

ClarkeEnergy®

Engineer - Install - Maintain

Supply Chain Opportunities & Industry Challenges

James Mitchell BEng(Hons)
Decarbonisation Engineer

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UK Market Segments Served



Gas Peaking



Grid-Scale BESS



H₂ Electrolysis



Microgrids

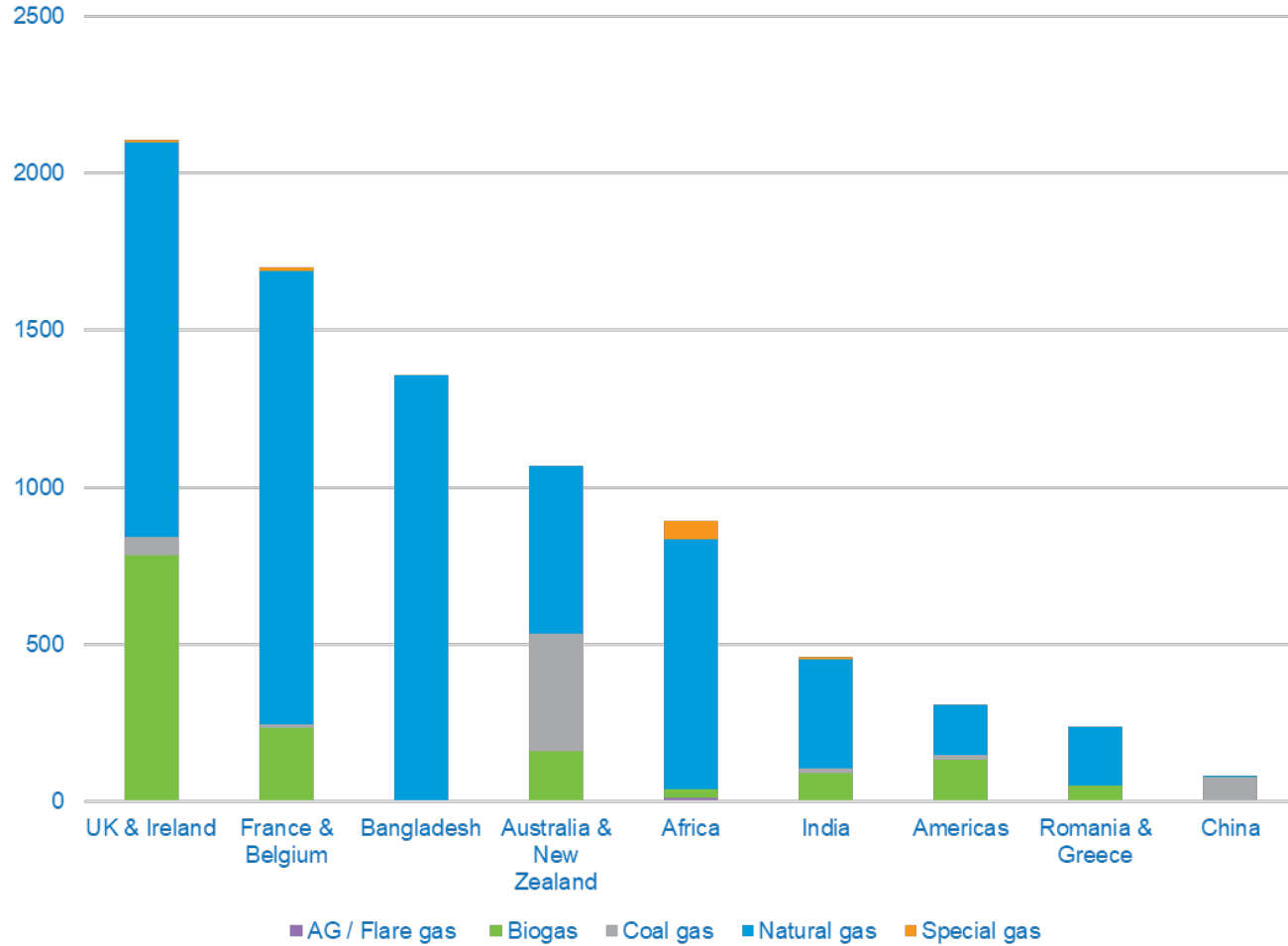


Data Centres



Green Gases

Our Global Installed Fleet



Risks to the H₂ Economy

If we are to deliver 10GW of H₂ by 2030, we need to get moving

Political

Whilst government are supporting the HAR process, it's taking far too long for successful projects to reach FID

The LCHA needs to be signed quicker to show intent

Planning

Site selection is integral to a successful project

Planners are unfamiliar with the technology and might be more apprehensive with approvals

Should HAR projects be classed as Critical Infrastructure to help move forward?

