Gazprom's Helium Facility in Orenburg

Supply & Start-Up of a Linde Liquefier

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Linde

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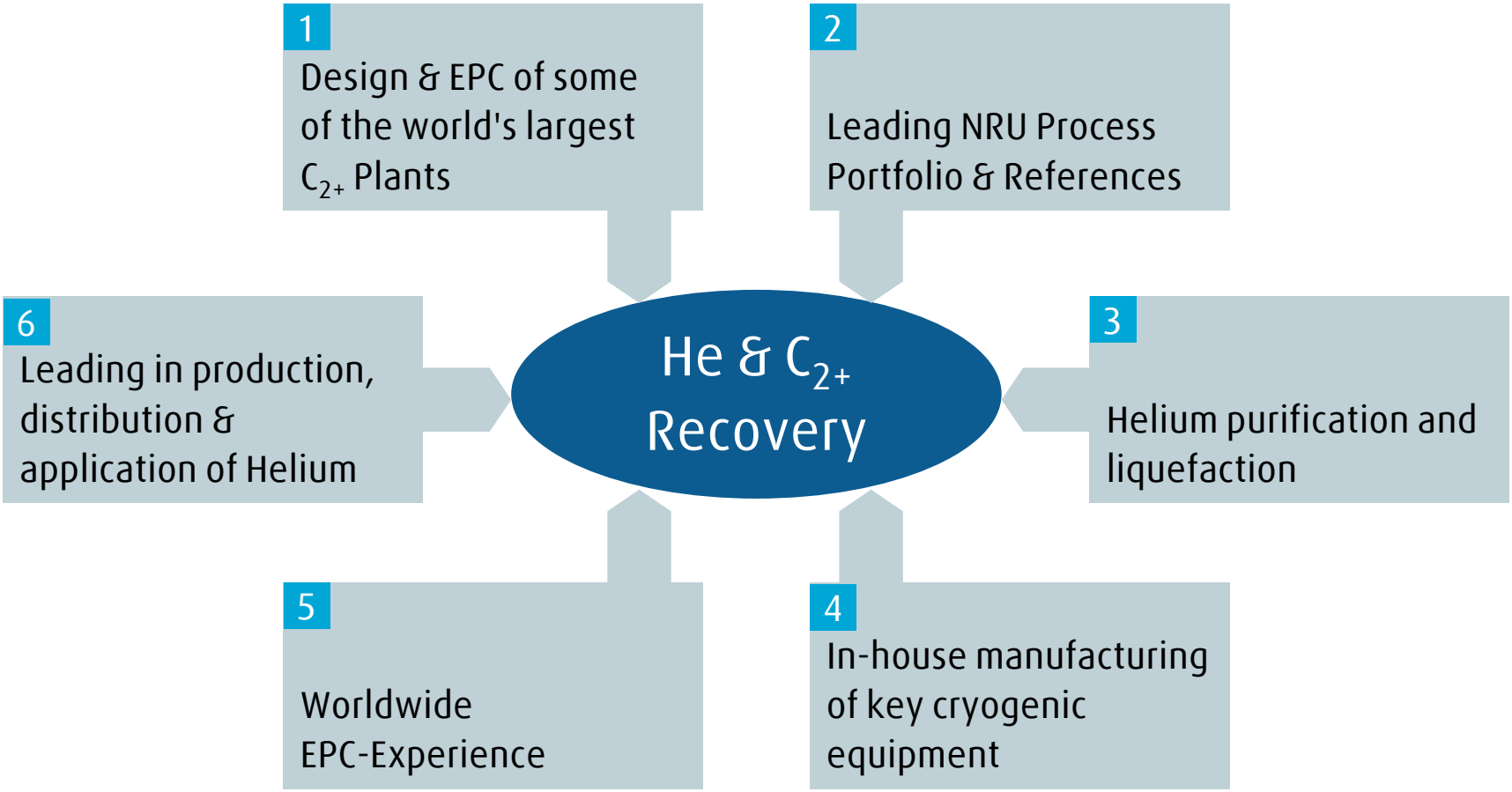
Introduction

Linde Engineering provides all capabilites for execution of He & C_{2+} recovery projects worldwide.



