



**A growing player of the environmental transition**

**November 2022**

## 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'*

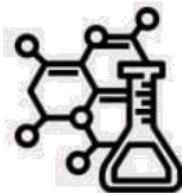
## Our Products

First renewable isobutene and derivatives

### Key molecules for cosmetics

used for decades in oil-based version

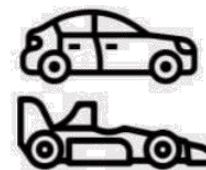
→ 2022: first orders from main industry players including L'Oréal (main shareholder since 2019)



### 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



Production

CO<sub>2</sub> savings

## Horizon 1

## Horizon 2

## Horizon 4

## Horizon 3

Demo plant in Leuna, Germany

Semi-works unit in Pomacle, France

Large Plant in France, 2025

IBN-One 2028, France



15-30 t/yr Isonaturane® + 80 t/yr IBN

2.000 t/yr Isonaturane®

30.000 t/yr

25.000-100.000 t/yr in whole cosmetics

Millions of tonnes/yr In sustainable fuels

Range of Make-up products LAST®

2021

2022

2025

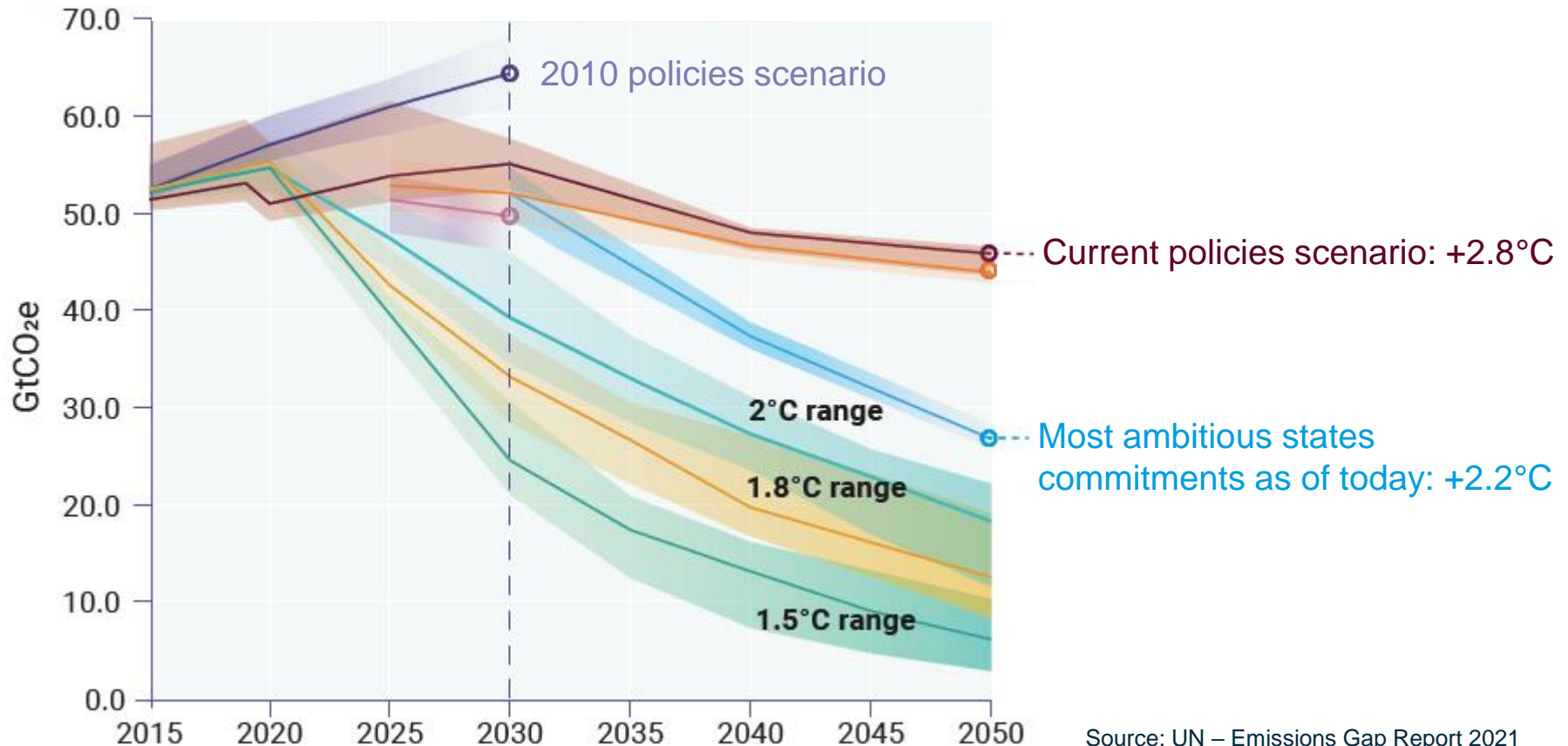
2028

3

Market

# An alarming global context

- The Paris agreement (2015) aimed at “limitating global warming to well below 2°C and preferably to 1.5°C compared to pre-industrial levels”
- Latest projections (IPCC report 2021) indicate that this goal already seems out of reach. People are now starting to talk about 4.5°C...

