

Workshop « Bioenergy in a Net Zero Future »

CO₂ potential of
advanced biofuels

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ABOUT IFP ENERGIES NOUVELLES

A public sector
R&I body

A **training**
center

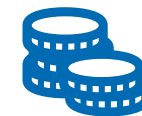
An industrial
group

An international scope in the fields of energy, transport
and the environment



1,549
people

€121.2m
budget allocation
in 2022



1,095 engineers and
technicians dedicated
to research

€141.5m
own resources
in 2022



WHICH SYNERGY BETWEEN DIFFERENT PATHWAYS?

CARBURANTS AÉRONAUTIQUES DURABLES (CAD) SUSTAINABLE AVIATION FUELS (SAF)



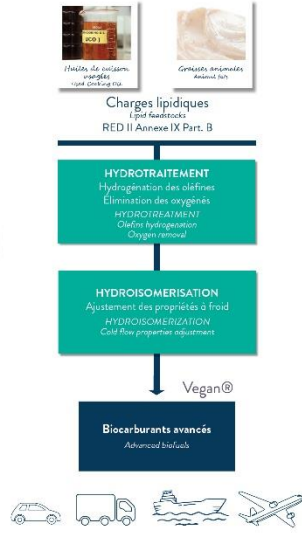
4 FILIÈRES DE PRODUCTION À PARTIR DE RESSOURCES DIVERSIFIÉES
4 PRODUCTION PATHWAYS FROM VARIOUS FEEDSTOCKS

HVO
HYDROTREITEMENT DES HUILES VÉGÉTALES
HYDROTREATED VEGETABLE OIL

- 85 %
par rapport au kérosène comparé to fossil jet

50 %
Aujourd'hui certifié jusqu'à 50 % d'usage
Incorporation up to 30% in jet pool

DES PROJETS EN EUROPE
EUROPEAN PROJECTS

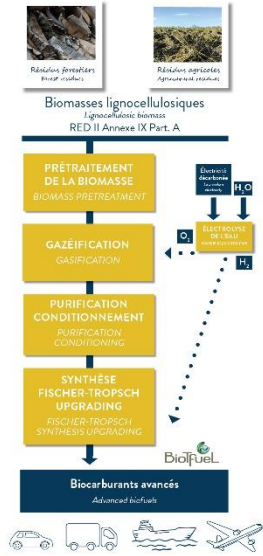


BTL and E-BTL
BIOMASS-TO-LIQUIDS AND E-BIOMASS-TO-LIQUIDS

- 90 %
par rapport au kérosène comparé to fossil jet

50 %
Aujourd'hui certifié jusqu'à 50 % d'usage
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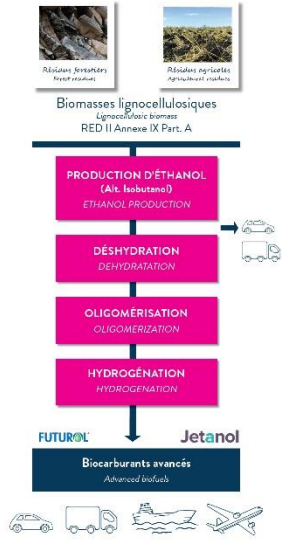


ATJ
ALCOHOL-TO-JET

- 85 %
par rapport au kérosène comparé to fossil jet

50 %
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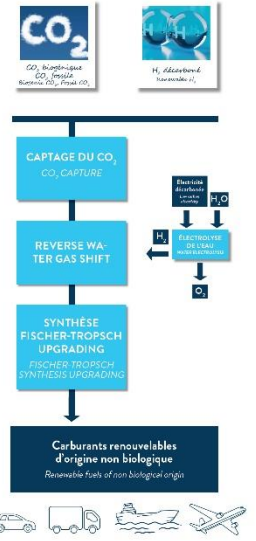