Introduction

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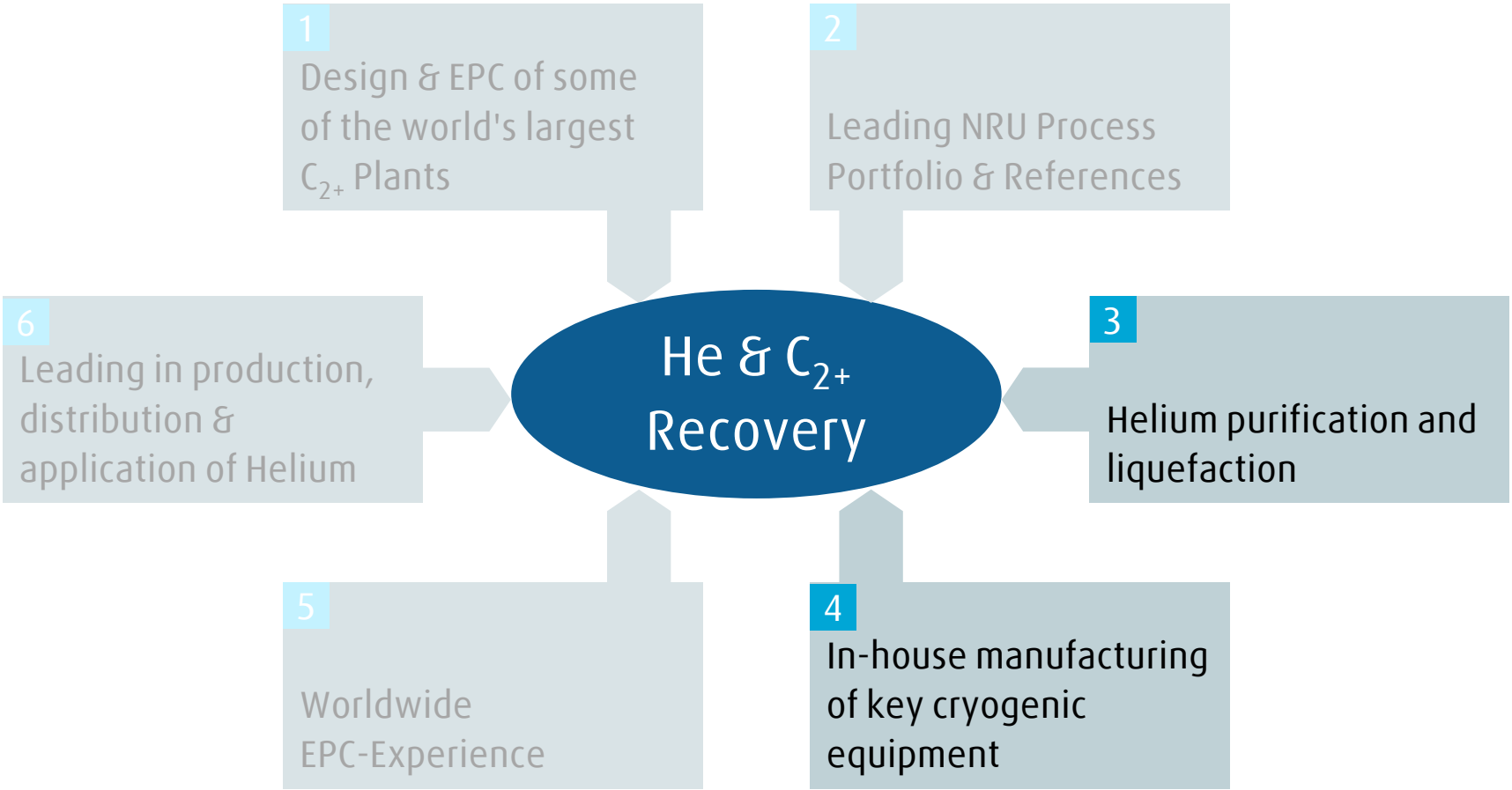