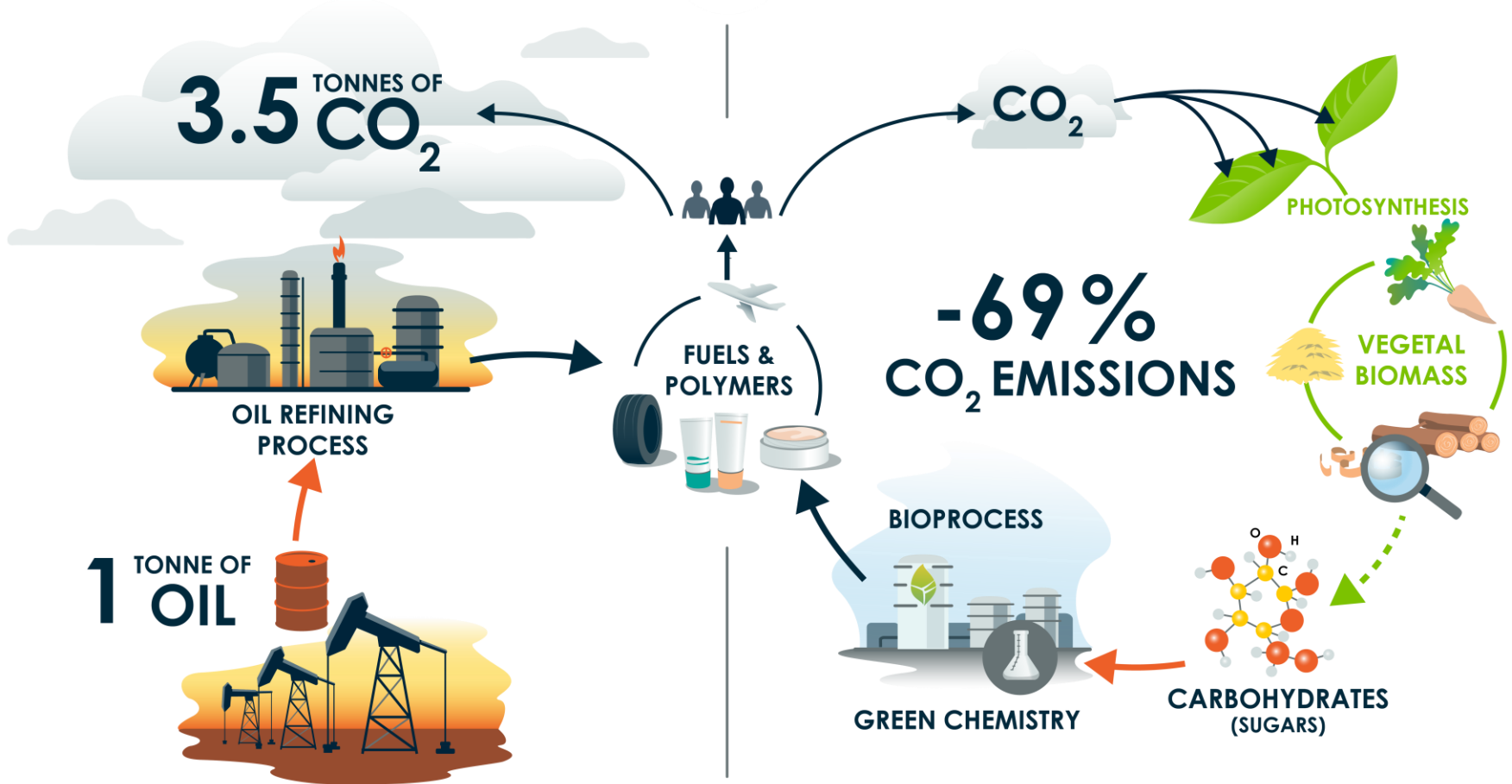


# Industrial biology is a way to decarbonisation

**PETROCHEMISTRY**

**Vs**

**INDUSTRIAL BIOLOGY**



- 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 with a score of 40/100 (average within the companies in the same sector), expected to grow fast in the coming years
- One full-time ESG manager driving progress and objectives



An aerial photograph of a dense forest with vibrant green foliage, partially obscured by a teal background. A white banner with rounded ends is positioned horizontally across the middle of the image, containing the text.

**A disruptive technology to impact the planet**

# Biomass $\rightleftarrows$ Isobutene $\rightleftarrows$ Isododecane

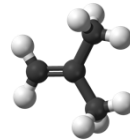
- A unique process to convert renewable resources into isobutene (“IBN”), then converted into isododecane (“IDD”)

## Agricultural and forestry residues



**BIOLOGY**

**IBN**

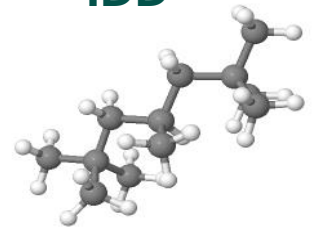


*Strong entry barriers with solid intellectual property rights: **unique sugar-to-IBN process***



**GREEN CHEMISTRY**

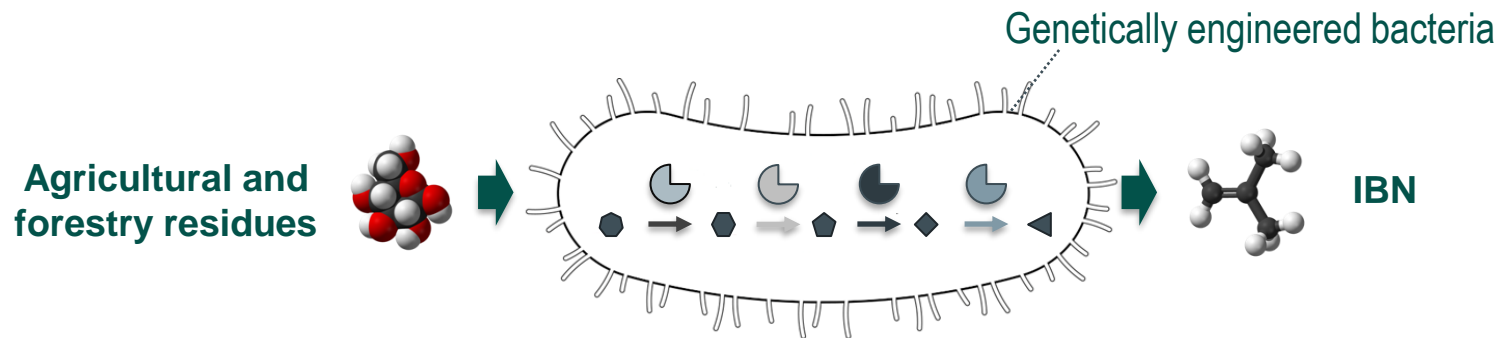
**IDD**



*Generic technology with IP on improvements*



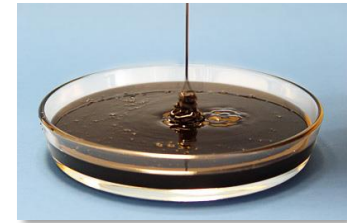
- Engineering bacteria by implementing a metabolic pathway to IBN



- 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

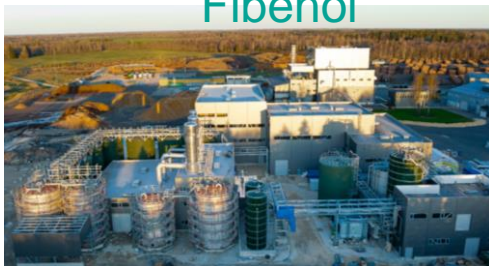
## 2<sup>nd</sup> generation: wood residues and straw

