

TerraX

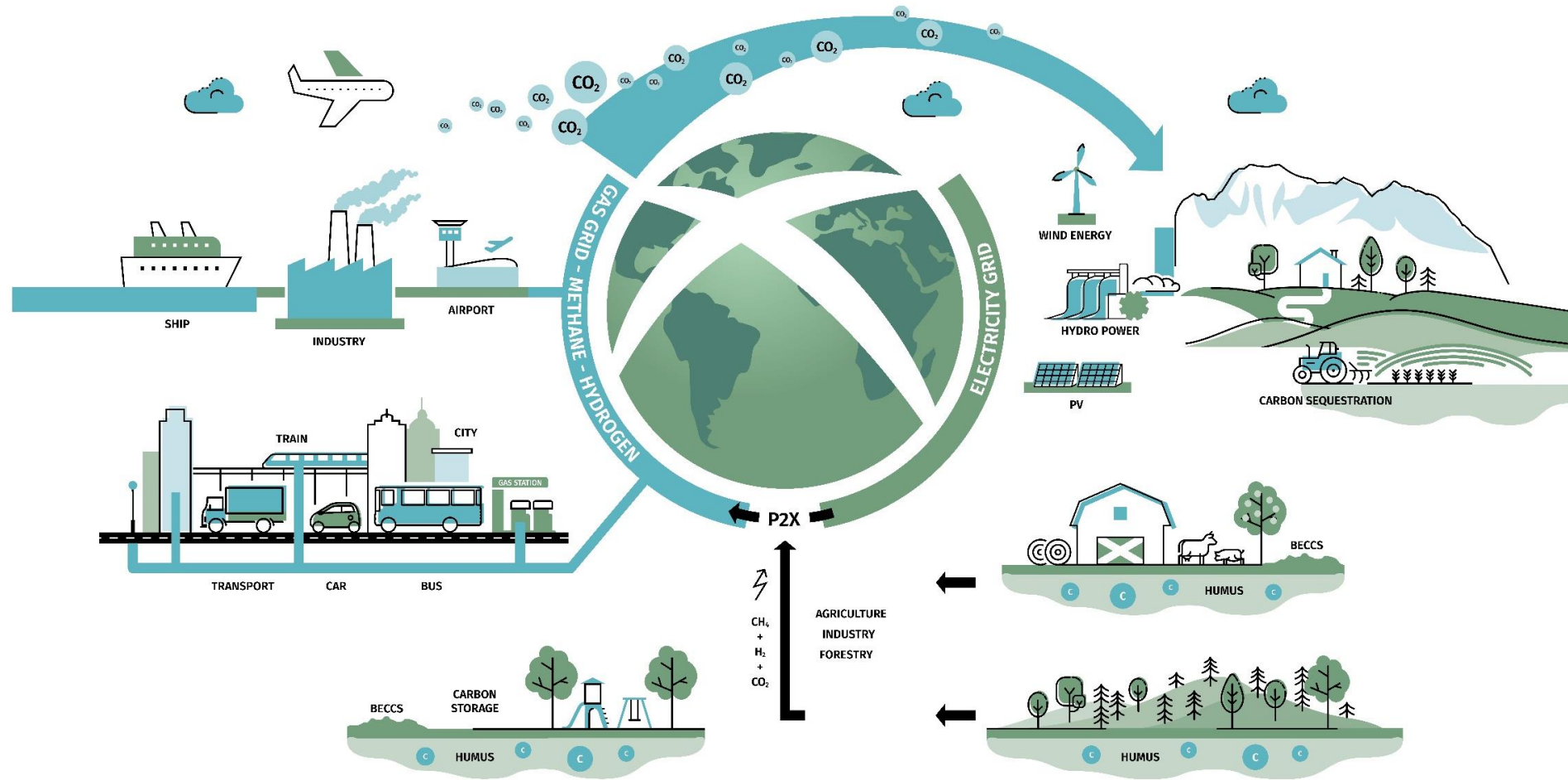
a new era

We guide the world in the transition
towards the use of renewable energy.

From the soil to the earth.



