FLEXIBLE CHP IN RENEWABLE ENERGY MARKET

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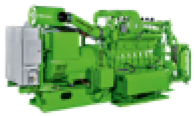
CONTINUOUS EVOLUTION IN INNOVATION MAKES SUSTAINABLE ENERGY WORK TODAY

Timeline

1957



1st Jenbacher genset

1979

Jenbacher combined heat & power module

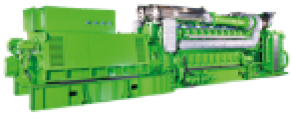
1985

Jenbacher LEANOX engine

1993

1st 20-cylinder engine, the J320

1997

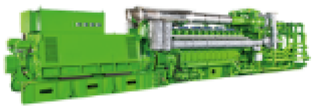


World's smallest 20-cylinder engine in the 3 MW power range, the J620

2007

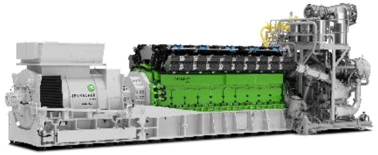
World's 1st 24-cylinder 4 MW engine, the J624

2010



World's 1st 2-stage Jenbacher engine

2013



1st Jenbacher engine to enter the large engine space, demonstrating **highest electrical** efficiency in its class, the **J920 FleXtra**

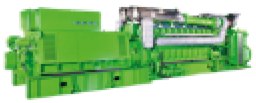
In 2015: 1st to break 50.1% electrical efficiency milestone in a test environment, the Type 9 engine platform

2015

myPlant developed by INNIO

myPlant scalable cloud-based IoT solution with thousands of connected engines

2019



Achieves full load in under 45 seconds, the **J620 fast-start engine**

2020

ready for H_2

World's 1st large-scale engine pilot plant in the 1 MW range that can be operated either with 100% conventional gas or with variable hydrogen mixtures up to 100% hydrogen

World's 1st 1 MW engine to begin hydrogen operation in the field

2024

Microgrid solutions integrating renewables and storage, including launch of first Jenbacher microgrid controller