Linde's Helium Product Portfolio

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Standard Liquefiers (> 600 units sold)

150 Turbine Machines
450 Piston Machines

1200 l/h
277 mmscf/y

1500 l/h
346 mmscf/y

1800 l/h
415 mmscf/y

2200 l/h
508 mmscf/y

2400 l/h
554 mmscf/y

3500 l/h
808 mmscf/y

Standard Engineered Liquefiers

20 kW refrigeration capacity
equivalent to 6000 l/h or 1385 mmscf/y

Customized Plants

Key Components
Coldboxes and Heat Exchangers for Helium Applications

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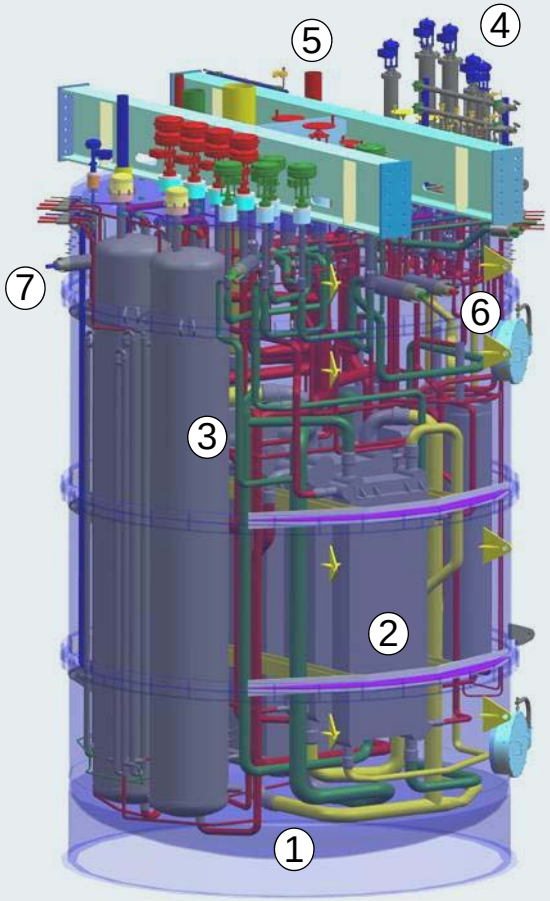
Cold box for Liquefaction of Helium in Skikda

- 3,500 l/h of helium
- 99.999% (5.0)
- 3 MW_{el}
- 2.000 l/h LIN



1 Vacuum-insulated cold box
2 Heat exchanger blocks
3 20 K adsorbers
4 Turbo expanders
5 Gaseous He inlet
6 Liquid He discharge
7 Liquid N_2 inlet (pre-cooling)

18 kW Helium Refrigerator at CERN's Large Hadron Collider

Key Components
Linde's Turbo-Expander Technology

Linde's dynamic gas bearing turbines provide highest efficiency combined with unsurpassed reliability hence ensuring lowest operating costs.

