Haffner Energy

Decarbonize · Innovate · Regenerate

Haffner Energy's biomass-agnostic technology for SAF production: the keystone of SAF Zero investment opportunity

Innovate UK

SAF Café webinar

July 17, 2025

SAFzero

SAF projects & production technology

Haffner Energy is an experienced cleantech provider

Our value proposition

Decarbonize with competitive clean fuels, backed by over 30 years experience

Our vision

Regenerate our planet for future generations

Our mission

Replace fossil fuels with affordable clean fuels

80 international patents on our biomass thermolysis technology

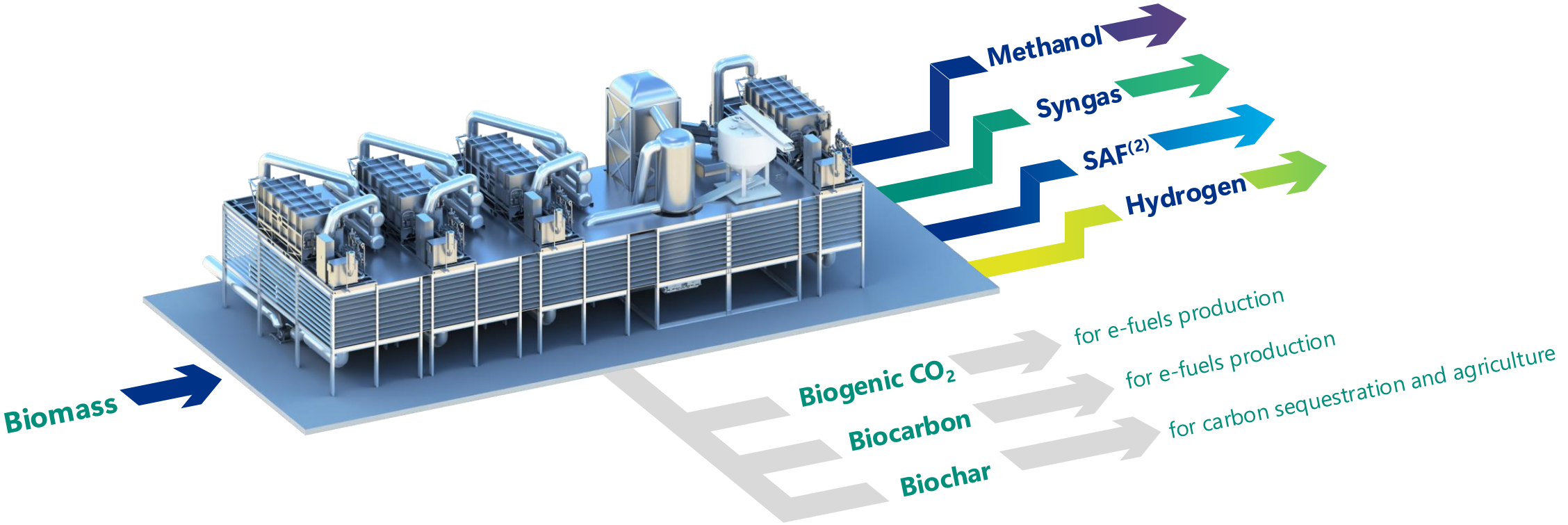
40 plants delivered under EPCM and EPC schemes for a total of 600-MW LHV installed capacity

32+ years' experience in biomass-to-energy projects

Flexible tech and solutions to produce clean fuels

Proprietary & stackable(1) ready-to-market technology for 4 clean fuels and 3 decarbonation co-products.

From any type of biomass or waste



(1) Arranged horizontally
(2) SAF: Sustainable Aviation Fuel

Unique biomass and waste agnostic technology

Abundant biomass/waste resource

1 billion tonnes of sustainable biomass potential in US and 520 million tonnes in Europe annually by 2030; fuel production potential equivalent to 100% of current aviation fuel consumption

Reduced procurement cost

Unlike traditional biomass, residual biomass incurs no production costs and fierce competition, leading to a low cost

Non-competing end-uses

Leveraging residual biomass/waste that are currently untreated and disposed, and represent a net loss of potential energy