More focus on fuelflex and opflex

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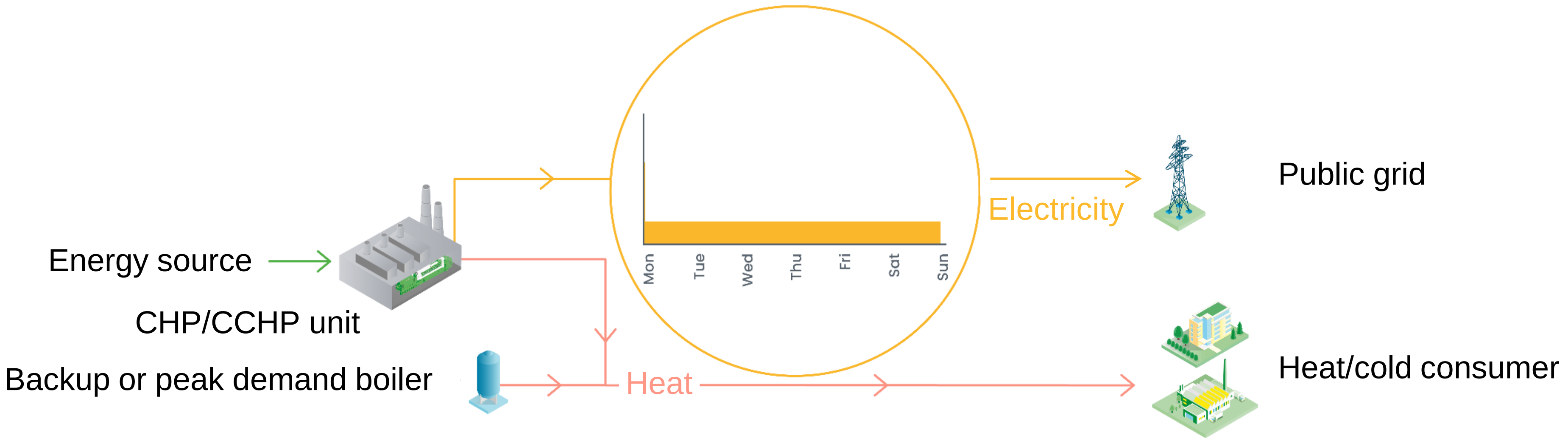
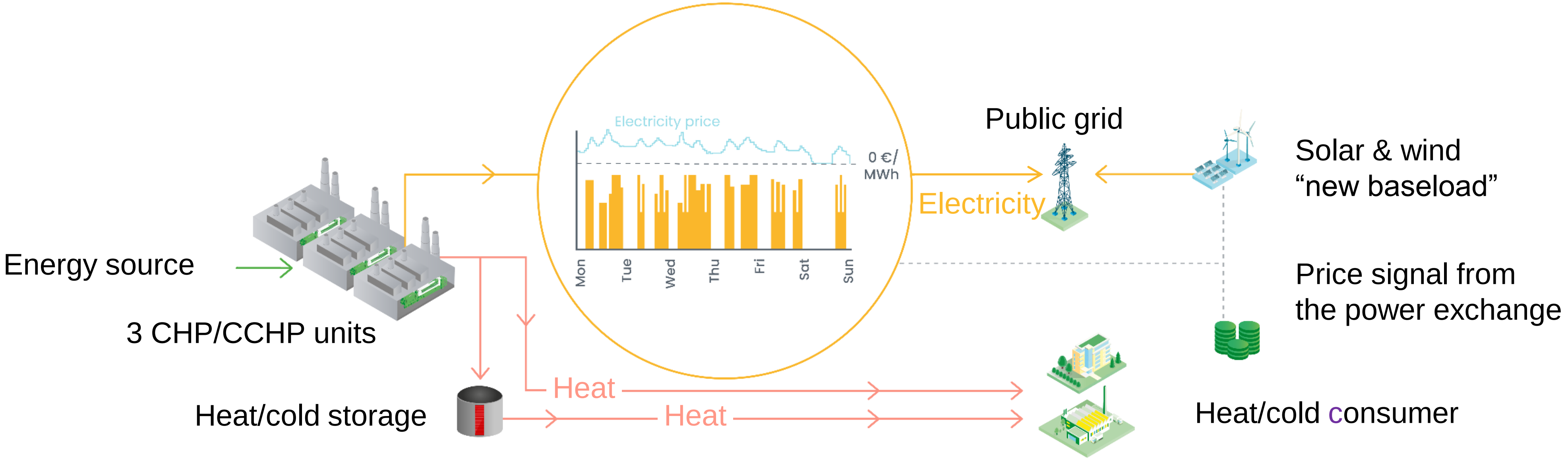
CHP AS BALANCING POWER PLANTS

