Felix Grass

Introducing Hexagon Mobile Pipeline®

May 21st, 2020

Today in Germany it is a bank holiday (Ascension Day)

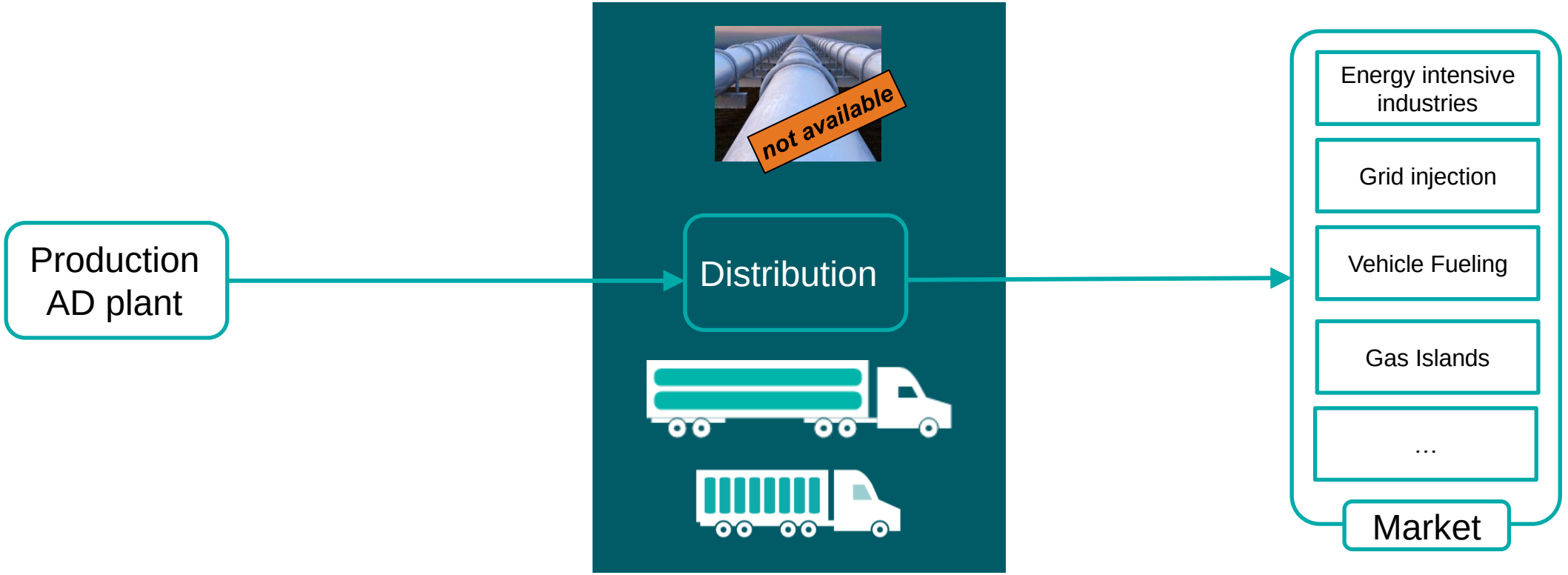
- LEAK-FREE
- LIGHTWEIGHT
- NON-CORROSIVE (SAFE)
- GOOD FATIGUE STRENGTH (LONG LIFE)

Imagine the gas grill is a **paper mill** that wants to become **CO2 neutral**

Biomethane Mobile Pipeline®

Cost components of delivering biomethane (RNG) to the demand side

€/sm³ RNG + €/sm³ RNG + €/sm³ RNG



Hexagon specializes in providing a truck based solution to transport biomethane from production sites that lack market access

Delivering Natural Gas by truck – the options

Compressed NG transports:

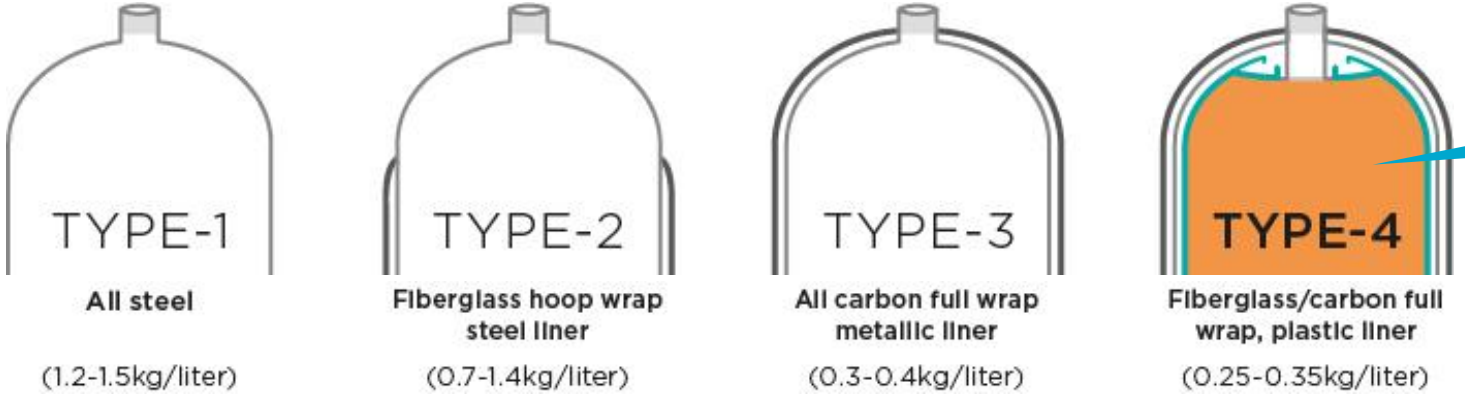
- Can move upwards of 147 MW / trip
- Operate at atmospheric temperature
- Operate at a nominal pressure of 250 bar
- Several different designs of cylinders available
- Compression stations can be built on lower CAPEX and OPEX compared to LNG

Type 1 | **Type 2** | **Type 3** | **Type 4**

Liquified NG transports:

- Typically move 234-293 MW / trip
- Cryogenic liquid at -162°C
- Operate at <10 bar
- Natural gas liquefaction facilities are more regional