Vision & Mission



TerraX
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TerraX bio-H₂

Production of biogenic hydrogen
from sustainable biomass



Renewable H₂ for the Mobility Sector & beyond

Bio-H₂ Fuel Quality Characteristics:

- Fuel Cell Grade, 99.97% H₂ purity (3.7 grade) as of:

→ [DIN EN 17124:2022](#)

→ [UNI EN 17124:2022](#)

→ [ISO 14687:2019 Grade D](#)

→ [SAE J2719_201511](#)

*These standards specify the quality characteristics of hydrogen fuel dispensed at hydrogen refueling stations for use in proton exchange membrane (PEM) fuel cell vehicle systems, and the corresponding quality assurance considerations for ensuring uniformity of the hydrogen fuel.

Hydrogen Fuel Cell Quality Standard (ISO 14687:2019 Grade D)	
Specification	Value
Hydrogen Fuel Index (%)	99,97
Total Gases (ppmv)	300
Water (ppmv)	5
Total Hydrocarbons (ppmv)	2
Methane (ppmv)	100
Oxygen (ppmv)	5
Helium (ppmv)	300
Nitrogen and Argon (ppmv)	300
Carbon Dioxide (ppmv)	2
Carbon Monoxide (ppmv)	0,2
Total Sulfur Compounds (ppmv)	0,004
Formaldehyde (ppmv)	0,2
Formic Acid (ppmv)	0,2
Ammonia (ppmv)	0,1
Total Halogenated Compounds (ppmv)	0,05
Particulate Size (µm)	10
Particulate Concentration (µg/L)	1

TerraX R&D Office based at NOI Techpark BZ

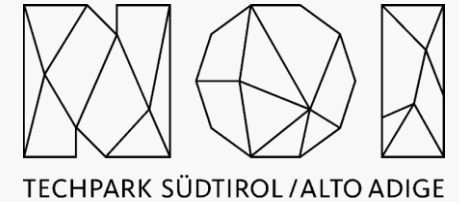
Main Focus – Bio-H₂ Development:

- Feasibility Studies
 - Woodgas to H₂ (closed)
 - Biogas to H₂ (closed)
- Experimental Development
- Project Development

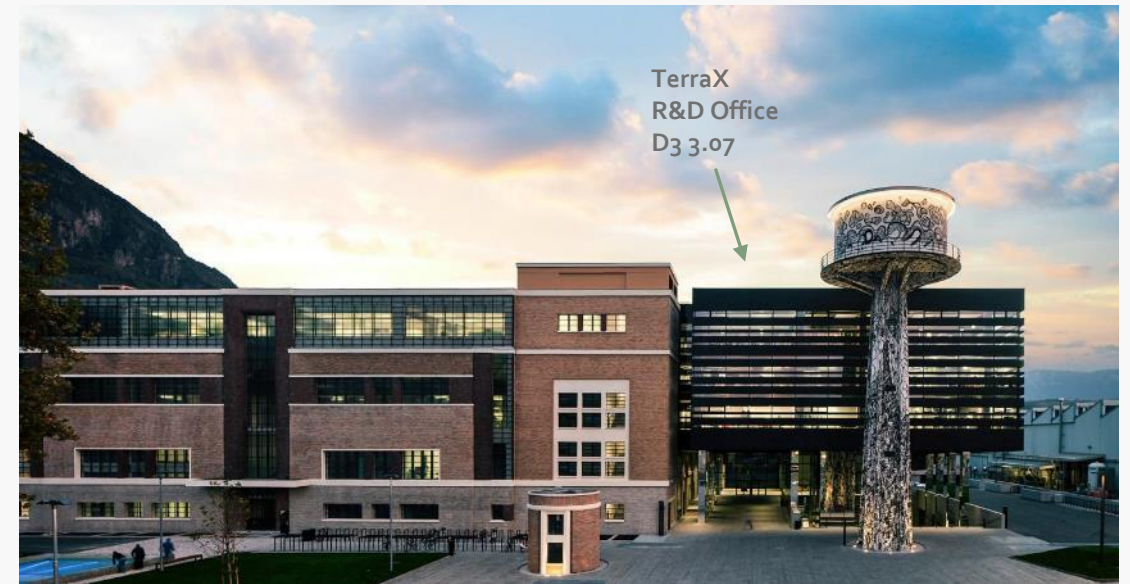


Zambaldi Philipp, M.Sc.
Project Development Hydrogen

R&D Office
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Via Alessandro Volta Straße, 13A
I-39100 Bolzano/Bozen (BZ)
South Tyrol-Alto Adige-Südtirol
ITALY



