

IDROGENO E INNOVAZIONE

Nuovi orizzonti di sostenibilità e
redditività nella Power Generation

Andrea Pivatello

3° Hydrogen Expo

11-09-2024

Piacenza , IT

JENBACHER



OGGI PARLEREMO DI

Settori emergenti che utilizzano H₂ per produrre energia

La tecnologia Jenbacher per un'alimentazione affidabile e un'impronta di carbonio ridotta

Applicazioni sostenibili e che generano redditività



H₂ APPLICATIONS FOR POWER GENERATION

First H₂ movers



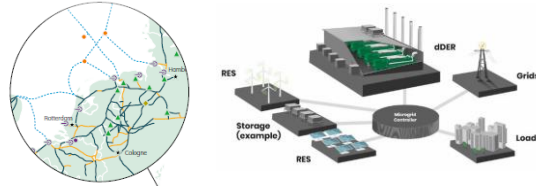
Highly developed H₂ infrastructure

Data center



Plant size: medium (1 to ~100 MW)
Operation: back-up
H₂ cons: low
H₂ supply: local storage

H₂-hub & microgrids



Plant size: medium (1 to ~50 MW)
Operation: balancing
H₂ cons: medium
H₂ supply: local storage/pipeline

RES balancing



Plant size: medium (1 to ~100 MW)
Operation: balancing
H₂ cons: low/medium
H₂ supply: pipeline

Industrial H₂



Plant size: small (1 to 100 MW)
Operation: onsite power
H₂ cons: medium
H₂ supply: from local processes

Islands



Plant size: small/medium (1 to 50 MW)
Operation: baseload/balancing
H₂ cons: medium
H₂ supply: local storage/pipeline

Flexible CHP



Plant size: medium (1 to ~200 MW)
Operation: balancing
H₂ cons: medium
H₂ supply: pipeline

PROVEN EXPERIENCE WITH HYDROGEN & HYDROGEN MIXTURES

90 projects installed with syngas/process gases in 28 countries



>95% H₂
as fuel

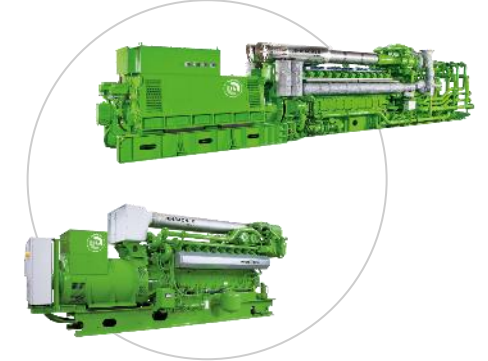
4 x 200,000 oph



CO₂
neutral



Traditional gas/
hydrogen mixture



Process gas (Austria)
COD 1996

Syngas (Japan)
COD 2003

Traditional gas (Argentina)
COD 2008

Pure hydrogen
2021+

H₂: ~15-17% (vol)
CH₄: ~1.5% (vol)
LHV: ~0.5 kWh/m³

H₂: ~30-40% (vol)
CO: ~25-30% (vol)
LHV: ~2.5 kWh/m³

H₂: ~0-42% (vol)
CH₄: ~100-58% (vol)
LHV: ~10-7 kWh/m³

H₂: ... 100% (vol)
Pipeline gas or inerts
LHV: ~3 kWh/m³

Commercial operation
(Challenges: gas quality variations)

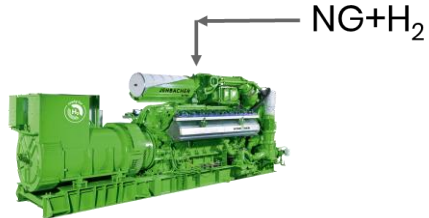
Future

Delivering more than 250 MW of power!