Type 4 technology is at the heart of our storage and transport solutions

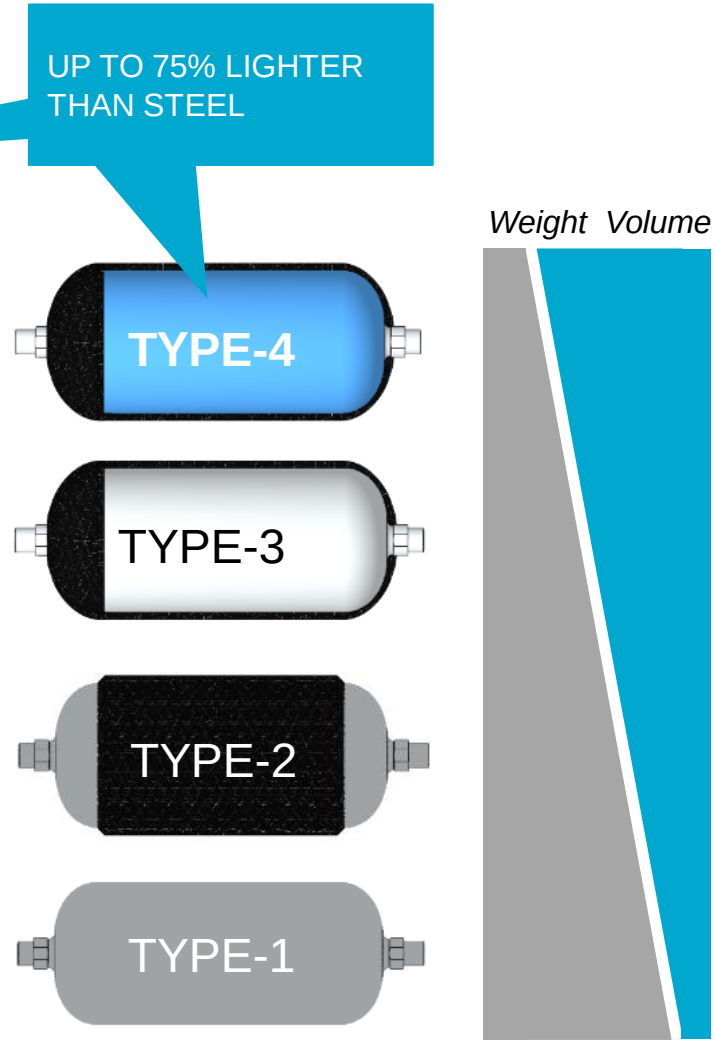


Type 1 – All metal (steel). Typically these are the heaviest cylinder and the lowest capital cost

Type 2 – Metal liner reinforced by composite wrap (glass or carbon fiber) around the cylindrical portion of tube (hoop wrapped)

Type 3 – Metal liner reinforced by composite wrap around entire tube. Include cylindrical portion and domes

Type 4 – Plastic gas-tight liner reinforced by composite wrap around the entire tube. Lightest tube and most capital expensive.



Comparison of 20ft container mass efficiency

127%
more efficient than
STEEL

	gross weight	nominal payload[1]	approx. supply of biomethane[2]	container mass efficency[3]
HEXAGON X-STORE **Type 4 carbon fiber** 250 bar 18.900 liter	13,4t	3.927 kg net weight 9.460 kg	3.325 kg	0,25
Type 1 steel 250 bar 17.480 liter	28,1t	3.632 kg net weight 24.500 kg	3.075 kg	0,11

- ***High purchasing price***
- ***Low operating costs due to high payload***

- ***Low purchasing price***
- ***High operating costs due to low payload***

[1] biomethane 15°C and 250 bar

[2] with filling efficiency of 92% and residual container pressure of 20 bar

[3] delivered biomethane / gross weight

HOW DOES A MOBILE PIPELINE® WORK?

Mother station fills natural gas to our container @ 250 bar

Full container travels to offloading station @ 250 bar

Container is offloaded at client´s decompression station (daughter station)

Empty container travels to mother station @ 10 bar

Cost of operating Mobile Pipeline®

	EUR / MMBTU	EUR / sm^3	EUR / MW
Compression	2,50	0,09	8,53
Transport	3,00	0,11	10,24
Decompression	0,50	0,02	1,71
Mobile Pipeline	**6,00**	**0,22**	**20,47**

- Mobile Pipeline® typically costs between 5€ and 7€ per MMBtu to operate. This includes capital costs for compression, transportation equipment, and operating expenses for the electricity, trucking, and injection at a centralized facility.
- Drivers are: gas demand, distance, rules & regulations of country, climate, etc.
- Each project requires multiple modules. A module will always be in the fill process, and the other module will be either offloading or in transit. The number of modules required for a project is a function of distance and load. Hexagon can help you determine the number of modules required.
- Hexagon can support to deliver drivers for the business case such as TCO (total cost of ownership) and support in approaching ECA to acquire financing for the complete project

Contact

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HEXAGON

Mobile Pipeline®

The cost-effective, environmentally friendly energy solution for sites off the gas.

MOBILE PIPELINE® SOLUTIONS FROM HEXAGON

X-STORE® solution

- flexible modular design
- vertically assembled tanks
- available from 10 ft (9,500 l) up to 53 ft (63,000 l)
- ADR and ISO 11439 compliance
- ISO 668 compliance

TITAN® solution

- largest Type 4 cylinders in the market
- horizontally assembled tanks
- available from 30 ft (24,600 l) up to 53 ft (45,600 l)
- trailer solution available (40 ft / 49,250 l)
- DOT and ABS compliance
- ISO 668 compliance on the containerized solution

