Global Bioenergies

A growing player of the environmental transition

October 2022

GBE at a glance

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_2 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'

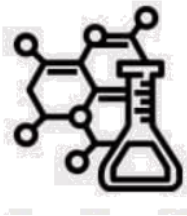
Our Products

First renewable isobutene and derivatives

Key molecules for cosmetics

used for decades in oil-based version

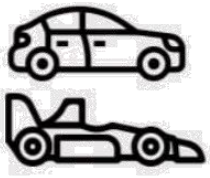
→2022: first orders from main industry players including L'Oréal (main shareholder since 2019)



Next molecules for sustainable fuels

ASTM certification under process

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



Horizons

Global Bioenergies

Production

CO_2 savings

Market

Horizon 1

Demo plant in Leuna, Germany

Make up products LAST®

Horizon 2

Semi-works unit in Pomacle, France

15-30 t/yr Isonaturane®
+
80 t/yr IBN

Make up ingredients Isonaturane®

400 t/yr

Horizon 3

SPV unit 2025, France

2.000 t/yr Isonaturane®

Cosmetics ingredients

25.000 t/yr

Horizon 4

IBN-One 2028, France

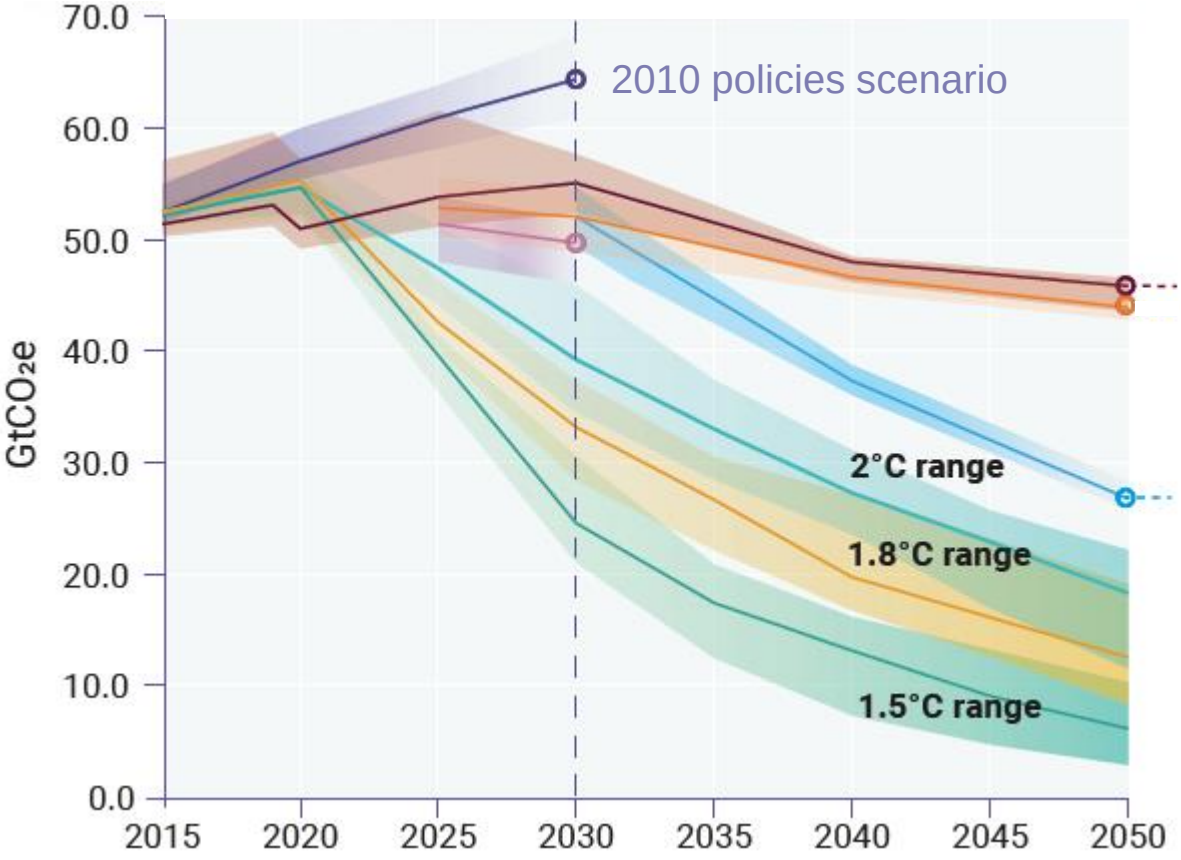
30.000 t/yr

Sustainable Fuels Millions of tonnes/yr

2021 2022 2025 2028

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

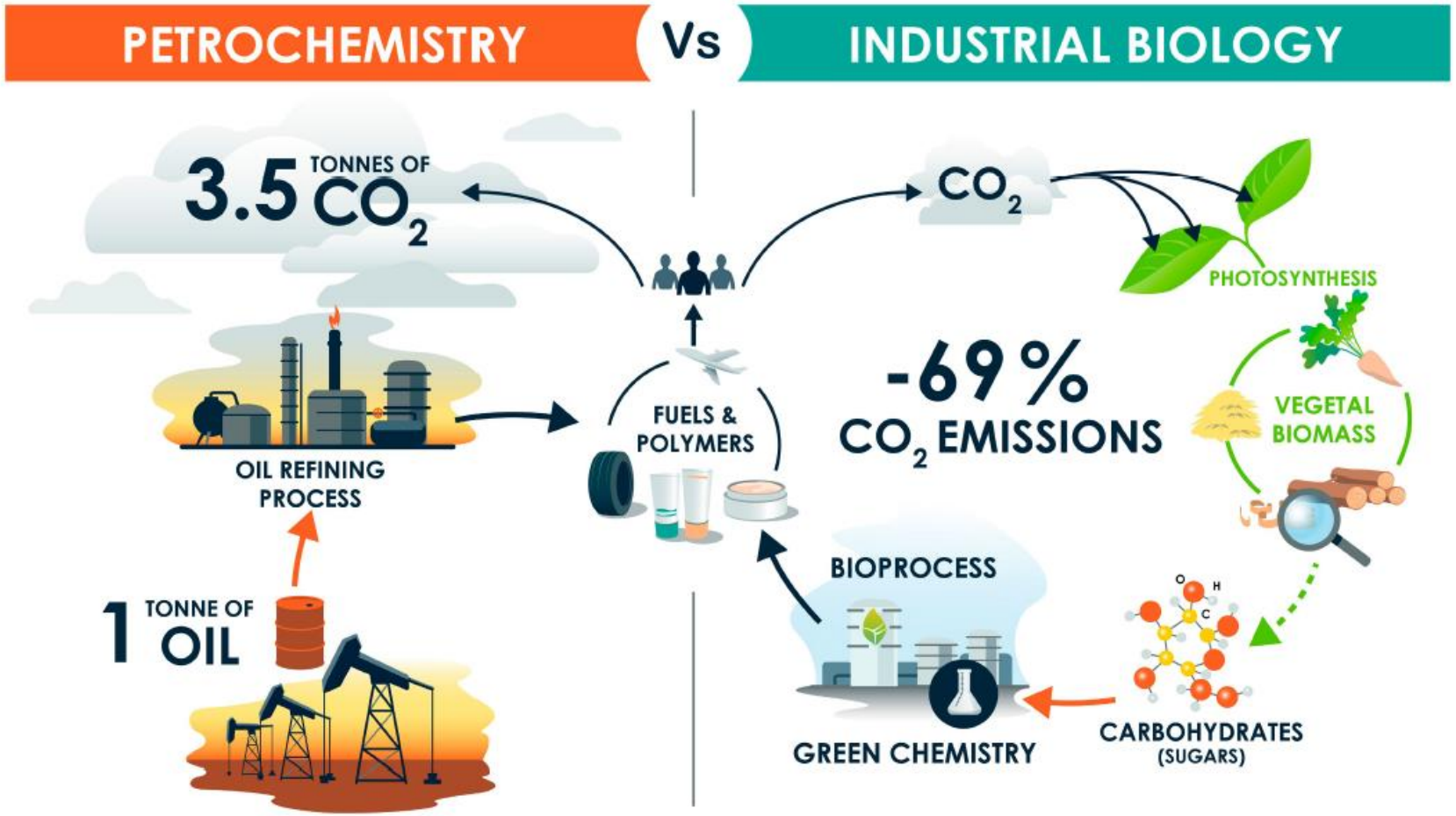


Current policies scenario: +2.8°C

Most ambitious states commitments as of today: +2.2°C

Source: UN – Emissions Gap Report 2021

Critical need to radically decarbonize our society



Our commitment: contributing to building a better world

- 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



IBN product tree

