OxFA GmbH

From Biomass Residues to Formic Acid and Methanol: A New Pathway to Sustainable Chemicals

The OxFA-Process as key technology for sustainable C1 building blocks



Future of Biochemicals | Dr. Florian Kohler | 12.11.2026

OxFA Company Introduction


Matthias Schmidt (CEO)


Florian Kohler (CTO)

- Founded in 2015 in Schesslitz, Bavaria, technology spinoff from Friedrich-Alexander-University Erlangen-Nuremberg; Privately owned company
- OxFA experts have decades of experience in chemical engineering, chemistry, agriculture and business development
- R&D-Projects and partners (MeOH-RES project): Helmholtz Institute, FAU Erlangen-Nuremberg, LIKAT

OxFA GmbH

We are a **technology provider** addressing the growing supply gap for sustainable chemicals through a proprietary catalytic **biomass utilization technology**. Our platform enables the production of bio-based formic acid and sustainable methanol for a **sustainable transformation.**



Bavaria, Germany

Bavarian Ministry of Economic Affairs, Regional Development and Energy


Pilot Plant, Bavaria (Germany)

Green C1 – key for sustainable transformation



Today's chemistry is fossil

FA 1.1 mio t/a

Formic Acid only fossil based, exisiting bioFA demand[1]

&

MeOH 120 mio t/a

Methanol predominantly fossil-based (70% material use)



Tomorrow's shipping needs clean fuels

MeOH ~400 mio t/a

Sustainable methanol forecast 2050 for shipping fuel[2]



Tomorrow's aviation needs green MeOH

MeOH ~500 mio t/a

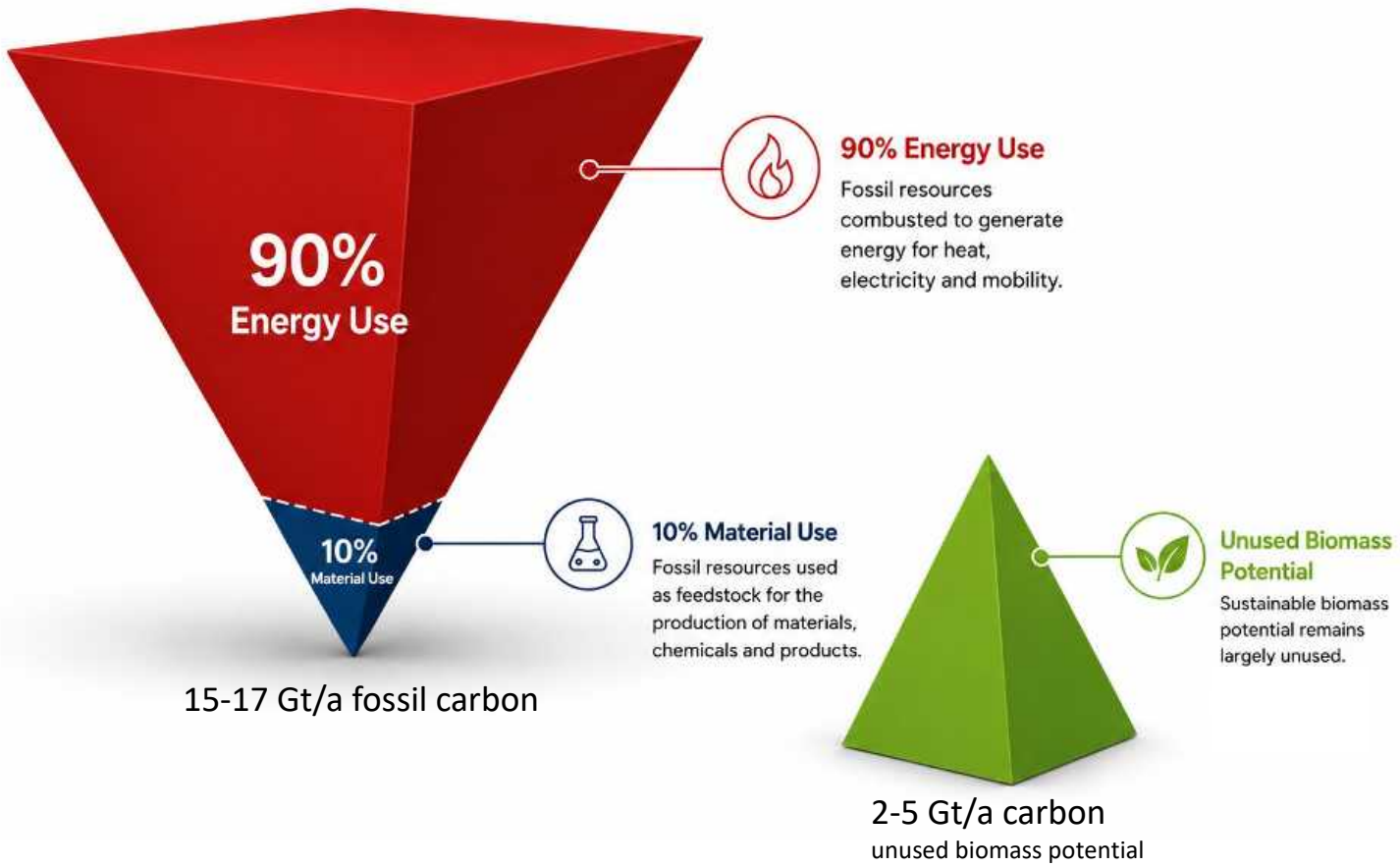
Sustainable methanol demand forecast for SAF production in 2045[3]

