



BioTfuel[®]

**A Commercial technology
From Biomass to SAF**

*ETIP Bioenergy
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Nicolas SIMON – Technology Engineer



Axens
Powering integrated solutions

Axens in Brief

Company Profile

- Technology and catalyst provider for biofuel, biochemical, oil & gas, and petrochemical industries
- 40+ yrs. experience in biofuel & biotech
- Ownership structure: 100% IFPEN

Business Areas



ALTERNATIVES &
RENEWABLES



PETROCHEMICALS



GASES



OIL
REFINING



WATER



Offices in 15 countries



3,000+
industrial units
under license



3,500+
furnaces sold



500+
modular units
references



70,000+ tons
catalysts &
adsorbents sold
each year

Axens Offer

- Integrated solutions
- Covers the entire value chain

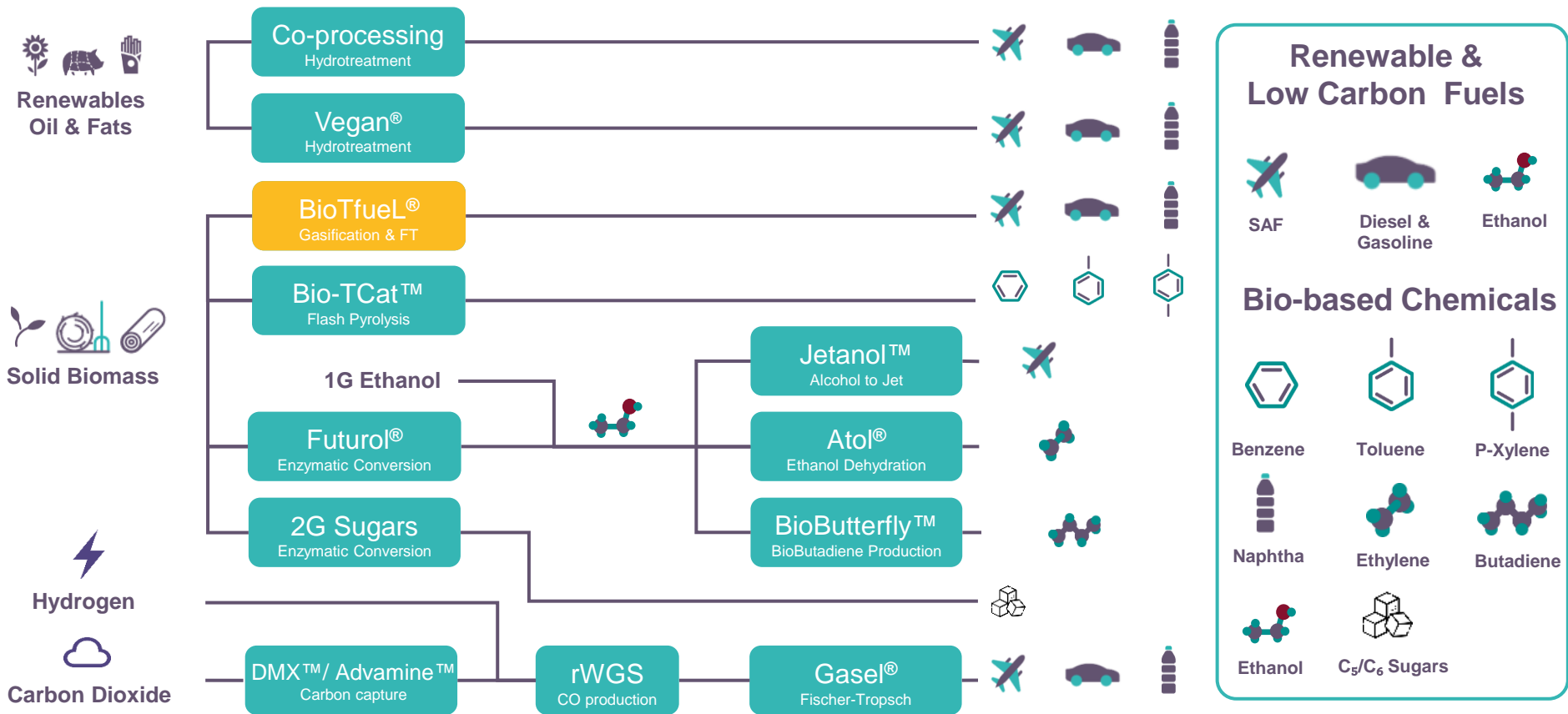
Axens
HORIZON

Axens
SOLUTIONS

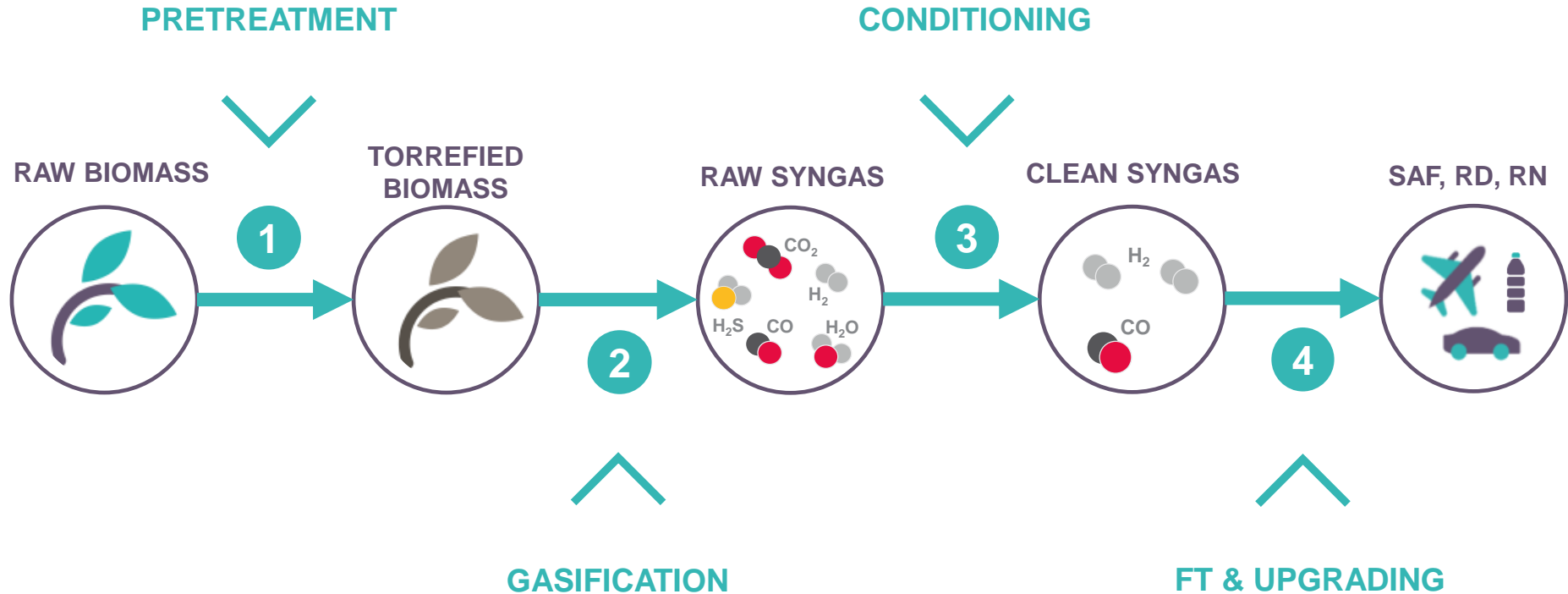
Heurtey
Petrochem
SOLUTIONS



Axens Technologies for Low-Carbon Products



Quick Overview - The BioTfuel[®] Technology



Technology – Pretreatment (1/4)

Forestry Residues



Soft/hard wood ...

Agricultural Residues



Straw, Bagass ...

RAW BIOMASS



Waste Wood



Furniture, Pallets ...

Energy Crops



Miscanthus ...

