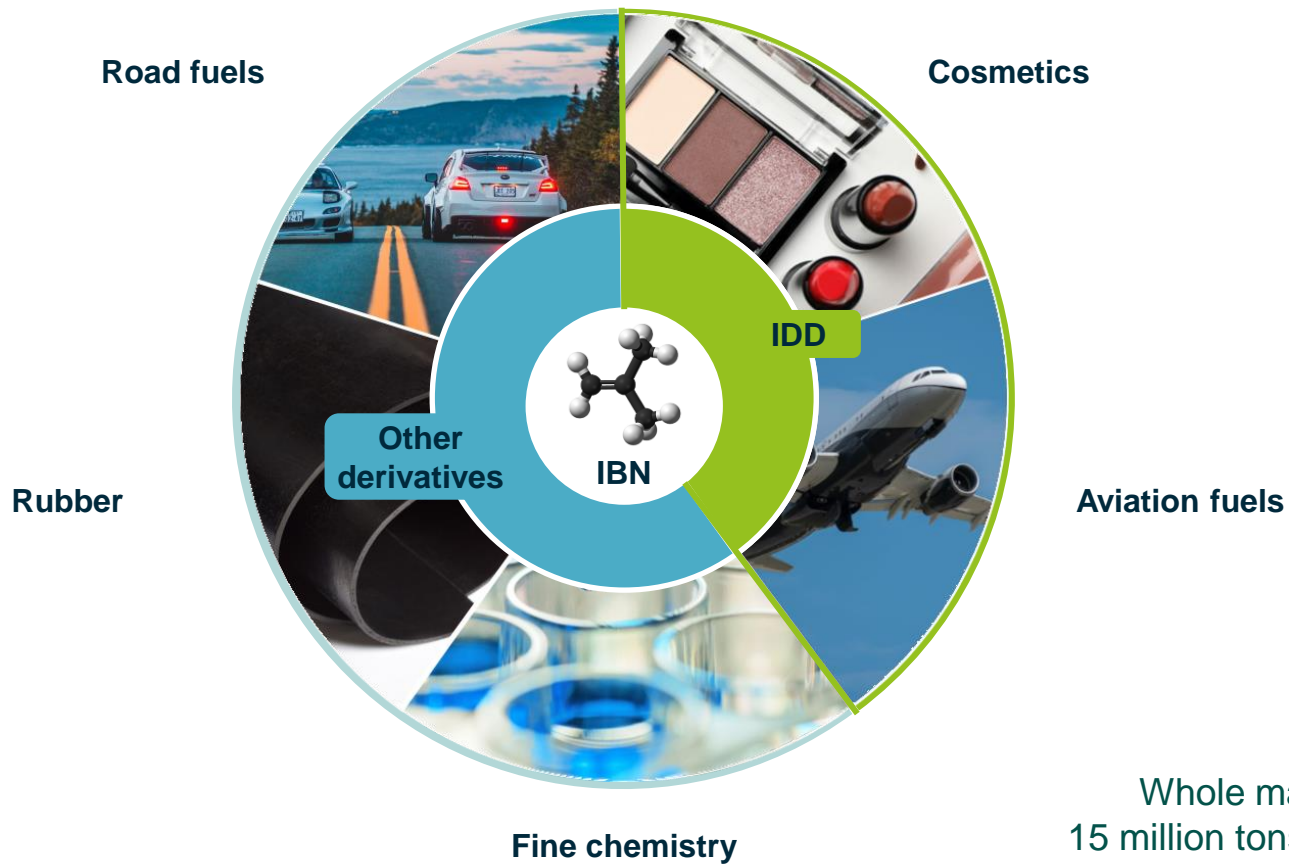
→ One of the few technologies worldwide to have a large-scale perspective in road and air transportation





- The smallest **branched** carbon structure
- A **double bond**, which allows the conversion of isobutene into numerous high-performance compounds: octane rating for gasoline; air-tightness for elastomers; volatility for cosmetic oils...
- Numerous markets well in place fully relying on isobutene
- These performances cannot be obtained from products extracted from Nature, because it only relies on isobutene and isobutene is not produced in Nature

# Isobutene product tree



Whole market:  
15 million tons per year  
(20 billion USD)