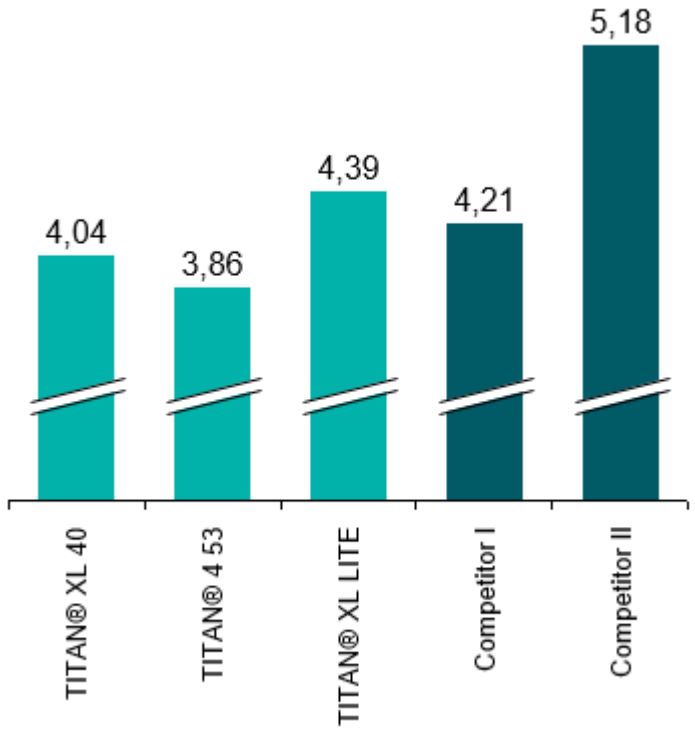
MOBILE PIPELINE® VALUE PROPOSITION

Value proposition

- Move gas, not steel – carbon fiber vs steel specs
- Opex vs capex
- Lifecycle Asset Management Program (LAMP)
  - Global warranty and service network
  - Requalification testing
  - Financing/leasing facilities
  - Trade-in/upgrade program

Transportation costs

USD per mmbtu, Hexagon estimates



MAE requalification

In-situ MAE Requalification of TITAN® and SMARTSTORE® Modules/Cylinders

X-STORE® SOLUTION FOR ADR[1]

X-STORE®		10 ft	20 ft	30 ft	40 ft	45 ft
Approval	Cylinders	According to ISO 11119-3 / EN 12245*				
	System	ADR approved and leak tested according to DIN EN 1779				
	Container	According to ISO 668 including CSC approval				According to CSC
	Corner castings	ISO 668				
Hydraulic capacity, approx.	l	8,750	19,250	29,750	40,250	45,500
Nominal transport capacity CNG (15 °C) [1)]	m^3	2,570	5,655	8,735	11,820	13,360
Net weight container, approx. [2)]	kg	4,360	8,825	13,195	17,410	19,575
Gas weight CNG (D=0.75 kg/m^3) [1)]	kg	1,930	4,240	6,550	8,865	10,020
Total container weight + CNG [1) 2)]	kg	6,290	13,065	19,745	26,275	29,595
Quantity cylinders, 350 l	pcs	25	55	85	115	130

1) European agreement concerning the international carriage of dangerous goods by road

X-STORE® SOLUTION ECO[1] (ISO11439[2] APPROVED)

X-STORE®		10 ft	20 ft	30 ft	40 ft	45 ft	48 ft
Approval	Cylinders	According to ISO 11439					
	System	Leak tested according to DIN EN 1779					
	Container	According to ISO 668 including CSC approval				According to CSC	
	Corner castings	According to ISO 668					
Hydraulic capacity, approx.	l	8,750	19,250	29,750	40,250	45,500	48,300
Nominal transport capacity CNG (15 °C) [1)]	m^3	2,570	5,655	8,735	11,820	13,360	14,185
Net weight container, approx. [2)]	kg	5,560	11,465	17,275	22,930	25,815	27,510
Gas weight CNG (D=0.75 kg/m^3) [1)]	kg	1,930	4,240	6,550	8,865	10,020	10,640
Total container weight + CNG [1) 2)]	kg	7,490	15,705	23,825	31,795	35,835	38,150
Quantity cylinders, 350 l	pcs	25	55	85	115	130	138

1) Hybrid technology (glass + carbon fiber)
2) High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles

TITAN® SOLUTION FOR DOT[1] and ABS[2]