NOI Techpark BZ



Situation in South Tyrol

In 2014 the first H₂ distributor opened in Italy:

- H₂ Capacity of 360 kg/d

Green Mobility South Tyrol:

- **2014:** 2 buses in operation
- **2020:** 5 buses in operation
- **2022:** 12 (17) buses in operation
- **Future:** up to 180 (660) buses



Olympia 2026 South Tyrol

Biathlon at Anterselva:

- **When:** 06.02. – 22.02.2026
- **Where:** South Tyrol Arena Anterselva



Olympic Transport Plan:

- „The province of South Tyrol (together with the „Fondazione Milano Cortina 2026“) is responsible for implementing the „**Olympic transport plan**“. To ensure sustainable accessibility to the sports venues, the railway will act as the backbone of public mobility, while the last mile will be covered by environmentally friendly hydrogen shuttle buses.“
- „Purchase of **48 hydrogen-powered vehicles** to be used for the 2026 Milano-Cortina Olympic Games (city buses, intercity buses, shuttle buses, pick-ups, etc.).“

H2 Euregio Masterplan:

- „Planning and expansion of emission-free bus transport in the Dolomite regions and to the 2026 Olympic venues in Anterselva and Cortina d'Ampezzo.“



Brenner Green Corridor – South Tyrol

H₂ Refuelling Stations:

- Brunico Alperia: 800 kg/d
- Vipiteno A22: 1.000 kg/d
- Bolzano Sud A22/SASA/Alperia
- Merano SASA

H₂ Production Sites:

- Bolzano Sud: 2.500 kg/d – in autorizzazione
- Bolzano Nord: 2.000 kg/d – bloccato

Bio-H₂ Production Sites:

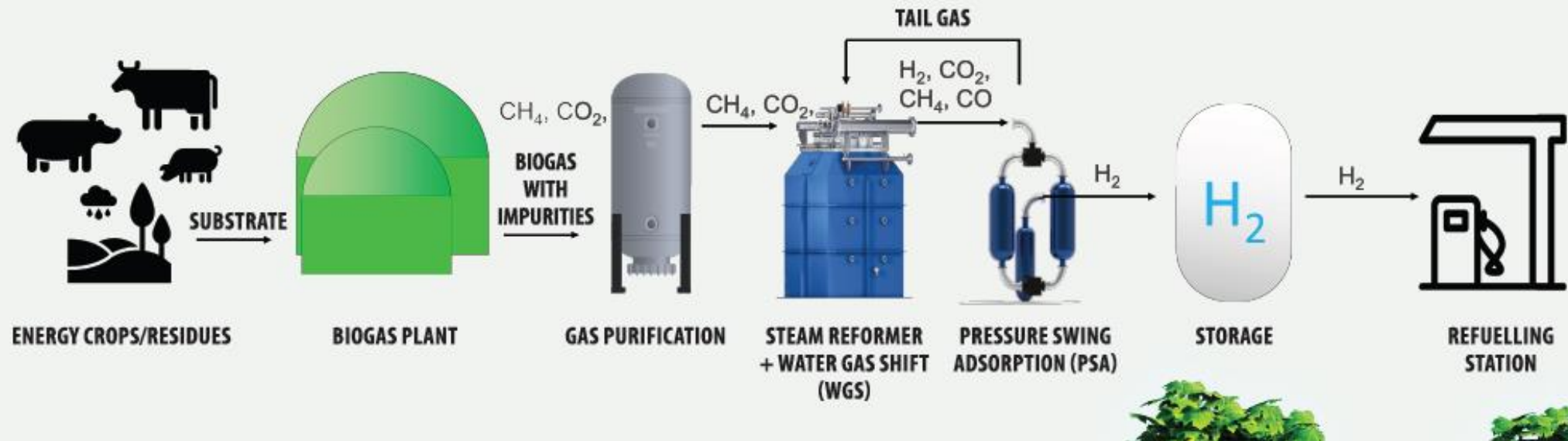
- Terento TerraX: 200 kg/d – authorized
- Sluderno TerraX: 400 kg/d – feasibility study