SAF totals 500 mio t/a with ~40% MtJ-processes
(2.5 ton MeOH demand per ton SAF)

The demand for biogenic, drop-in-capable molecules is established. The market will grow exponentially in the next ten years.

[1] Biobased Formic Acid Market Estimates from Mordor Intelligence [2]Green Methanol Makes a Splash in Quest for Net-Zero Shipping | BloombergNEF [3] New report identifies Methanol-to-Jet as a key accelerator

The Challenge: Industrial Bioeconomy at Scale



15-17 Gt/a fossil carbon

2-5 Gt/a carbon
unused biomass potential

< 0.3 % of chemicals in EU are based on biogenic carbon

Feedstock Variability

Classical biorefineris struggle with heterogeneous biomass streams and humid biomass

Low Selectivity

Direct conversion of complex molecules yields mixed products, high separation costs and low carbon efficiency

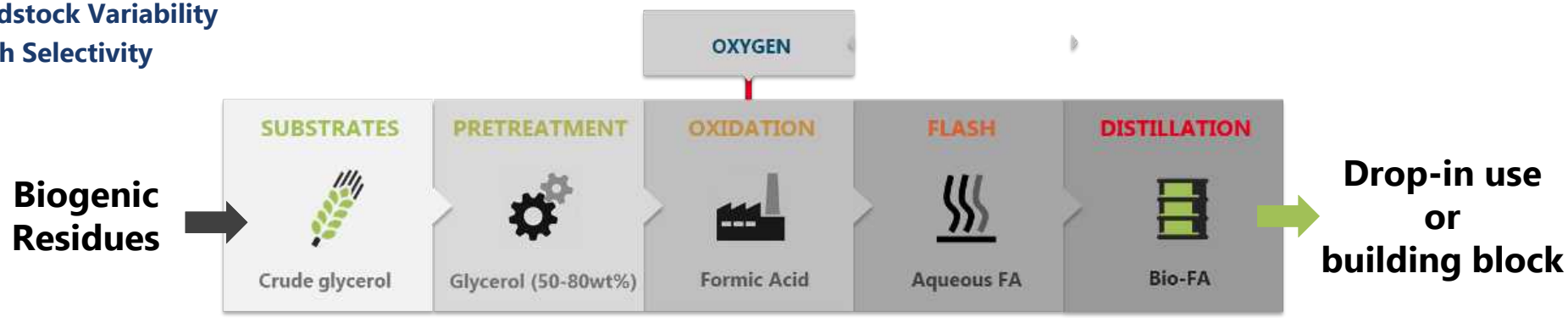
Infrastructure Gap

Novel bio-based processes lack compatibility with existing chemical infrastructure – high CAPEX hurdles. Scalability is challenging (hight T and or pressure).