E-Fuels

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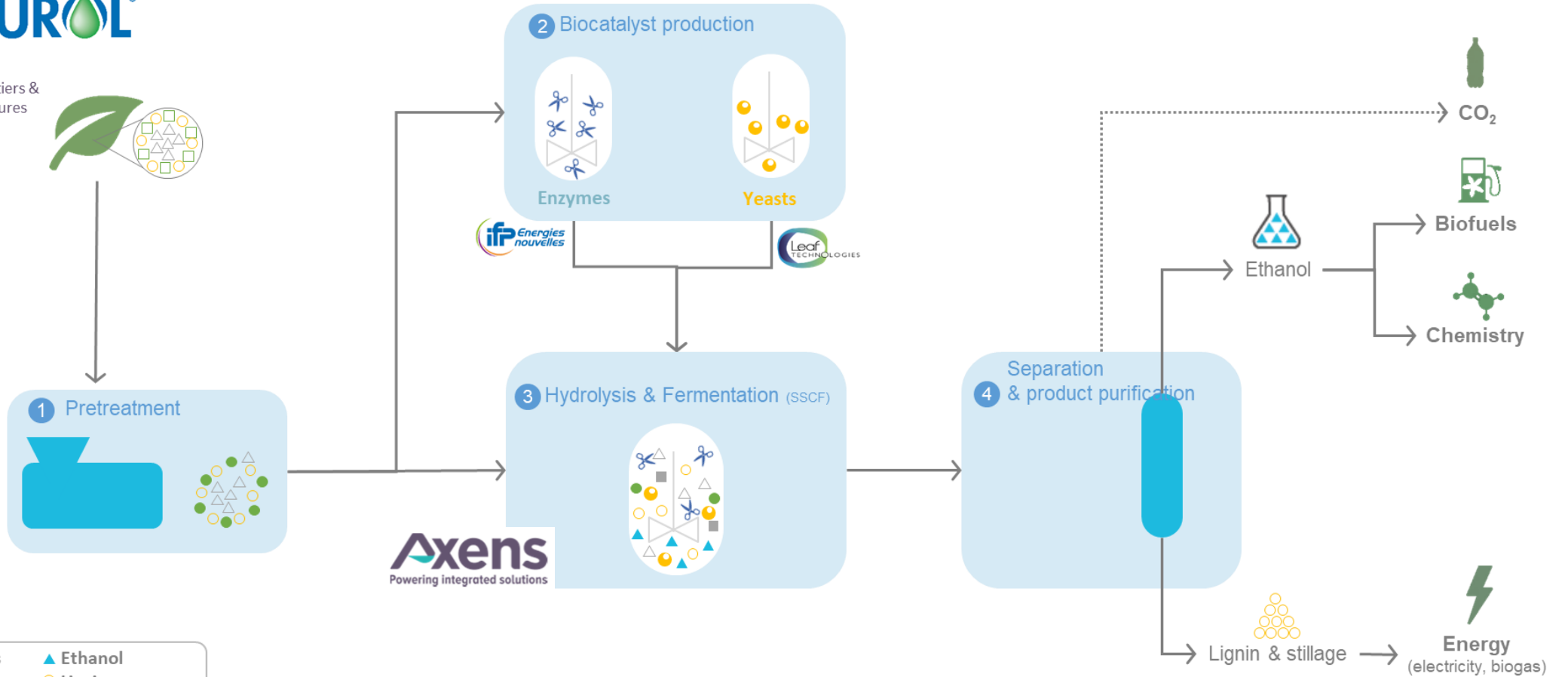
DES PROJETS EN EUROPE
EUROPEAN PROJECTS



CO2 FROM ADVANCED ETHANOL PRODUCTION

FUTURO^{OL}

Résidus forestiers & agricoles, cultures dédiées...