		TITAN4® 30ft	TITAN4® 40ft	TITAN4® 53ft	TITAN®XL trailer 40ft
Approval	Cylinders	According to ABS / DOT			
	System	DOT / ABS	DOT / ABS	DOT / ABS	DOT / ABS
Hydraulic capacity, approx.	l	24.480	34.000	45.600	49.250
Nominal transport capacity CNG (15 °C)	m^3	7.420	10.300	13.480	14,876
Net weight container, approx.	kg	13.100	15.650	14.845	21,545
Gas weight CNG (D=0.75 kg/m^3)	kg	5.345	7.420	10.110	10,700
Total container weight + CNG	kg	18.450	23.070	24.955	32,256
Quantity cylinders	pcs	4 (6,120l)	4 (8,500l)	4 (11,400l)	12 (*)

1) *American Department of Transportation*
2) *American Bureau of Shipping*

GLOBAL FOOTPRINT: OVER 1,500 MOBILE PIPELINE® UNITS SOLD WORLDWIDE

HEXAGON

NORTH AMERICA

550 UNITS

EUROPE & RUSSIA

300 UNITS

ASIA PACIFIC

350 UNITS

LATIN AMERICA

300 UNITS

HEXAGON

Case Studies of Mobile Pipeline®

Case Study – Port Townsend Paper, Washington State (XNG)

TITAN® XL40 in Washington used by XNG to serve Port Townsend Paper Co.

Port Townsend Paper Co, Port Townsend, WA

Satsop Industrial Park to Port Townsend, 104-miles.

Key Equipment Load Profile

Lime Kiln	400,000 Mmbtu/yr
Recovery Boiler	350,000 Mmbtu/yr
Package Boiler	100,000 Mmbtu/yr
Power Boiler <	300,000 Mmbtu/yr

XNG supplies ~800,000 MMBtu/yr (nearly 1700 TITAN®XL deliveries per year)

Key statistics on the conversion

- Converted from RFO#6 to CNG in Sept 2016
- Estimated conversion cost: $3.1MM
- Facility now complies with Max Achievable Control Technology (MACT) boiler rules
- NG average Henry Hub price ($3.02)
- **First year savings of $1,200,000**, including fuel, maintenance, and regulatory compliance costs
- Long-term NG prices predicted to remain stable by the US EIA
- **Estimated reduction of 17,600 tons of CO_2 (27%) per year** through Mobile Pipeline®

Case Study Nestle Coatepec, Veracruz Mexico (Igasamex)

Igasamex Compression Facility – Zona Norte

X-STORE® 40 ft discharging

Nestle factory in Coatepec, State of Veracruz, Mexico

Key Equipment Load Profile

Production Boiler 919,800 MMbtu/yr

Currently Igasamex delivers to Nestle 21 million m^3/year of CNG (~2500 X-STORE® deliveries / yr)

Key statistics on the conversion

- Converted from LPG to CNG in Nov 2014
- Est conversion cost: $2.2MM
- First year savings is estimated at $1,000,000 including fuel and maintenance costs.
- **Estimated reduction of 10,100 tons of CO_2 (16%) per year** through Mobile Pipeline®

Case Study – Mobile NGV stations, Indonesia (Pertamina & PGN)

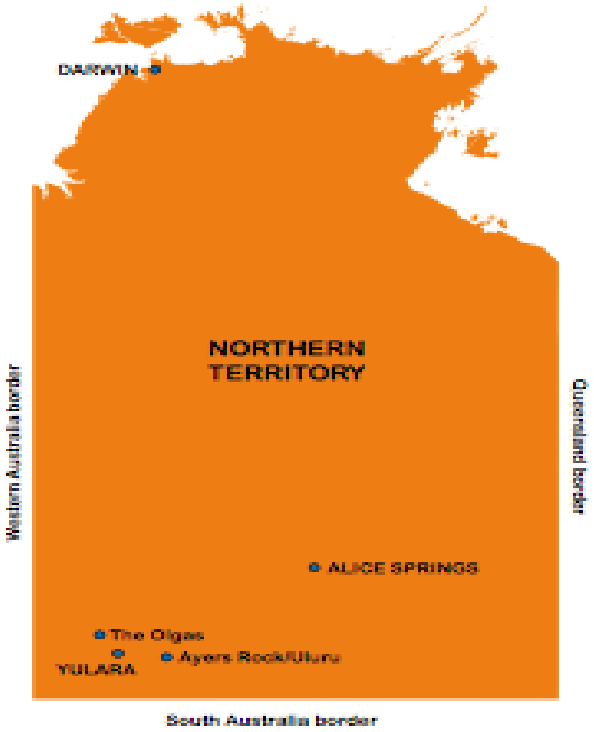
- Over 15 Mobile Refilling units in operation in Jakarta
- 40 NGV or 350 BAJAJs capacity
- 20ft footprint refilling station (easy deployment)
- Quick setup (less than 6 months)
- Much lower setup cost of a conventional station
- Less hassle in getting land approvals for usage