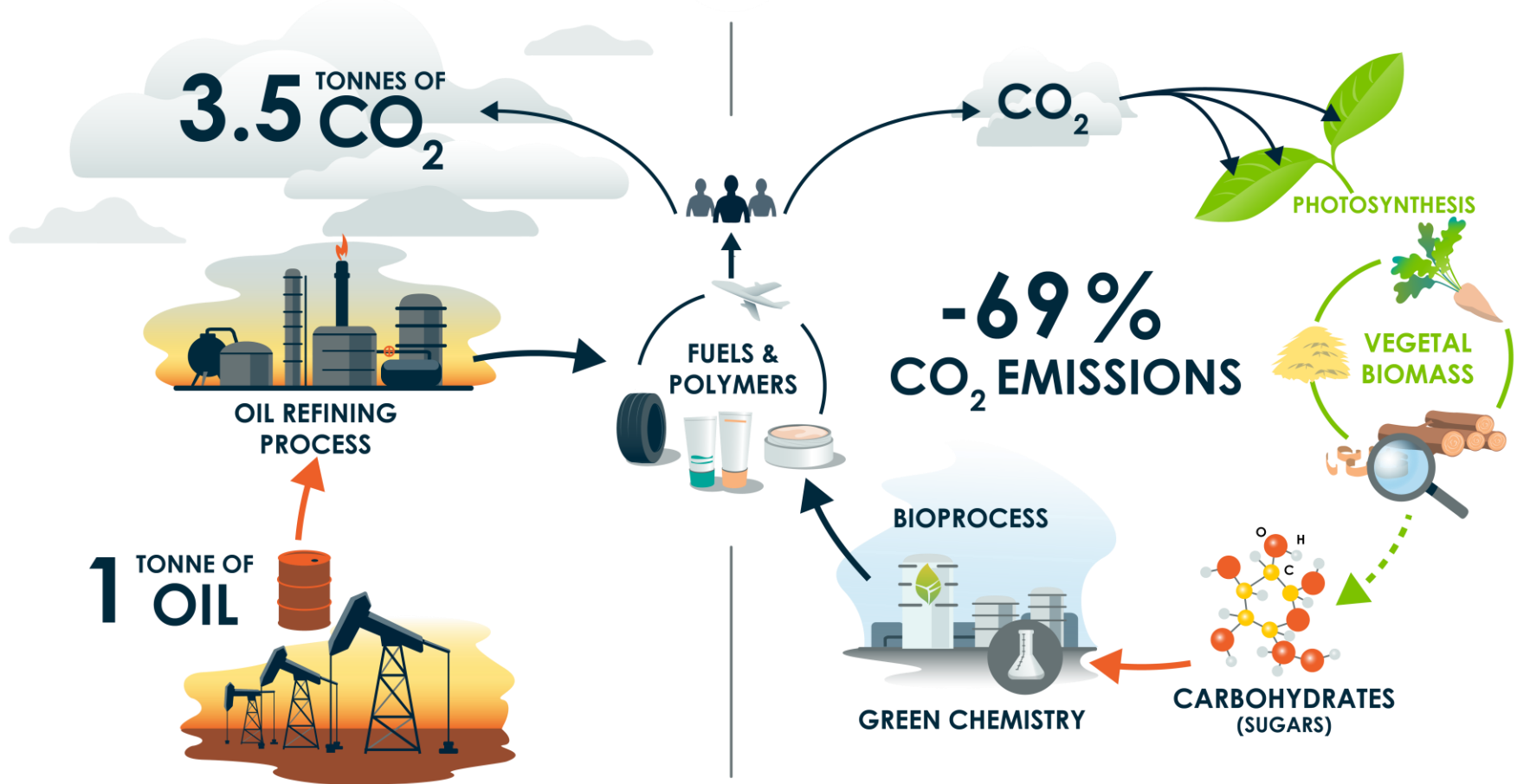


# Industrial biology is a way to decarbonisation

## PETROCHEMISTRY

Vs

## INDUSTRIAL BIOLOGY



# Our commitment: contributing to keeping the world livable

- We aim at becoming an example for an environmentally-friendly industry
- Sustainability is at the heart of our activity
- Started the Gaïa notation :
  - in 2021 : score of 40/100 (average within the companies in the same sector)
  - in 2022 : score of 56/100
- One full-time ESG manager driving progress and objectives