Pretreatment

STANDARDIZED BIOMASS



Torrefied chips



Torrefied pellets

Key Features

NON-FOOD BIOMASS FEEDSTOCK

- Often abundant & available
- Sustainable sourcing & supply

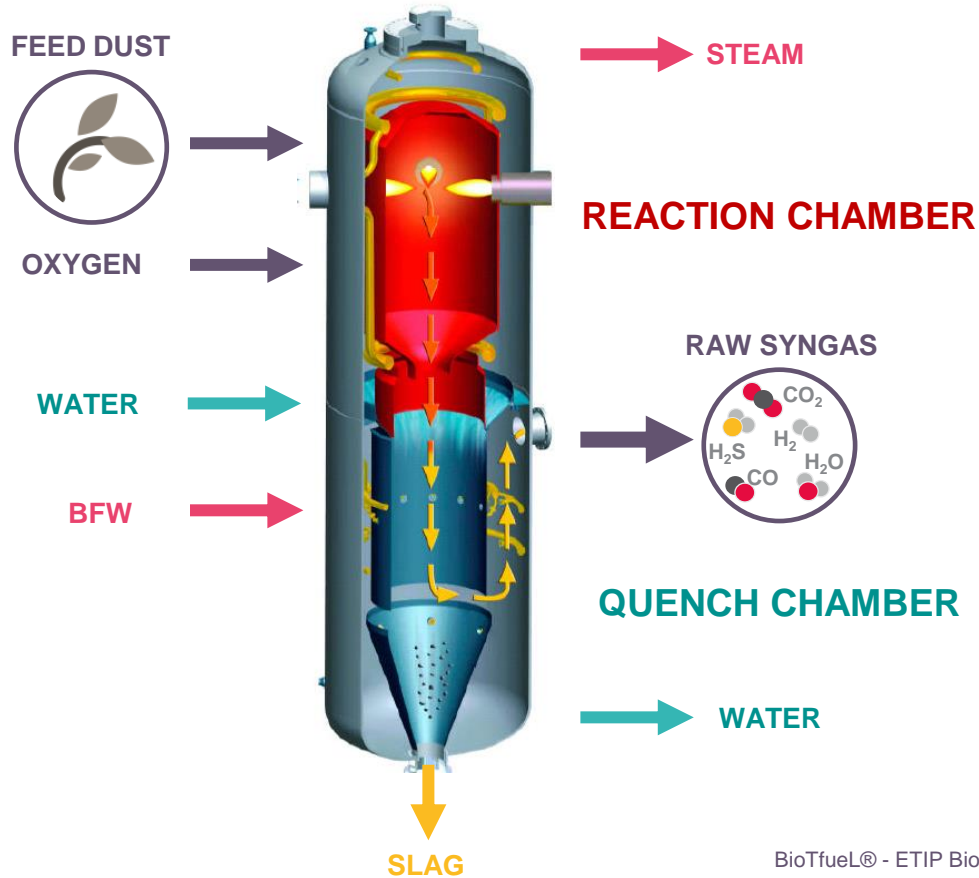
HIGH FEEDSTOCK FLEXIBILITY

- Compatibility with a wide range of lignocellulosic biomass
- Adaptable to feedstock seasonality and change of quality

BIOMASS STANDARDIZATION

- Enhanced grindability
- Homogenous biomass quality
- Higher energy density
- Easy conveying to the gasification burners