The OxFA Process

Step 1: Selective Catalytic Biomass Oxidation

☑ **Feedstock Variability**
☑ **High Selectivity**



OxFA patented bioFA-Process converts e.g. crude glycerol / hemicellulotic hydrolysates to formic acid

Process conditions

- ✓ mild reaction parameters (90-150 °C, <8 bar)
- ✓ Simple separation, mainly CO_2 and CO as gas-phase by-products
- ✓ water as solvent
- ✓ residence time of several hours
- ✓ no sulphur in off gas

Proprietary Catalyst



- ✓ polyoxometallate as strong oxidant
- ✓ very high selectivity towards formic acid
- ✓ very high solubility in water
- ✓ noble metal free
- ✓ own production

OxFA: uniquely high yield · few by-products · easy separation for different biomass feedstocks

OxFA Process – Biomass Flexibility

OxFA Feedstock

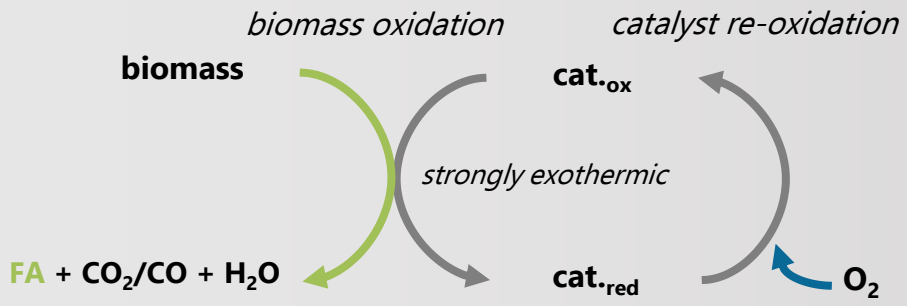


OxFA product (yield & crude quality)

One catalytic platform for diverse biomass streams

substrate	yield FA [kg_{FA}/kg_{DM}]
glycerine	**1.00**
sugars (C5,C6)	**0.80-0.90**
corn	**0.68**
wood	**0.58**
algea	**0.57**
wheat straw	**0.46**
bagasse	**0.45**

Catalytic cycle:



	OxFA	Conventional FA production
Heat demand	*300-600 kWh/t_{FA}*	*> 5000 kWh/t_{FA}*



