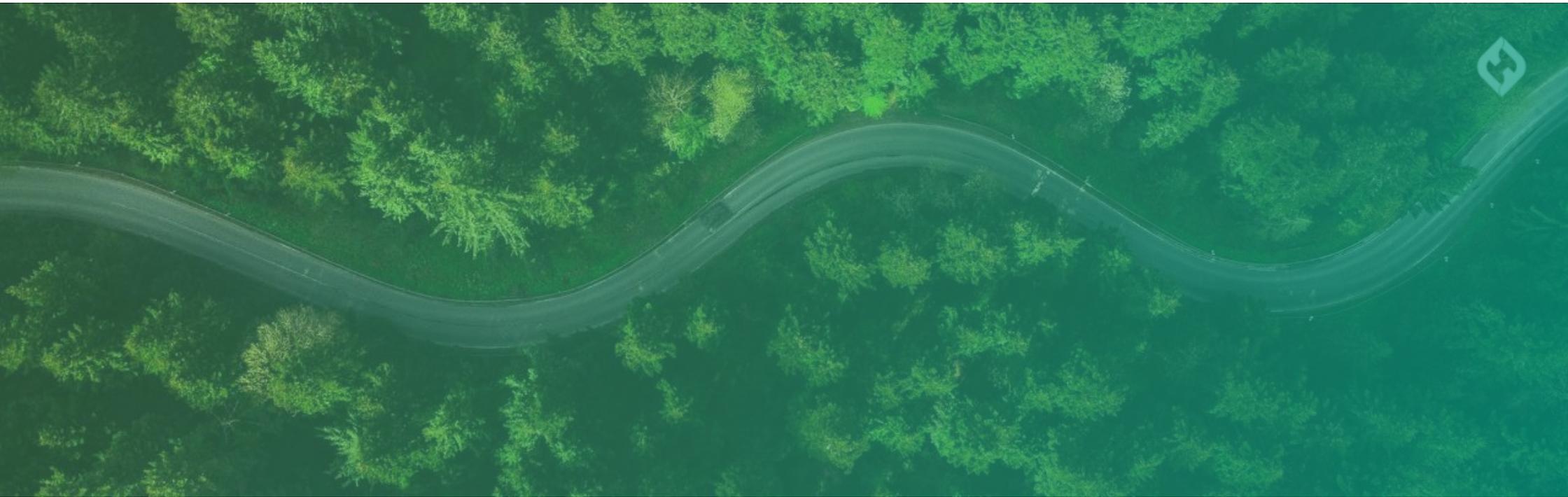




Decarbonization & Sustainable Aviation Fuels

High quality syngas for SAF production from
all types of biomass residues

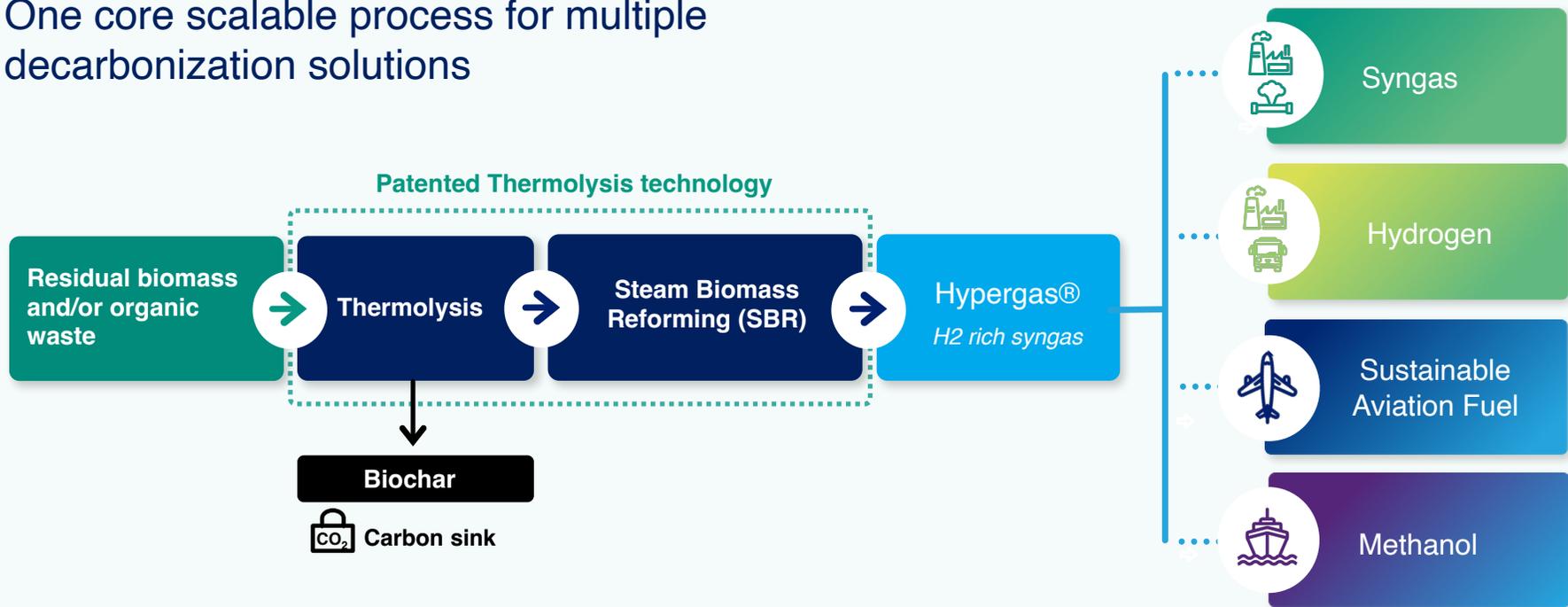


