



HYDROGEN COMPRESSION SYSTEMS

**AN INGERSOLL RAND HOLISITC APPROACH TO
SUSTAINABLE SOLUTIONS UTILISING CORE TECHNOLOGY**



INGERSOLL RAND INTRODUCTION



Ingersoll Rand (NYSE: IR) today

~\$5.8B

FY 2022E Revenue¹

~\$1.4B

FY 2022E Adj. EBITDA¹

Mid-20s

FY 2022E Adj. EBITDA Margin¹

\$20.5B

Market Cap²

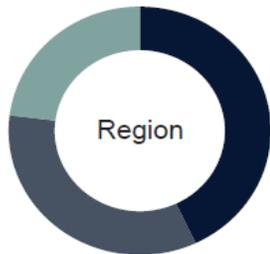
~16,300

Employees²

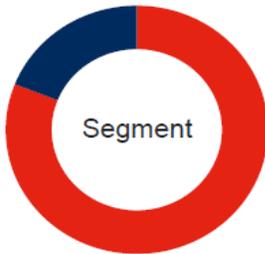
65

Key Manufacturing Sites²

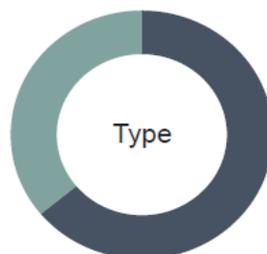
Revenue Composition³



Americas **43%**
EMEIA **34%**
Asia Pacific **23%**



ITS **81%**
PST **19%**



Equipment **64%**
Aftermarket **36%**

* Total recurring revenue (aftermarket plus like-for-like replacement of PST products) is ~44%

Industrial Technologies and Services (ITS)

Broad range of compressor, vacuum and blower solutions as well as industrial technologies including power tools and lifting equipment

Precision and Science Technologies (PST)

Highly specialized fluid management solutions including precision liquid and gas pumps and niche compression technologies



	Air and gas compressors	Equipment and services for the compression, treatment and management of air and gas
	Blowers	Equipment for creating low-pressure air flow
	Vacuum pumps	Equipment for removing air or gas from a chamber or process
	Positive displacement pumps and liquid handling systems	Equipment for the precision transfer of liquids
	Other products and systems	Other flow- and non-flow products including controls, software, valves, boosters, loading arms, power tools, air motors, lifting equipment and more

1. Based on FY2022 estimate as provided on Company's Q2 earnings call on August 4, 2022. Figures shown are approximate midpoints. Adjusted EBITDA represents net income before interest, taxes, depreciation, amortization and certain non-cash, non-recurring and other adjustment items. Adjusted EBITDA Margin represents Adjusted EBITDA as a percentage of revenues. 2. As of September 12, 2022. 3. FY2021.

INGERSOLL RAND INTRODUCTION

We are investing in sustainability efforts and disclosures; external recognition is improving

2021 Sustainability Report

- Our most comprehensive effort ever
- Published June 30, 2022
- Highlighted new work on product safety, lifecycle assessments (LCA), Task Force on Climate-related Financial Disclosures (TCFD) and more



Aligning portfolio to **three** global megatrends

1. Digitization
2. Sustainability
3. Quality of life

Through **three** strategic organic growth enablers

1. Demand generation
2. Industrial Internet of Things (IIoT)
3. Product and service innovation

Investing to build capability

- Built a new, agile team 100% dedicated to sustainability efforts
- Committed 1,100+ person hours to establish 2020 Scope 3 use-phase GHG emissions baseline for enterprise portfolio
- Contracted with leading sustainability consulting firm to develop Design for Sustainability (DfS) playbook for enterprise-wide deployment in Q1 2023
- Evaluating partners for full Scope 3 analysis
- Formed first internal team to lead business development within select high-growth, sustainable markets

Being recognized for our progress

- Measurable improvement with each rating agency from 2020-2021 to today

	2020 - 2021	Current
MSCI	BBB	AA
SUSTAINALYTICS	30.1 High Risk	23.5 Medium Risk
S&P Global	Unranked	Sustainability Yearbook Member 2022 S&P Global Sustainability Award Industry Mover 2022 S&P Global
CDP DRIVING SUSTAINABLE ECONOMIES	D	B



View or download our [2021 Sustainability Report](#)

HYDROGEN HAS SURPASSED EXPECTATIONS



Global Hydrogen Fueling Station Market Revenue (USD Million) Forecast, by Region, 2017–2028