Formic acid – much more than a commodity



Bio drop-in Alternative

Intermediate

100% biogenic carbon

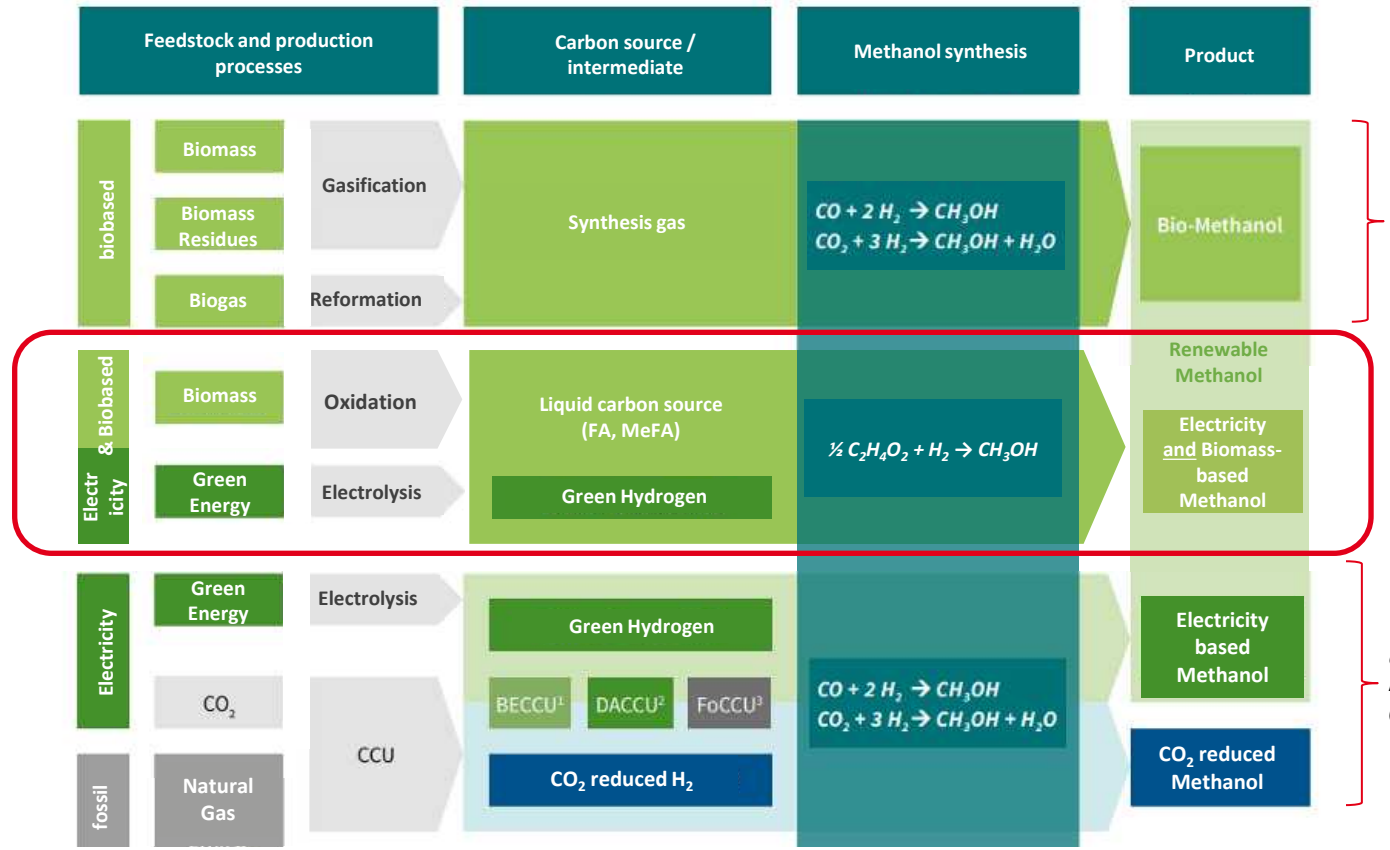
Transport & storage

Globally traded

Break down first – Build Later! FA as stable liquid C1 building block!

Process Route Comparison

Technologies for sustainable methanol (DENA Studies 2024)

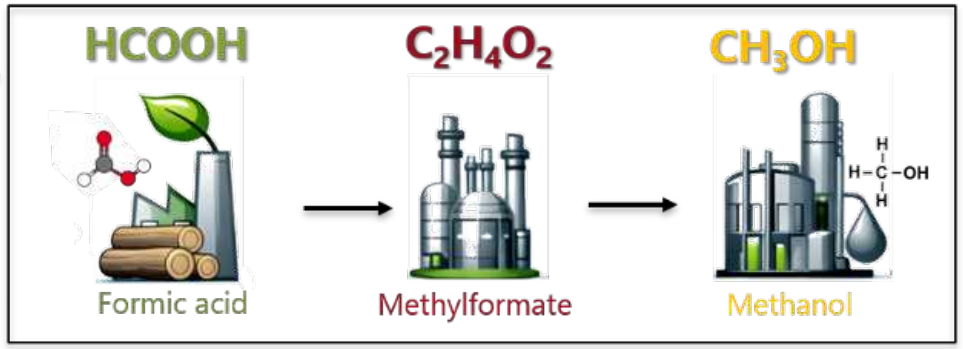


New production route for electricity based Bio-Methanol combining electricity usage and aqueous biomass utilization