01. Why Haffner Energy and SAF



Haffner Energy's scope of expertise

One core scalable process for multiple decarbonization solutions





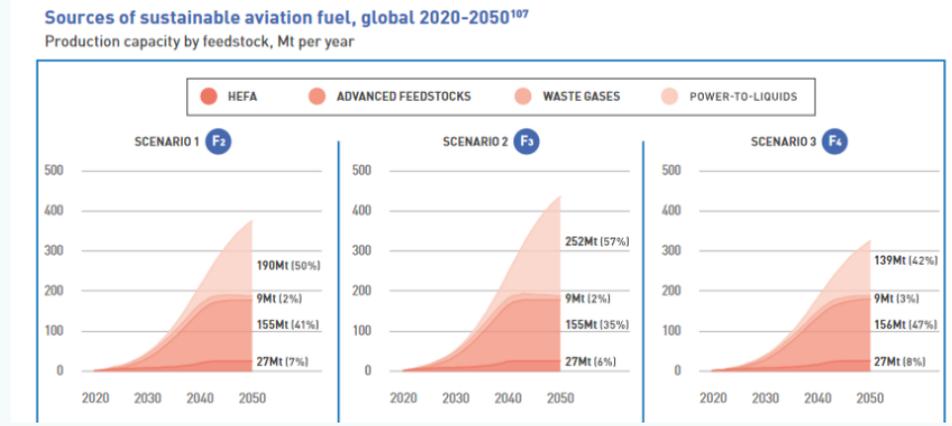
The missing link to convert organic waste into SAF