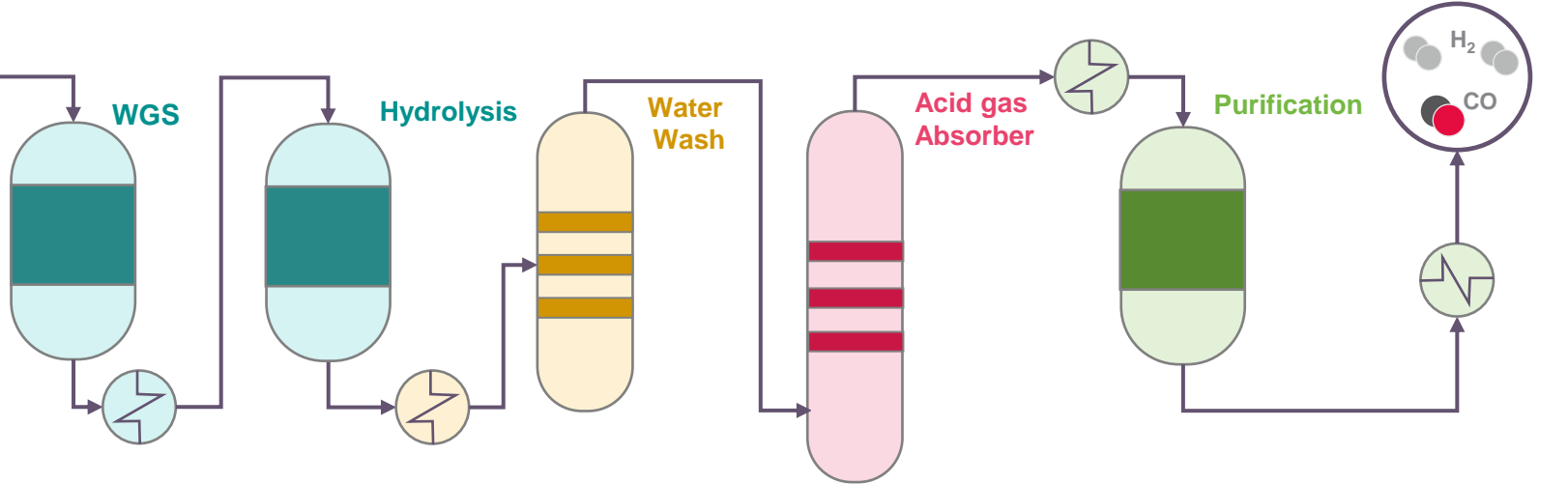
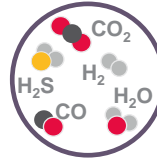
Technology – Gasification (2/4)



- Full Carbon Conversion
- Clean & tar-free syngas
- High Scalability
- 17 years of operation in largest worldwide IGCC

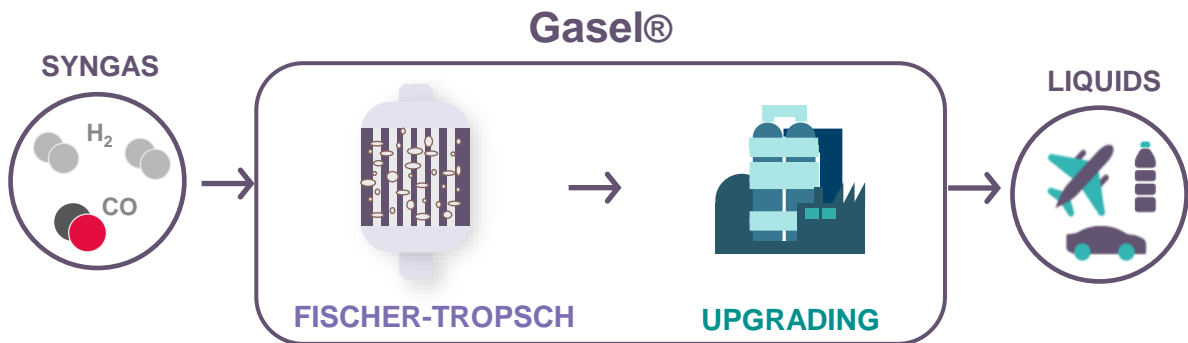
Technology – Syngas Conditioning (3/4)

RAW SYNGAS



- Robust & flexible
- Tailored to remove any impurities
- Adjusts H_2/CO ratio
- > 200 references worldwide for Acid Gas Removal

Technology – FT & Upgrading (4/4)