The OxFA-MeOH Process

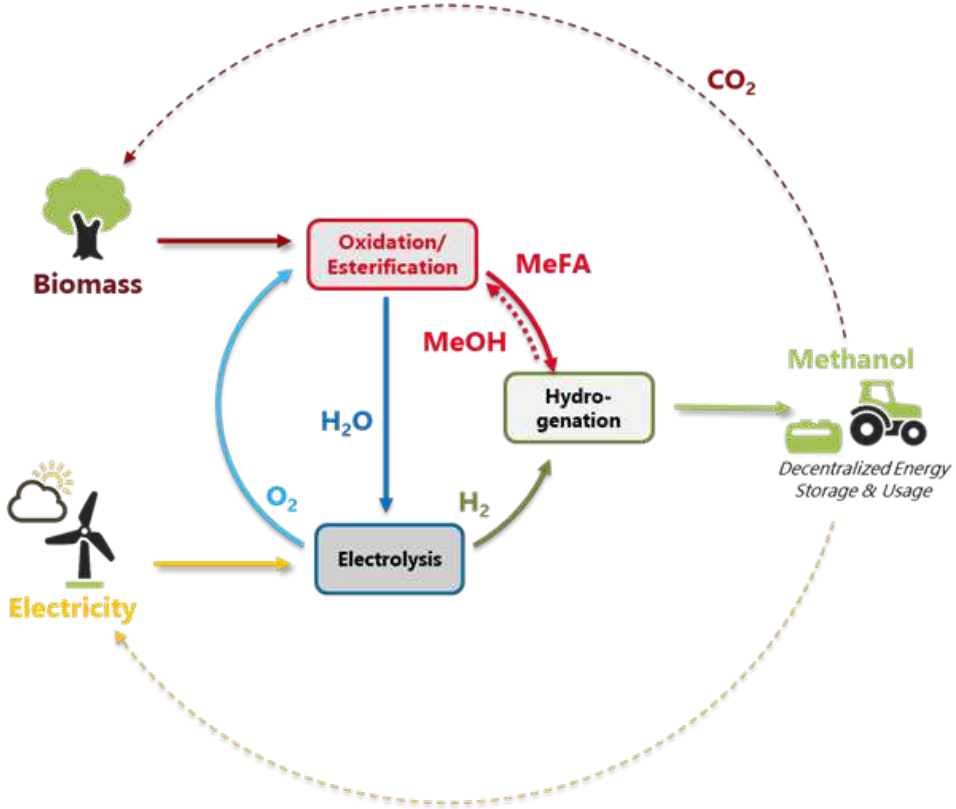
Step 2 & 3: Esterification and Catalytic Hydrogenation