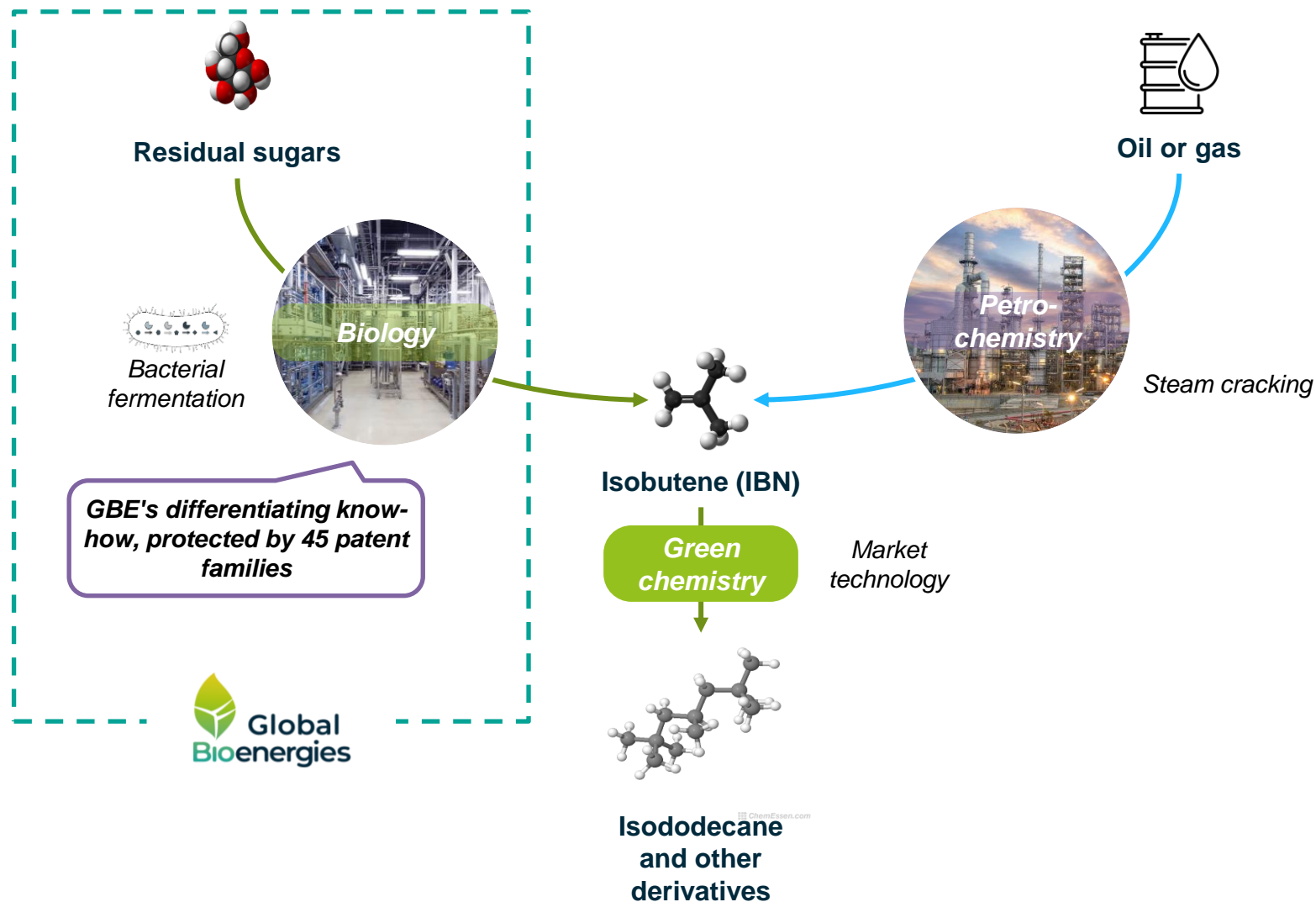


An aerial photograph of a dense forest with a thick canopy of green trees, showing various shades of green and some darker patches where the canopy is denser. The image is partially obscured by a teal background and a white text box.