- 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

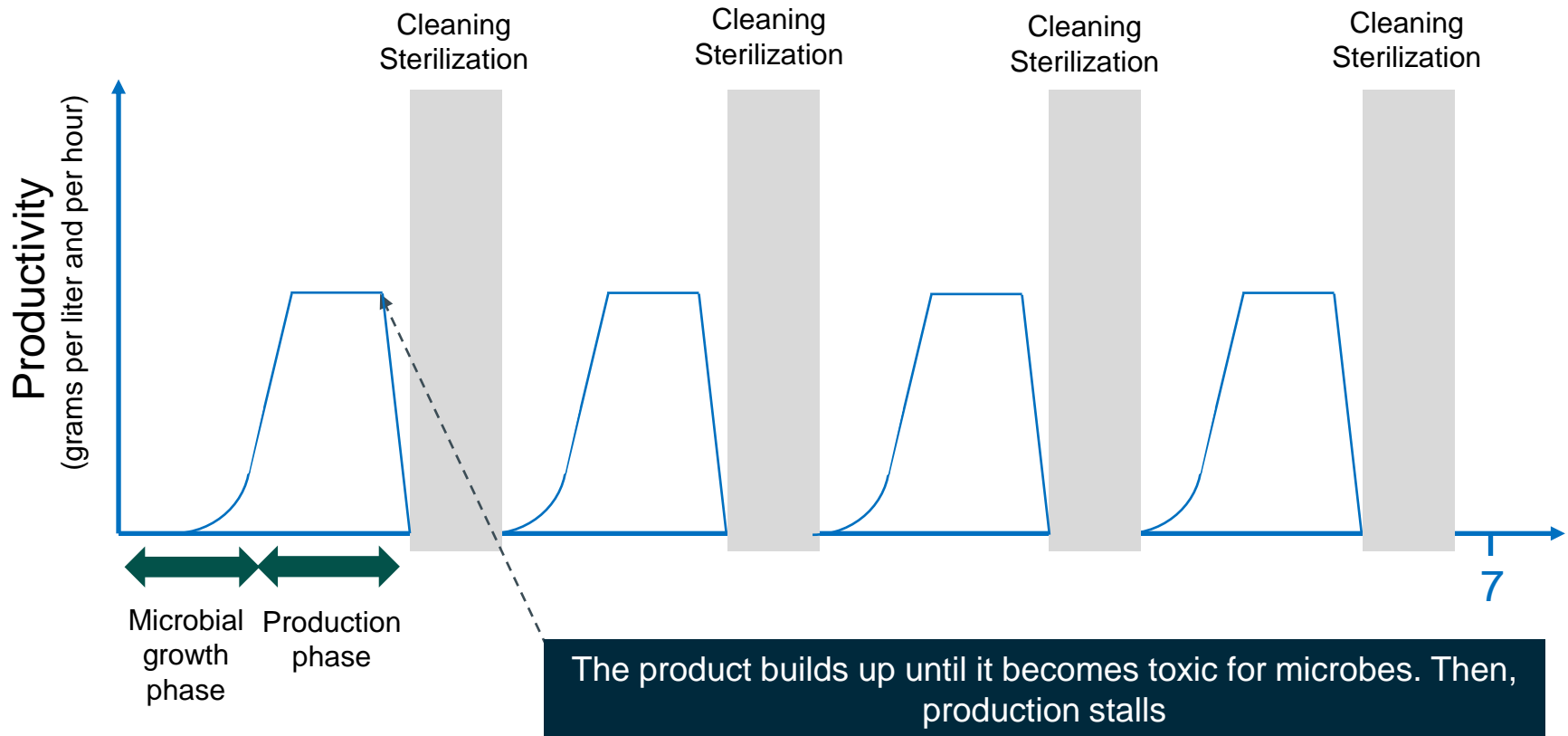


Clariant



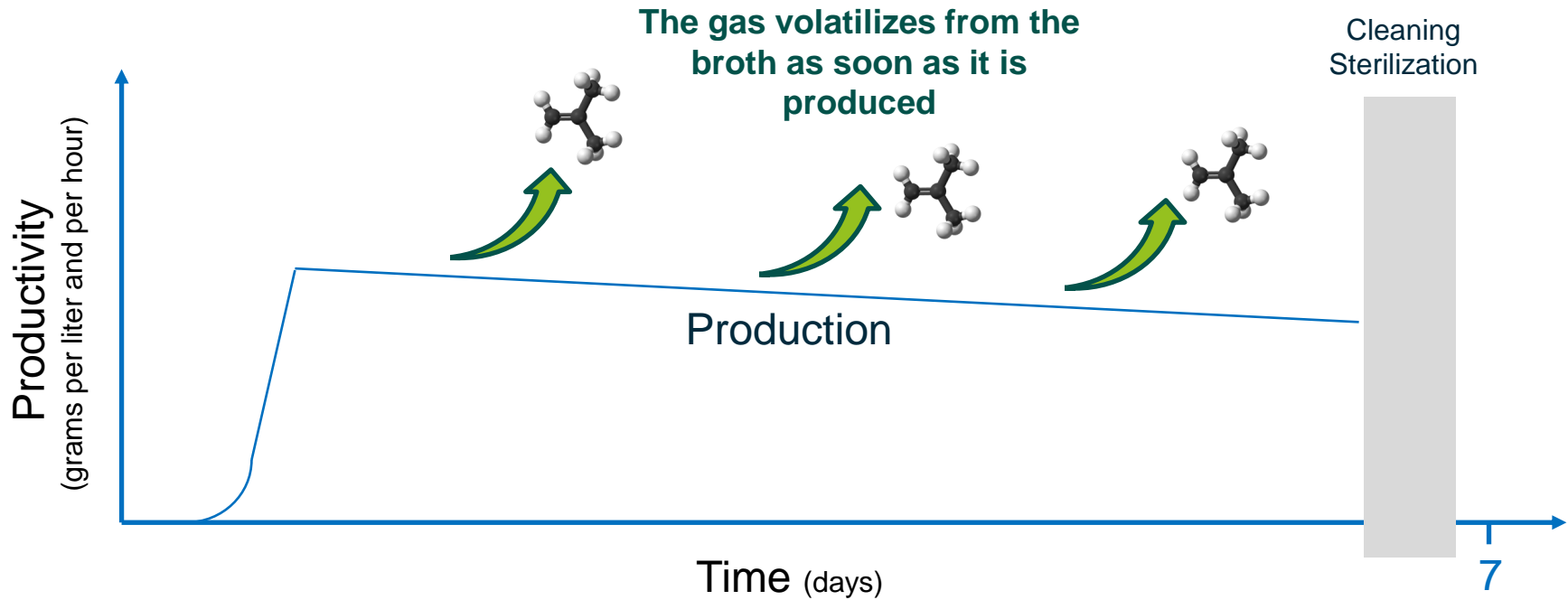
Sugar capacity: 100 kt/y  
Start of operation: mid-2022  
Location: Romania

# What our peers do: producing liquid products



- Less than 50% of fermenter time is used for production (the rest is in growth phase and maintenance)
- At the end of the run, the product needs to be extracted from a complex fermentation broth → high downstream processing cost