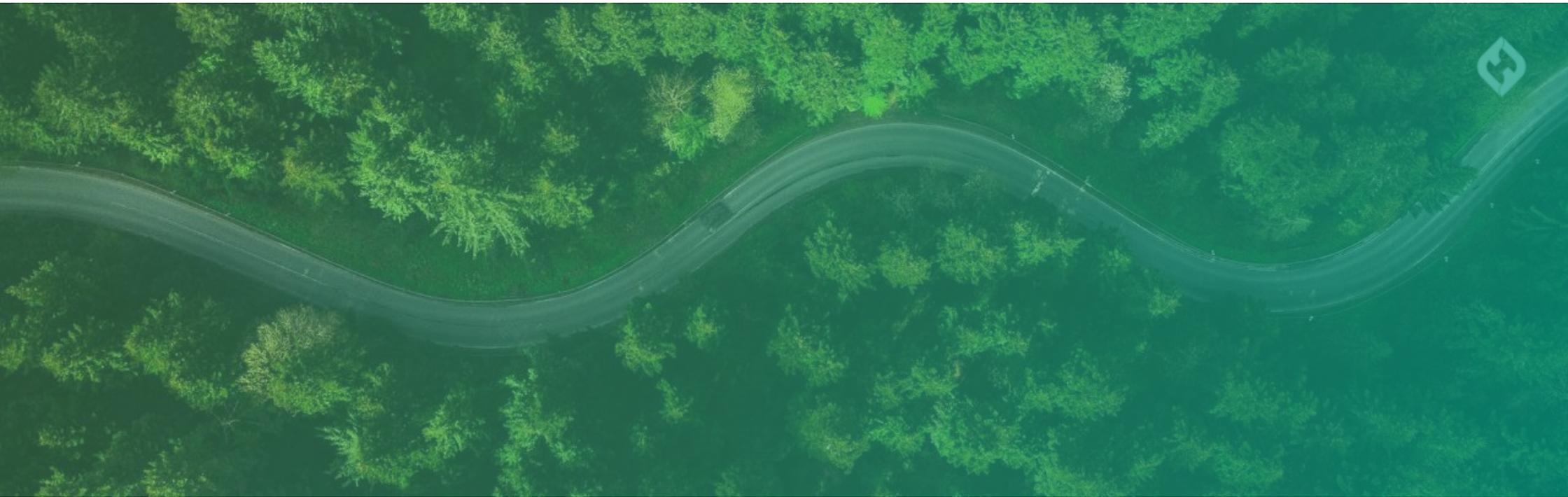
The right technology to address the SAF Challenge

- One technology for both green H₂ molecules and biogenic CO₂
- Biomass agnostic technology with ASTM approved Fischer-Tropsch pathway
- Other ways to produce SAF (HEFA and Alcohol-to-Jet) are limited by feedstocks
- Scalable 50 MW modules

Exponential addressable market growth

- Europe: mandatory 20% minimum share of SAF in EU airports by 2035
- Europe: 150 biorefineries in operation by 2050
- US: 3 billion gallons of SAF from biomass and waste by 2030; 35 by 2050
- US: 250 biorefineries in operation by 2050