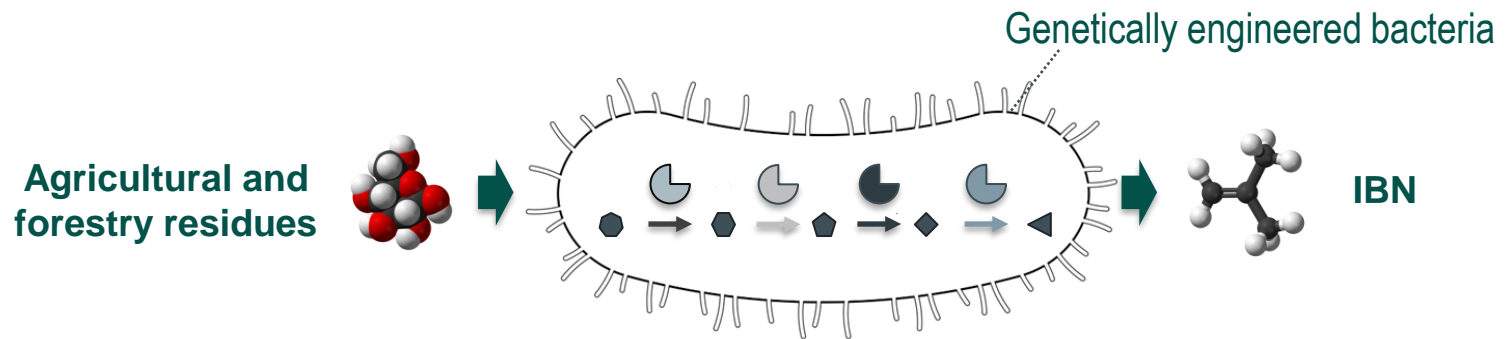
**A disruptive technology to impact the planet**



# Biomass $\rightarrow$ Isobutene $\rightarrow$ Isododecane



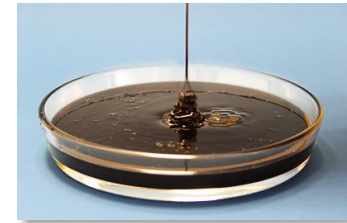
- Engineering bacteria by implementing a metabolic pathway to IBN



- No biological starting point because IBN is not produced by Nature  
→ We created a unique artificial metabolic pathway - huge technology barrier overcome
- Global Bioenergies developed the first ever fermentation process to a gas, with solid advantages translating in economics

## 1<sup>st</sup> generation: sugar residues

- ✓ Residue: natural and inevitable coproducts in the production process
  - ✓ No food (nor feed) application
  - ✓ No need for additional land
  - ✓ Potential for high GHG emission savings
- Well established industry
  - Available volumes sufficient for the cosmetics and specialty chemicals markets
  - CO<sub>2</sub> savings if compared to fossil ~ 65%



### Focus on beet

French beet production:  
40 mt



16% sugars:  
6 mt



11% non extractable sugars:  
650 kt

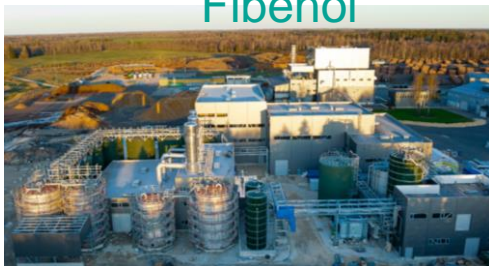
## 2<sup>nd</sup> generation: wood residues and straw

- Wood chips from sawmills & wheat straw
- Proven compatibility with GBE technology
- New, emerging industries: first plants in operation in Europe
- Accessible volumes in future: several thousands of million tons, enough to cover all jet fuels needs
- CO<sub>2</sub> savings: 80% if compared to fossil

→ Clariant & Fibenol both partners of Global Bioenergies through EU-funded projects:



Fibenol



Sugar capacity: 20 kt/y  
Start of operation: Q1 2023  
Location: Estonia



Clariant

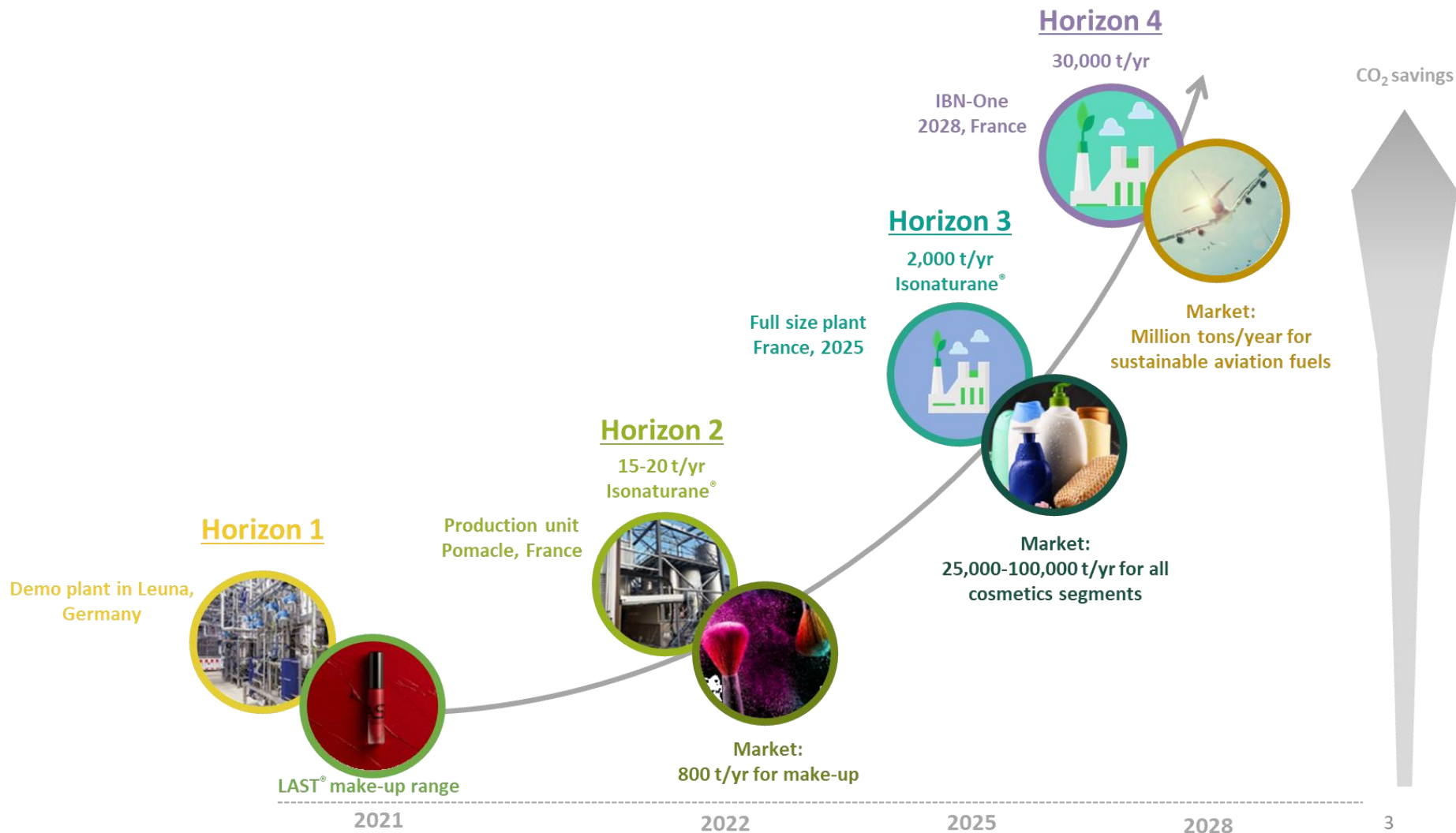


Sugar capacity: 100 kt/y  
Start of operation: mid-2022  
Location: Romania





**Step by step roadmap**



# Isonaturane : first bio-based IDD

USP in cosmetics :  
Brings naturalness & maintains performance

In make-up : volatile solvent



In overall cosmetics : aerial emollient

Long-wear

Waterproof

No Transfer

Lightness

Silk effect

IDD 1<sup>st</sup> ingredient in volume:  
from 25% up to 60% in formulas

make-up, skincare, haircare, toiletries  
25,000 to 100,000 tonnes per year

H1

Proof of concept

LAST<sup>®</sup>

H2

Sale of unique  
ingredient to make-up  
leaders

L'ORÉAL

...