Performance

In a relatively new area, understanding the performance and contractual/commercial landscape is key

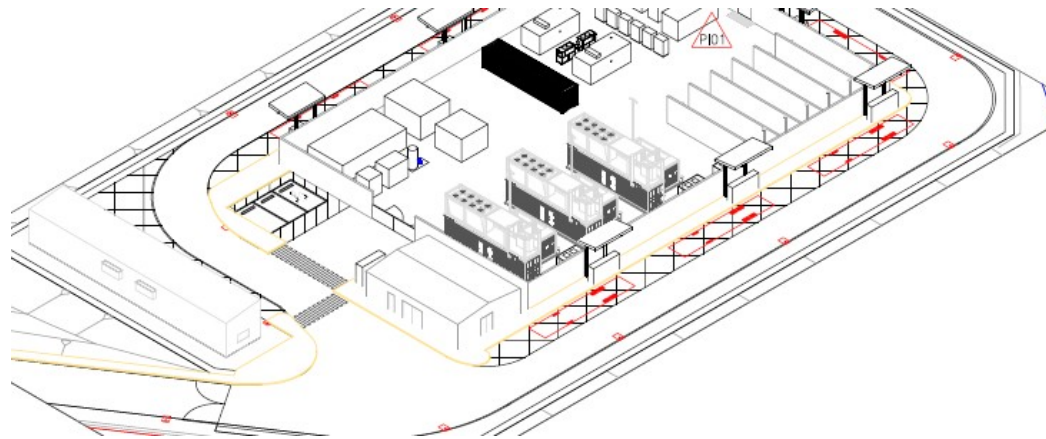
Expectations between developers and suppliers need to be aligned



HAR1 Project Client 1



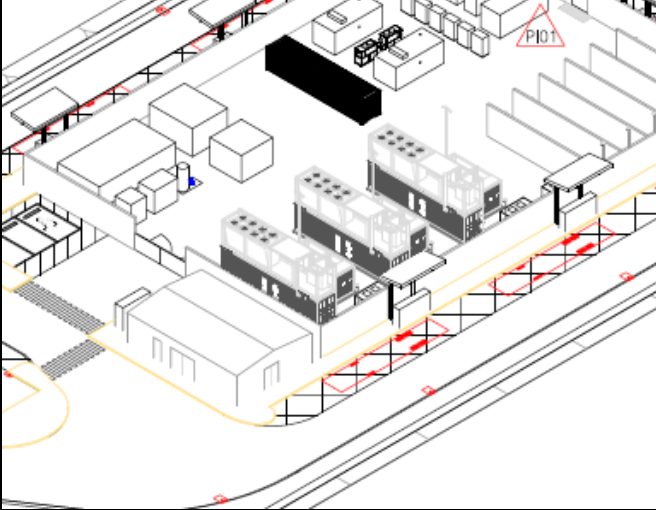
**7.5MW
Electrolysis
Early-Works
Design
Package**



Scope of the early-works included

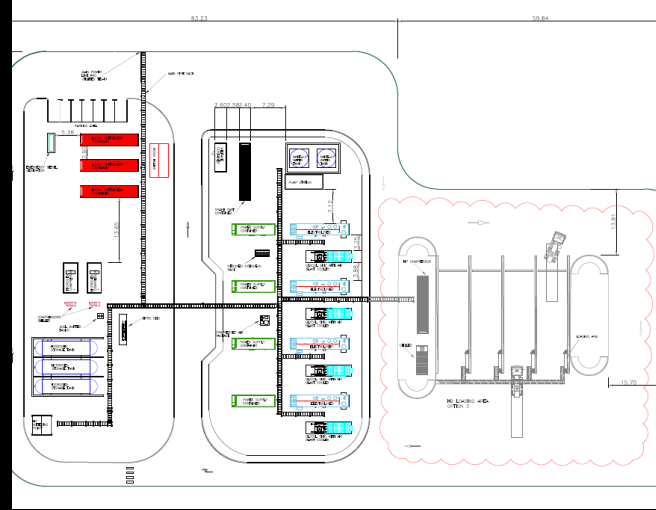
- **Equipment Specification**
- **Site Studies (Electrical / Civils / Hazard / etc.)**
- **Construction Plan**
- **Performance Guarantees**
- **Firm Price Proposal**