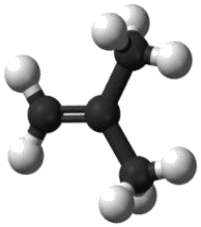
Global Bioenergies

Cosmetics

Gasoline

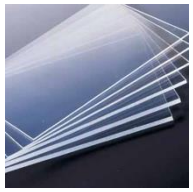
Fine chemicals

IBN



Jet fuel

Plastics



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

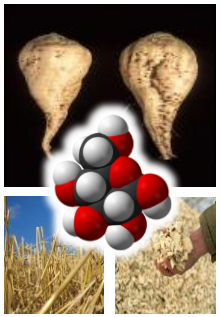
Butyl rubber

A disruptive technology to impact the planet

Biomass → Isobutene → Isododecane

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

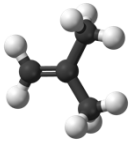
Agricultural and forestry residues



BIOLOGY

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

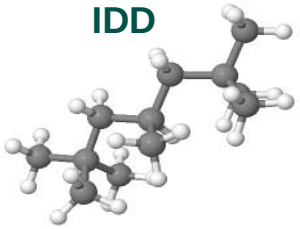
IBN



GREEN CHEMISTRY

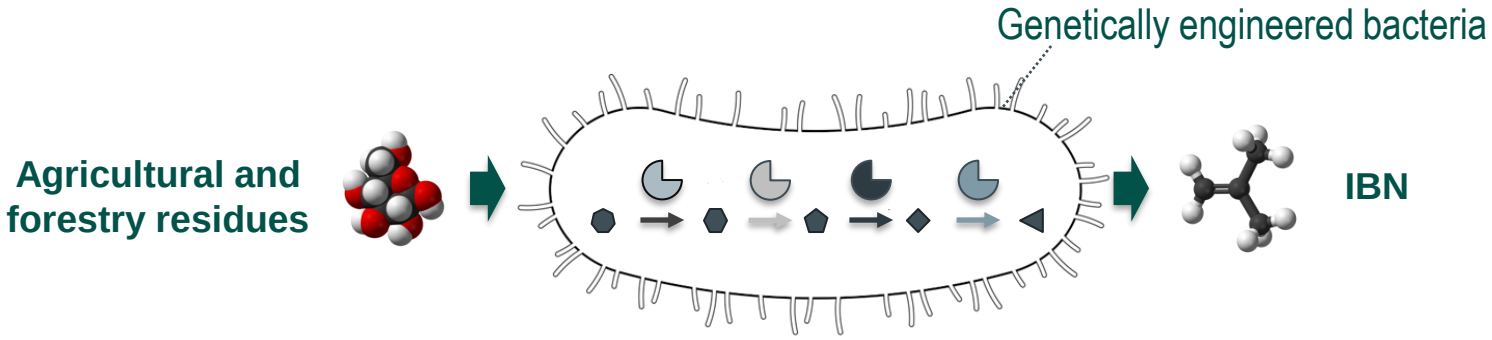
Generic technology with IP on improvements

Cosmetic grade IDD



Unique science

- Engineering bacteria by implementing a metabolic pathway to IBN



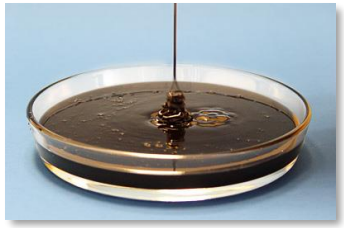
- No biological starting point because IBN is not produced by Nature

  → We created **a unique artificial metabolic pathway** - huge technology barrier overcome

- Global Bioenergies developed **the first ever fermentation process to a gas**, having solid advantages translating in economics

Conventional resources

1st 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_2 savings if compared to fossil ~ 65%

Focus on beet

French beet production:
40 mt

↓

16% sugars:
6 mt

↓

11% non extractable sugars:
650 kt

Emerging resources

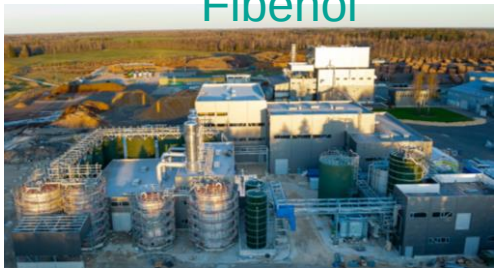
2nd generation: wood residues and straw

- 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_2 savings: 80% if compared to fossil

