



HASKEL HYDROGEN SYSTEMS

The evolution of hydrogen refueling
Experience to date and developing
the next generation of H2 technology

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WHY HASKEL?

- **World leading, mission critical expertise**
- **Over 200 hydrogen project references worldwide**
- **Excellence in safety, quality and project execution**



Key Markets

Aerospace & defence

Oil & Gas

General industry

Hydrogen M

Specialty gas

HASKEL GLOBAL REACH



Global in region support network for commissioning, maintenance and service

SUPPORT THE WHOLE PROJECT LIFE CYCLE



GLOBAL HYDROGEN REFUELLING APPLICATIONS



HYDROGEN REFUELLING

Comparable to conventional fuelling

- Safe, efficient and odor free
- Universal standard refuelling used worldwide
- Proven technology suitable for efficient infrastructure scale up
- Rapid refuelling capabilities similar to conventional liquid refuelling



HRS STATION

Compression, Storage and Dispensing



Dispenser

- Pre-Cooling
- Protocol
- Single/Multiple nozzles
- Simultaneous Dispensing



Hydrogen Supply

- Electrolyser
- Merchant H₂
- Pressure
- Flow

Storage

- High Pressure
- Medium Pressure
- Low Pressure
- Volume
- Type 1 - 4



Compressor

- Gas Booster
- Pneumatic
- Hydraulic
- Piston



HYDROGEN FUELLING STATIONS

Designed, developed and built in house in conjunction with our global partners



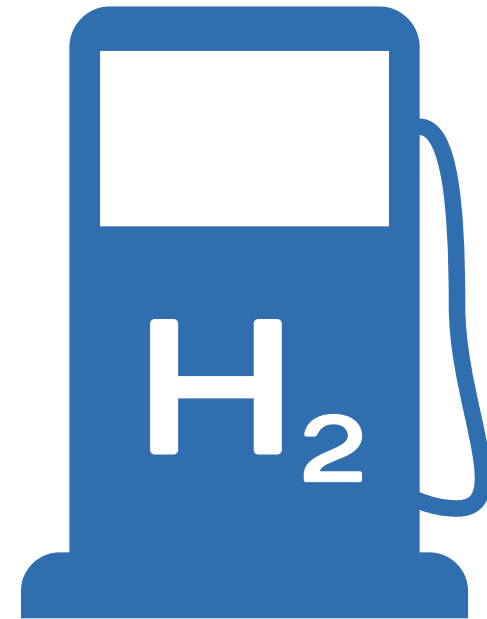
Bonett, the largest natural gas vendor in the Czech Republic and Poland, purchased Geno hydrogen refueling stations for deployment at Unipetrol public fueling stations throughout the Czech Republic.



Development, installation and deployment of new hydrogen refuelling equipment for the public hydrogen station of Total Nederland N.V., located in the Dutch city of Arnhem.



Haskel Hydrogen Systems Group chosen to support refuelling of Scotland's first hydrogen-powered train



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Haskel Hydrogen Systems Group to supply refuelling station for Australia's first hydrogen trucks

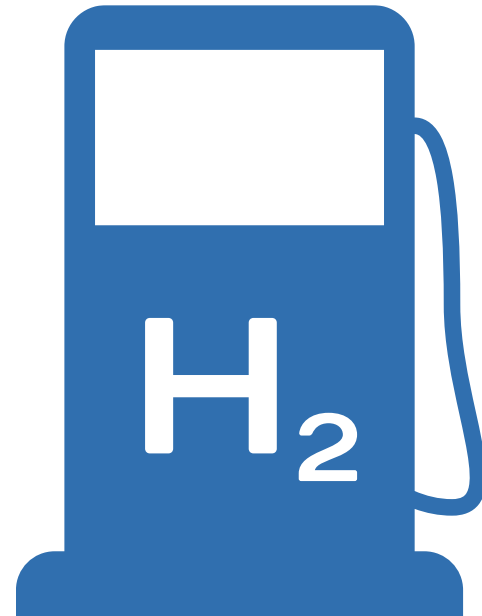


Design and construction of the first H2 refuelling station in Western Australia which will support ATCO's and Fortescue's fleet of Toyota Mirais.