Region	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	CAGR (2021-2028)
North America	10.21	14.44	16.63	23.08	40.15	51.88	68.71	94.97	130.73	188.58	281.34	435.31	40.56%
Europe	25.52	96.40	75.95	111.22	164.31	220.89	304.54	431.86	630.46	761.06	921.90	1,163.56	32.27%
Asia Pacific	19.82	61.67	186.98	231.84	200.53	243.40	295.12	358.37	436.53	570.79	761.33	1,037.23	26.46%
Rest of World	0.45	3.05	5.34	1.21	1.47	4.17	5.66	8.04	10.76	15.01	21.66	30.25	54.02%
TOTAL	56.00	175.56	284.90	367.35	406.46	520.34	674.03	893.24	1,208.48	1,535.44	1,986.21	2,666.35	30.83%

Key Takeaway

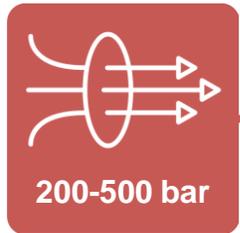
- An extreme delta in stations from 2021 – 2028 expected
- Forecast has increased exponentially from \$56million to \$2,666 billion.

EXAMPLE EARLY INSTALLATION



DEMO OR
LOW
USAGE

TUBE
TRAILER
SOURCE



REFUELING
APPLICATION

Bypass line

MARKET FEEDBACK AND TRENDS

1. CAPEX is extremely important to project viability.
2. Inlet sources now include electrolysis and local SMR, reducing inlet pressure. Additional longer term grid opportunity.
3. Service support and critical system management important to manage customer risk.
4. New, wider range of applications (chemical processes, secondary power generation, grid injection) with a range of delivery pressure requirements.
5. Flow rate requirement increasing.

HIRINGA



Downer

Shell
Hydrogen



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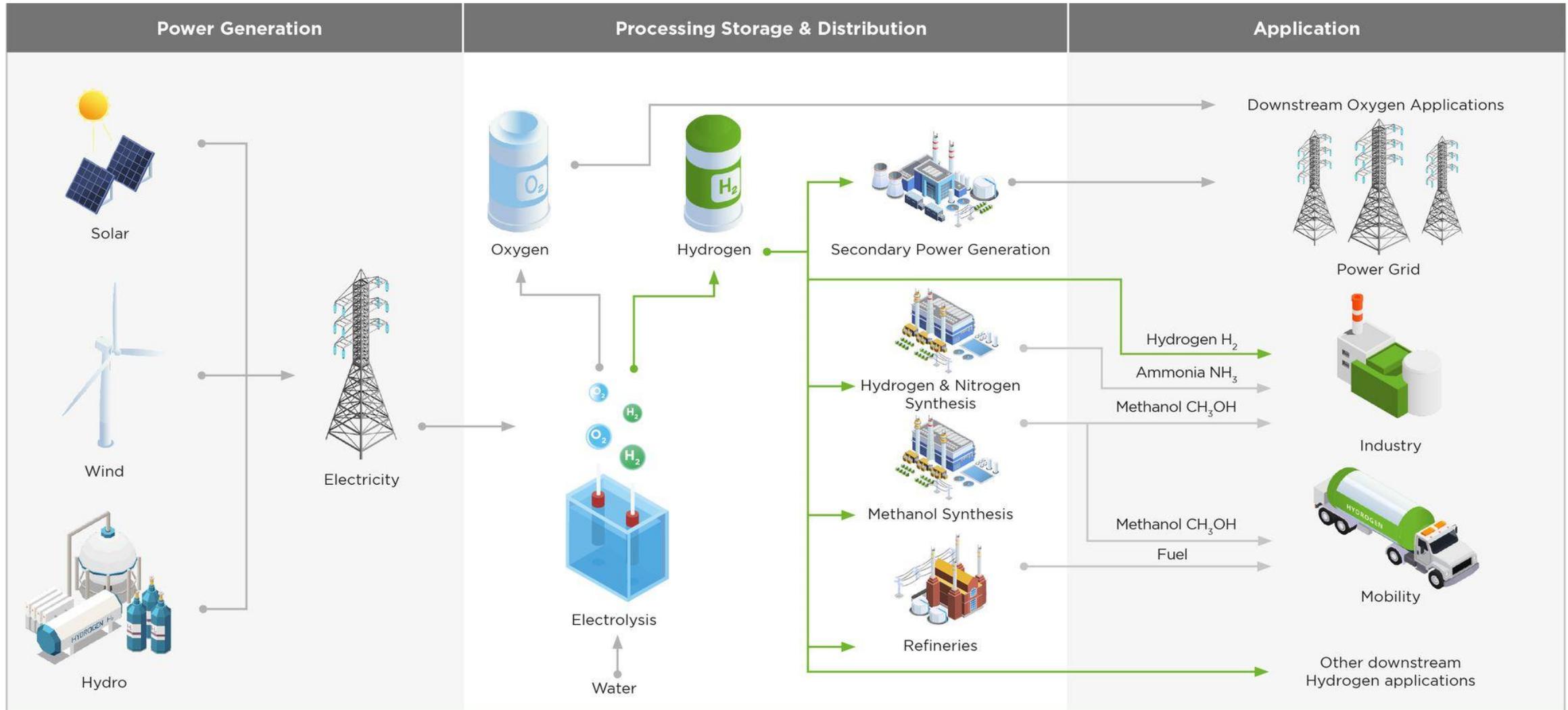
MARKET FEEDBACK AND TRENDS