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

SWEETWOODS

Fibenol



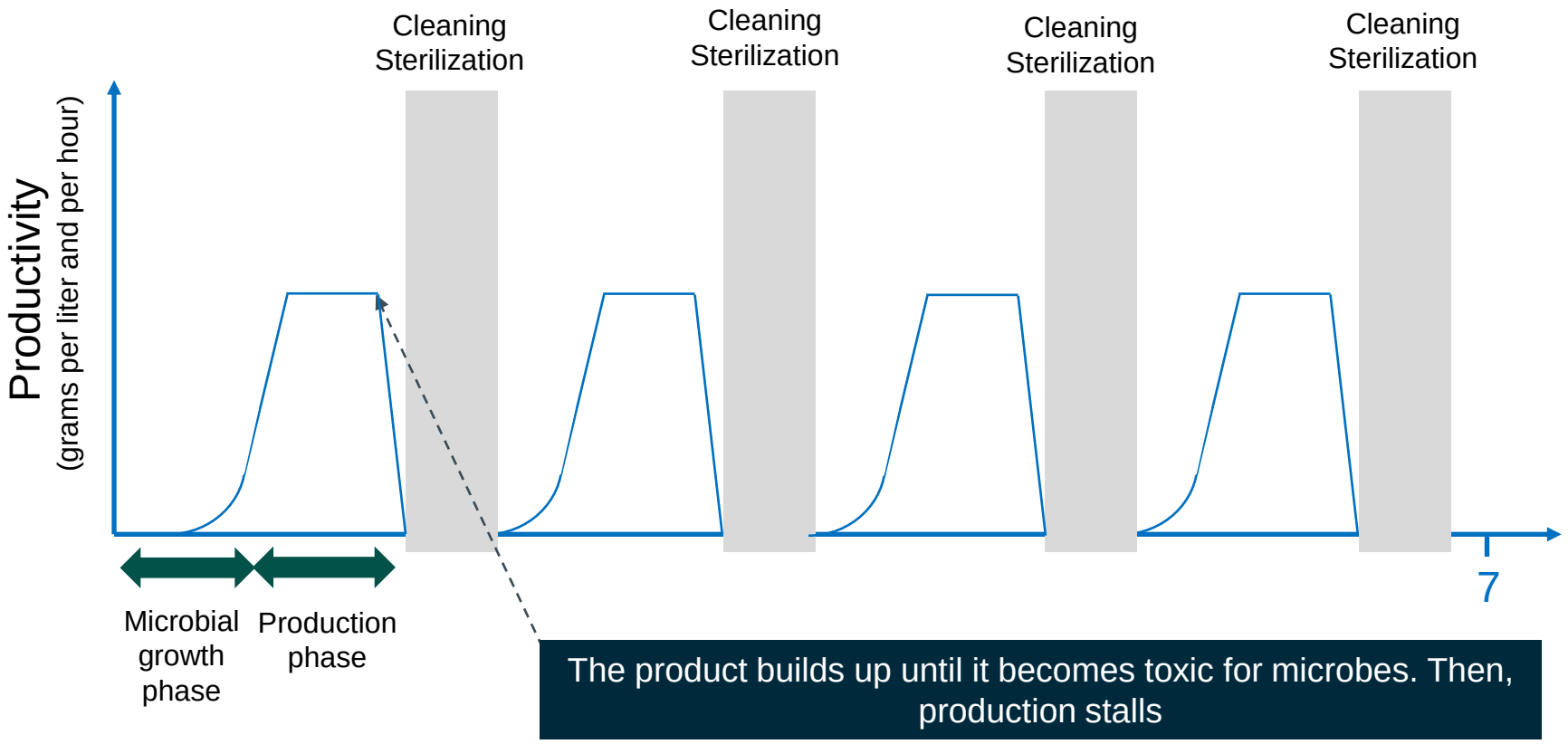
Sugar capacity: 20 kt/y
Start of operation: Q1 2023
Location: Estonia

Optisochem

Clariant

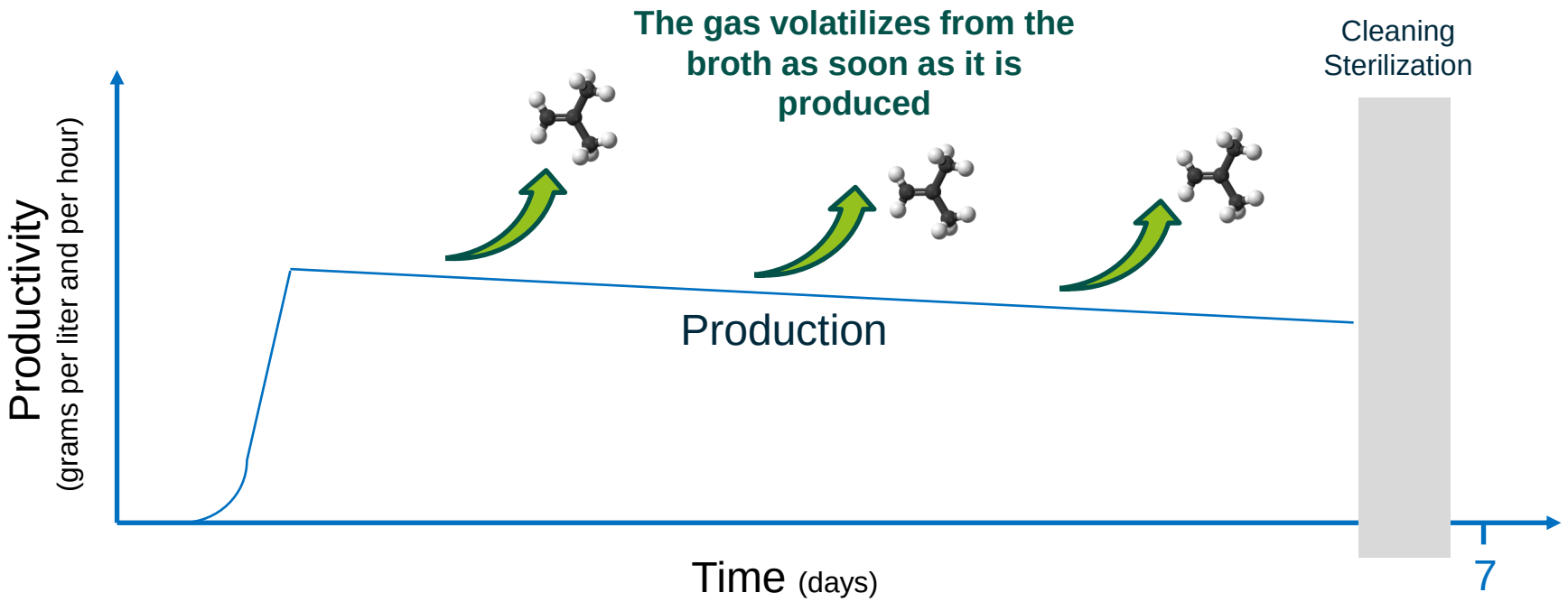
Sugar capacity: 100 kt/y
Start of operation: mid-2022
Location: Romania