☑ **Infrastructure Gap**



Process Conditions

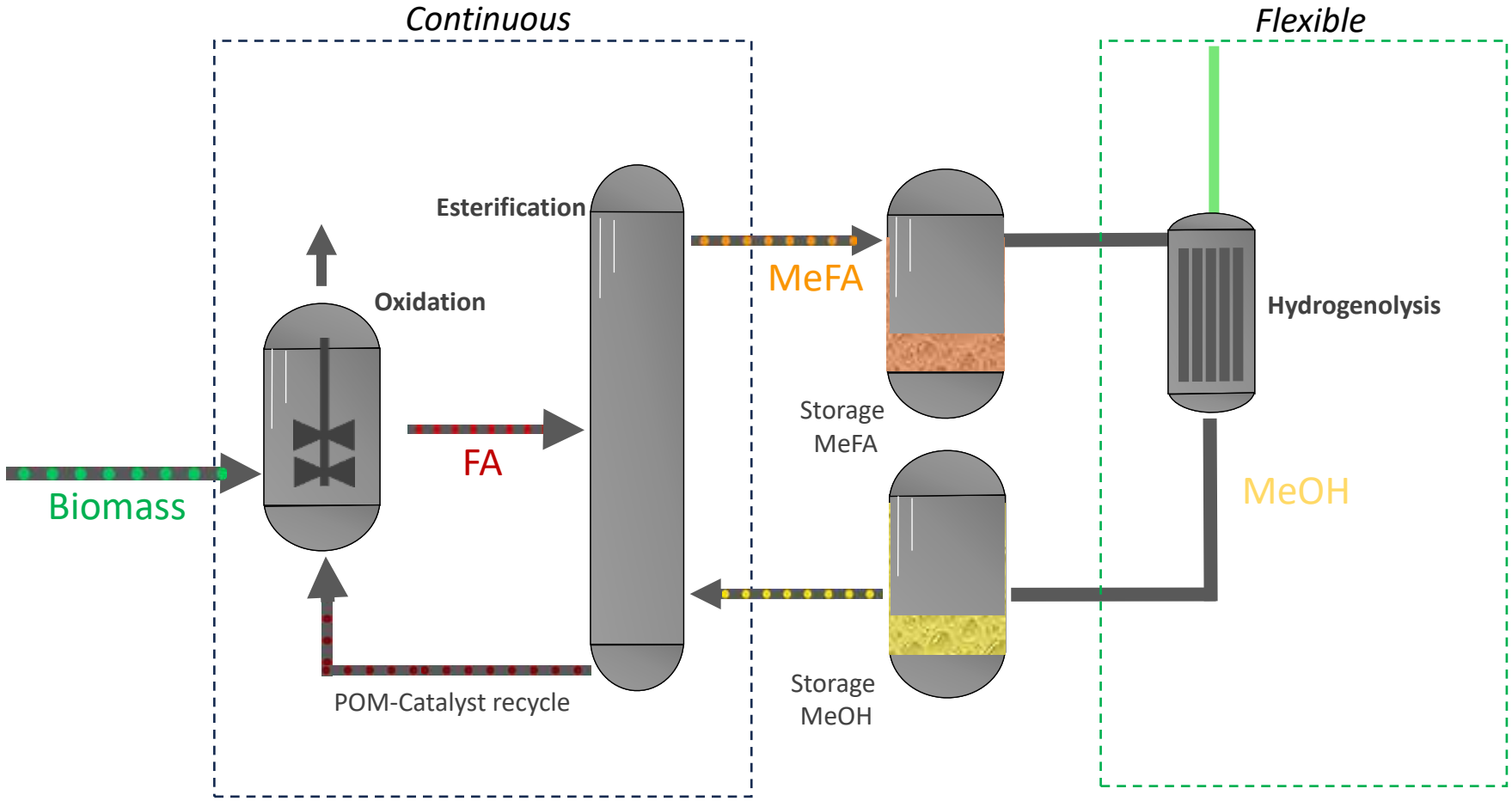
- ✓ **Lower H_2 demand 0.13 t_{H2}/t_{MeOH}**
- ✓ **Relatively mild reaction conditions**
- ✓ **<200 °C and < 20 bar**
- ✓ **High selectivity towards methanol**
- ✓ **Load-flexible integration of electrolyzer**
- ✓ **Synergetic use of H_2 & O_2**



Synergetic combination of oxidation and hydrogenation

Biomass becomes a scalable molecule factory — drop-in formic acid & methanol for established markets.