Early-Works Contracts



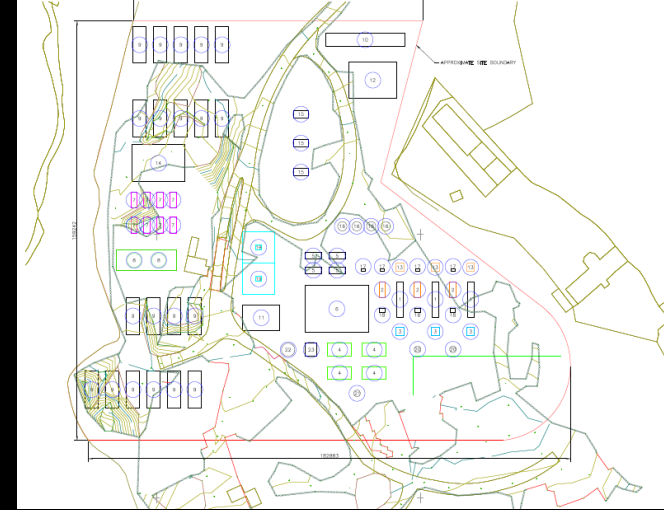
HAR1 Project – Client 1

- 6 Month two stage early-works design for a 7.5MW hydrogen electrolyser
- EPC Scope – Full Wrap



HAR1 Project – Client 2

- 6 month two stage early-works design for a 7.5MW hydrogen electrolyser
- EPC Scope - BoP



HAR2 Project – Client 1

- first stage design for a 30MW hydrogen electrolyser
- EPC Scope BoP / Full Wrap

Early-Works Design Benefits



Helps to de-risk project delivery

Only way to firm-up projects costs

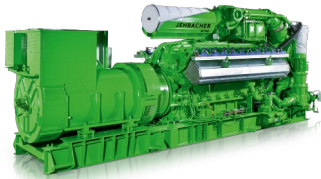
Our approach considers constructability and maintainability from the outset

We are an EPC delivery business though... so need projects at the end of the process!

Jenbacher H₂ Gas Engine Categorisation

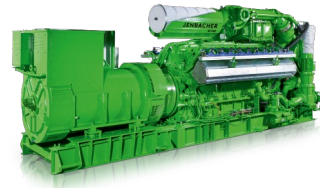
A

H₂ in natural gas pipeline



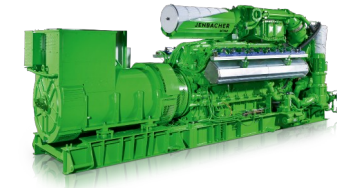
B

H₂ local admixing



C

Pure H₂



A-1: Low H₂ blending

Optimised for natural gas
<5% H₂ (v/v)

A-2: Medium H₂ blending

Broad product
5-25% H₂ (v/v)

B-1: Special gas engine B-2: Natural gas / H₂ engine

Operational optimised
up to ~60% H₂ (v/v)

Dual gas engine to 100% (v/v)
Natural gas / H₂

C: H₂ engine

Hydrogen engine (H₂)
100% H₂ (v/v)