What our peers do: producing liquid products



- Less than <u>50%</u> 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_2)

Fermentation to a gas: pros and cons

- 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’

Global Bioenergies

S'abonner

BIBA

MODE BEAUTÉ BIBA MUM CUISINE CULTURE LIFESTYLE LOVE & SEXE INSOLITE BOURSE PODCASTS NEWSLETTER

ACCUEIL > BEAUTÉ > SOINS VISAGE & CORPS

Clean Beauty : quand le vert s’invite dans nos cosmétiques

LA RÉDACTION DE BIBA EN PARTENARIAT AVEC MANUCURIST 18 JUILLET 2022 MIS À JOUR LE 19 JUILLET 2022

La Clean Beauty, on en entend beaucoup parler mais concrètement, qu’est-ce-que ça veut dire ? Et quel impact sur nos choix cosmétiques ? Biba vous répond avec l’exemple de la marque française de vernis et de soins Manucurist.

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Beauté naturelle : La Clean Beauty prend de l’ampleur

Rédigé par consoGlobe, le 6 Apr 2022, à 14 h 02 min

Marchés & Tendances

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

Premium Beauty News

5 juillet 2022 PARTAGER :

ELLE

MODE BEAUTE PEOPLE CULTURE SOCIÉTÉ ELLE À TABLE ELLE DÉCO ASTRO

Elle > Beauté > News beauté > News Make-up

Beauté green : 7 Français sur 10 achètent des produits écoresponsables

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Marchés & Tendances

Les Françaises optent pour u… green et engagée

Premium Beauty News avec ETX Studio (Photo : © LightFieldStudios / iStock)

28 mars 2022

The Washington Post

Wellness

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

11 March 2020

Demand for clean beauty products keeps mounting. Within the $19 billion “prestige beauty” market, skin-care labels that positioned themselves as natural rew 14 percent year-over-year in 2019, while clean brands jumped 39 pe… id Larissa Jensen, beauty analyst at the NPD Group, a… day, the clean skin-care category makes… es, more than double the size…

21 MAI 2021

FEU VERT SUR LES FARDS

CES MARQUES TOUTES NEUVES DÉCLINENT CHACUNE DES FORMULES ET DES EMBALLAGES ECO-FRIENDLY. AVEC UN TROPISME RÉJOUISSANT 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 volatil 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). Ombre à Paupières Liquide Longue Tenue, 12 teintes, 24 €. Mascara Volume Waterproof, 3 teintes, 25 €. colors-that-last.com

Longer term perspective: Sustainable Aviation Fuel

Global Bioenergies

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.

franceinfo:

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.

L'USINE NOUVELLE

Réservé aux abonnés

Aurélie Barbaux

18 Juin 2021 \ 14h00

3 min. de lecture

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 🍷

Les Echos investir

Global Bioenergies à l'origine du premier vol international à base de [...]burant renouvelable à 97%

...pécialiste de la conversion des ...liables en hydrocarbures par ...ift Fuel ! Leur partenariat a ...astien Le Roux dans les airs, à ...ol transfrontalier alimenté par ...iation renouvelable à près de

Les Echos WINE CLUB Ventes Privées par Cdiscount

Le Parisien

premier vol avec 97% de biocarburant entre Sarrebruck Reims

...ire décoller et atterrir un avion dont le réservoir est rempli de 97% de composés ...nouvelables, c'est tout l'enjeu du vol expérimental qui se déroule ce mardi 15 juin.

Journal du jour

Le Parisien

TECHNIQUES DE L'INGÉNIEUR

DÉCRYPTAGE

...carburants ?

...tion récemment, il faut rester ...vant leur généralisation.

...nts. Au total 7 filières permettant de mélan... ...l'organisme de normalisation qui rédige et ...viation. Ces derniers mois, des constructe... ...burants. Boeing, Safran et Airbus, entre ...nts d'ici 2030. « Ces annonces sont un pe... ...robable d'envisager une commercialisati... ...nce Philippe Marchand, retraité de chez...

Avion « zéro émission » : Airbus toujours 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_2 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 Trévidic @BrunoTrevidic

La page de la crise du covid semble déjà tournée 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 conférence 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_2 et la course à l'avion zéro émission. Un an après avoir dévoilé ses projets d'avions à hydrogène, le PDG du groupe, Guillaume Faury, a néanmoins insisté sur le fait qu'il « *ne mise pas tout sur l'hydrogène* [...] *qui ne permettra pas de résoudre tous les problèmes* ». A l'instar des associations de compagnies aériennes, Airbus compte d'abord sur les carburants alternatifs, d'origine non pétro-

vers 2035. « *Je suis très satisfait de l'intérêt suscité par l'annonce de nos projets dans l'hydrogène, a-t-il affirmé. Nous en sommes encore à la phase d'études* [...] *Mais nous sommes sur la bonne voie et la probabilité d'y parvenir est de plus en plus grande. Je pense que nous serons en mesure de prendre une décision* [de lancer ou non un premier programme d'avion à hydrogène NDLR] *vers 2025. Ce qui permettrait d'être au rendez-vous de 2035* ».

Priorité aux carburants alternatifs

Guillaume Faury a néanmoins insisté sur le fait qu'il « *ne mise pas tout sur l'hydrogène* [...] *qui ne permettra pas de résoudre tous les problèmes* ». A l'instar des associations de compagnies aériennes, Airbus compte d'abord sur les carburants alternatifs, d'origine non pétro-

Trois projets d'avions à hydrogène sont à l'étude chez Airbus, qui devrait décider vers 2025 s'il lance ou non un premier programme de construction. Photo Lydie Lecarpentier/REA

Ces nouveaux carburants sont à la fois moins polluants que le kérosène et permettent de compenser les émissions de CO_2 quand ils sont produits à base de matières végéta-

100 %. Mais les quantités disponibles sont encore très insuffisantes. « *Nous avons besoin d'un cadre réglementaire global, impliquant au minimum l'Europe, les Etats-Unis et la*

trait à Air France d'économiser 30.000 tonnes de carburant par an. Plusieurs projets européens d'amélioration de la gestion du trafic aérien sont en cours, mais le

projet de cadre réglementaire récemment proposé par la Commission européenne, qui vise à une réduction des émissions de CO_2 de 55 % d'ici à 2030 (comparé à 1990),

L'aéronautique ... réglementaires p...