# What we do: producing a gaseous compound

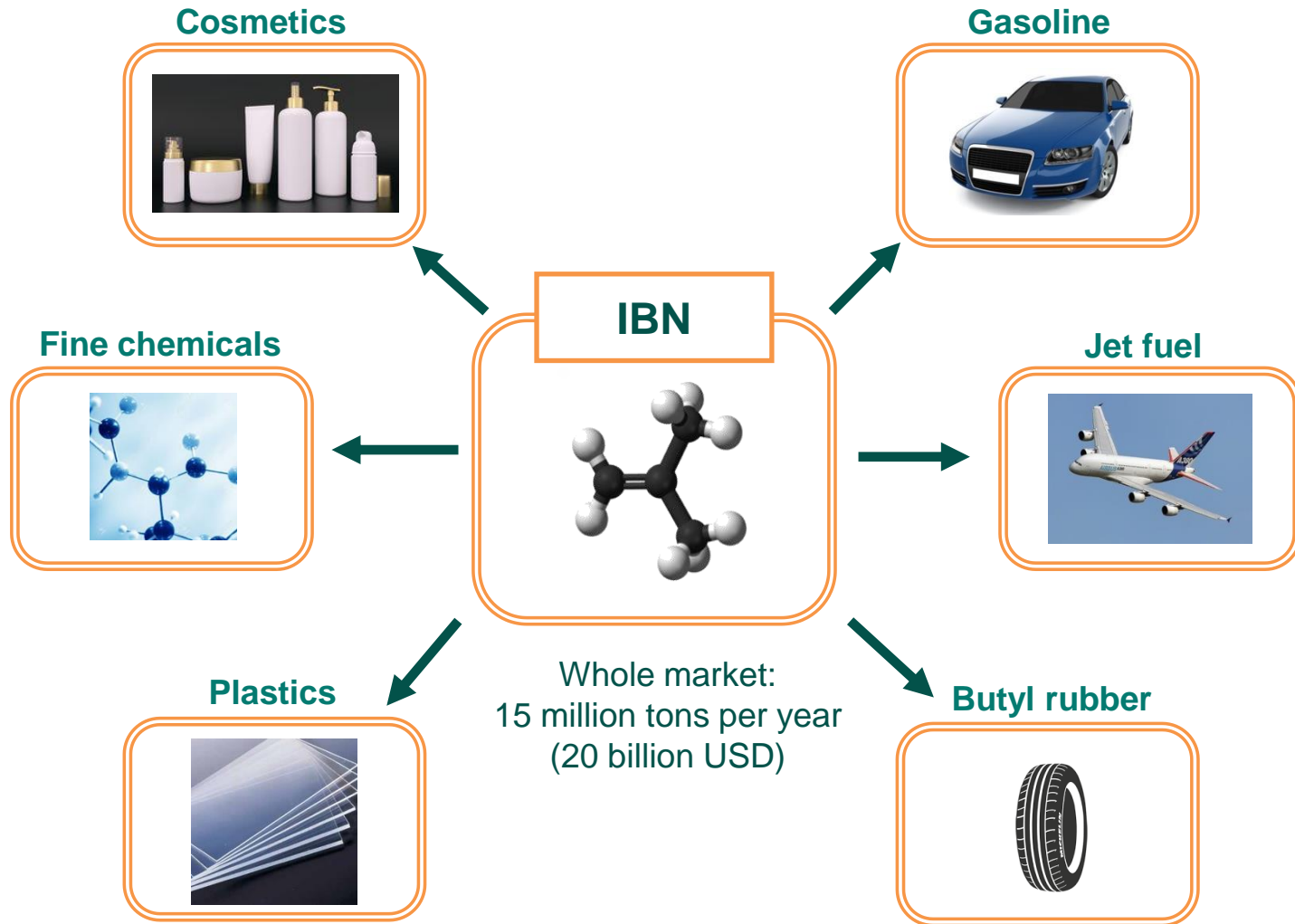


- No toxicity for microbes as the product does not build up in medium → very long runs → >80% of fermenter time devoted to commercial production
- Facilitated purification because the product comes out in a simple environment (air, water pressure, biogenic CO<sub>2</sub>)

- **Advantages:**
  - Fermentation step: Better use of equipments and microbial biomass
  - Purification: Easier and much less costly
- **Drawback:**
  - Specific equipment needed as anti-explosion (ATEX) environment needed → innovative design of fermenter
  - Retrofits more difficult



# Step by step roadmap

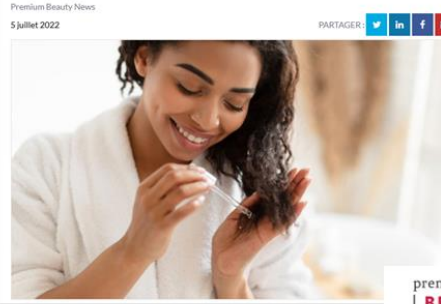




# Short term focus on 'Green Beauty'



## Le marché des cosmétiques naturels a atteint 12,5 milliards de dollars en 2021



## Les Françaises optent pour un green et engagée



## The Washington Post

Wellness

11 March 2020

**'Clean' beauty has taken over the cosmetics industry, but that's about all anyone agrees on**

Demand for clean beauty products keeps mounting. Within the \$19 billion "prestige beauty" market, skin-care labels that positioned themselves as natural grew 14 percent year-over-year in 2019, while clean brands jumped 39 percent. Larissa Jensen, beauty analyst at the NPD Group, says, "In 2020, the clean skin-care category makes up more than double the size of the natural category."



## FEU VERT SUR LES FARDS

CES MARQUES TOUTES NEUVES DÉCLINENT CHACUNE DES FORMULES ET DES EMBALLAGES ECO-FRIENDLY. AVEC UN TROPISME REJOUISSANT POUR LES COULEURS VIVES QUI APPELLENT AU JEU ET À L'EXPRESSION DE SON INDIVIDUALITÉ.

PAR ELISABETH MARTORELL

### POP GREEN TECH

Tout a démarré avec la formulation de la première alternative végétale à un ingrédient pétrochimique. Ce solvant végétal permettant l'adhésion des pigments sur la peau peut représenter 50 % d'un produit final. Jusqu'à présent, il était indispensable pour garantir les qualités waterproof et longue tenue des fards. Cette belle innovation a donné envie au labo qui en est à l'origine de lancer sa marque, Last, avec dix-huit références aux teintes vives, mates ou irisées, du mascara aux ombres à paupières (des rouges liquides arriveront en septembre), Ombré à Paupières Liquide Longue Tenue, 12 teintes, 24 €. Mascara Volume Waterproof, 3 teintes, 25 €. colors-that-last.com



# Longer term perspective: Sustainable Aviation Fuel

**Première mondiale en Champagne : un avion a réussi à voler avec un biocarburant issu de jus de betterave**

Publié le 16/06/2021 14:46 Mis à jour le 16/06/2021 16:07

⌚ Durée de la vidéo : 1 min.

**United Airlines just became the first airline in history to operate a passenger flight using 100% sustainable aviation fuel**

**[Idée verte] Global Bioenergies fait voler un avion à l'essence de betteraves avec Swift Fuel**

Après une tentative dans les biocarburants pour voiture avec Audi, la greentech française Global Bioenergies retente sa chance dans l'aviation légère en partenariat avec l'allemand Swift Fuel.