1. *What is the best fit technology, can we leverage the wide range of options within Ingersoll Rand?*
2. *Is intermediate storage an option, what are the benefits?*
3. *New refueling stations need at least 2000kg of usable H₂, large CAPEX implications.*
4. *Can we configure standard, multiple technology solutions that work in harmony?*
5. *We need to be bold in our efforts to support the market move to standard solutions.*



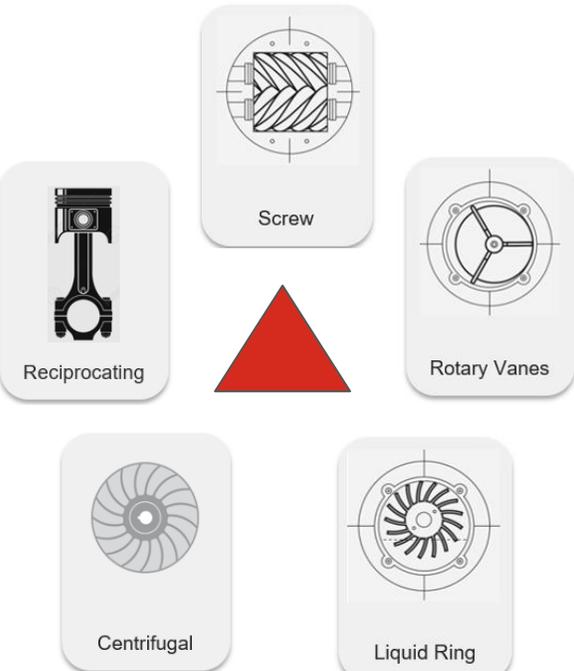
GREEN HYDROGEN VALUE CHAIN



FULLY HORIZONTALLY INTEGRATED

Ingersoll Rand has the expertise to standardize, without losing the flexibility to customize

Technologies



Brands



Features

- Oil-free and oil-lubricated designs
- Pressure range from 1 bar(g) to **1034 bar(g)**
- Flow rate **up to 168.000 m³/h**
- Fixed speed and variable speed
- Standard product and bespoke designs
- Certifications and approvals (ISO / ASME / ATEX / API)