Pour accélérer le développement des biocar... dirigeants d'Airbus et Safran, ainsi que le ... européenne fixant un taux minimal d'incorpora...

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

...ion technologique pour parvenir à ... les émissions de CO 2 du transport aérien. Les biocarburants et les nouveaux avions actuels peuvent déjà faire beaucoup sans attendre.

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

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

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

→ Horizon 4: Sustainable Aviation Fuel – 2028

H1: Launching our proprietary brand

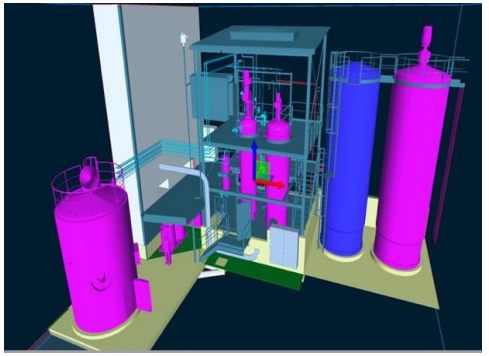
LAST® → *From Biotech to Beauty*

- **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® in summer 2021 (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

    → Strenghtened 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.

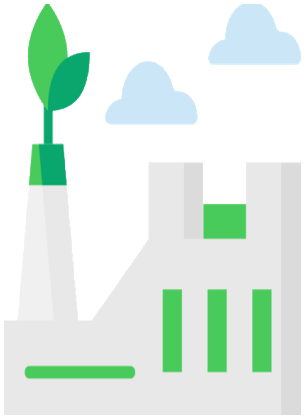
H2: Selling IDD to make-up leaders

- 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, commissioning started
- IBN capacity to reach 100 tons/yr by the end of 2022
- About 15 tons of the IBN will be used to manufacture cosmetic-grade IDD and sold under brand name Isonaturane®12:
  - Regulatory work completed
  - First orders signed with L'Oréal + a few others
- The rest of the IBN will be sold for various applications (other cosmetic ingredients, octane booster for motorsport, sustainable aviation fuel…)



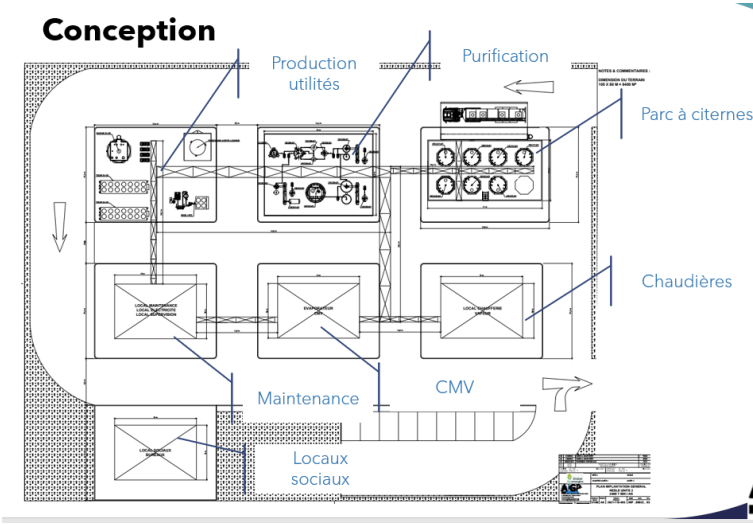
H3: Large volumes to skin and hair care

- 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
  - Fundraising €60m on SPV2000 targeted in S1 2023
  - Target revenues >€80m // IRR > 15%
  - Production to start in 2025

→ Will bring GBE profitable



H4: Decarbonizing air transportation

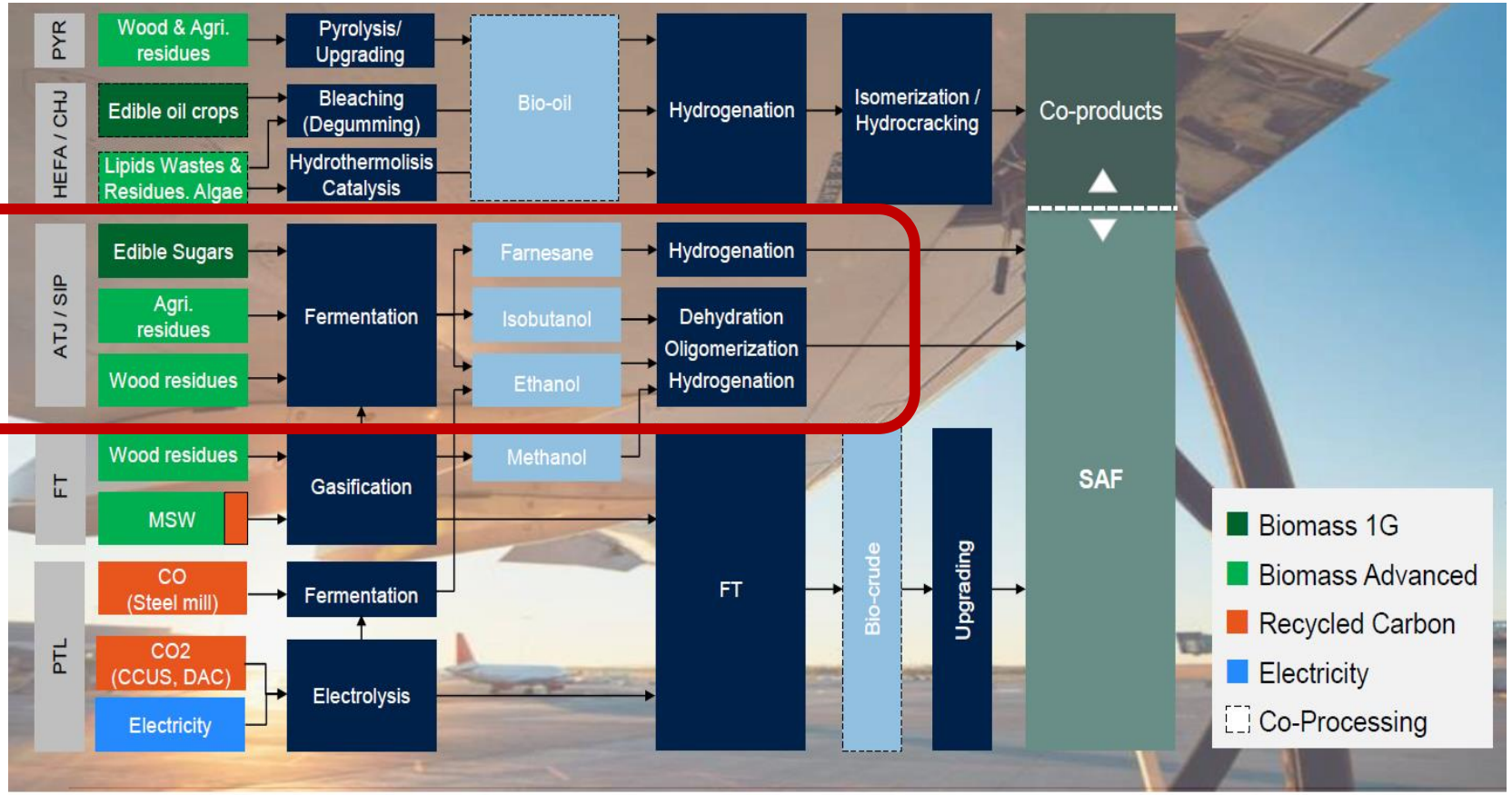
- First flight performed in June 2021 with a small airplane using **97% green aviation gasoline**