**franceinfo:** un biocarburant renouvelable à 97%

**Les Echos investir:** Global Bioenergies à l'origine du premier vol international à base de biocarburant renouvelable à 97%

**Twitter:** I Fly Bernard @i\_fly\_Bernard: Vol aller-retour aujourd'hui pour l'avion du groupe JC-Decaux, Paris <--> Nantes. Attention, c'est fort: en tout, 1h30 de vol pour moins d'1h d'arrêt à Nantes. À peine le temps de boire un verre de Muscadet 😊

**Le Parisien:** premier vol avec 97% de biocarburant entre Sarrebruck Reims

**Journal du jour:** L'aviation « zéro émission »: Airbus toujours à l'horizon 2035



**FINANCIAL TIMES**

Opinion Climate change

**Don't ban private jets – make them a green testing ground**

The aviation industry should use these elite flights to try out new technologies and fuels

PILITA CLARK + Add to myFT

**TECHNIQUES DE L'INGÉNIEUR**

Carburants ?

...tion récemment, il faut rester vigilant sur leur généralisation.

...Au total 7 filières permettant de mélanger l'organisme de normalisation qui rédige et valide les normes. Ces derniers mois, des constructeurs européens, Boeing, Safran et Airbus, ont annoncé des projets d'ici 2030. « Ces annonces sont un peu précoces », juge Philippe Marchand, retraité de chez Airbus.

## Avion « zéro émission »: Airbus toujours à l'horizon 2035

- Le sommet Airbus, qui s'est tenu mardi et mercredi à Toulouse, a été largement consacré à la réduction des émissions de CO<sub>2</sub> de l'aviation.
- Le PDG de l'avionneur, Guillaume Faury, a réaffirmé son plan de marche vers un premier avion « net zéro carbone » pour 2035.

**AÉRIEN**

**Bruno Trevadec** @BrunoTrevadec

La page de la crise du covid semble déjà tourner chez Airbus. Même si l'avionneur n'a pas encore retrouvé son niveau de production d'avant la crise, les dirigeants de l'avionneur européen, qui ont défilé lors de deux jours de conférences de presse à Toulouse, mardi et mercredi, donnaient tous le sentiment d'être passés à autre chose.

Les grands thèmes d'avant-covid ont repris les devants de la scène. A commencer par le sujet numéro un, la réduction des émissions de CO<sub>2</sub> et la course à l'avionnettes zéro émission. Un an après avoir dévoilé ses projets d'avions hydrogène, le PDG du groupe, Guillaume



## L'aéronautique réglementaire pour accélérer le développement des biocarburants

Pour accélérer le développement des biocarburants, les dirigeants d'Airbus et Safran, ainsi que l'Union européenne fixent un taux minimal d'incorporation de biocarburants renouvelables à 2% à partir de 2025.

Trois projets d'actions à hydrogène sont à l'étude chez Airbus, qui devrait décider vers 2025 s'il lance ou non un premier programme de construction. Photo: Getty Images/REX

Ces nouveaux carburants sont à la fois moins polluants que le kérosène et permettent de compenser les émissions de CO<sub>2</sub> quand ils sont produits à base de matières végétales.

« Nous avons besoin d'un cadre réglementaire global, impliquant au moins l'Europe, les États-Unis et le Japon », a déclaré le PDG de Safran, Pierre-Henri Gauguier.

Plusieurs projets européens d'annulation de la gestion du trafic aérien sont en cours, mais le projet de cadre réglementaire européen, qui vise à une réduction des émissions de CO<sub>2</sub> de 55 % d'ici à 2050 (compensé à 100%), est le plus avancé.

→ Horizon 1: Launch of our own make-up brand – LAST<sup>®</sup> 2021

→ Horizon 2: Ingredients for the make-up market – 2022

→ Horizon 3: Ingredients in skin & hair care markets – 2025

→ Horizon 4: Sustainable Aviation Fuel & Road Fuels – 2028

## 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...)
  - Understand how the field is organized between CDMOs and brand owners
  - Prove the high naturalness / high performance market at scale
    - Strengthened negotiating position in preparation for Horizon 2
- First e-retailers in Q1 2022. First large retailer expected in Q4.
- Sales to expand upon increase of retail selling points.



## H2: Selling IDD to make-up leaders

- 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 completed, ramp-up in progress - IBN capacity to reach 100 tons/yr by the end of 2022
- About 15 tons IBN to be converted into cosmetic-grade IDD and sold under brand name Isonaturane<sup>®</sup>12:
  - Regulatory work completed
  - Orders signed with L'Oréal + a few others
- The rest of the IBN will be sold for various applications (other cosmetic ingredients, testing volumes in road and sustainable aviation fuels...)



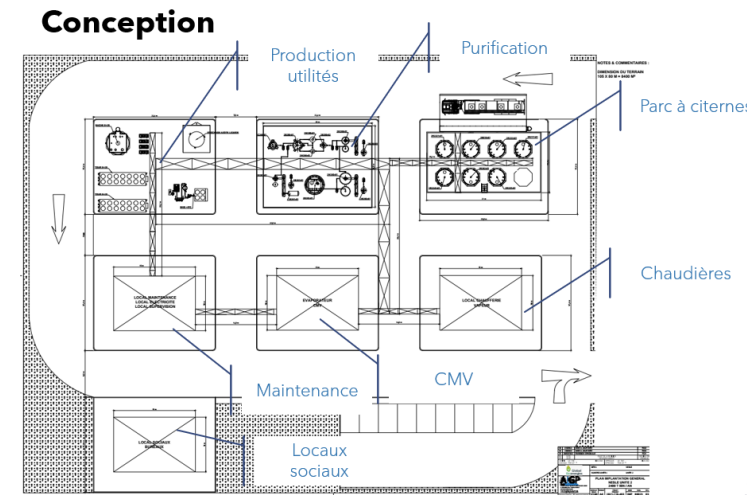
# H3: Large volumes to skin and hair care

- 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



- Plant project on its way:
  - 2,000 tons/yr
  - Site pre-selected
  - Basic engineering completed
  - Special Purpose Vehicle « SPV2000 » in creation
  - Target revenues >€80m
  - **IRR > 30% - unique situation due to the high value of these cosmetic ingredients**
  - Fundraising €60m on SPV2000 targeted in S1 2023
  - Production to start in 2025