A PROBLEM THAT NEEDS A SOLUTION

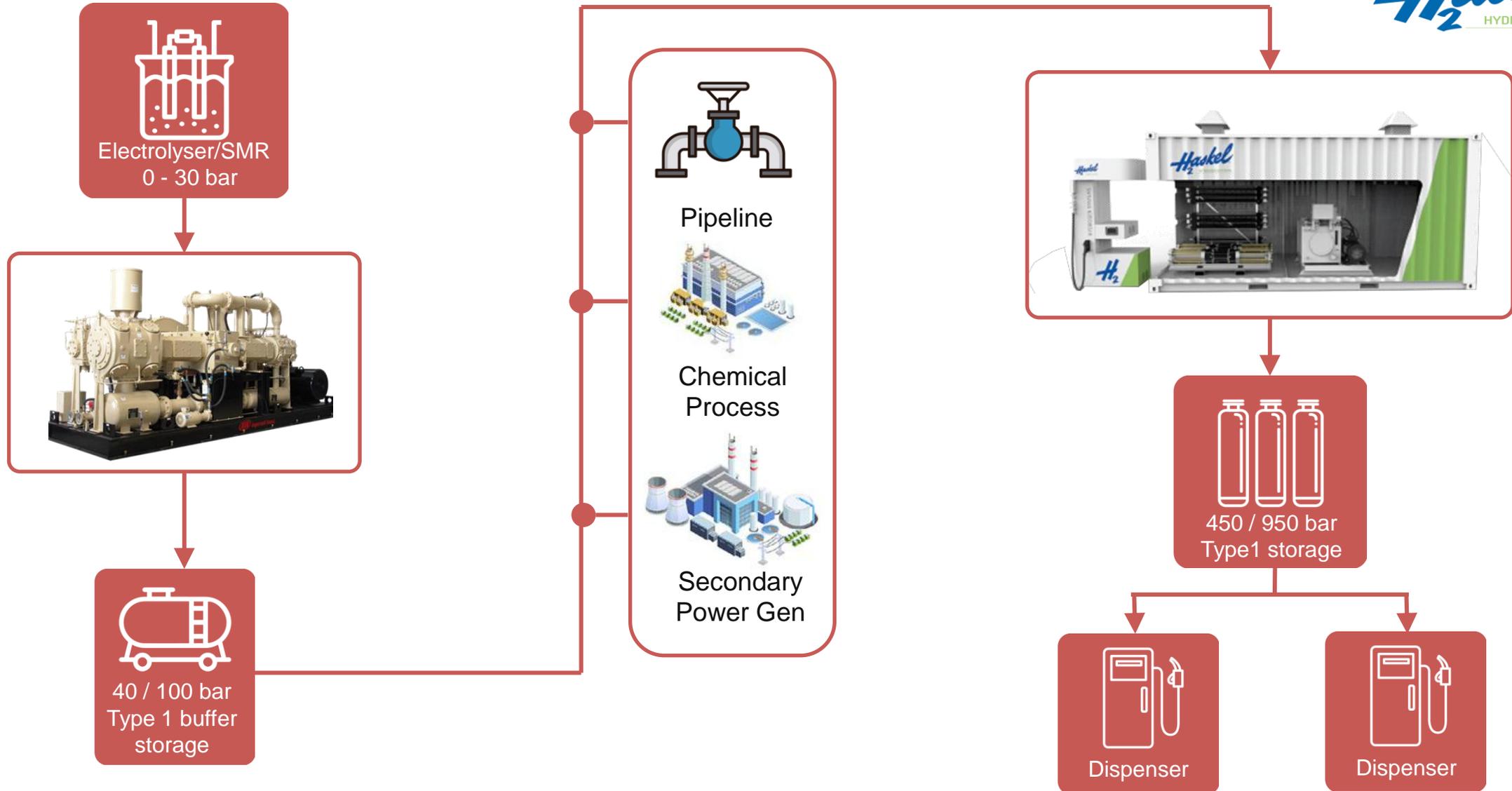
Stations need interim compression to serve a demanding refueling schedule