  → 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_2 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…

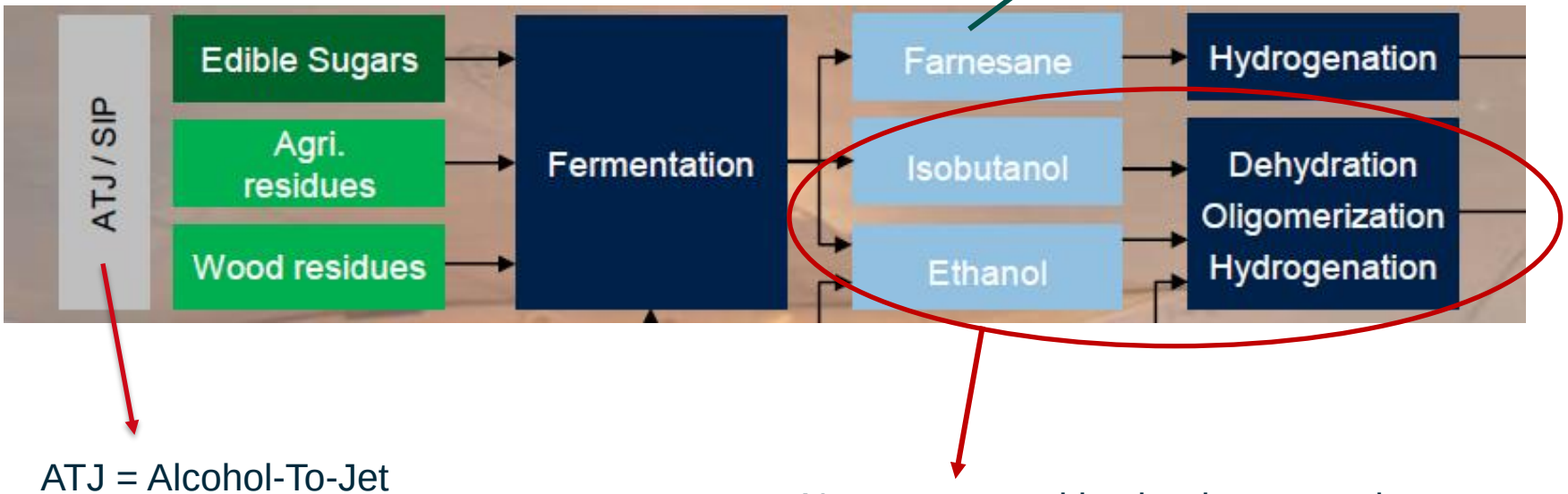
H4: TotalEnergies' vision



Presentation by Stéphane Thion, TotalEnergies

H4: Focus on sugar fermentation technologies

Amyris: Shelved for technical reasons



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

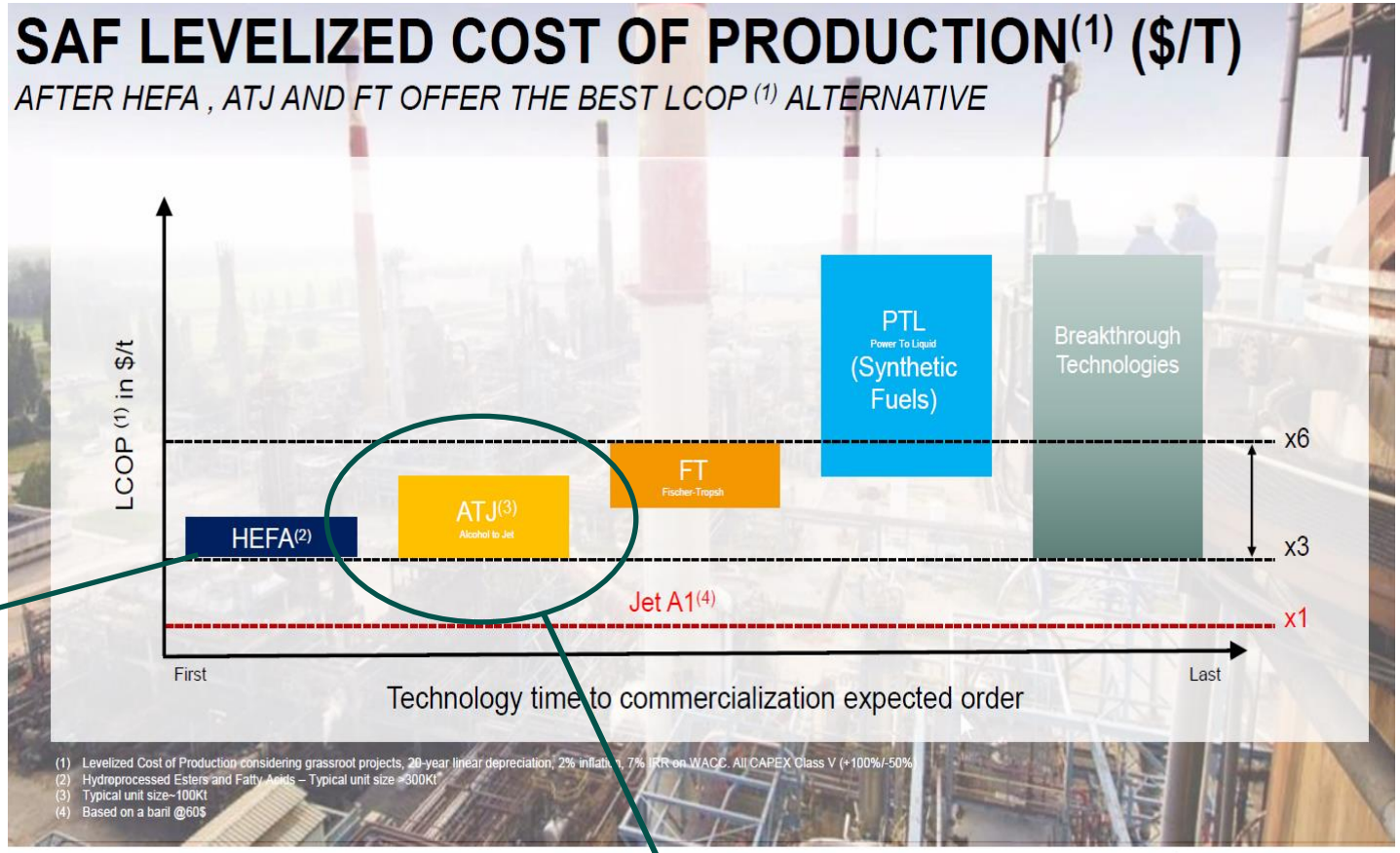
We are not in this picture because our process is not certified yet (expected to change late 2022)