→ Will bring GBE profitable

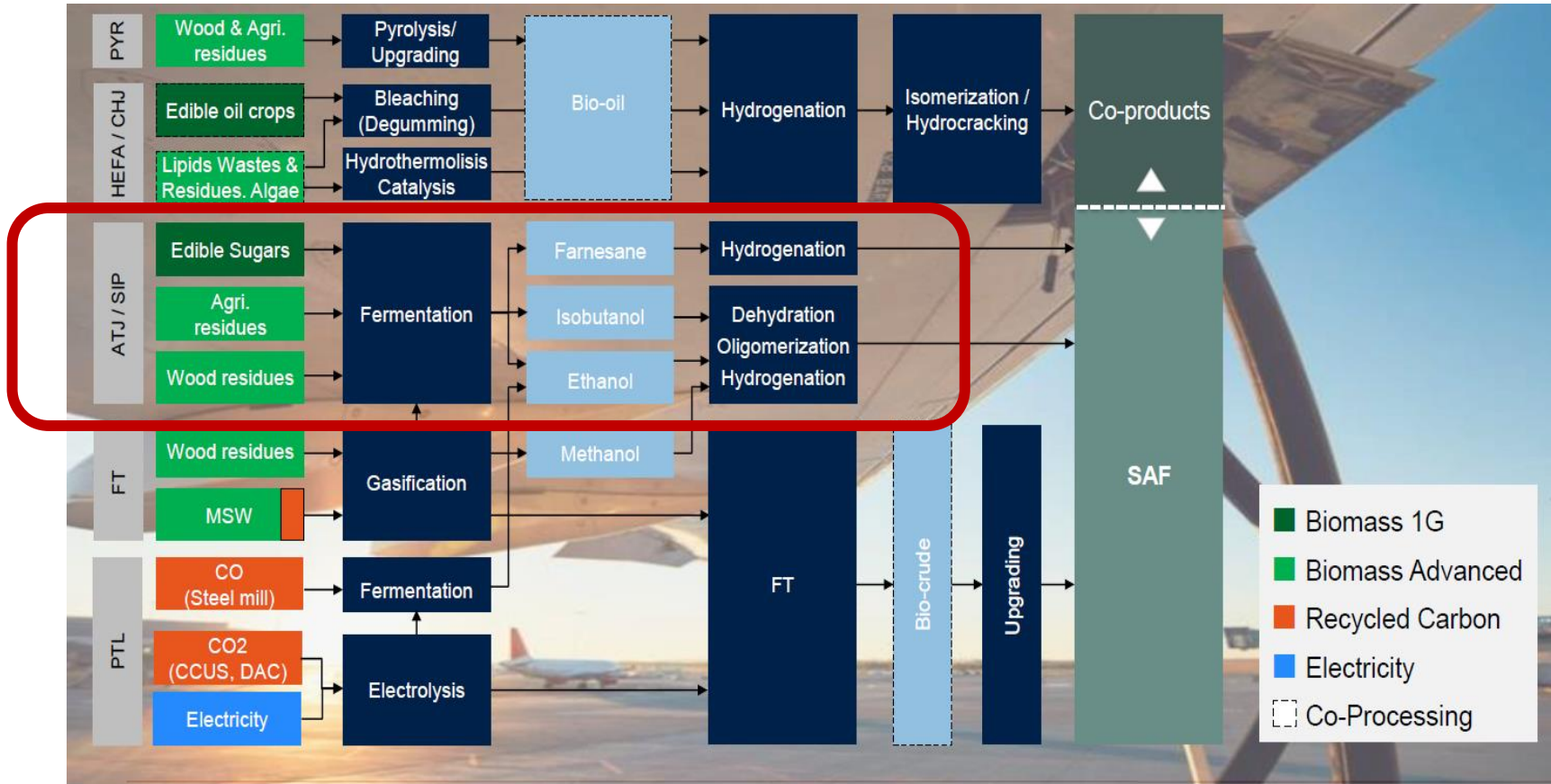


# H4: Decarbonizing air transportation

- 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...

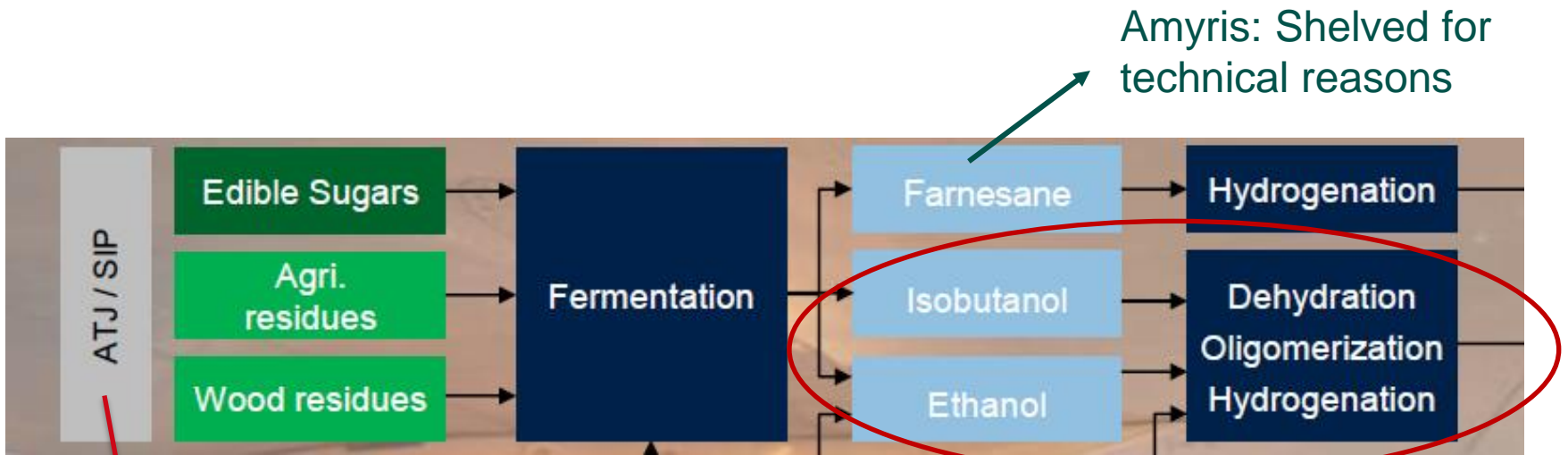


# H4: TotalEnergies' vision





# H4: Focus on sugar fermentation technologies



ATJ = Alcohol-To-Jet

SIP = Synthetic IsoParaffins

These are complex names...

The field should in fact just be named  
« sugar-based fermentation »

Narrow competitive landscape: only two technologies

We are not in this picture because our process is not certified yet (expected to change late 2022)