Continuous feedstock supply

Ability to intake a large variety of biomass mitigates the impact of seasonal and locational fluctuation in biomass supply quantities

Some examples of biomass


Green waste


MSW


Vine residues


Algae


Cereal straw


Manure


Energy crops


Flax

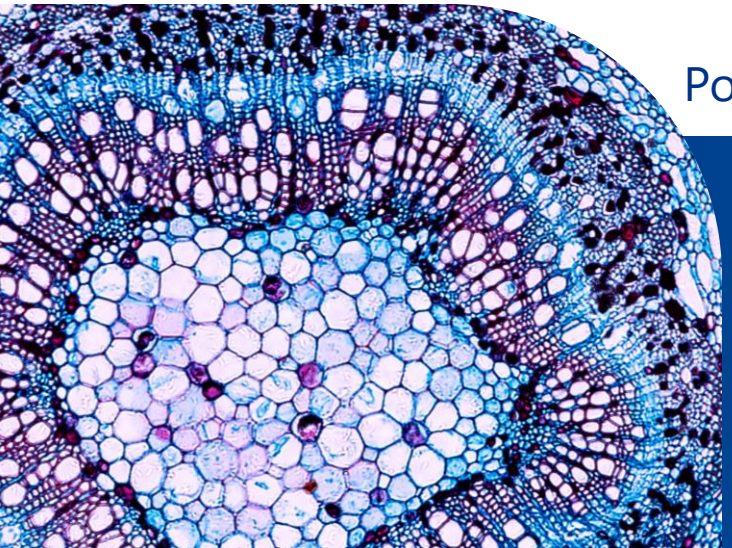
Source: U.S. Department of Energy Bioenergy Technologies Office (BETO) 2023 Report; sustainable biomass availability in Europe by Concawe

An essential co-product: biogenic CO_2

Biogenic CO_2 is made from biogenic carbon (captured from the atmosphere by plants) and oxygen.

Why is biogenic CO_2 key?

- SAF production through Power to Fuels pathways always requires biogenic carbon. Biogenic CO_2 is reformed to carbon monoxide (CO), combined with on-site generated Hydrogen to produce e-syngas
- SAFNOCA process enables extraction of biogenic CO_2 while producing syngas:
  → Part of biogenic CO_2 is used to make SAF in the SAFNOCA® process.
  → Surplus production can be used to produce e-SAF or monetized.



Possible uses of the surplus of biogenic CO_2 produced in SAFNOCA® process:

- Carbon Capture and Utilization (CCU)

  CO_2 is used as a key component in:
  - E-fuels production (including SAF)
  - Chemical feedstock (including food & beverage)
  - Building materials

- Carbon Capture and Storage (CCS)