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

H4: Sequencing of technology segments

Global Bioenergies

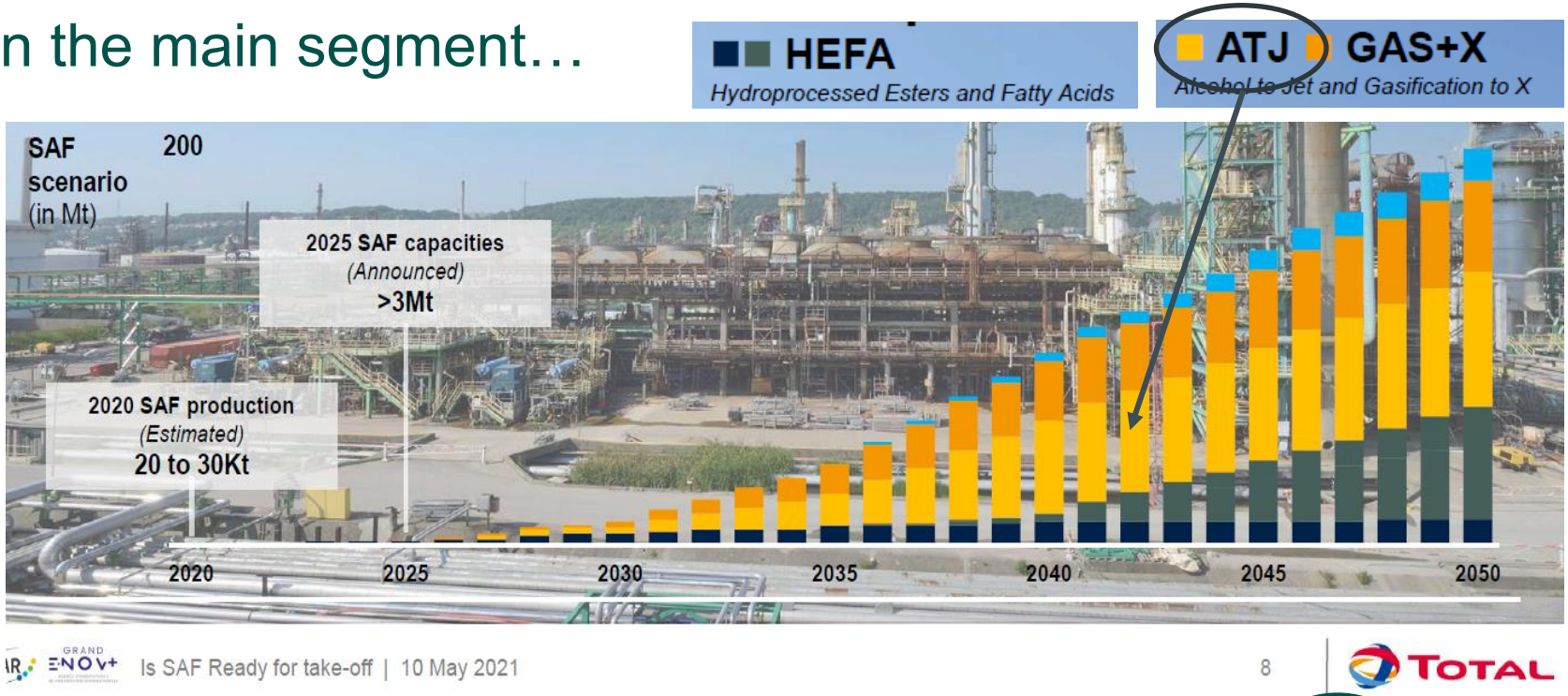
Waste cooking oils (cheap but limited resource)



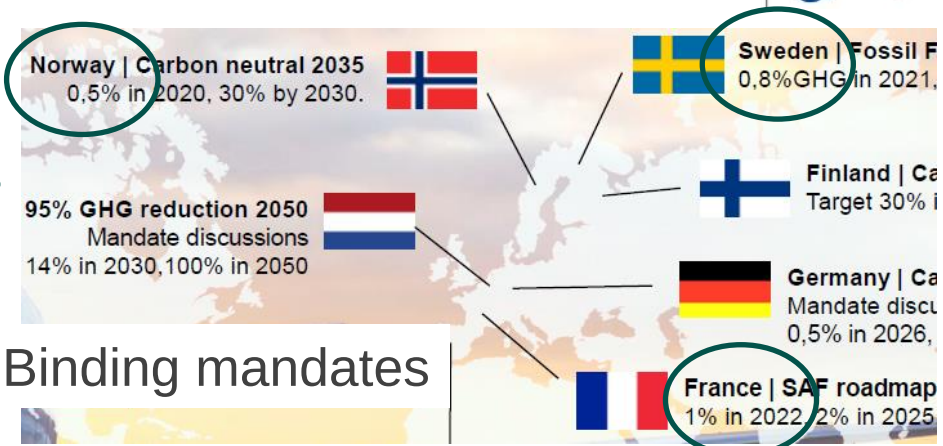
We have the best in class technology: we could well be the sole winner…

H4: Markets and technologies

… on the main segment…



… in a game that is just starting.