Case Study - Furnace for ceramic plants, Vietnam (Petrovietnam)

- Supply of CNG to NGV daughter stations and industrial furnance
- Distances between M-S to end users/D-S: 20-60km
- Over 150+ MOBILE PIPELINE® modules in operation since 2010
- OPEX savings – over 30%
- High flow rate applications
- Ease of operation

Case Study – Power generation, NT Australia (EDL)

- Re-powering Yulara Power Station (4.5MW)
- CNG is being transported 440km from Palm Valley-Alice Springs CNG Station to Uluru
- CNG are packed into crates and trailers hauled by road trains since 2006



MARINE APPLICATIONS
CNG FUEL STORAGE

- Hexagon has been awarded to supply storage systems for fuel storage onboard a Liquefied Natural Gas (LNG) supply vessel being built for Babcock Schulte Energy
- TITAN® cylinders are an integral part of the ship's patent pending FGSV0™ system, developed by Babcock LGE Process, to enable the LNG bunker vessel to meet the emission limits of the IMO Emission Control Areas (ECA) regulations
- Composite material is ideal for marine environment due to corrosion resistance and low cost for periodic inspection

Photo: Babcock Schulte Energy

"By compressing the boil-off and flash gas and supplying it as fuel to the ship's engines, our clients will save distillate fuel costs and at the same time reduce the vessel's emissions of sulphur oxides (SOx) and particulate matter (PM)."

- Andrew Scott, General Manager at Babcock LGE Process

HEXAGON

Hexagon Group

We enable mobility and storage solutions

For clean energy: Hydrogen, RNG and CNG

HEXAGON

		Fuel & Energy sources
Automotive Fuel cylinders for light-duty vehicles, transit buses, refuse trucks and heavy-duty trucks		Hydrogen Biomethane (RNG) Compressed natural gas (CNG) Battery electric Propane
Mobile Pipeline Storage and transportation cylinders and modules for off-pipeline applications		Hydrogen Biomethane (RNG) Compressed natural gas (CNG)
Marine & Rail Fuel and storage cylinders for marine and rail		Hydrogen Biomethane (RNG) Compressed natural gas (CNG)
Ground storage Cylinders for ground storage		Hydrogen
Household and leisure LPG cylinders for leisure activities, household and industrial applications		LPG (propane and butane)

Hexagon is the global market leader in all its segments

HEXAGON PURUS

Hydrogen, Battery electric & CNG Light-Duty Vehicles

- Compressed natural gas (CNG)
- Renewable natural gas (RNG)/ biomethane
- Hydrogen cylinders
- Hydrogen systems
- Battery electric systems

AGILITY FUEL SOLUTIONS

Medium and Heavy-Duty Vehicles

- Compressed natural gas (CNG)
- Renewable natural gas (RNG)/ biomethane
- Propane