- C₅ sugars
- C₆ Sugars
- ✂ Enzymes
- Yeasts
- ▲ Ethanol
- Lignin
- Hémicellulose
- △ Cellulose

Axens
Powering integrated solutions

ifp Energies nouvelles

Leaf TECHNOLOGIES

Four steps process
Energetic products hub

CO2 FROM ADVANCED ETHANOL PRODUCTION

Renewable energies

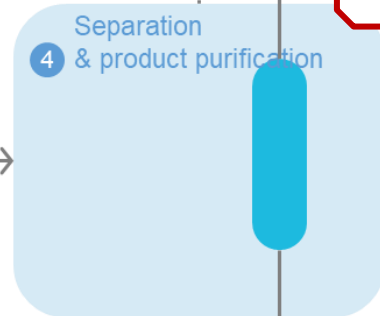
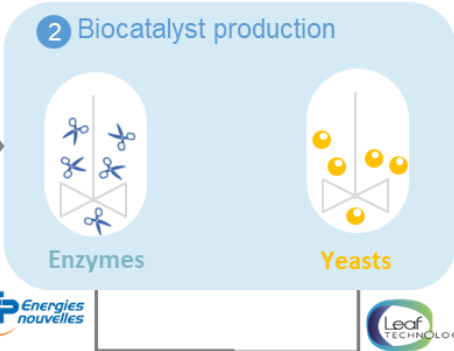
FUTURO[®]

Résidus forestiers & agricoles, cultures dédiées...



150 kta

Advanced ethanol typical mass yield : 20 wt%



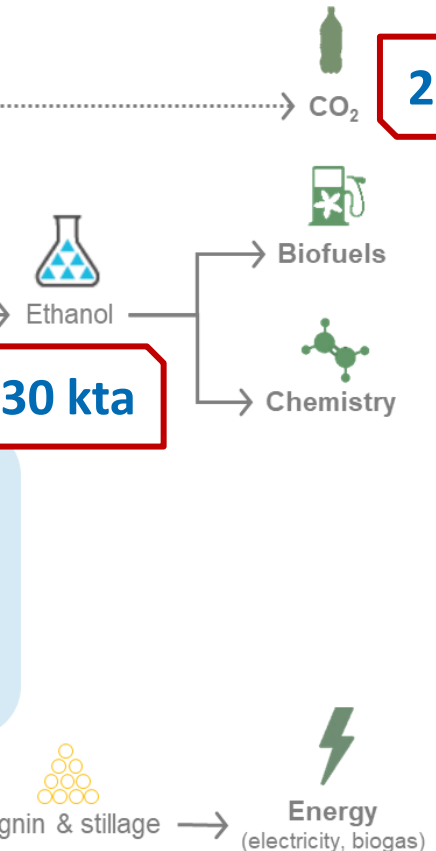
- C₅ sugars
- C₆ Sugars
- ✂ Enzymes
- Yeasts
- ▲ Ethanol
- Lignin
- Hémicellulose
- △ Cellulose