**REFUELLING STATION
INPUT : 40 BAR**



SMR OUTPUT : 4-7 BAR

NEXT GENERATION SOLUTIONS



RECIPROCATING COMPRESSORS

100 bar solutions



Reliable

Proven in mission critical applications across industry



Robust

Engineered to perform in any environment



Efficient

Slow piston speed and active water cooling for maximum efficiency



Configurable and flexible

Performance to match your system needs



Ease of Maintenance

Designed to allow fast and effective maintenance



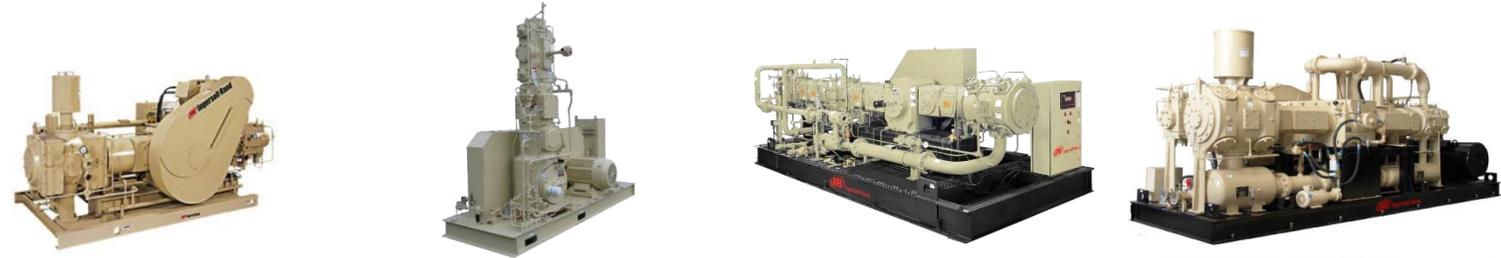
Certifications and approvals

ISO, ASME, ATEX, API and other certifications available on request

RECIPROCATING COMPRESSORS

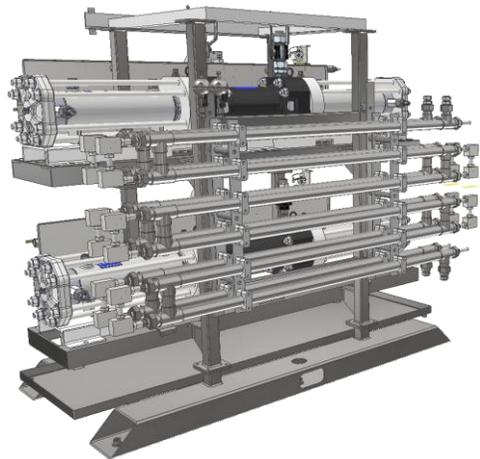


100 bar solutions



	ESH	ESV	PHE	HSE
Layout	Horizontal	Vertical	Horizontal	Horizontal
Speed Range (rpm)	300 – 750	300 – 650	300 – 750	350 – 500
Max Discharge Pressure	100 barg			
Flow Rate (m ³ /hr)	100 – 200	250 – 500	750 – 1,750	1,500 – 3,500
Max Flow (tpd)	0.5	1	3.5	7
Max Flow boosted inlet (tpd)	-	-	15	30
Rated Power (kW)	56	56	310	620

HIGH PRESSURE BOOSTERS



REFUELING STATIONS

IR Ingersoll Rand®

Haskel
HYDROGEN SYSTEMS



Customer Requests

Impact on decision

Fast filling



- T_{ambient} - < 60 Minutes
- T_{20} - < 10 Minutes
- T_{40} - < 3 minutes

Increased flow rate



- Regional fleets
- 3,000 kgs+ per day
- Reduction in on site MP and HP storage
- Up to 120g per second dispense

CAPEX/TCO



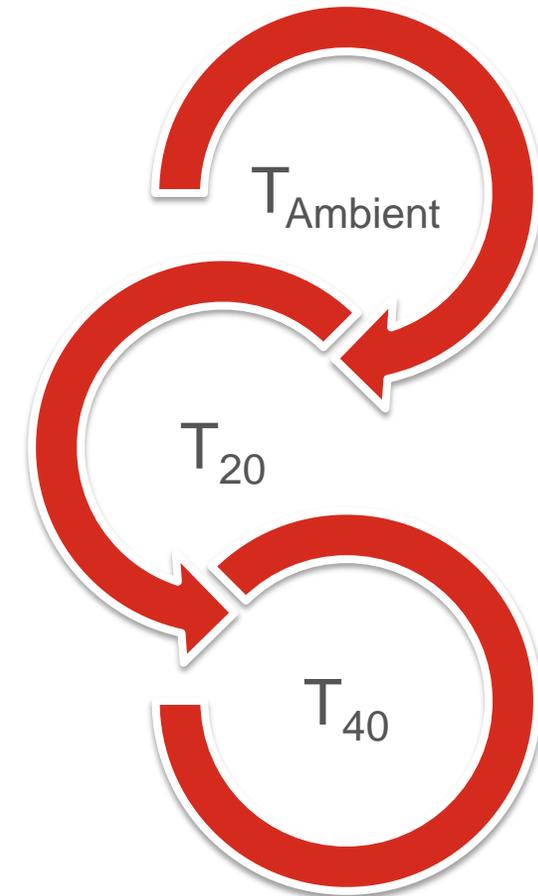
- Compressor/system efficiency
- IoT connectivity
- Advanced service support features
- Container based installation

Inlet condition



- LP, MP, HP Storage
- PEM Electrolyser
- SMR Low Pressure output
- Liquid

SAE
J2601



OUR LIFETIME PROMISE



Total equipment **solution** design capability across all technologies

Global presence and service coverage with OEM expertise and parts

Design principles for lowest **Total Cost of Ownership**, and extreme **robustness**



Total Peace of Mind with **CARE** Maintenance Agreements and IIoT services

Strong **Engineer-To-Order** capability, with in-house manufacturing

Maintenance, overhaul and upgrade offerings for **maximized useful life** of equipment

OUR LIFETIME PROMISE



Lean on us

To help you make life better

We are committed to making our customers successful.

We pride ourselves on innovation, and we aim to operate in a clear, straightforward fashion. We aspire to be connected for life with our customers and embrace the responsibility that comes with that. We know they lean on us for essential, vital and mission-critical solutions.