IATA predicts 63-187 plants by 2030

SAF zero
SAF projects & production technology

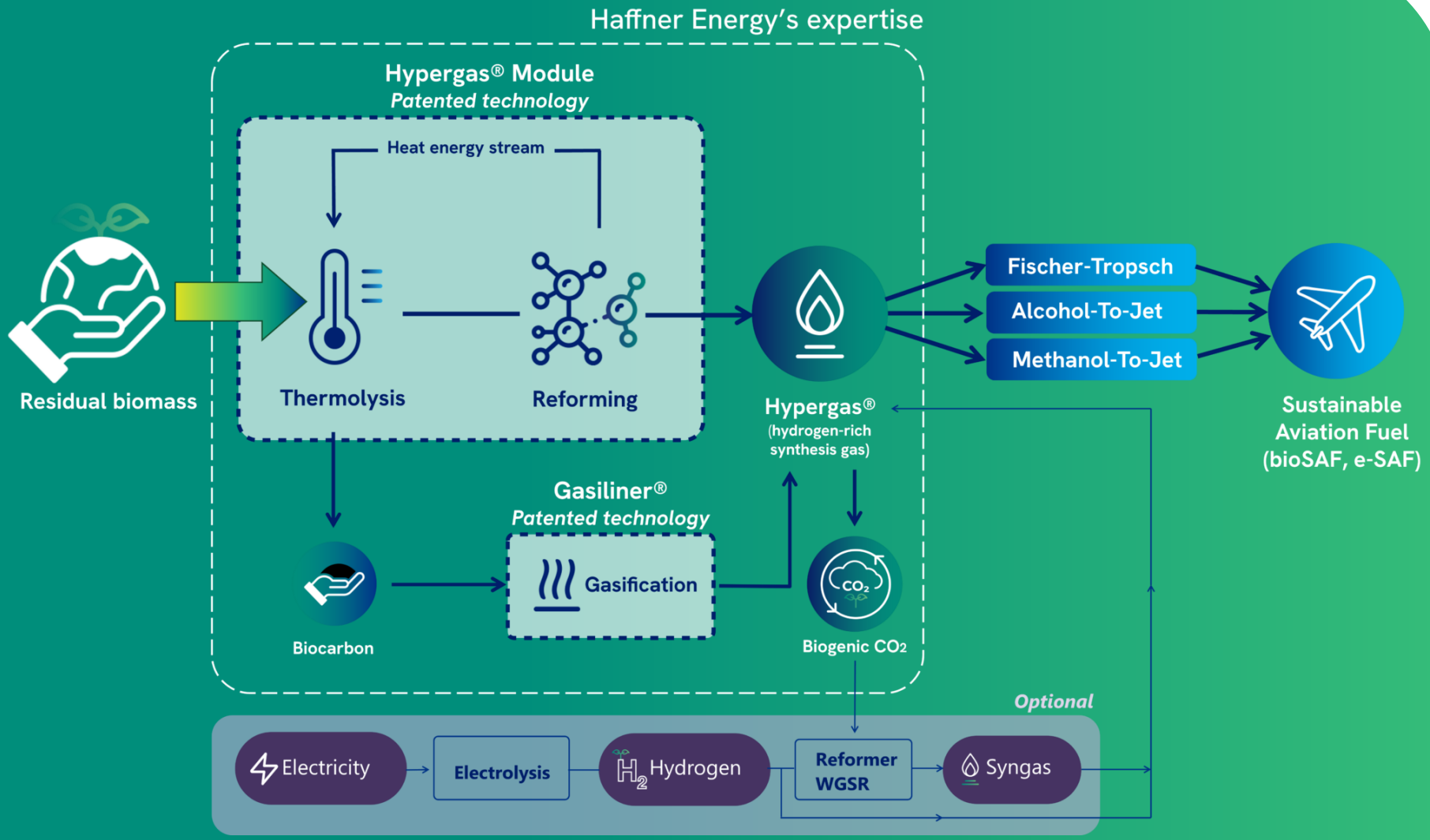
What is SAF Zero?

- SAF Zero is a Haffner Energy spinoff dedicated to SAF projects and production technology.
- Haffner Energy is a cleantech company backed by 30+ years of experience, with over 80+ international patents and 40+ plants built to date

SAF Zero assets

- Unrestricted Haffner Energy head license for technology that is critical for SAF production. It can be used for:
  - SAF Zero projects
  - Individual licenses can also be sold for other projects
- Existing SAF project pipeline from Haffner Energy as well as future projects

SAF Zero, spin-off to focus on bio and e-SAF production



SAF production using Haffner Energy's syngas demonstrated at the US lab RTI

SAF Zero technology is mature

SAF Zero assets today:

- SAF IP from Haffner Energy
- SAF projects pipeline from Haffner Energy

Proprietary technology development

2014 – PROTOTYPING
- First prototypes developed
- 15 patent families filed

2021 – DEMONSTRATOR
- Thousands of operating hours
- Produced 99.97% hydrogen, purified from H_2-rich syngas

2021 – TECHNOLOGY ASSESSED AS MATURITY 7-8 by international certification body DNV

2024 – COMMERCIALIZATION
- Commercial-scale plant in France
- Testing center for biomass types
- Training center

NOW – INDUSTRIALIZATION
- First SAF project: Paris-Vatry SAF
- LanzaJet as technology partner

SAF Zero brings security and savings to SAF projects

SAF zero
SAF projects & production technology

1

No biomass risks and unexpected costs

- SAF Zero tech: unique because biomass- and waste-agnostic
- RED-III and SAF mandates compliant

2

Flexible pathways for both bio-SAF and e-SAF

- Bio-SAF: syngas for FT, ETJ, Methanol-to-Jet
- E-SAF: Biogenic CO_2 and biocarbon