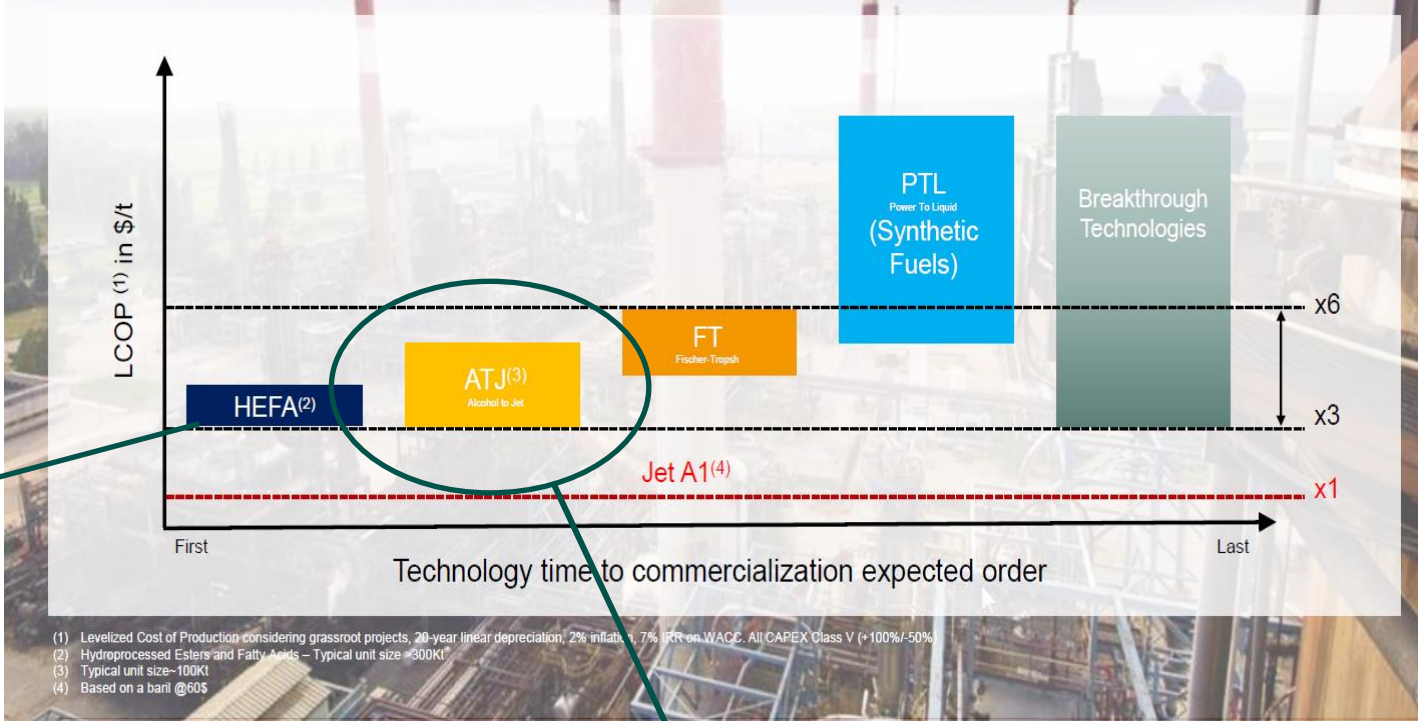
Our process surpasses the two competitive technologies: better products, better OPEX if targets reached

# H4: Sequencing of technology segments

## SAF LEVELIZED COST OF PRODUCTION<sup>(1)</sup> (\$/T)

AFTER HEFA, ATJ AND FT OFFER THE BEST LCOP<sup>(1)</sup> ALTERNATIVE

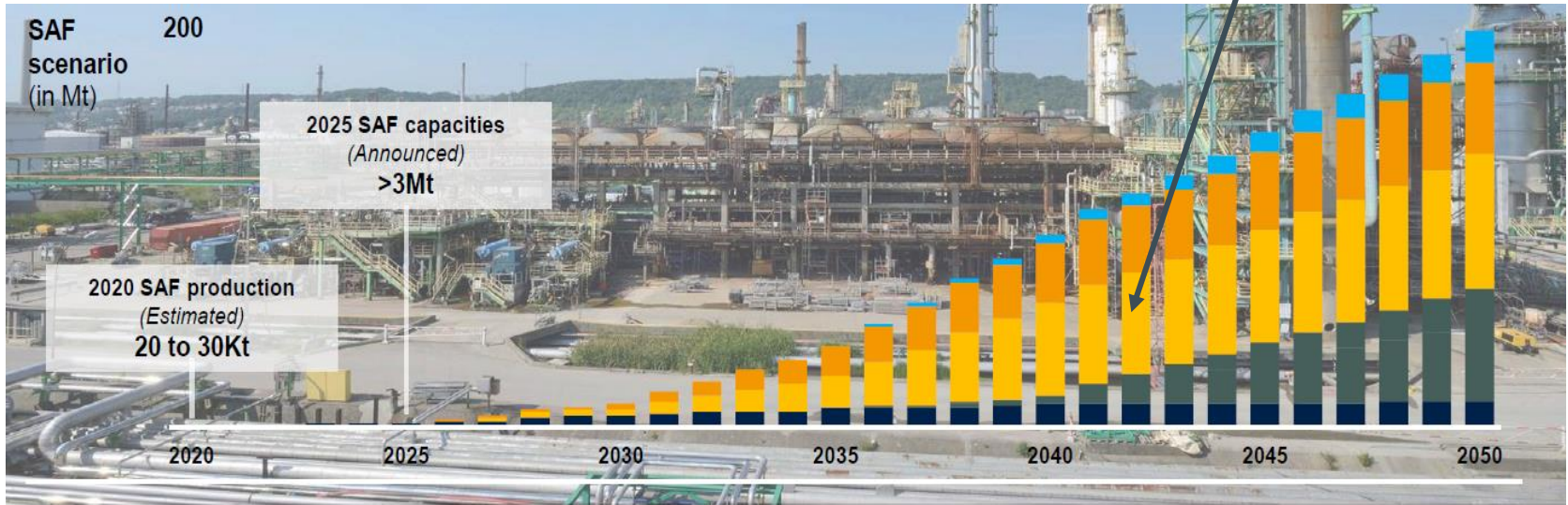
Waste cooking oils (cheap but limited resource)



(1) Levelized Cost of Production considering grassroots projects, 20-year linear depreciation, 2% inflation, 7% IRR on WACC. All CAPEX Class V (+100%/50%)  
(2) Hydroprocessed Esters and Fatty Acids – Typical unit size >300kL  
(3) Typical unit size=100kL  
(4) Based on a barrel @60\$

We have the best in class technology: we could well be the sole winner...

... on the main segment...

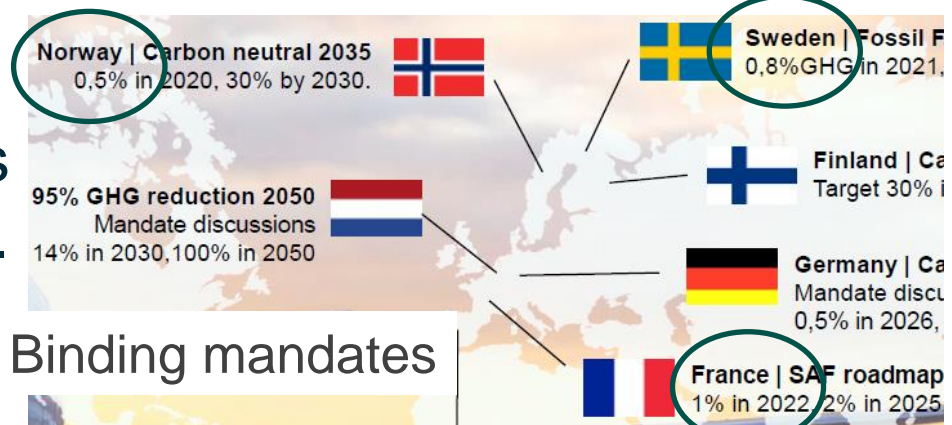


GRAND ENOV+ Is SAF Ready for take-off | 10 May 2021

8



... in a game that is just starting.