Base load operations

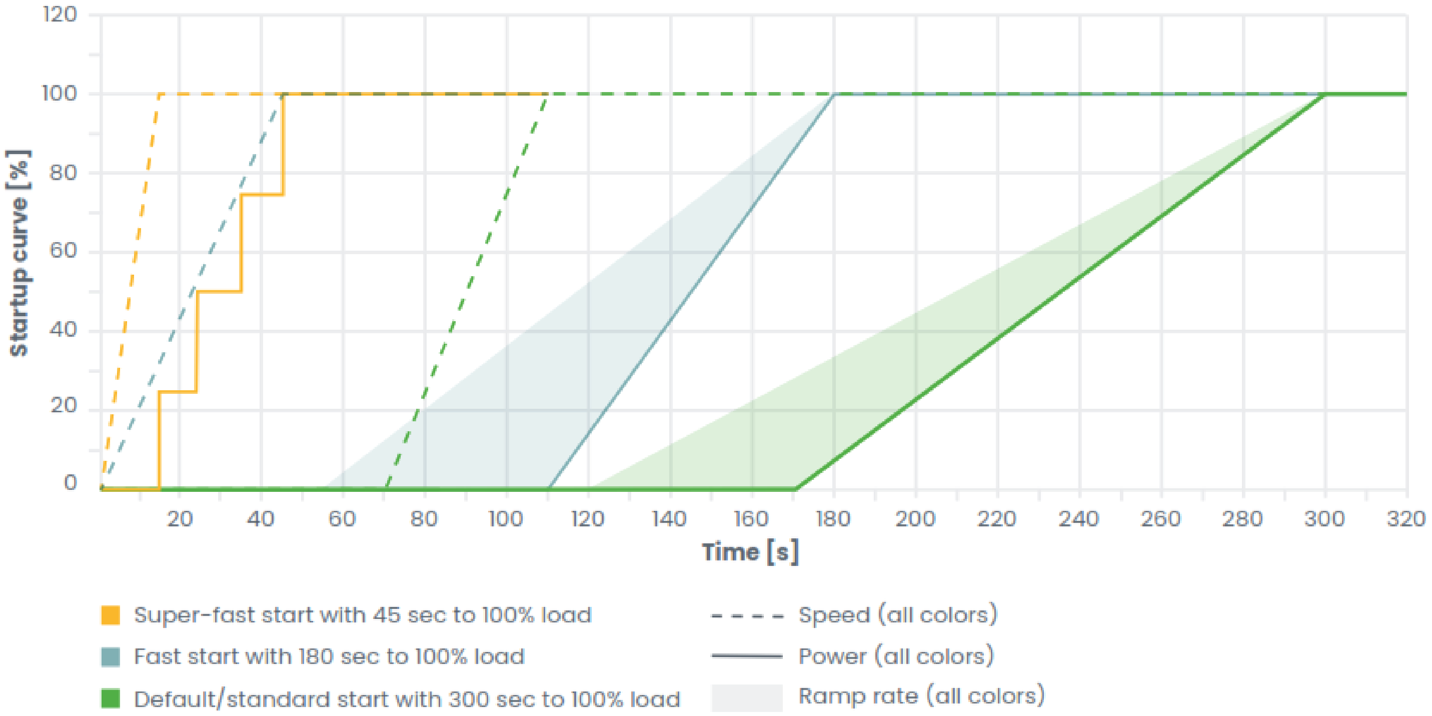


Highly flexible operations



ENGINE CAPABILITIES FOR GRID SUPPORT

Including ancillary service possibilities



Features

Broad bandwidth of different starting times

- 45 sec to 100% load - super-fast start
- 180 sec to 100% load - fast start with
- 300 sec to 100% load default/standard

Smart start feature to securely meet target times of 180 sec and 300 sec for all Type 6 engines

Fast starting engines let you provide ancillary services

TRANSITIONING TO 100% RENEWABLE GASES

The Jenbacher fleet

Today

45% ← EU → 55%

Nat. gas CHP

Biogas

Today‘s mix from fossil gas and renewable gases

Tomorrow

Biomethane or synthetic methane CHP

Biomethane & CO_2 usage

Hydrogen CHP/CCHP

Biogas (Flex-Biogas)

CO_2-neutral gases including biogas/biomethane & green hydrogen

MICROGRIDS

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INDUSTRY TRENDS

How microgrids deliver resilient, cost-effective power solutions

What is a microgrid?

- Small scale power generation and distribution systems, including various Distributed Energy Resources (DER), loads, and storage systems
- Can operate isolated or connected to main grid
- Typical size between 0.1 and 10 MW
- Focused on resilience and sustainable alternatives to the public grid

What is the value of lost load (VOLL) ?