3

Cost competitive & high energy efficiency

- Access to low-cost primary energy
- Minimal energy losses
- Cost-effective
- Byproducts fully valorized

4

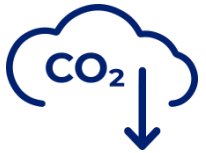
Compatibility with all types of biomass

- Biomass agnostic
- Addresses residual biomass and waste
- Immune to seasonal variations

5

Modular scalable technology

- Modular, scalable thermolysis technology with 50MW stackable[1] modules.
- Scope proven in industrial plant



6

Significant carbon reduction

- >90% carbon reduction vis-à-vis fossil-based jet fuel
- Carbon intensity below 9g CO2e/MJ SAF

1 : horizontally stacked

SAF zero
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Why SAF Zero?

- To invest in SAF projects through a dedicated vehicle
- To serve investors dedicated to SAF
- To create a pool of strategic and financial investors collaborating in making SAF plants happen
- To fully leverage Haffner Energy technology for SAF

Luxaviation to play an active role in SAF Zero

Announced at International Paris Air Show on June 18, 2025

- Luxaviation Group, leading global operator in the business aviation sector
- SAF Zero aligned with their sustainability strategy:
  - cash funding to finance initial development activities;
  - support the strategic definition and global visibility;
  - offtake agreements in relevant SAF Zero projects such as Paris-Vatry SAF.
- Both Luxaviation and Haffner Energy are members of Project SkyPower

Will YOU be the next partner joining SAF Zero to accelerate SAF projects with us?

"At Luxaviation, we believe that the future of aviation must be sustainable, and that requires bold partnerships and innovative solutions. Our collaboration with Haffner Energy and our interest in SAF Zero reflect our commitment to accelerating the adoption of sustainable aviation fuel and driving meaningful change across the industry.
By combining our operational expertise with Haffner Energy's cutting-edge technology, we are taking a decisive step toward a cleaner, more responsible future for aviation." **Patrick Hansen, CEO of Luxaviation Group.**

SAF zero projects

- **2 publicly announced projects**
  - ✓ Paris-Vatry SAF – press releases HERE and HERE
  - ✓ IdunnH2 – press release HERE

- **More projects in the pipeline**
  - ✓ Information can be released upon NDA signing

- **Many more projects to participate in**
  - ✓ Once the proper resources are allocated

ZOOM on IDUNN project: Iceland largest e-SAF project

Key project info

Project developer	IDUNNH2
Tech partners & pathway	**Methanol-to-eSAF** pathway by IDUNNH2 SAFzero
Location	**Helguvík port, near Reykjavik airport** in Iceland
Volume	**65,000** T per annum e-SAF. Icelandair has already committed to using 45,000 tonnes.
Timeline	**2028 e-**SAF production launch target

Project differentiators

- **224 kt CO_2eq avoided per year,** with 90% emissions reduction v. conventional jet fuel (1)
- **Biogenic carbon provided at lower cost** through on-site solid biocarbon gasification using SAF Zero Gasiliner technology.
- **Residual biomass as feedstock,** with abundant supply
- **Compliant with latest EU mandates** on SAF production

(1) Equivalent to 14,000 European flights (assuming average distance of 1,000 km)