H3

Like-for-like  
substitution to oil-  
based IDD

H3

Replacement to  
silicons

# H1: Launching our proprietary brand

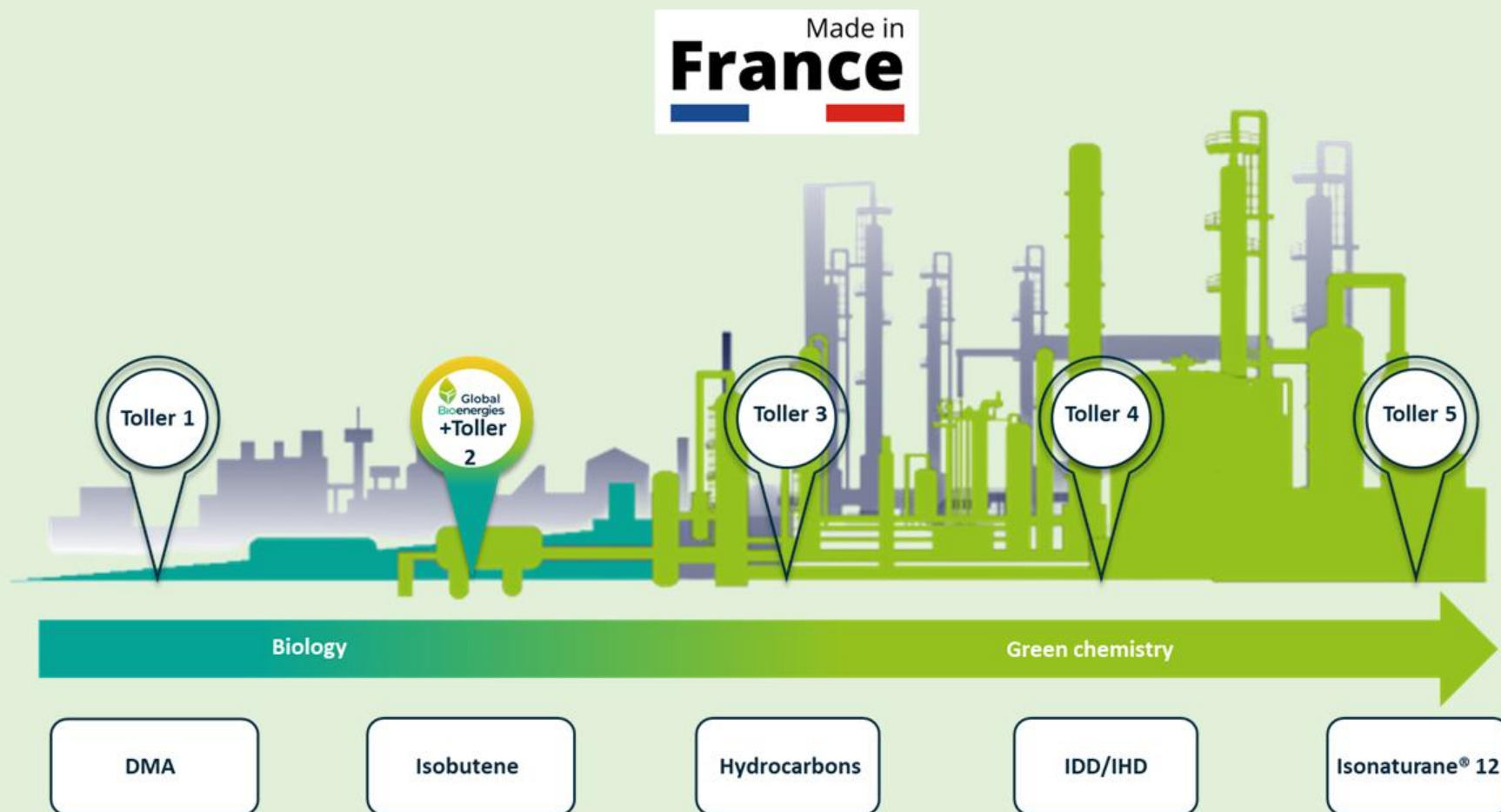
## LAST<sup>®</sup> → *From Biotech to Beauty*

- **IDD is the key, indispensable molecule in longwear make-up,** and first ingredient in proportion: from 25% up to 60% in formulas
  - First bio-sourced IDD → Unique Selling Proposition: first brand combining naturalness and longwear/waterproof/no-transfer performance
  - Moving up the value chain and launching LAST<sup>®</sup> in summer 2021 ([www.colors-that-last.com](http://www.colors-that-last.com)) allowed us to:
    - Qualify our raw material (regulatory...)
    - Prove the high naturalness / high performance market at scale
- Strengthened negotiating position in preparation for Horizon 2
- First e-retailers in Q1 2022.
  - 10 selling points as at December 2022, including Printemps Haussmann and Printemps Nation. Sales to expand upon increase of selling points.