Biogenic Hydrogen Production from Biogas

Bio-H₂ via biogas reforming:

- **Biogas Reforming System** → 400 kg/d system – 160 t/a H₂
→ 200 kg/d system – 80 t/a H₂
→ 100 kg/d system – 40 t/a H₂
- **Principle with containerized solution:**



“Biowasserstoff Terenten” in Terento – South Tyrol

Bio-H₂ Reforming:

- **Biogas AD plant** → 200 kW_{el.eq.}
 - 200 kg/d bio-H₂ system
 - 80 t/a bio-H₂
 - 10 buses
 - 1.400 GLU

Feed-in tariff expired

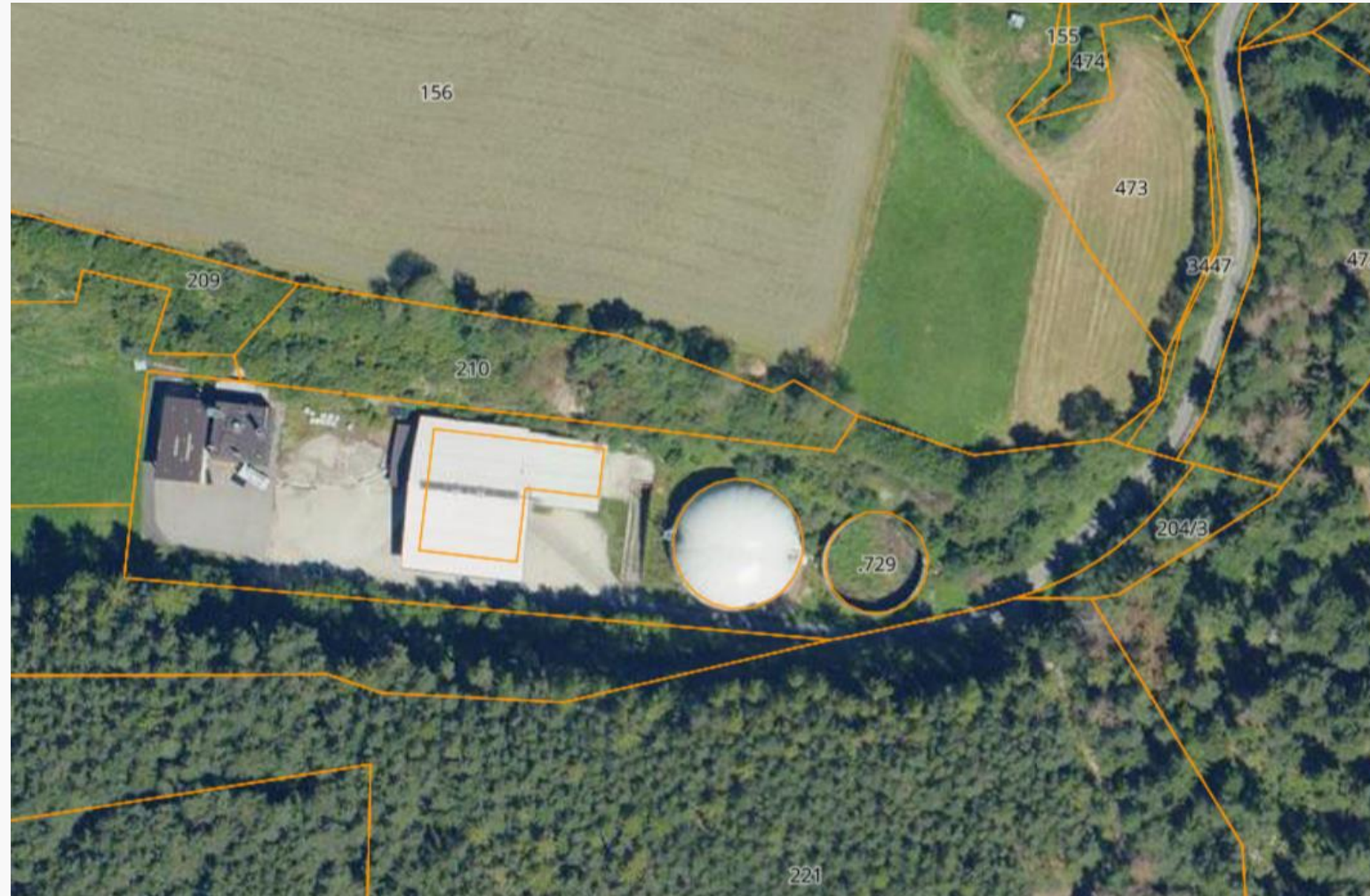
Revamping of existing small-size biogas plant