SAFzero

ZOOM on Paris-Vatry SAF project

France's first bioSAF project

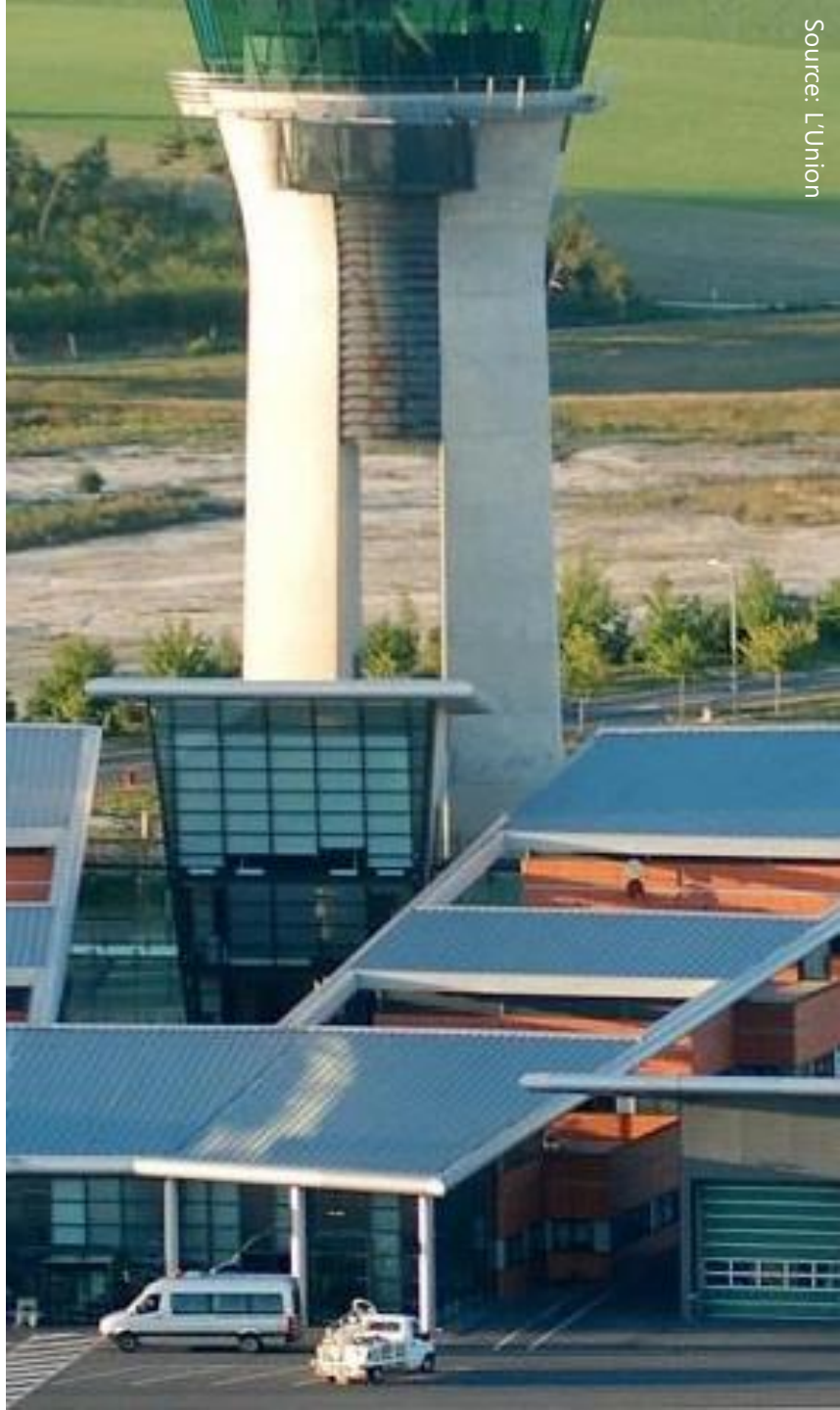
Key project info

Project developer	SAFzero
Location	**Paris-Vatry airport** in Champagne, France
Volume	**60,000** T per annum SAF, with expansion potential
Timeline	**2028** SAF production launch target

Project differentiators

- **400 kt CO_2eq avoided per year,** with 90% emissions reduction v. conventional jet fuel (1)
- **Biogenic CO_2 production**, creating E-SAF co-location potential
- **Residual biomass as feedstock,** with abundant supply
- **Compliant with latest EU mandates** on SAF production
- **Strong support** for project from authorities, airlines, technological partners and other parties