SELECTING THE RIGHT SOLUTION TODAY ... WITH FLEXIBILITY FOR THE FUTURE

Pipeline gas and H₂ CHP solutions

A



**100% NG plant,
Ready for H₂**

With CHP:
33% NG savings
33% CO₂ savings

1

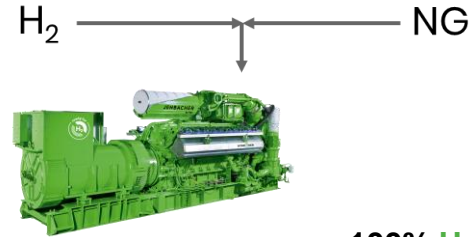


2

**100% NG plant, 25% (vol) H₂ in
NG, Ready for H₂**

With CHP:
>33% NG savings
>33% CO₂ savings

B



**100% NG plant, 60%
(vol) H₂ admixing,
Ready for H₂**

With CHP:
>33% NG savings
>33% CO₂ savings

3

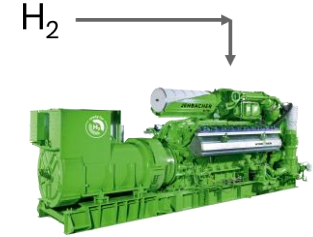


4

**100% NG plant,
100% H₂ optional (dual gas)**

With CHP:
>33% NG saving
>33% CO₂ saving

C



**100% H₂ plant,
100% NG back-up (dual gas)**

With CHP:
33% H₂ savings
100% CO₂ savings

5



6

H₂ plant

With CHP:
33% H₂ savings
100% CO₂ savings

H2 420 CONTAINER JENBACHER

1 MW electrical power output 100% Hydrogen



NORTH C DATACENTERS, EINDHOVEN, NL

First data center with H₂-Engines for emergency back-up power

NorthC Datacenters

Small scale regional DC in Netherlands, Germany, & Switzerland

15 local DCs, of which 10 are in Netherlands

Carbon neutral by 2030

DC Groningen (2022): first with standby H₂ fuel cell

DC Eindhoven (2023): first with 6 x Jenbacher JGC420 H₂-Engines

Going forward ... new and replacement standby power based on H₂

Datacenter Eindhoven – 6 H₂-Engines

6 MWe ... standby power based on **6 x Jenbacher JGC420 1 MWe H₂-Engines**

Replacing concept with multiple 1.5- 2 MWe standby diesel generators

Re-designing concept for UPS & cooling/chillers

Dual fuel H₂-Engines (pipeline gas as back-up fuel)

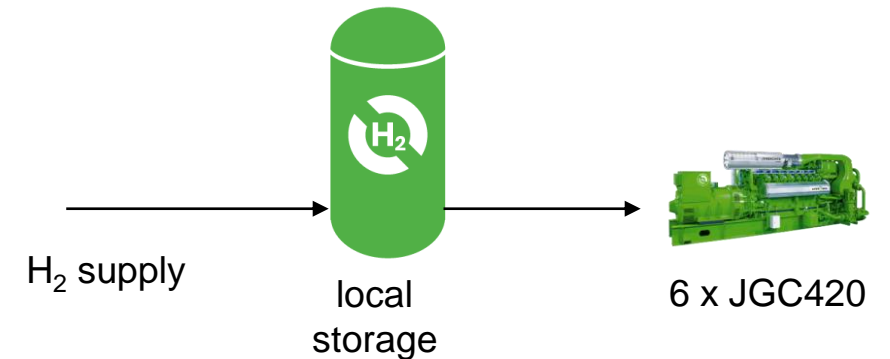
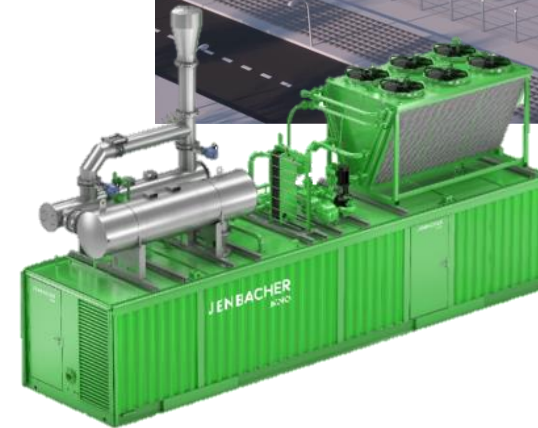
H₂ as main fuel from local H₂ storage until H₂ pipeline is available

Pipeline gas as back-up fuel in case of longer grid failures

<https://www.northcdatacenters.com/en/about-us/sustainable-data-centers/>

JENBACHER

Containerized solution for Jenbacher
Type 4 engines - example only for
illustration purposes



H₂ applications for distributed power
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RAG UNDERGROUND HYDROGEN STORAGE, AUT

First of its kind in Europe - world's first 100% hydrogen storage facility in a porous underground reservoir

Summer operation

- Solar PV overcapacity
- 2 MW electrolyzer for green H₂ production
- H₂ compression