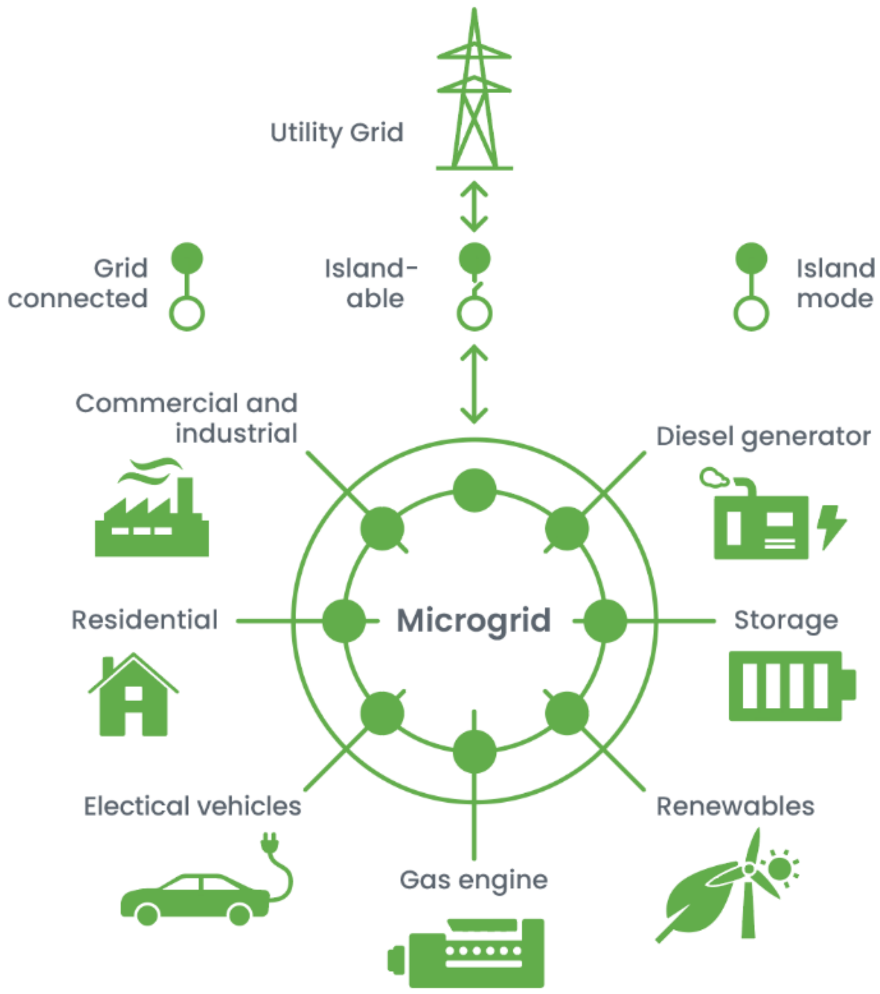
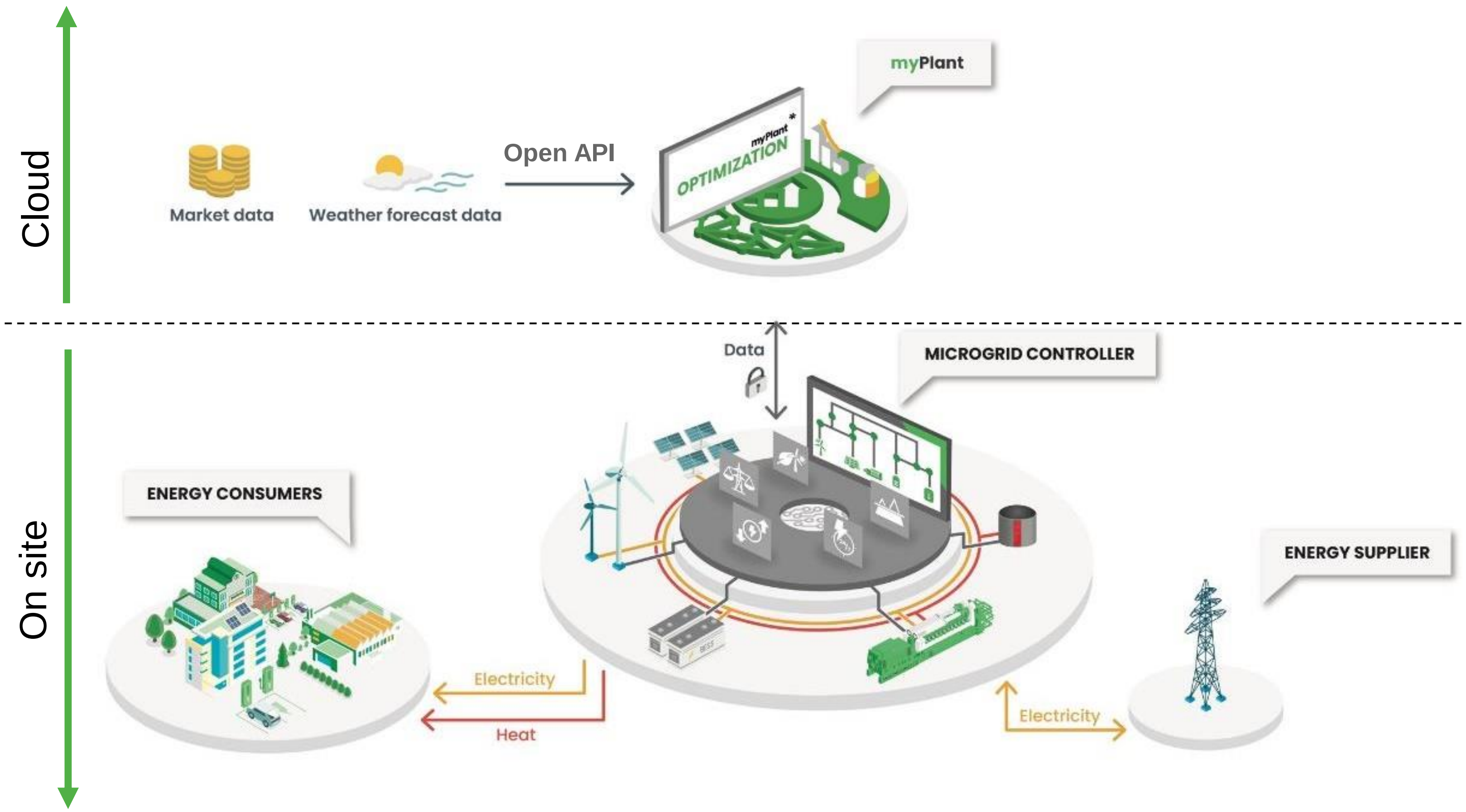