Load-Flexibility (no/low load operation)

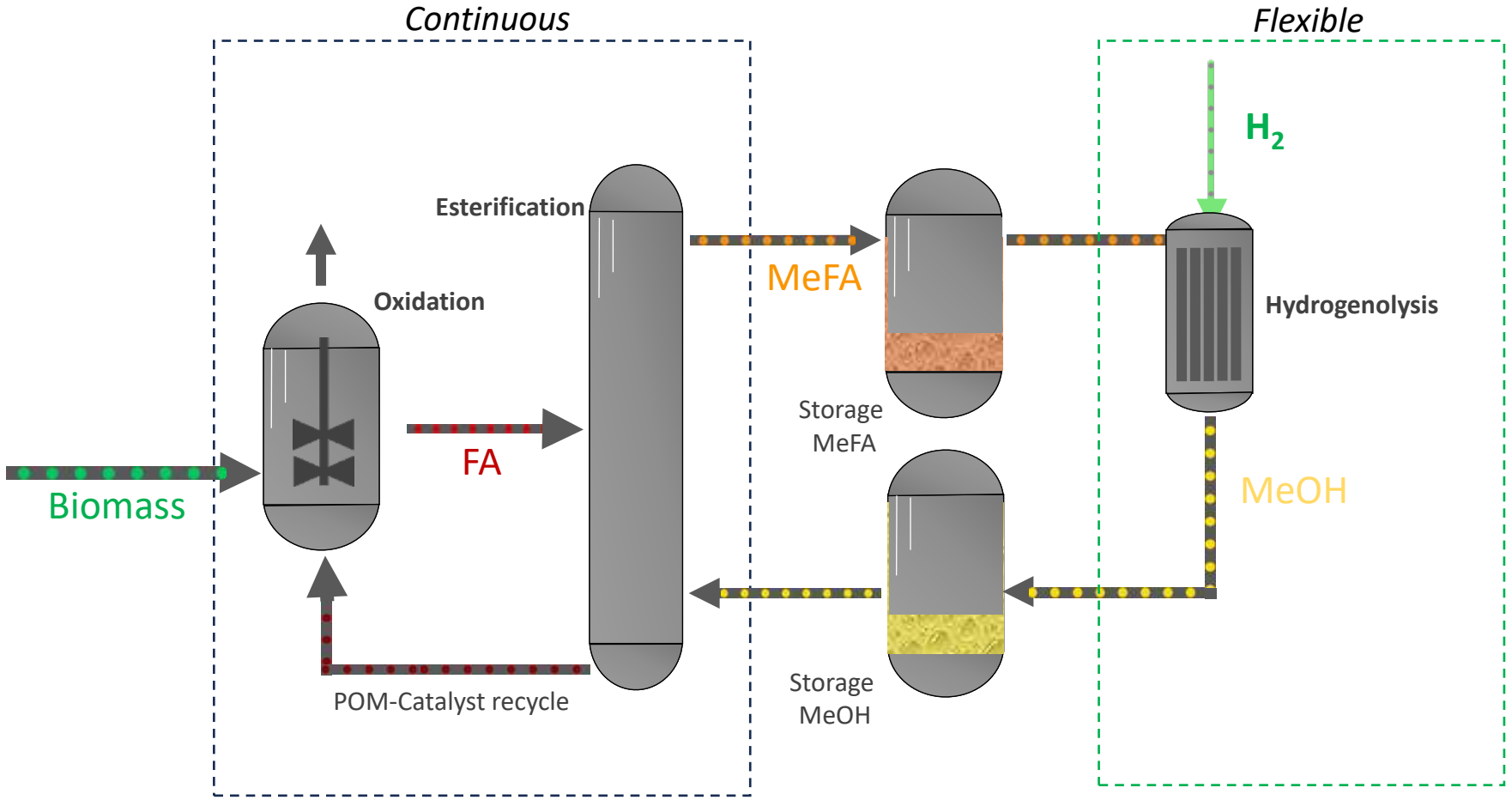


Flexible Operation /
no/low Load

- ✓ MeFA production and storage for high Load operation
- ✓ Stored Methanol used steady state production

Storage of liquid intermediate and product enables flexible production.