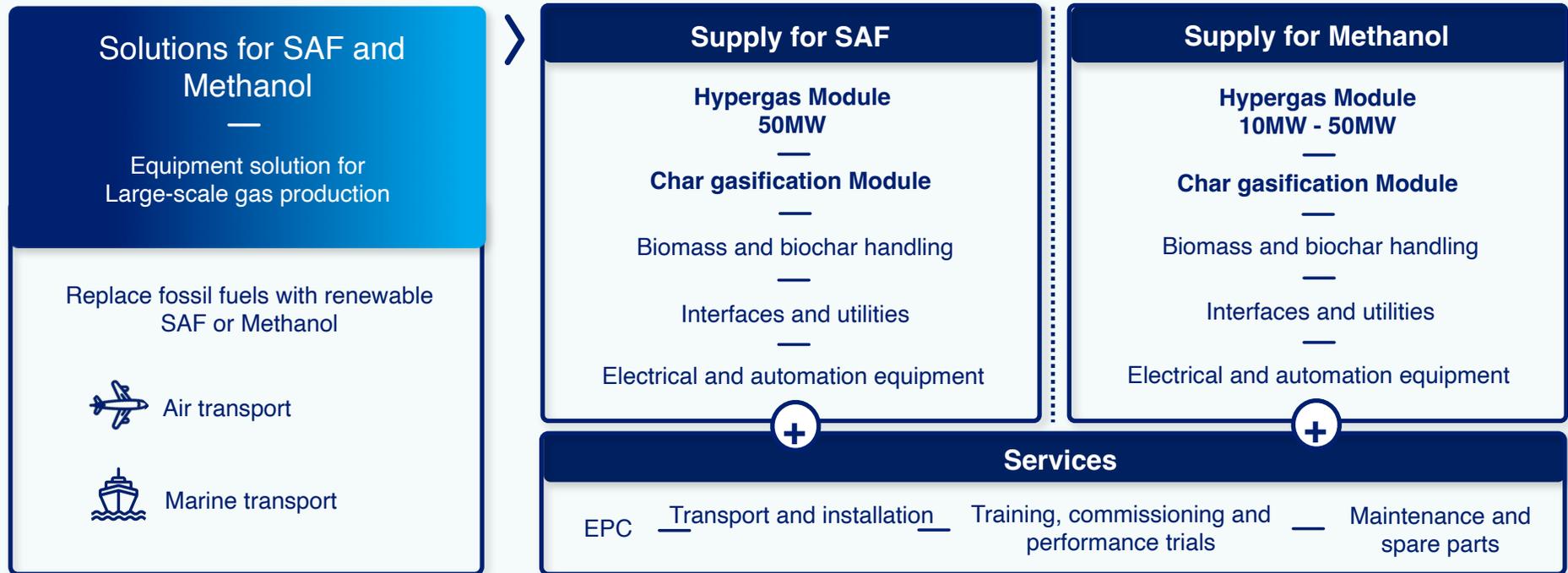


02. Our Solution for SAF



Solutions for clean fuels

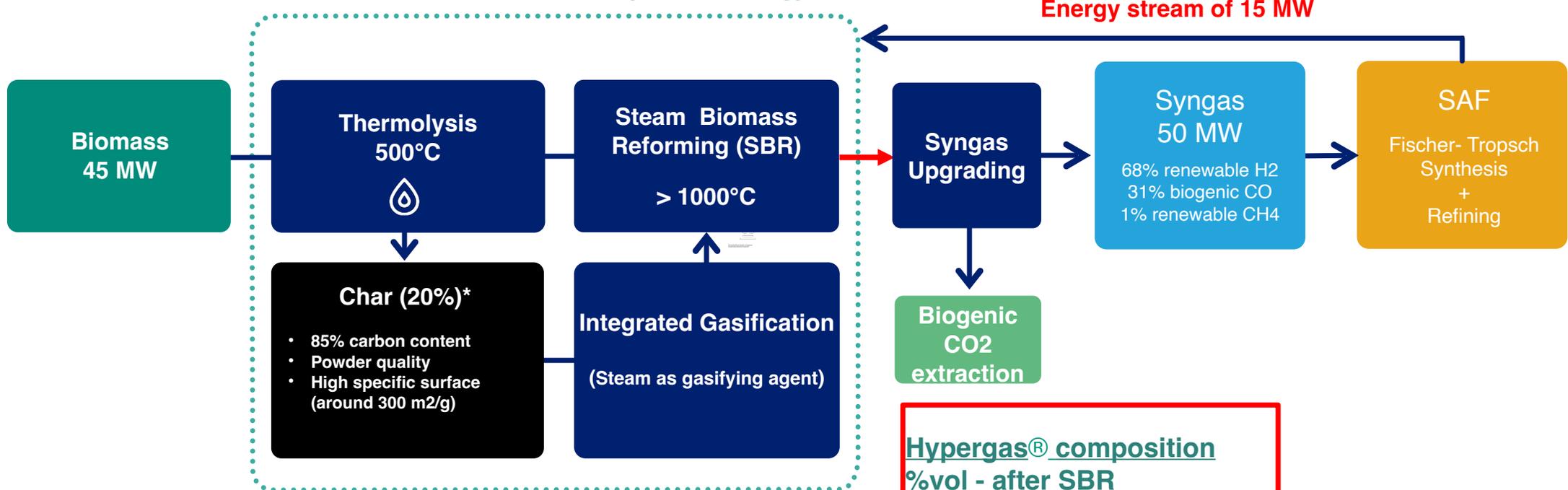
Solutions for SAF and Methanol - large-scale **Hypergas®** production
Renewable gas suited for liquid clean fuel production





The technology SAFNOCA®

Patented SAFNOCA® Thermolysis technology



Char (20%)*

- 85% carbon content
- Powder quality
- High specific surface (around 300 m2/g)

Hypergas® composition
%vol - after SBR

➤ H2	~ 50%
➤ CO	~ 39%
➤ CO2	~ 8.50%
➤ CH4	~ 1 %
➤ H2O	~ 1.25%
➤ Other	<0.5 %



All types of biomass residues

In the context of energy production, biomass is the **organic matter** from plants. It contains **biogenic carbon** absorbed by the plant via photosynthesis.