Fischer-Tropsch Unit
Sannazzaro, Italy



FT Waxes



Key Features

CHARACTERISTICS

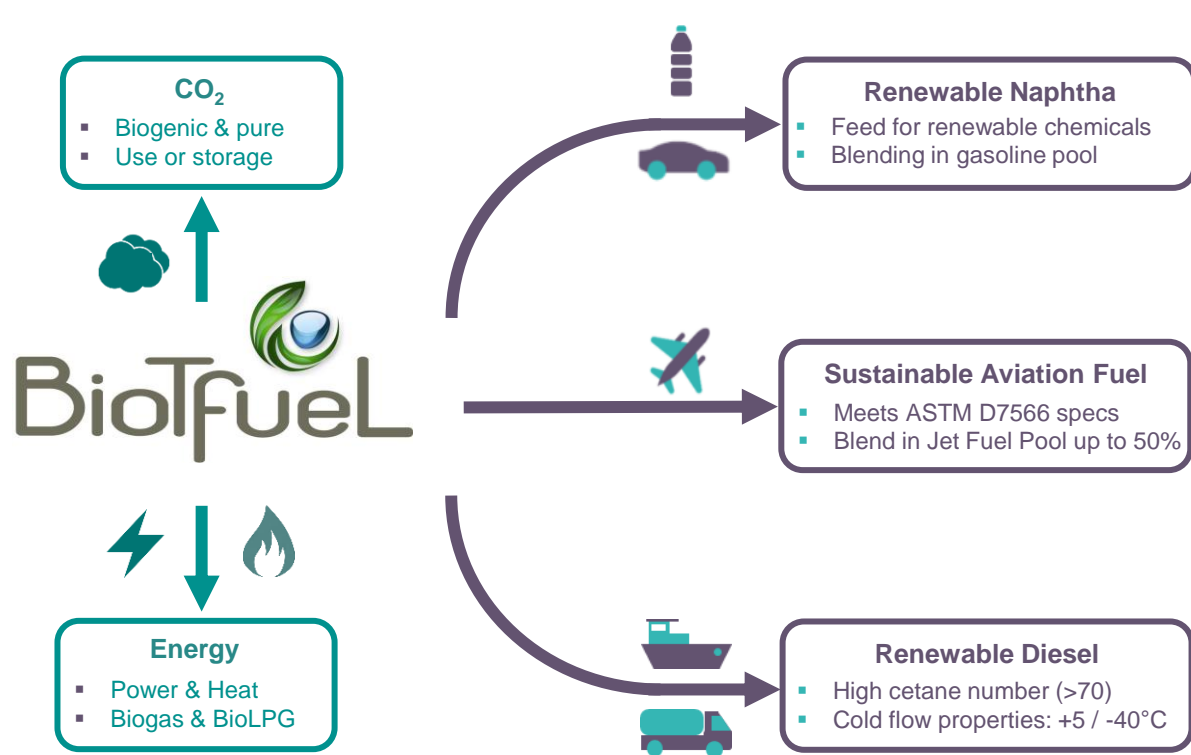
- Feedstock Agnostic: PTL / BTL / WTL
- SBCR technology maintains product quality and high availability
- Catalyst maximizes middle distillate
- Flexible Upgrading scheme

COMMERCIAL TECHNOLOGY

- 2 references
- 25 000 hours of operation
- Over 70 references worldwide for upgrading