## H2: Priming the market for Isonaturane



## H2: Priming the market for Isonaturane

- Small manufacturing unit in the premises of fermentation toller ARD in Pomacle, France
- Production focuses on the IBN production, and takes advantage of tolling capacities for the upstream and the downstream segments
- Construction and commissioning completed
- IBN to be converted into cosmetic-grade IDD and sold under brand name Isonaturane®12:
  - Regulatory work completed
  - Orders signed with L'Oréal + a few others
- IBN will also be sold for various applications (other cosmetic ingredients, testing volumes in road and sustainable aviation fuels...)



## H3: Large volumes to skin and hair care

- Frost & Sullivan paid-for study:
  - IDD and IHD widely used in four of the five cosmetics segments: make-up, skincare, haircare, toiletries
  - Present market **25,000 tons/yr**
  - Ramping up to **100,000 tons/yr** within years by considering substitution of D5 silicon, soon to be banned from the whole cosmetics industry
- Isonaturane launched during renown In-Cosmetics fair in Paris and Bangkok with > 150 meetings
- Several types of customers:
  - Brand owners
  - CDMOs
  - Distributors
- Limited competition



**in-cosmetics™**  
**asia**



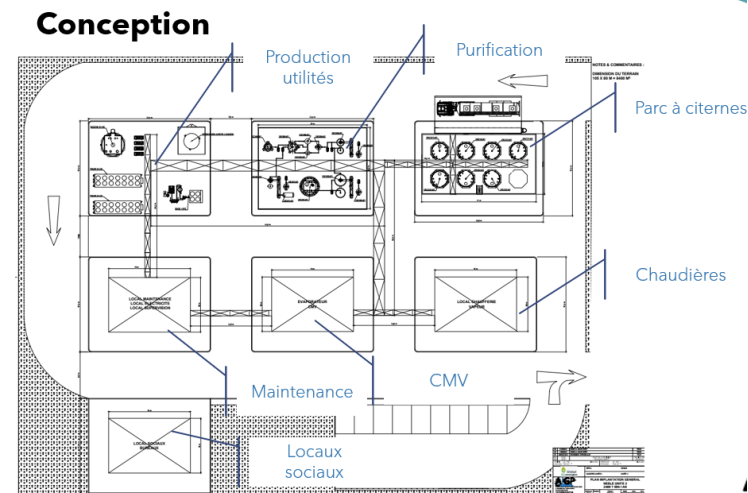
Innovation Zone  
Best Ingredient  
Award 2022

**SILVER WINNER**

FUNCTIONAL CATEGORY

# H3: Large volumes to skin and hair care

- Plant project on its way:
    - 2,000 tons/yr Isonaturane®
    - Site pre-selected in France on existing industrial park
    - Basic engineering completed
    - Special Purpose Vehicle « ViaViridia » in creation
    - Target revenues >€80m at high margin rate due to its unique selling proposition
    - Commercial discussions ongoing
    - Investment advisory firm already at work
    - Fundraising on ViaViridia targeted in Q2 2023 (equity + debt)
    - Production to start in Q4 2025
- Will make GBE profitable





# H4: Decarbonizing air transportation

- First flight performed in June 2021 with a small airplane using **97% green aviation gasoline**
  - sends the message of our commitment to improving the sustainability of air transportation
- IDD is already approved for a 50% blend in commercial jet fuel
- ASTM-certification on its way
- Objectives for renewable & sustainable jet fuel:
  - Bring cost below 4€/kg (R&D efforts necessary)
  - New Life Cycle Analysis to calculate CO<sub>2</sub> savings (and more)
  - Prove reduction in particles emission → less contrails, that are also contributing to global warming
  - 30kT SAF-centered plant in the second half of the decade
- A lot of communication in the press suggesting that the competition is coming from numerous technologies. In fact, the competition is quite limited...