Give value to residual biomass

At Haffner Energy, we support the use of sustainable biomass, meaning giving value to residual or waste biomass from agriculture, forestry, municipality or industry



Accessible and affordable resource

Sustainable biomass available for bioenergy in Europe in 2030: 520 to 860 million dry tons ⁽¹⁾

SAFNOCA® is biomass agnostic

Recovered Wood			Short Rotation Coppice
Vine Residues			Hemp
Miscanthus/energy crops			Flax / Flax Shives
Corn / Cereal Straw			Green and industrial wastes
Other types of biomass			

⁽¹⁾ Source: Imperial College London Consultants, Sustainable biomass availability in the EU, to 2050. The scope of the study defines biomass accordingly to the RED II definition



03. About Haffner Energy



Haffner Energy : who we are

- **30 years' experience** in biomass to energy projects under EPC and EPCM schemes
- IPO in Feb. 2022: 74 million € raised
- IP-protected technology - 15 patent families and 80 international patents portfolio
- Strong executive team and expanding workforce with dedicated skillset
- Operating site R-HYNOCA in Strasbourg
- Manufacturing facility in Grand Est region
- International reach in Europe and the US
- Strong partnerships with best-in-class industry players



Manufacturing plant Jacquier in Grand Est region, France





30 years' expertise in biomass-to-energy

Haffner Energy benefits from strong experience in biomass-to-energy and biomass sourcing

Selected Haffner Energy projects



France (Guyane)