Load-Flexibility (high load operation)



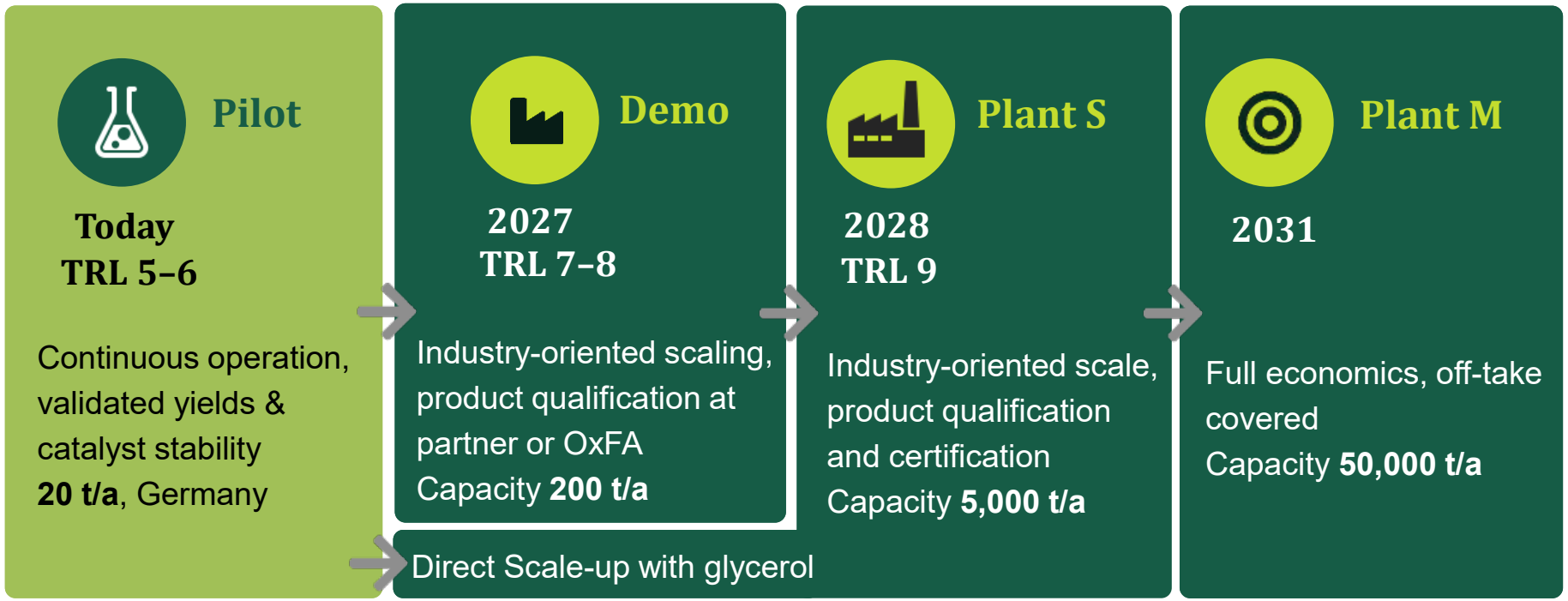
Flexible Operation /
High Load

- ✓ Electrolytic Hydrogen and stored MeFA used for methanol production
- ✓ Methanol produced in excess

Different feed rate of Methylformate at different loads.

Where are we right now

Scale-up from pilot to commercial replication



Targets until 2029:

- MeOH plant demonstration in Europe or Singapore
- Final Investment Decision for Plant S for FA in Europe
- FEED for commercial Plant M finalized



Summary

- ✓ The future bioeconomy needs renewable carbon, not only renewable energy.
- ✓ Validation with pilot plant: 2–3 kg FA/h | 1–2 kg MeOH/h
- ✓ Search for **strategic partners** for project realization/funding and commercialization partnership

Working together on a new way of thinking C_1-chemistry:
Sustainable. Innovative. Scalable

Many thanks for your attention!



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