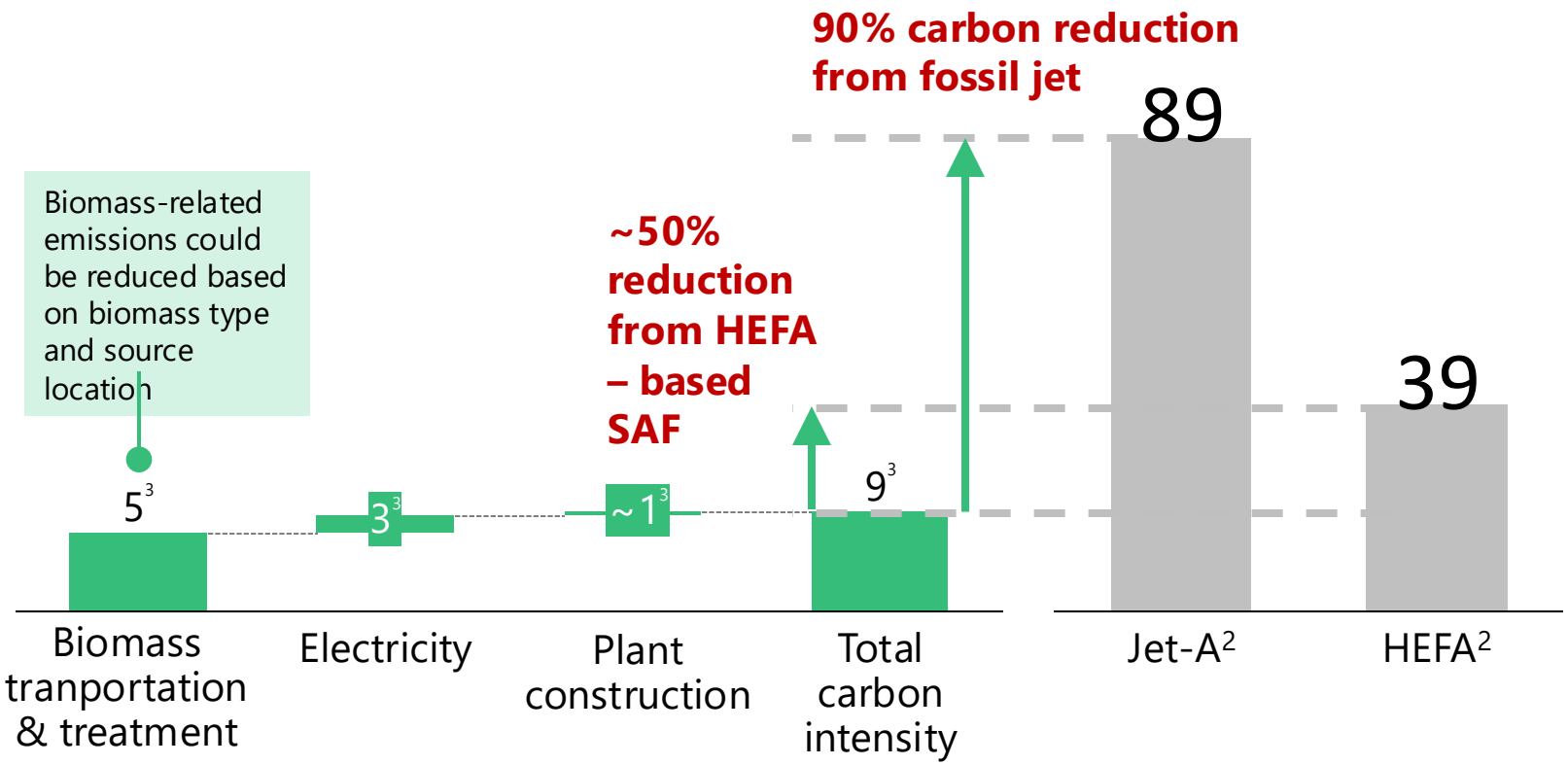
(1) Equivalent to 25,000 European flights (assuming average distance of 1,000 km)



Source: L'Union

Our technology reduces 90% of fossil jet fuel emissions

safnoca® carbon intensity[1] (g CO_2 / MJ SAF)



1. Carbon emission based on Paris-Vatry SAF project
2. Jet-A CI is global average according to Nature publication; HEFA CI is average of LCFS approved pathways
3. Indicative values, can vary according to biomass used and other technologies

Key takeaways

Safnoca® -produced SAF

- **90%+ reduction in SAF emissions vs. fossil jet fuel**
- **50% emissions reduction vs. SAF produced through HEFA**, the most prevalent SAF production pathway today

Haffner Energy's production process produces biogenic CO_2 that could be sequestered / utilized in e-SAF production

Thank you!

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