No possibility to gas grid connection



“Biowasserstoff Terenten” in Terento – South Tyrol

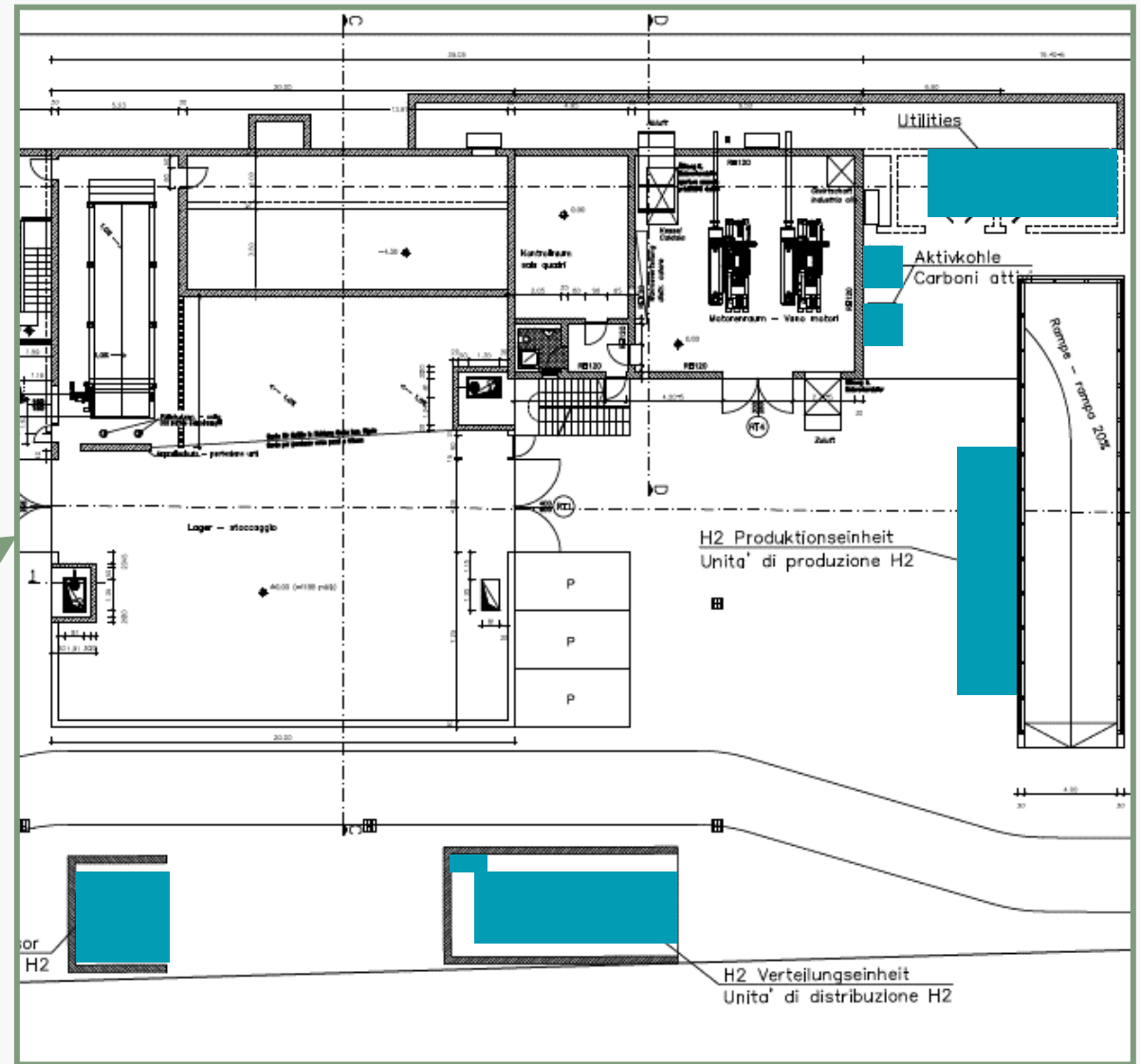
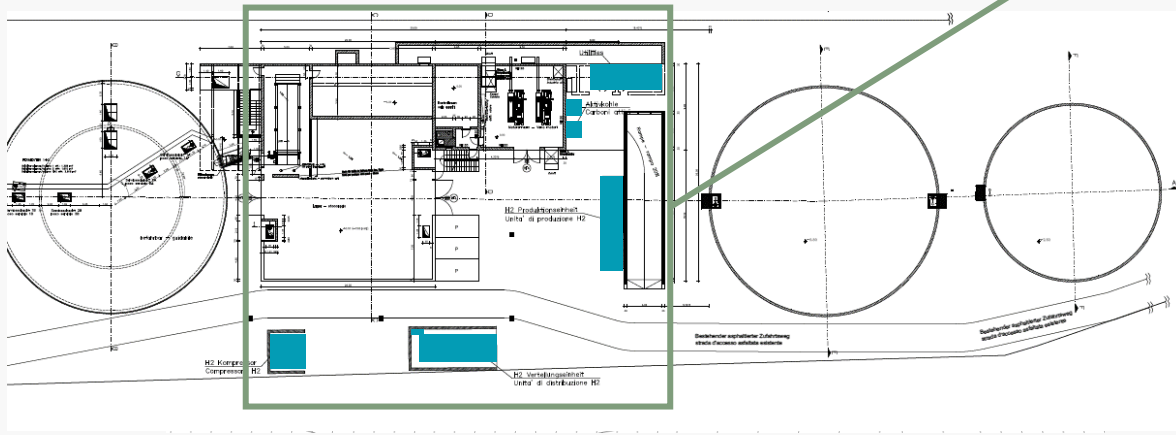
Plant Location:



“Biowasserstoff Terenten” in Terento – South Tyrol

Plant Design:

- Bio-H₂ Production Facility
- 300 bar bio-H₂ 20' Trailer Filling Station



“Biowasserstoff Terenten” in Terento – South Tyrol

CO₂-Balance:

- Net negative CO₂ Balance from bio-H₂ Production
- Neutralizing your fleet by partial substitution
- 4 H₂ Fuel Cell Buses neutralize additional 6 Diesel Buses



bio-H ₂ Production	
-19	kg CO ₂ /kg H ₂
-157	g CO ₂ /MJ H ₂
94	g CO ₂ /MJ Diesel
-251	g CO ₂ /MJ Difference to Diesel
-30	kg CO ₂ Difference to Diesel
-267%	GHG-Reduction to Diesel

Carbon Credits	
2	Counting
70	€/t CO ₂
-4,20	€/kg H ₂ Configurazione Base
-5,05	€/kg H ₂ Configurazione Rinnovabile

H ₂ Fuel Cell Bus		
Tank Capacity	37,5	kg
	5 x 312	L
Range	350	km
Bus Length	12	m
Consumption	10,7	kg/100km
CO ₂ Balance	-201	kg CO ₂

Diesel Bus		
Consumption	39	L/100km
	1.399	MJ
CO ₂ -Balance	131,5	kg CO ₂

“Biowasserstoff Terenten” in Terento – South Tyrol

CO₂-Balance:

- Net negative CO₂ Balance from bio-H₂ Production
- Neutralizing your fleet by partial substitution
- 3 H₂ Groomer neutralize additional 5 Diesel Groomer



bio-H ₂ Production	
-19	kg CO ₂ /kg H ₂
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Carbon Credits	
2	Counting
70	€/t CO ₂
-4,20	€/kg H ₂ Configurazione Base
-5,05	€/kg H ₂ Configurazione Rinnovabile