Seasonal storage

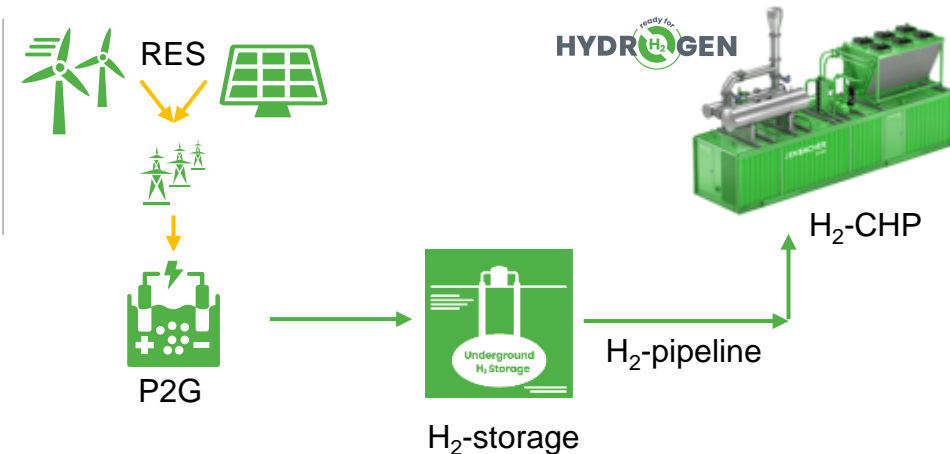
- 1.2 mio. Nm³ H₂ storage in modified NG storage
- Gas chromatograph at H₂ discharge
- 8 km H₂-pipeline from H₂-storage to CHP unit
- Up to 600 Nm³/h H₂-pipeline capacity

Winter operation

- J412 containerized CHP
- 530 kW electrical output and 550 kW heat output
- 100% H₂ and up to 40% NG / 60% H₂ mixture
- Commissioning date early 2024
- ~2,000 bis 4,000 oh/yr



Summer operation



Winter operation

WEBINAR GREEN HYDROGEN FOR E-MOBILITY WITH JENBACHER

16 ottobre 2024 ore 17.00 Online

START REQUIREMENTS

H₂ Production site

- PV field capacity
- Electrolyzer capacity
- BESS optimization
- H₂ compression and buffering

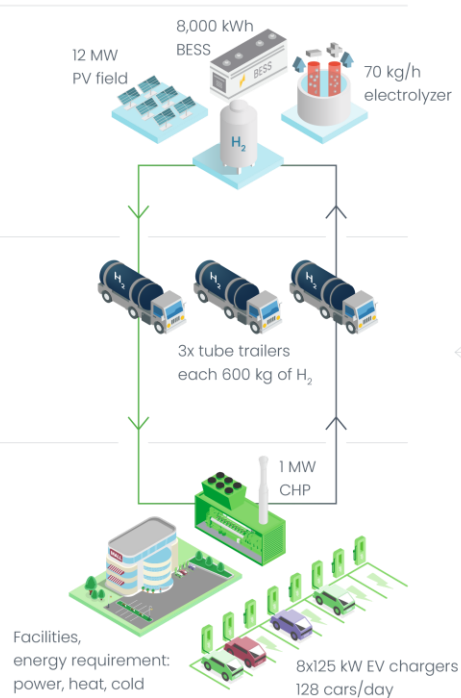
TECHNICAL FEASIBILITY

Virtual pipeline for H₂ supply

- H₂ tube trailers sizing
- Logistics evaluations and safety
- Depressurization station

H₂ Consumption site

- EV charging demand and station utilization modelling
- Fueling station heat and cold and power demand modelling
- CHP unit and absorption chiller
- Back up BESS
- Heat storage and peaking