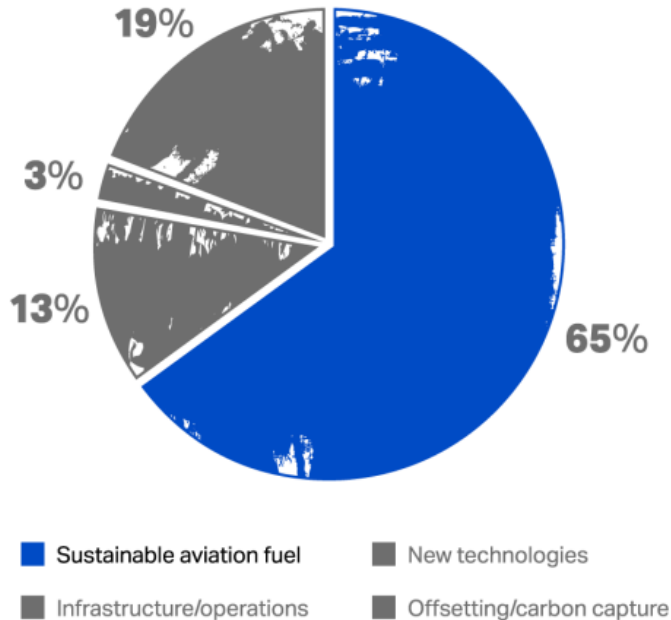
Binding mandates

# 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



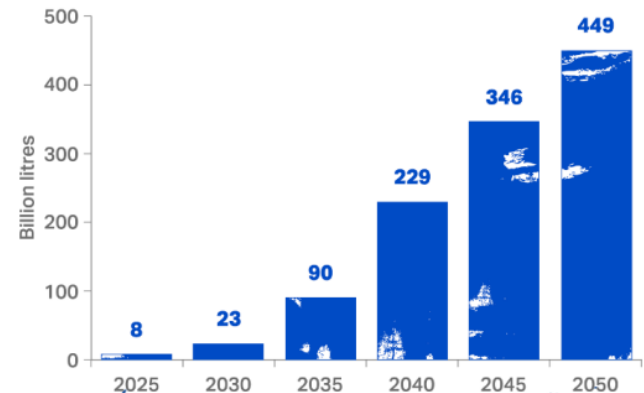
The state of sustainable aviation fuel (SAF) in 2021

<b>360,000 flights</b>	<b>100 million litres per annum</b>	<b>36 countries with SAF policies</b>
2016: 500 flights 2025: 1 million flights	2016: 8 million litres 2025: ~5 billion litres	2016: 2 countries 2025: global agreement?
<b>7 technical pathways</b>	<b>70% average CO<sub>2</sub> reduction</b>	<b>\$13 billion in forward purchase</b>
2016: 4 pathways 2025: 11 pathways	2016: ~60% reduction 2025: ~80% reduction	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, and the continuation of thermal engines in Europe beyond 2035 now seems linked to it. Biofuels appear again as a part of the solution.



- Motorsport, a niche market where higher prices are possible, paves the way: no fossil fuels anymore in Formula 1 from 2026 on.



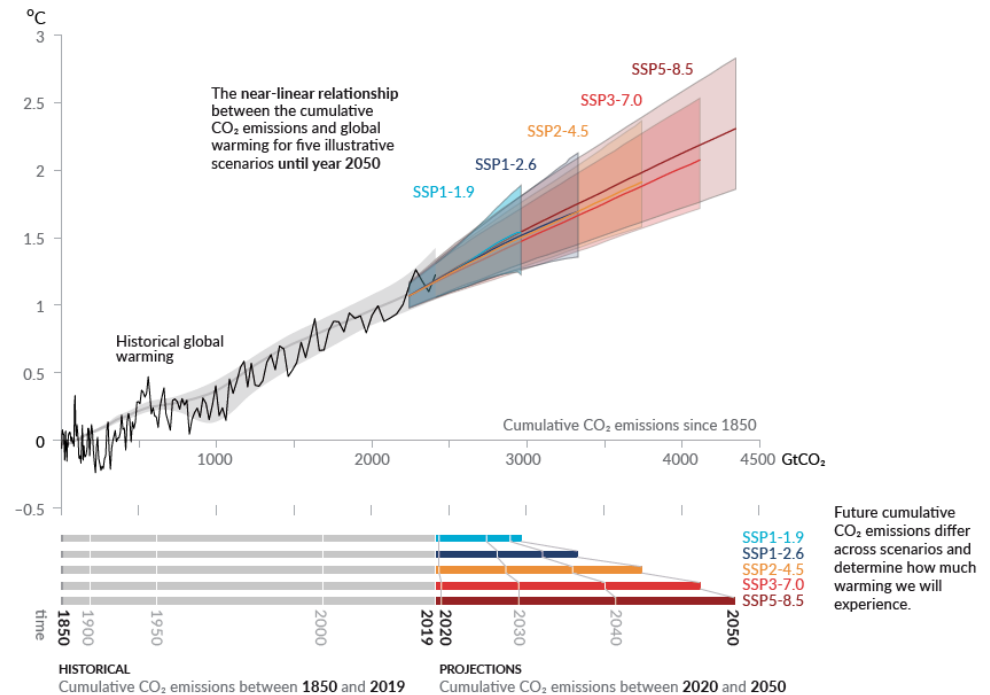


# Conclusions

- Reducing CO<sub>2</sub> emissions down to zero by 2050 is mandatory for the planet to stay livable
- We have not started yet: CO<sub>2</sub> emissions are still growing year after year
- It will first require huge efforts from everyone, starting with a massive reduction in fuel and goods consumption, powered by government policies

## Every tonne of CO<sub>2</sub> emissions adds to global warming

Global surface temperature increase since 1850–1900 (°C) as a function of cumulative CO<sub>2</sub> emissions (GtCO<sub>2</sub>)



Source: IPCC report *Climate Change 2021*

- Low CO<sub>2</sub> emission technologies will bring a key part of the solution by preserving some of our present living standards at a reduced environmental expense

- Human activity emits about 40 billion tons CO<sub>2</sub> per year
- Aggressive scenario regarding the deployment of our technology:
  - Thousands of plants based on our technology
  - Converting 1,000 million tons feedstock into 250 million tons SAF and other IBN derivatives
  - Preventing the emission of 500 million tons CO<sub>2</sub> per year



- 1% of global CO<sub>2</sub> emissions prevented, i.e. emissions of 100 million people
- Both a large figure for a unique technology, and small regarding the depth of the problem



- 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 will be the most profitable of the whold industrial bio world
- 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

# 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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