HEXAGON MOBILE PIPELINE

Gas Transportation

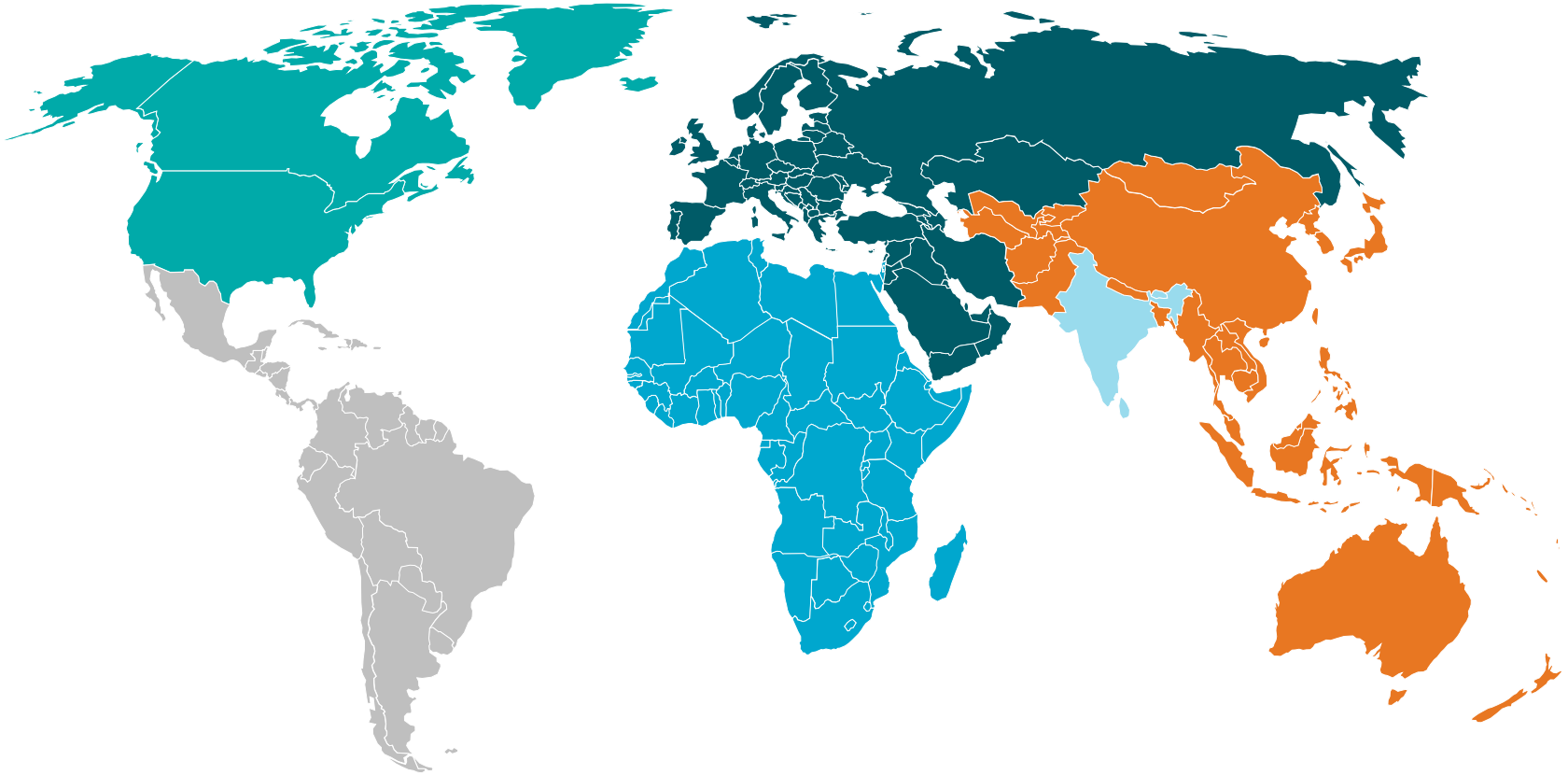
- Compressed natural gas (CNG)
- Renewable natural gas (RNG)/ biomethane
- Industrial gases (e.g. helium, nitrogen, etc.)
  - Flare gas capturing
  - Micro distribution
  - Mobile refueling units (MRUs)

HEXAGON RAGASCO

LPG

- Propane and Butane

Hexagon's Global Mobile Pipeline® Team is ready to help you



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Mobile Pipeline®: The cost-effective, environmentally friendly energy solution for sites off the gas grid.

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