PROJECTS ON TRACK

Products – a Bioenergy Hub



Key Features

HIGH PRODUCT FLEXIBILITY

Adaptable product slate

- Max SAF
- Max Renewable Diesel
- Mixed SAF & Renewable Diesel

HIGH QUALITY FUELS

- No Sulfur / Oxygenates / Olefins ...
- Drop-in : same infrastructure

BY-PRODUCTS OPPORTUNITIES

- Carbon capture integrated
- Excess energy utilization
- Biogas and BioLPG

A TRUE BIOENERGY HUB

Full Chain Demonstration Plant



Technology Validated



from Biomass to SAF



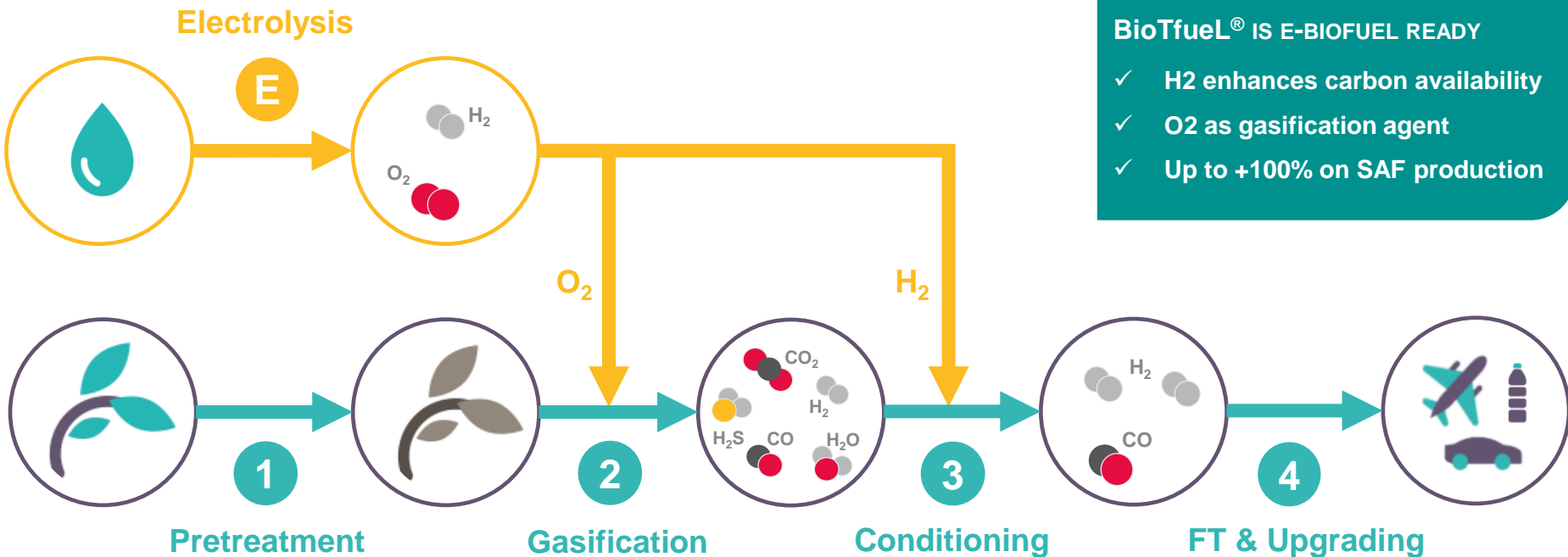
Drying + Torrefaction
Venette, France
Capacity: 3 t/h biomass



Gasification + Clean-Up + FT
Dunkirk, France
Capacity: 3 t/h biomass



BioTfuel[®] + Electrolysis = E-BTL



Attracting investors – Technology Licensor Perspective



Commercial Scale SAF projects

- ❖ Biomass Sourcing & Capacity
- ❖ Environmental performance
- ❖ It's not just about GHG !

SUSTAINABILITY



- ❖ Compliance with Regulations
- ❖ Eligibility to Subsidies & Incentives
- ❖ Market by-products



PROFITABILITY

- ❖ Technology maturity
- ❖ Licensor Bankability
- ❖ Resilience to Feed or Product Disruption

RISK ASSESSMENT

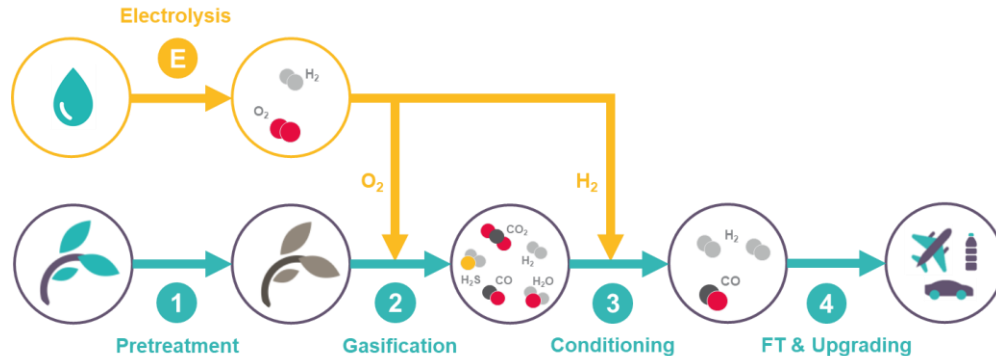


CREDIBILITY

- ❖ Expertise of Project Developer / Consortium
- ❖ Increased role of Licensing Companies

A First Reference on the Track: BioTJet

- South of France
- Forestry residue and alternative feedstocks. Local sourcing.
- 110 000 t/year SAF + Renewable naphtha
- Scheme with electrolytic hydrogen injection
- Start-up target : 2028



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Thank you

Axens.net
a new digital
journey