Same amount of CO₂ than ethanol

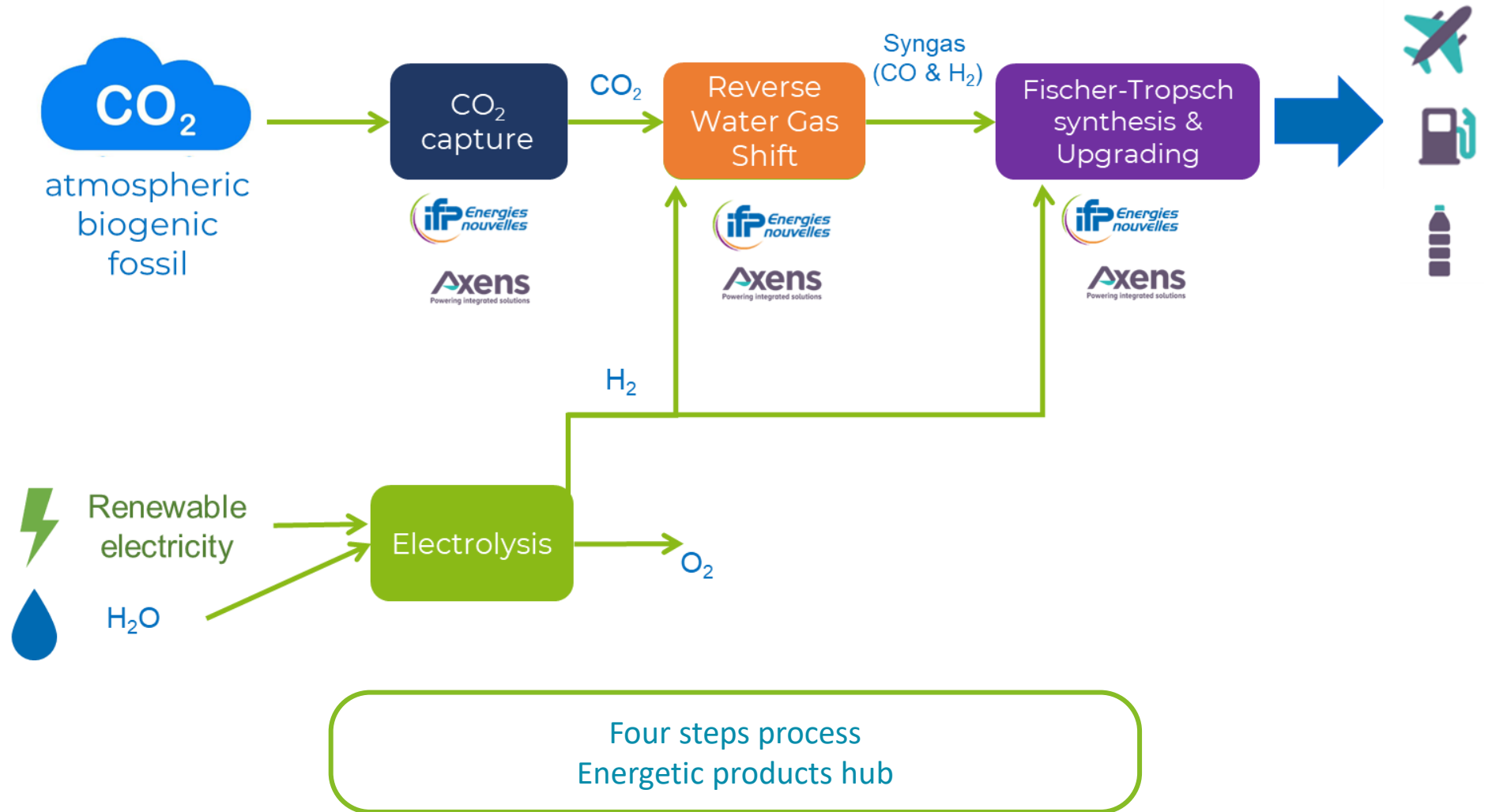
30 kta

29 kta



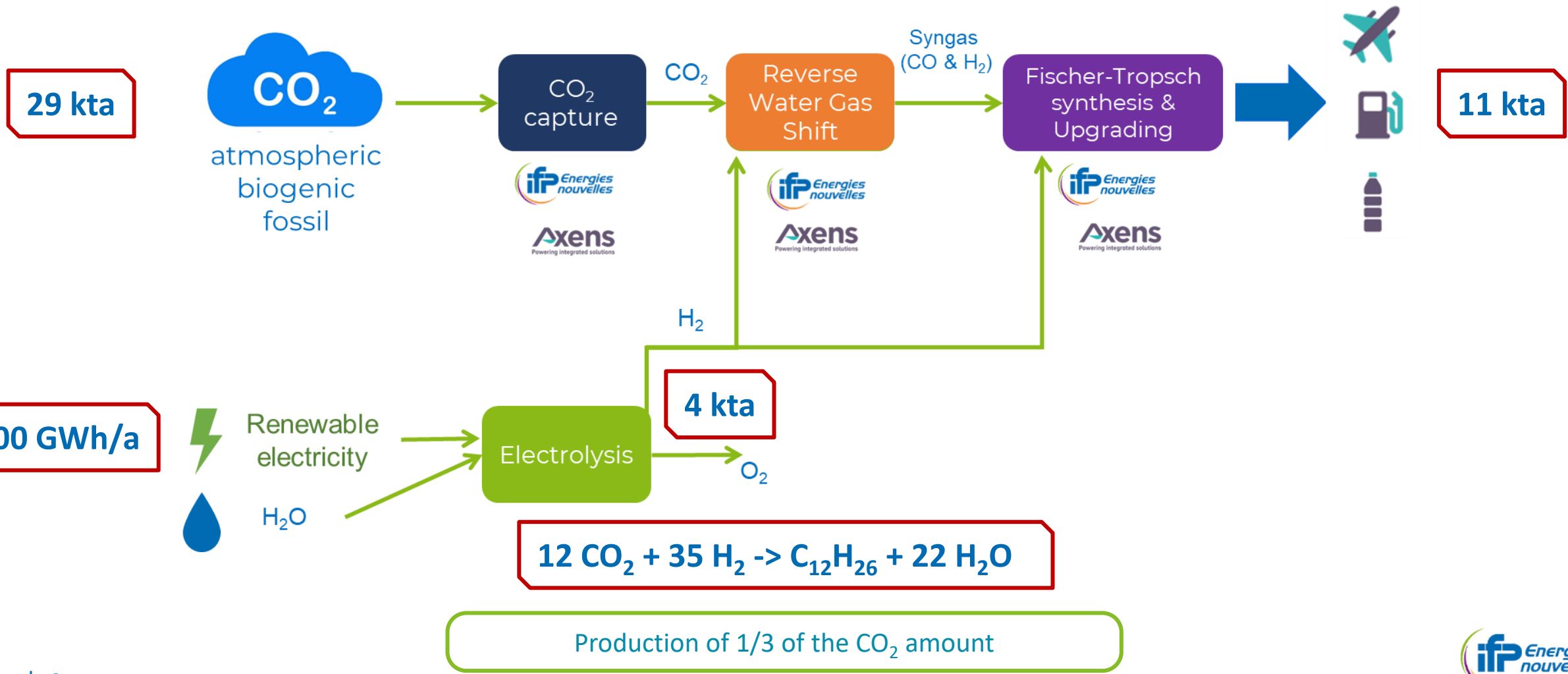
E-FUELS CO2 UTILIZATION

Renewable energies

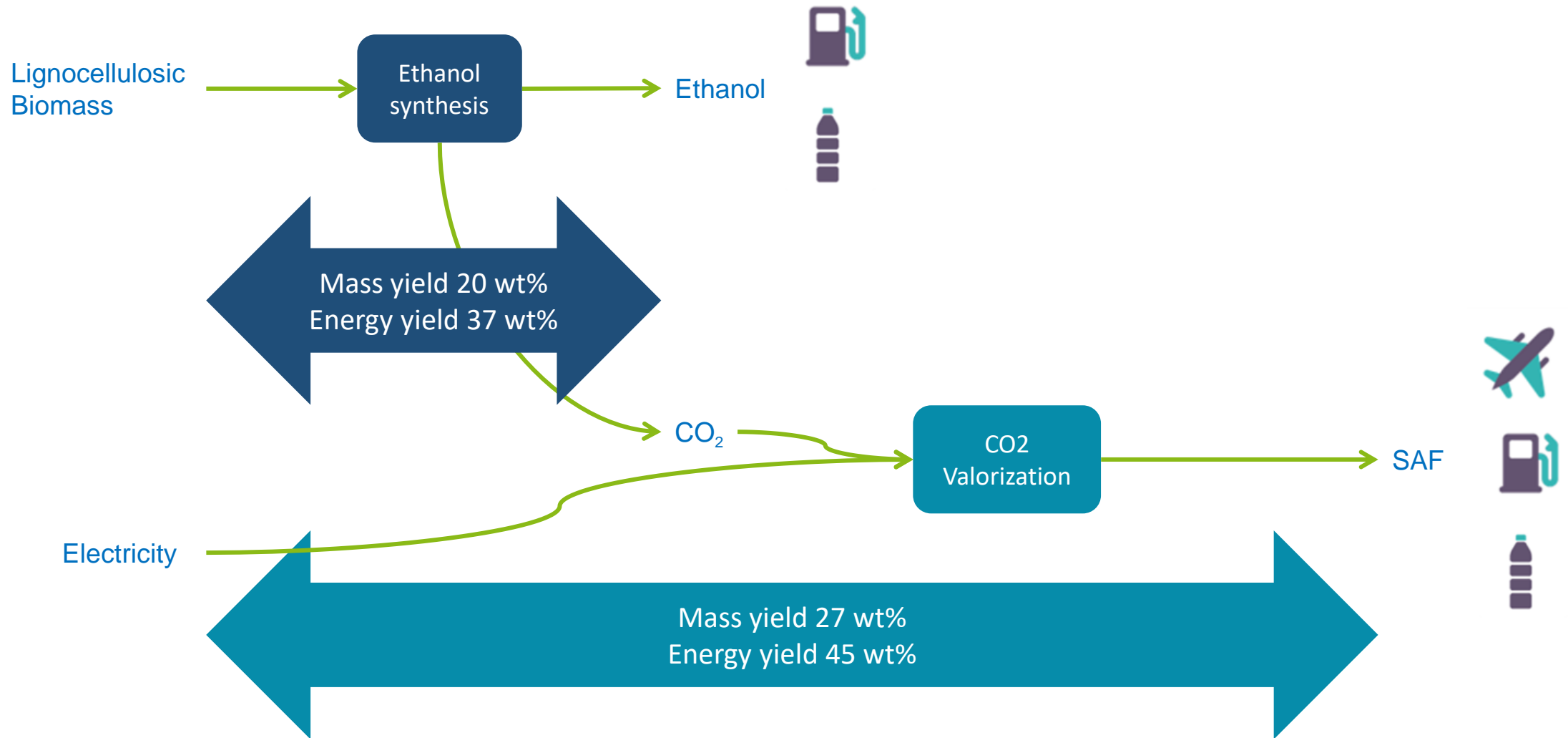


E-FUELS CO2 UTILIZATION