VIABILITY

Financial and economic iterations

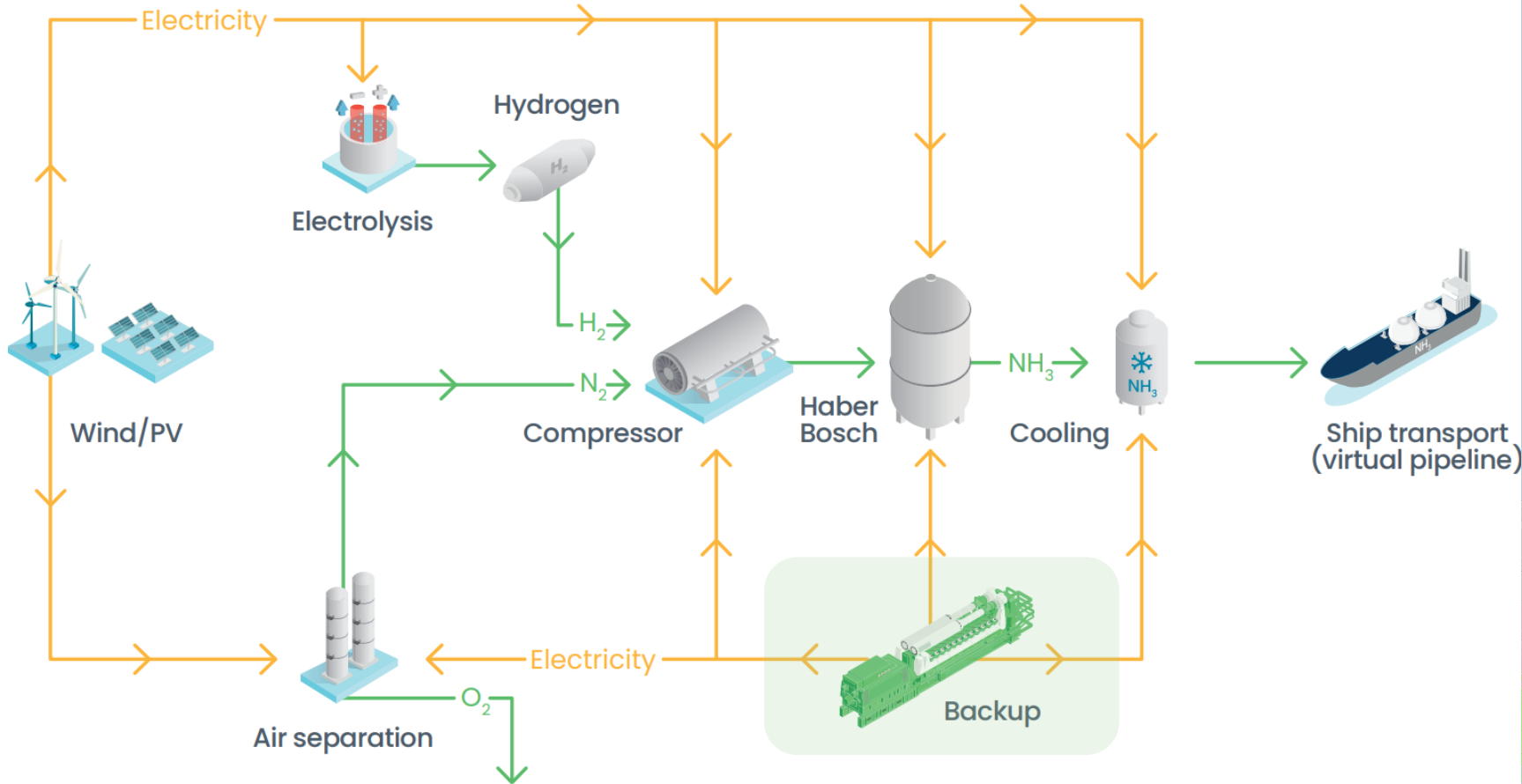
- LCOH optimization
- PV sizing and excess
- EE remuneration



Iscrizione gratuita

PRESENTAZIONE WHITEPAPER AMMONIACA VERDE

Hydrogen Expo Piacenza, 12 settembre 2024 - sala B - ore 10.00



INNIO Group is a leading energy solution and service provider that empowers industries and communities to make sustainable energy work today. With its Jenbacher and Waukesha product brands and its AI-powered myPlant digital platform, INNIO Group offers innovative solutions for the power generation and compression segments that help industries and communities generate and manage energy sustainably while navigating the fast-changing landscape of traditional and green energy sources. INNIO Group is individual in scope, but global in scale. With its flexible, scalable, and resilient energy solutions and services, INNIO Group enables its customers to manage the energy transition along the energy value chain wherever they are in their transition journey.

INNIO Group is headquartered in Jenbach (Austria), with other primary operations in Waukesha (Wisconsin, U.S.) and Welland (Ontario, Canada). Through a service network in more than 100 countries, a team of more than 4,000 experts provides life-cycle support to the more than 57,000 engines that INNIO Group has delivered globally.


INNIO Group's ESG strategy has been recognized and awarded by esteemed rating agencies such as Sustainalytics and EcoVadis. Additionally, the company's near-term climate targets until 2030 have been validated by the Science Based Targets initiative (SBTi).

For more information, visit INNIO's website at www.innio.com. Follow INNIO Group and its brands on [X](#) (formerly known as Twitter) and [LinkedIn](#).

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In general, "Ready for H2" Jenbacher units can be converted to operate on up to 100% hydrogen in the future. Details on the cost and timeline for a future conversion may vary and need to be clarified individually.

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JENBACHER

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ENERGY SOLUTIONS.
EVERYWHERE, EVERY TIME.



JENBACHER