Illustration based on IRENA (2015)

OUR APPROACH

INNIO Group's Jenbacher microgrid controller and myPlant Optimization



myPlant Optimization ($$$)

- Artificial Intelligence (AI)-based energy management solution
- Precisely understands all the plant's operational requirements
- Optimizes operational efficiency & economics

Jenbacher microgrid controller

- Acts as the brain of the microgrid
- Enables safe, reliable operation
- Integrates a wide selection of DERs
- Increases renewable generation
- Maintains frequency & voltage in island mode
- Delivers black-start capability

*supported in selected countries

DANONE MICROGRID, SOUTH AFRICA
Making yogurt with power from a sustainable microgrid

- Empowering pathway to net zero by advancing renewables growth, energy resilience, and energy efficiency
- Power & Heat production via hydrogen ready CHP engines incl. heat storage and on-site solar power
- Plant managed by a **Jenbacher microgrid controller**
- Microgrid planned for commissioning in late 2024

2 x J616 CHP

5 MW, Energy source: Pipeline gas

Solar PV

Electrical: 1 MWp

4 x Diesel genset

(existing back-up)

Thermal Storage

75,000 liter

» With our frequent power supply outages, this microgrid solution will allow us to become independent from the grid, increase production uptime, and integrate various distributed energy resources including hydrogen, all while reducing our carbon footprint.«

Kid Nkantsu, Senior Director for Operations and Design to Deliver at Danone Sub-Saharan Africa

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.