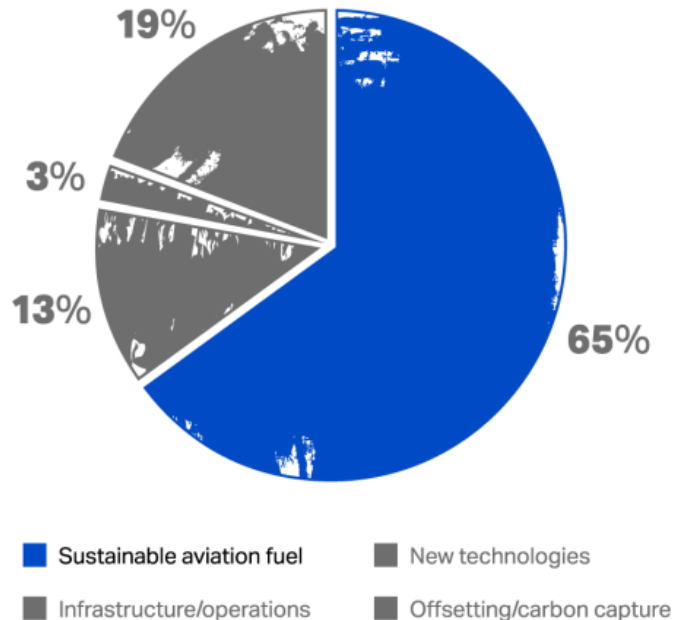


# H4: IATA's view



**International Air Transport Association's view:**  
(IATA is the trade association for the world's airlines, representing 290 airlines or 83% of total air traffic)

## Contribution to achieving Net Zero Carbon in 2050



## The state of sustainable aviation fuel (SAF) in 2021

**360,000 flights**

2016: 500 flights  
2025: 1 million flights

**100 million litres per annum**

2016: 8 million litres  
2025: ~5 billion litres

**36 countries with SAF policies**

2016: 2 countries  
2025: global agreement?

**7 technical pathways**

2016: 4 pathways  
2025: 11 pathways

**70% average CO<sub>2</sub> reduction**

2016: ~60% reduction  
2025: ~80% reduction

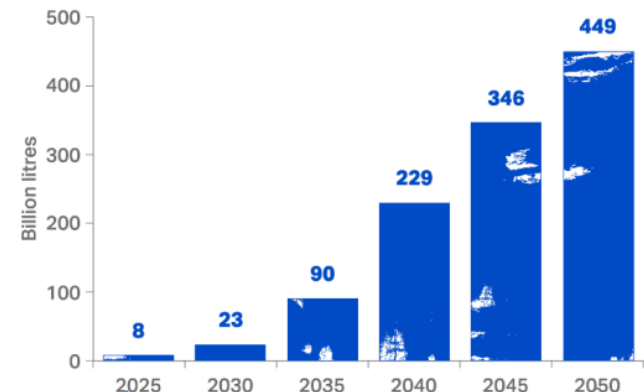
**\$13 billion in forward purchase**

2016: \$2.5 billion  
2025: >\$30 billion

Source: IATA 2025 estimates

« We estimate that SAF could contribute around 65% of the reduction in emissions needed by aviation to reach net-zero in 2050. This will require a massive increase in production (see chart below) in order to meet demand. The largest acceleration is expected in the 2030s as policy support becomes global, SAF becomes competitive with fossil kerosene, and credible offsets become scarcer. »

## Expected SAF required for Net Zero 2050



- Road biofuels were considered until recently as a dead case: the electric car would become core for road transportation, and thermal engines would be banned.
- Several arguments recently damaged this vision: dependency on China; effective CO<sub>2</sub> emissions of cars, batteries, and electricity; tensions on rare earth elements; shortages on electricity...



- Road biofuels are back. The continuation of thermal engines in Europe beyond 2035 now seems linked to biofuels, which appear again as a part of the solution.
- Isobutene derivatives are energy-dense, high-octane and drop-in compounds.
- Research collaboration with Shell started in November 2022.







## Conclusions



- Process now mature for applications in the cosmetics
- Clear and stepwise roadmap for ramping up the production from Cosmetics to Sustainable Aviation Fuels and Road fuels
- Horizon 2 plant in operations / Horizon 3 plant projected for Q4 2025
- Potential to build thousands of plants and re-industrialize deserted territories
- Contributing to the energy independence of many countries – strategic dimension
- Perspective to reduce world CO<sub>2</sub> emissions by 1%, a large figure for a unique technology, bringing a concrete contribution to limiting global warming, the main challenge of our generation

## **Contact**

Global Bioenergies  
5 rue Henri Desbruères  
91000 Evry

Tél. : +33 (0) 1 64 98 20 50

E-mail : [invest@global-bioenergies.com](mailto:invest@global-bioenergies.com)