H ₂ Snow Groomer		
Tank Capacity	50	kg
Range	4	h
Operation	8	h/d
	5	months
	1.200	h/a
Consumption	100	kg/d
	12,5	kg/h
	15	t/a
CO ₂ -Balance	-235	kg CO ₂

Diesel Snow Groomer		
Consumption	41	l/h
	1.470	MJ
CO ₂ -Balance	138	kg CO ₂

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TerraX e-NG

**Biomethane production from
methanation of biogenic CO₂ and
green H₂**



Bioraffinerie Dell'Etna – Sicily

Bio-Methanation:

- **Biomethane Plant** → 500 Sm³/h bio-CH₄
→ 7.000 t/a bio-CO₂
- **Biomethanation Plant** → 500 Sm³/h bio-CH₄
→ 1 MW_{el.eq} Gasifier
→ < 10 MW_{el} EL

Adjacent to biomethane production facility.

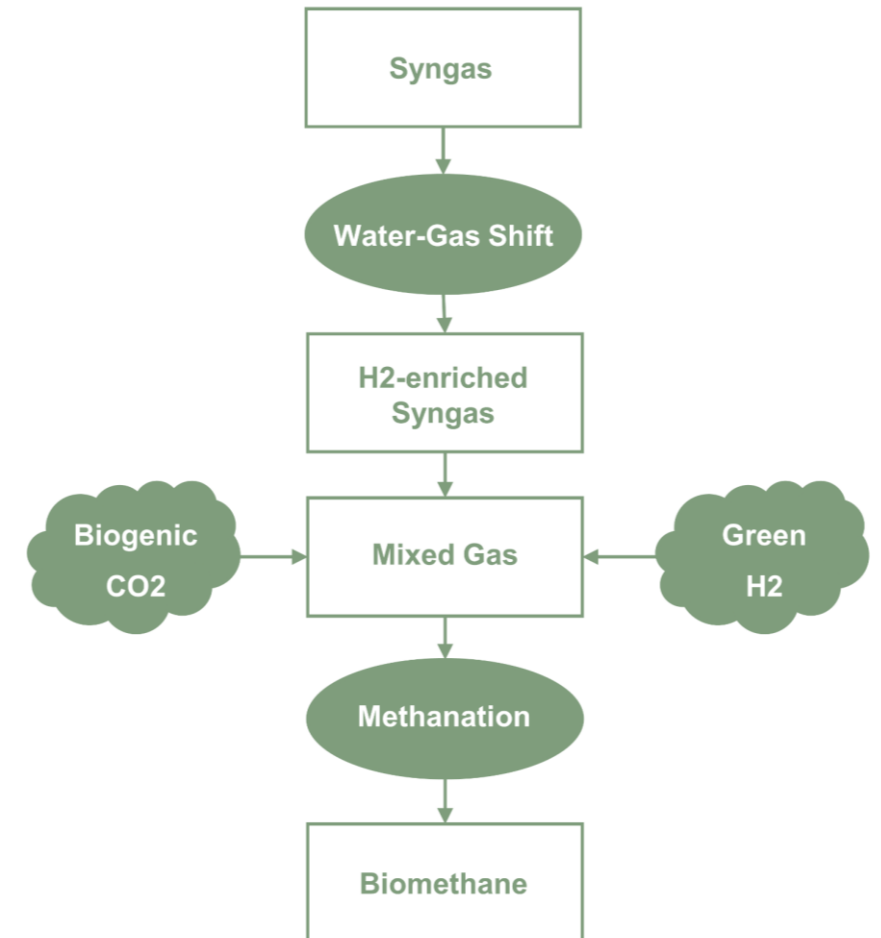
In combination with pelletisation system
for fertilizer production (44.000 t/a pellet).



Bioraffinerie Dell'Etna – Sicily

Bio-Methanation:

- **Plant Input** → 7.000 t/a bio-CO₂ from Biomethane Plant
→ 500 Nm³/h Syngas from Gasifier
→ 160 kg/h H₂ from Electrolyzer
- **Plant Output** → 500 Sm³/h Biomethane
→ 1.000 t/a Biochar
→ 175 kW_{el} autoconsumption syngas+methanation
→ 500 kW_{el} autoconsumption pelletizer



Thank you

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