- EPCM
- Woodchips
- 25,000T



France

- EPC / Biomass Sourcing
- Woodchips / Wood From Composting
- 54,000T

2007

2009

2015

2017

2020



France

- Feasibility studies / biomass research
- Wheat straw
- 70,000T



Italy

- EPC / biomass research
- Olive pomace + wood
- 80,000T + 45,000T



Netherlands

- EPC
- Woodchips
- 135,000T



Role / Biomass Type / Amount of Biomass per year



Decarbonization & Clean Fuels Solutions

CONTACT

Gurvan DANO

Business Developer

gurvan.dano@haffner-energy.com

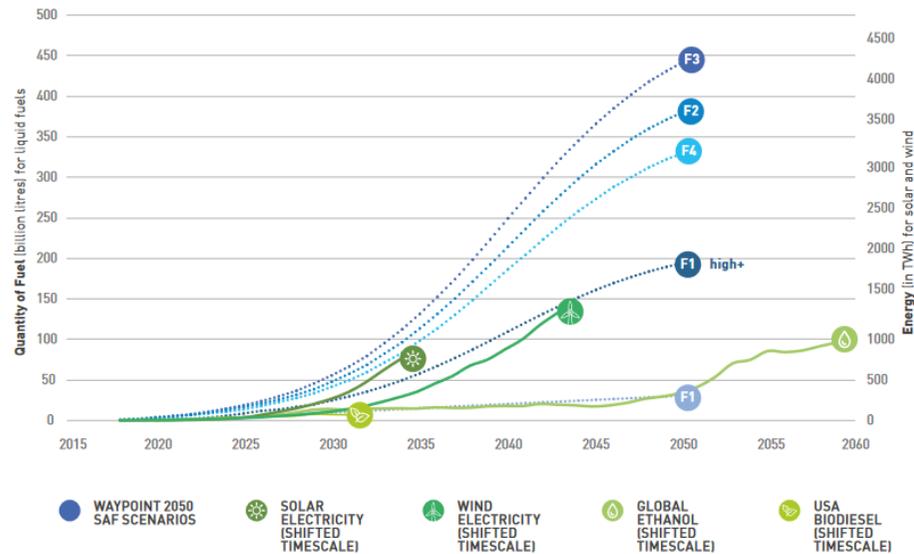
+33 6 76 57 42 58



Appendix : SAF market

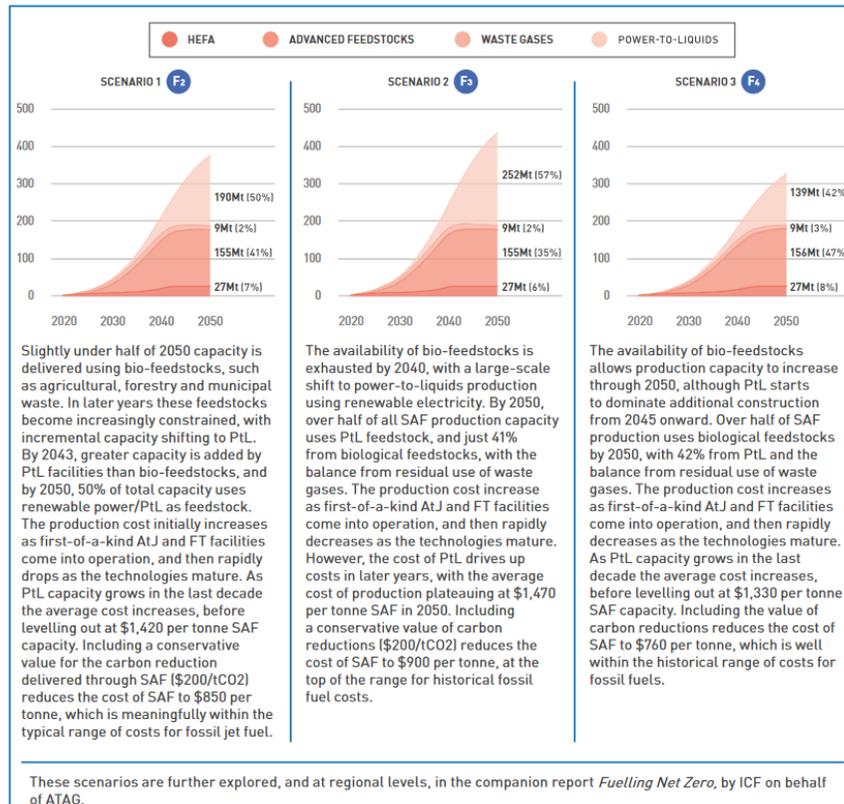
Scaling up the production of SAF is going to be a challenge, but not insurmountable

Waypoint 2050 sustainable aviation fuel scenarios are placed in context of the historical evolution and ramp-up of other alternative sources of energy (global ethanol production⁶³, USA biodiesel production⁶⁴, solar electricity generating capacity⁶⁵, wind electricity generating capacity⁶⁶). Given that the SAF scenarios represent forecasts from 2019-2050 and the alternative sources of energy are based on historical data, timescales for the alternative sources of energy were shifted to align to an arbitrary year (2025) for the purpose of analysis and illustration. The historical evolution of quantities of global ethanol production and USA biodiesel represented in terms of volumes (in litres in a given year) without conversion to equivalent energy. Global solar electricity and wind electricity are represented on the right-hand scale (in TWh in a given year) aligned with the equivalent energy from jet fuel. The SAF volume of 3.5 billion litres in 2025 corresponds to approximately 1980 production levels of global ethanol, 2012 production levels of USA biodiesel, 2010 energy level from solar and 2000 energy level from wind. The industry believes that it can reasonably reach twice this level of SAF production in 2025 (i.e. around 6-7 billion litres).



Sources of sustainable aviation fuel, global 2020-2050¹⁰⁷

Production capacity by feedstock, Mt per year



Source: ATAG - Waypoint 2050 report - <https://aviationbenefits.org/environmental-efficiency/climate-action/waypoint-2050/>