First Hydrogen Bus Fuelling in New Zealand Powered by Partnership Between Haskel Hydrogen Systems and Hiringa Energy.

Phase 1 of the development includes 8 refuelling stations across the north and south islands, with the first of the 8 sites planned to start construction in 2021. Phase 2 includes a further 16 stations introduced by 2025.



STANDARDISED REFUELLING STATIONS

NANO & NANO PRO

Small-Scale Cost-Effective Stations

- Up to 80kgs per day
- Slow refuelling (Ref J2601)
- Portable unit
- Ideal for small fleets or demonstrations
- Aimed at light duty vehicles
- Can refuel 1-2 HDV's with external storage



STANDARDISED REFUELLING STATIONS







GENO

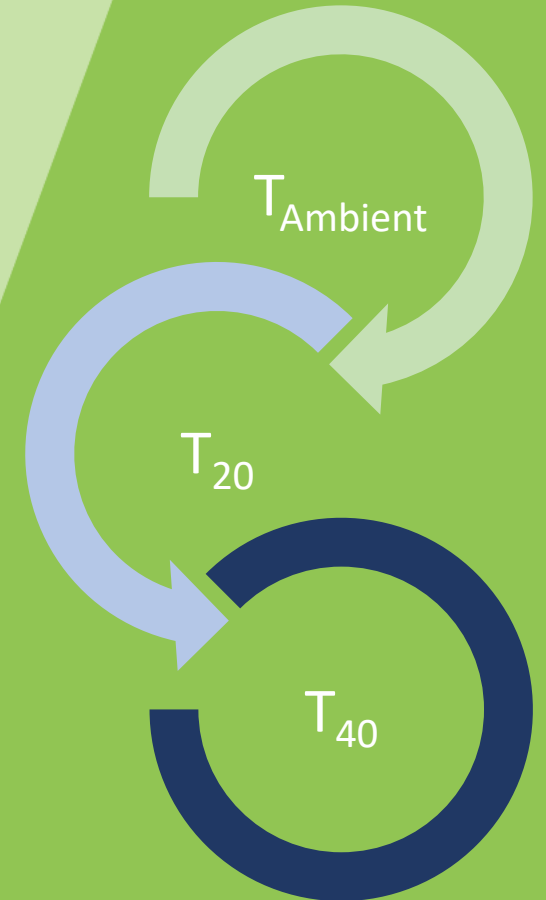
High-Volume, Large-Scale Stations

- 100kgs to 2000kgs+ per day
- Can achieve fast refuelling
- Permanent installation
- Servicing large fleets
- Heavy Duty Vehicles – 350bar
- Light Duty vehicles – 700bar
- Material Handling – 350bar

NEXT GENERATION TECHNOLOGY

Customer Requests	Impact on decision
Fast filling 	<ul style="list-style-type: none"> • T_{ambient} - < 60 Minutes • T_{20} - < 10 Minutes • T_{40} - < 3 minutes
Increased flow rate 	<ul style="list-style-type: none"> • Regional fleets • 3,000 kgs+ per day • Reduction in on site MP and HP storage • Up to 120g per second dispense
CAPEX/TCO 	<ul style="list-style-type: none"> • Compressor/system efficiency • IoT connectivity • Advanced service support features • Container based installation
Inlet condition 	<ul style="list-style-type: none"> • LP, MP, HP Storage • PEM Electrolyser • Grid/Pipeline • Liquid

SAE J2601



NON STANDARD AND BESPOKE SOLUTIONS

Hydrogen compressors, valves and components





An Ingersoll Rand Business

**SUPPORTING GLOBAL REFUELLING
INFRASTRUCTURE FOR HYDROGEN MOBILITY**