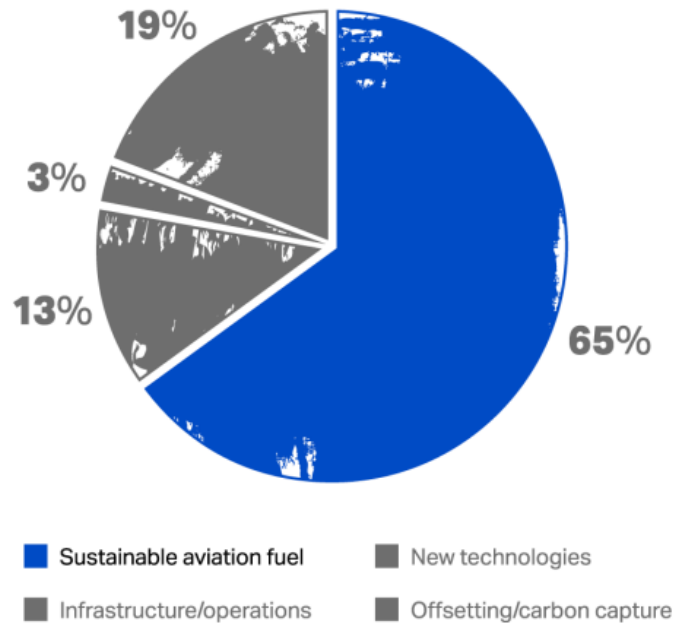


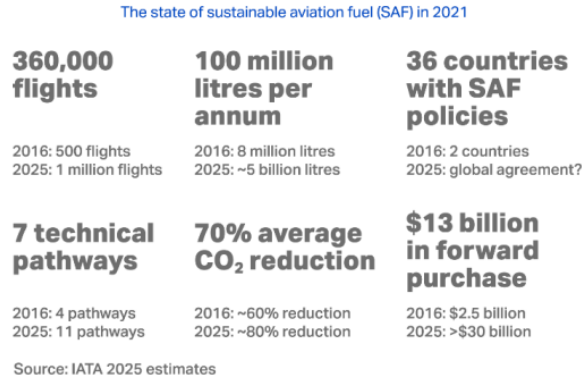
Binding mandates

H4: IATA's view

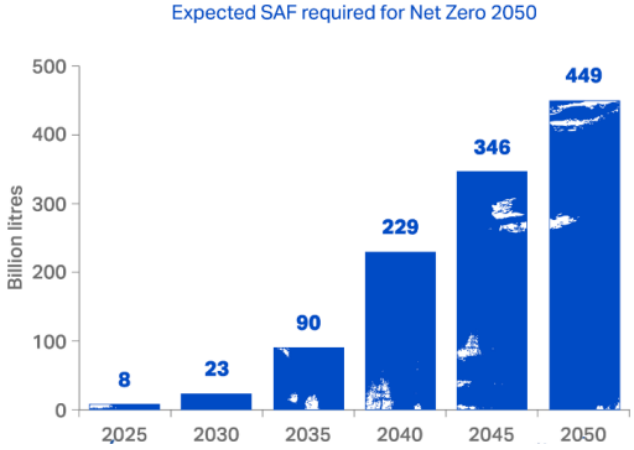
International Air Transport Association's view:

(*IATA is the trade association for the world's airlines, representing 290 airlines or 83% of total air traffic*)





« 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. »



Source:
www.iata.org/contentassets/b3783d24c5834634af59148c718472bb/factsheet_saf-.pdf

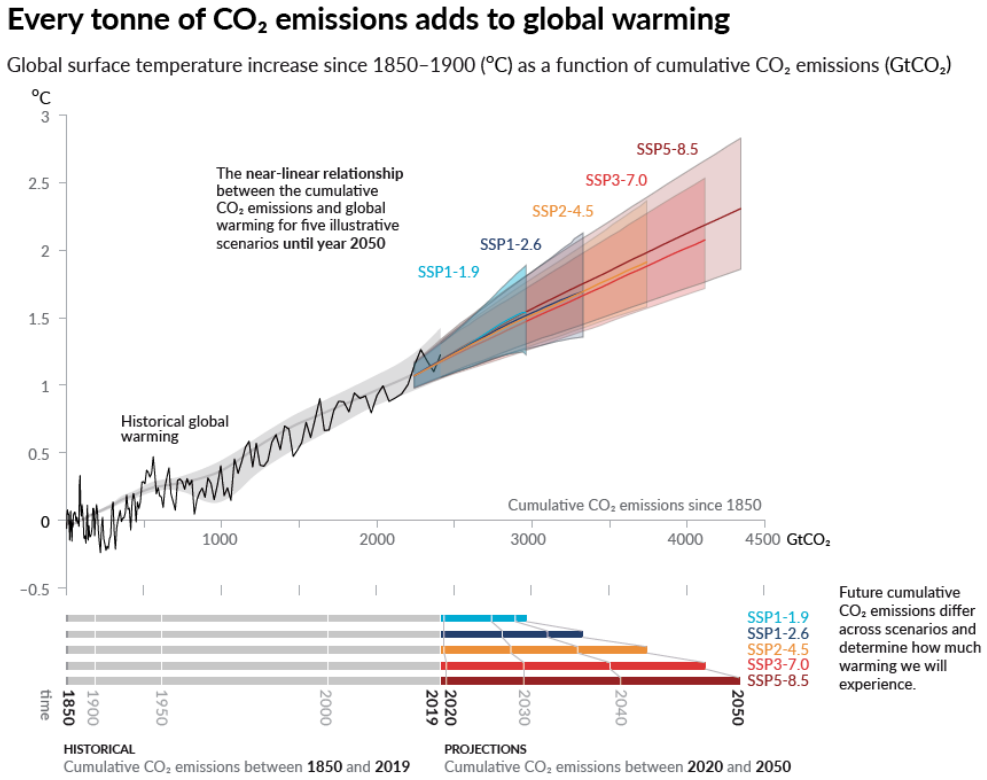
Road biofuels

- 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_2 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.
- It starts by motorsport, a niche market where higher prices are possible.

Conclusions

Environmental transition - Global picture

- Reducing CO_2 emissions down to zero by 2050 is mandatory for the planet to stay livable
- We have not started yet: CO_2 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



Source: IPCC report *Climate Change 2021*

- Low CO_2 emission technologies will bring a key part of the solution by preserving some of our present living standards at a reduced environmental expense

Metrics

- Human activity emits about 40 billion tons CO_2 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_2 per year

2 tons of CO_2 savings for each ton of SAF produced

→ 1% of global CO_2 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

Perspectives

- 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
- 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_2 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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