Conventional natural gas + H₂ fuel mixture boosted system

H₂ fuel injection system

Available for existing
versions

Available for existing
versions

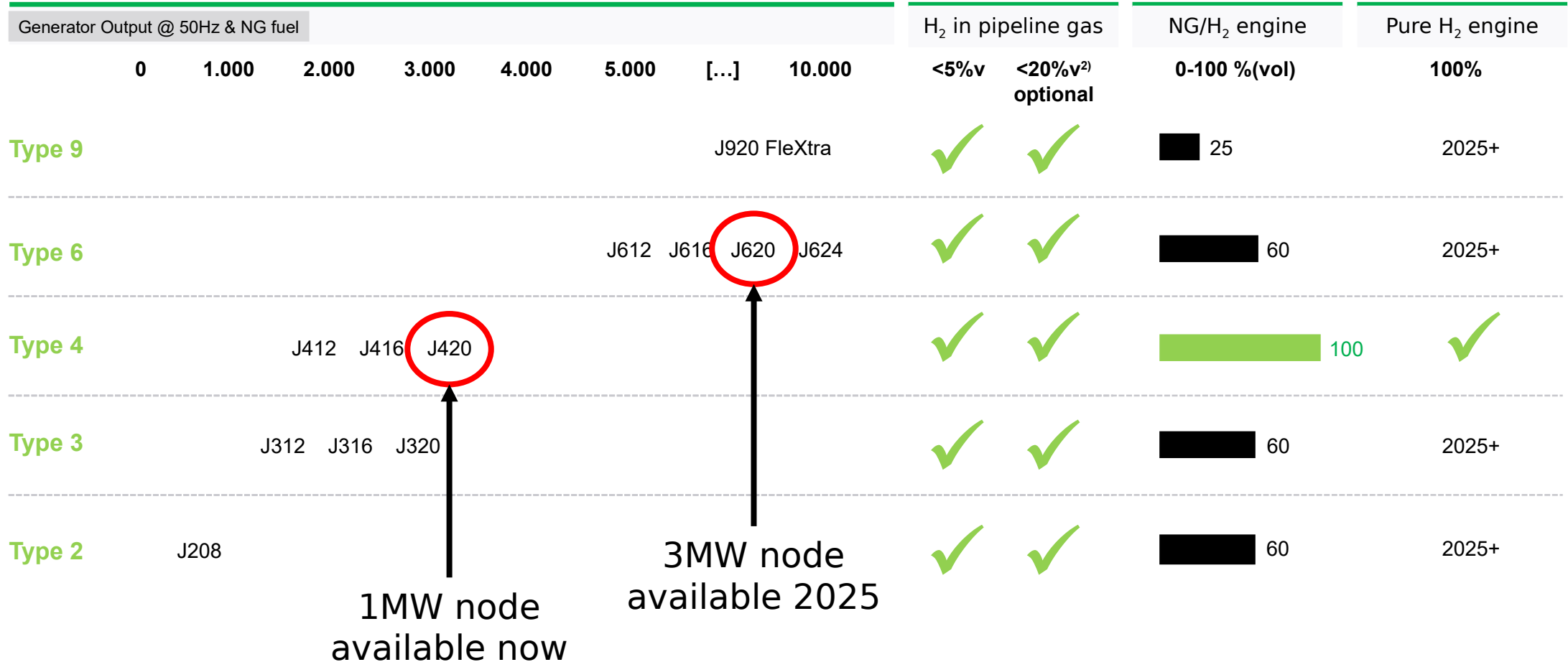
Available for existing
versions

Special release engines
available

Special release engines
available

Jenbacher Product Portfolio

Electrical Output (kW_e)



NorthC Datacentre, Eindhoven

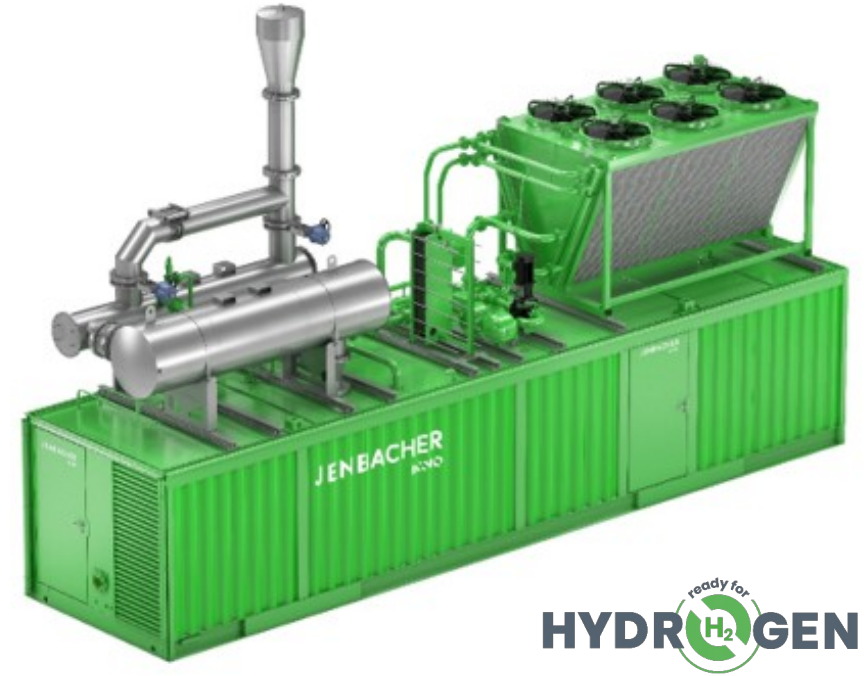
Regional colocation data centre in Netherlands

Green-certified electricity from the grid when available, with back-up H₂ gen sets

6 x 1MW_e Innio Jenbacher Gas Engines

Dual-fuel capability:

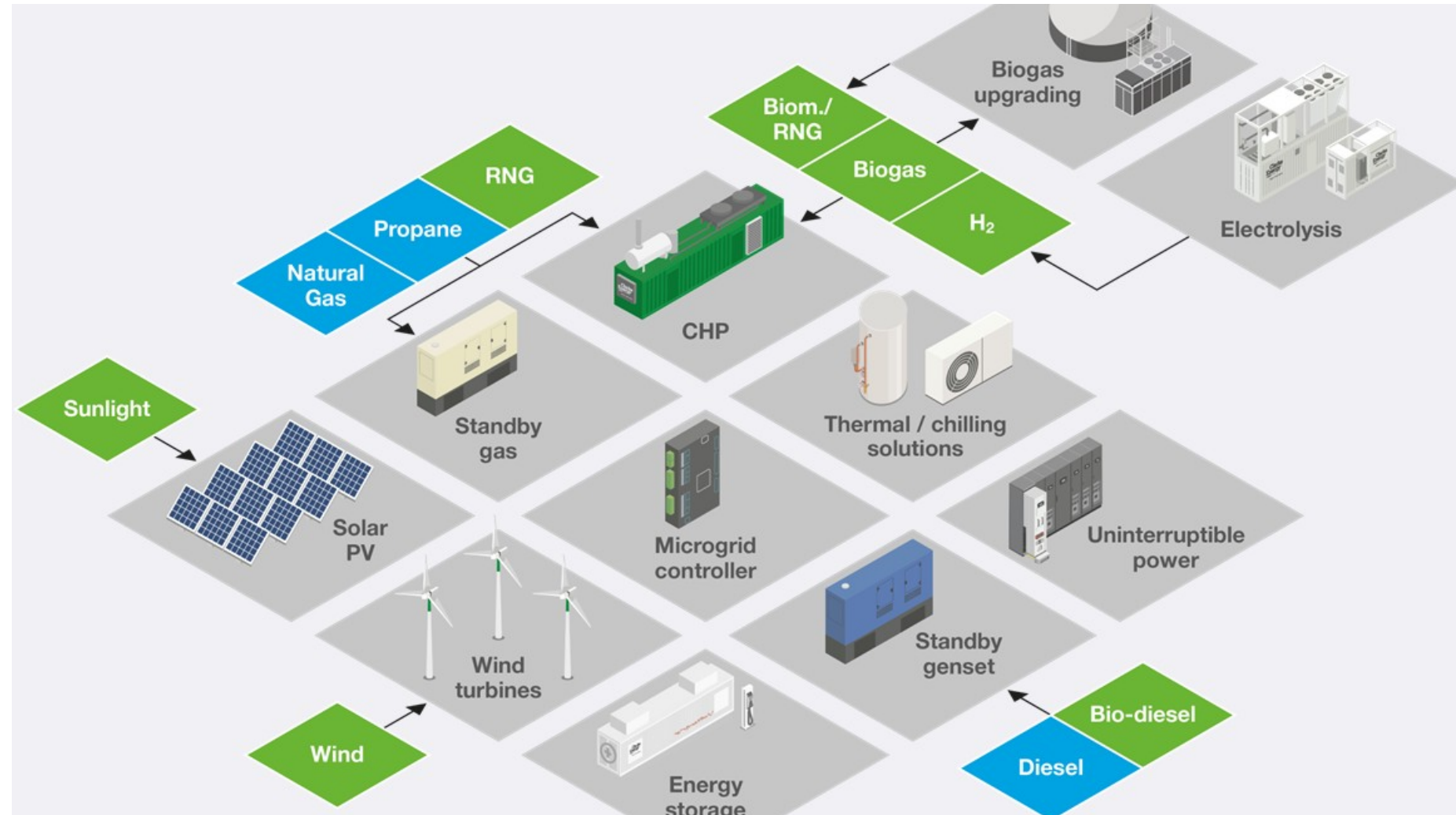
- H₂ as primary fuel
- Natural gas as back-up to support longer outages



“We selected INNIO’s Jenbacher technology to support our green hydrogen-powered electricity generation because of their long-term experience and proven track record with special gases, like hydrogen. With INNIO’s Jenbacher hydrogen emergency backup power solution coupled with the renewable power sources from the electricity grid, we can decarbonize our complete energy supply infrastructure.”

Decarbonising our Supply

Focus on an integrated system that offers maximum flexibility, maximises use of renewables when available and maximises efficiency at point of use



Any Questions?

Thank you for your time and here's looking forward to a successful H₂ future