Renewable energies

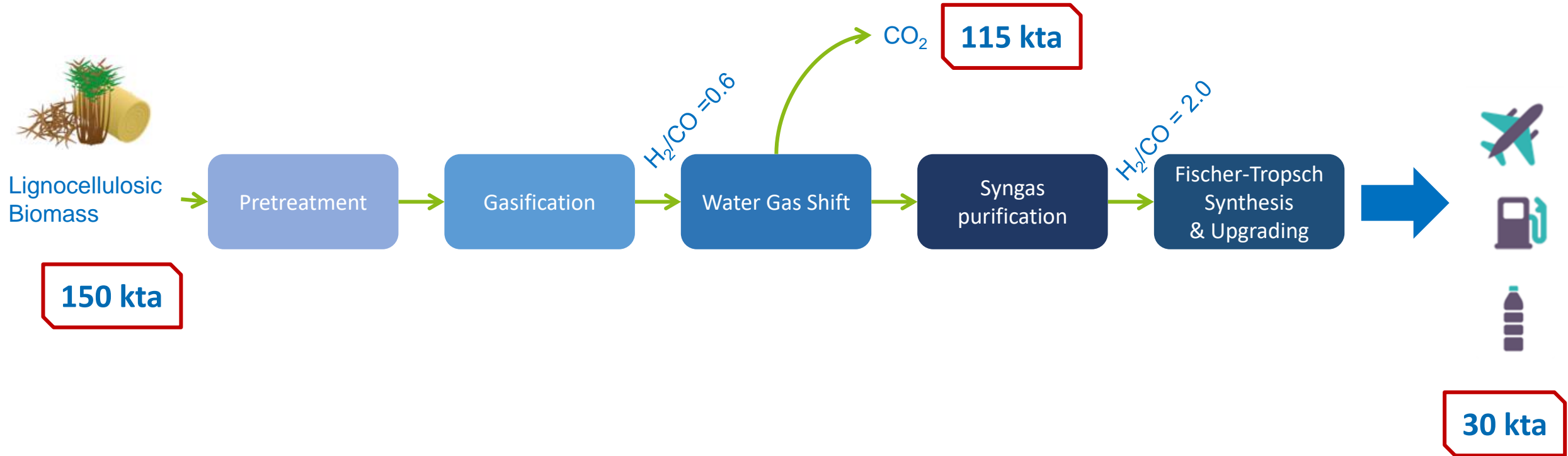


GOOD COMBINATION OF ETHANOL AND E-FUELS



THE E-BTL A WAY TO MAXIMISE BIOGENIC CARBON

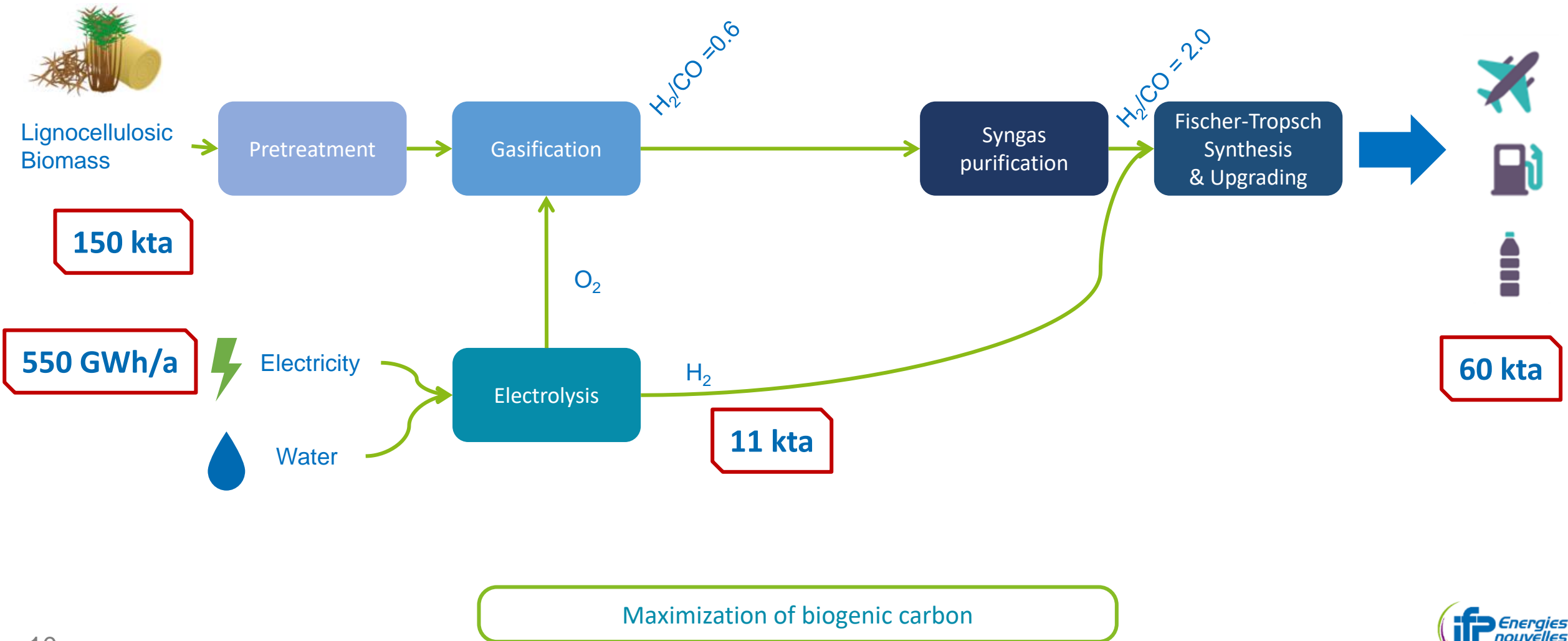
Renewable energies



Water gas shift process use to adjust the H_2/CO ratio

THE E-BTL A WAY TO MAXIMISE BIOGENIC CARBON

Renewable energies



SYNTHESIS

- Different pathways for advanced biofuels are ready for industrial deployment
- Advanced biofuels unit will be a source of biogenic CO₂
- Integration of different technologies will allow to maximize biogenic carbon use in final products
- Others utilities, streams could be integrated (steam, water, ...)

Innovater les énergies

Retrouvez-nous sur :

 www.ifpenergiesnouvelles.fr

 @IFPENinnovation