In general, "Ready for H_2" 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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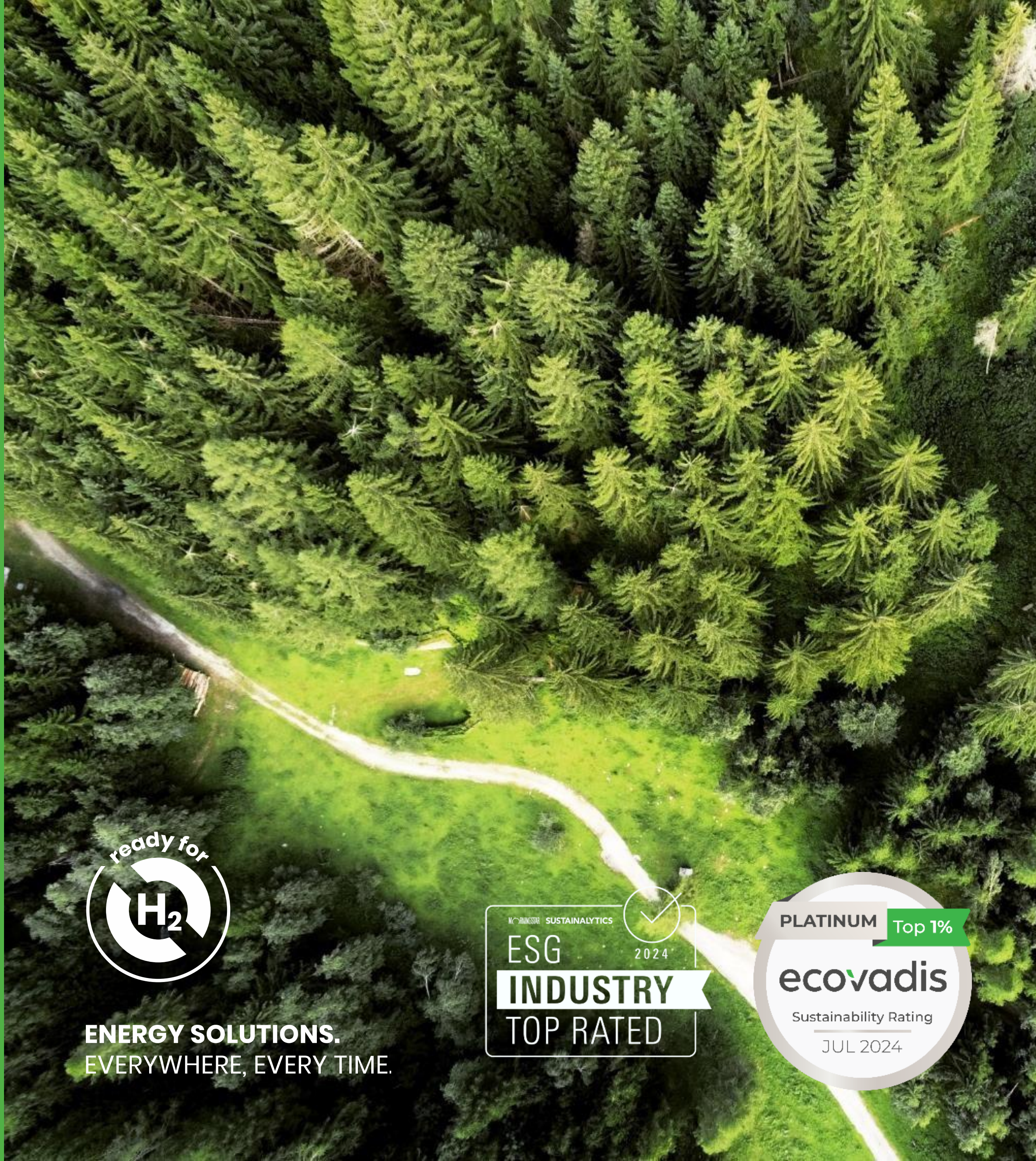
Jenbacher is part of the INNIO Group



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