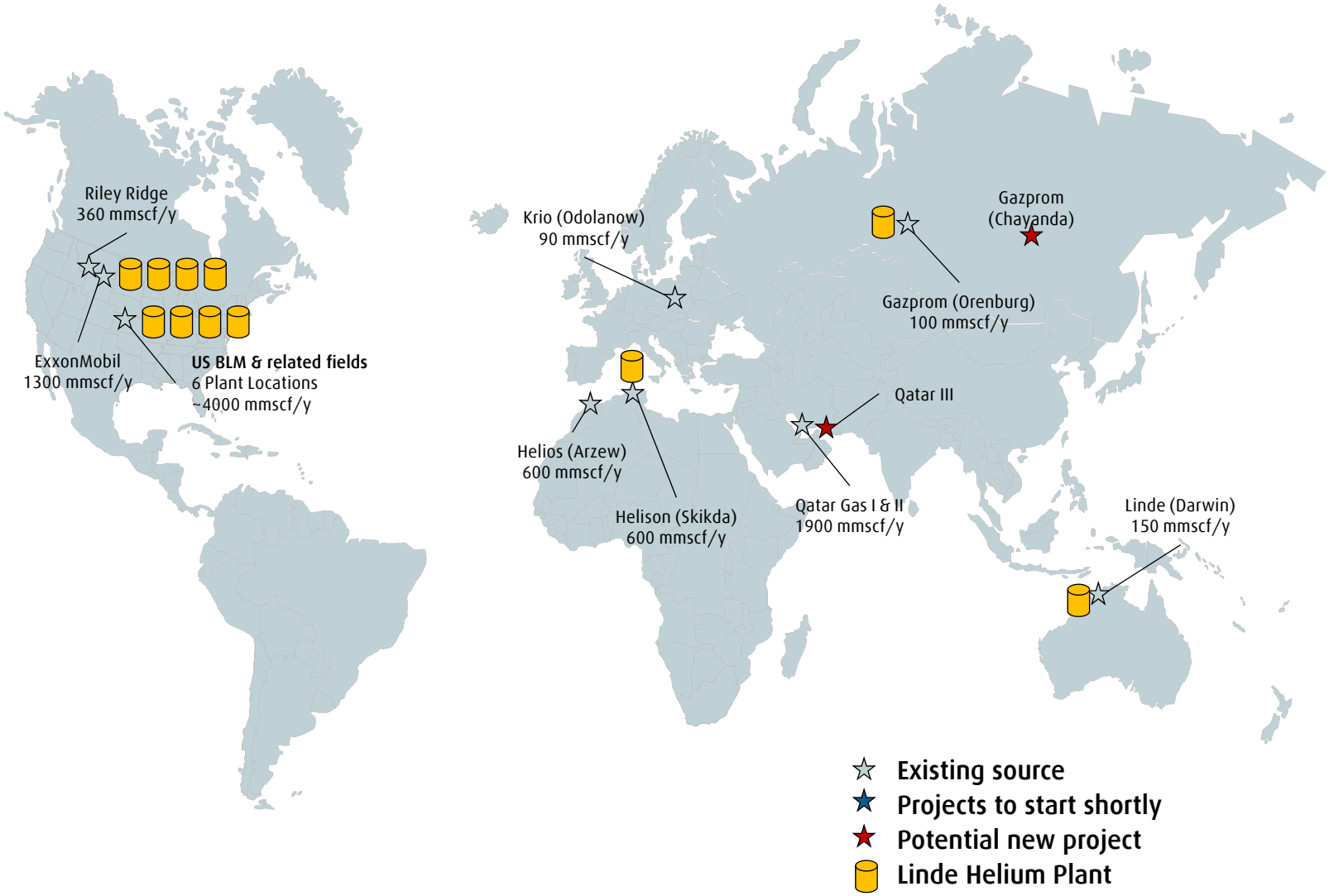
	Power [kW]	Max. Rotational Speed [rps]
TED 16	0.1 to 5	5'600
TED 22	0.2 to 10	4'200
TED 32	0.5 to 25	3'200
TED 45	5 to 50	2'200

Key Components
Linde's Helium Storage Containers

Linde's provides liquid helium storage storage tanks and transport containers with excellent thermal performance and low maintenance requirements

	Standard Tank	Large Tank
Gross volume (warm tank)	128 700 litres	230 000 litres
Net volume (cold tank)	121 200 litres	216 000 litres
Max working pressure	3 bar(g)	3.5 bar(g)
Design temperature	-269°C to 100°C	
Design code	ASME or PED	
Inner vessel material	Stainless steel	
Vacuum jacket material	Carbon steel	
Total length	21 650 mm	28 000 mm
Outer diameter	3 500 mm	4 300 mm
Empty weight	42 tons	100 tons
Shield	LIN and Helium (on request)	

Worldwide Helium Applications
Installed helium liquefiers



The Orenburg Helium Facility
Key Data

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Project set-up

- Customer: Gazprom Gazenergoset
- EPC Contractor: Cryogastech LLC
- Equipment Supply: Linde Kryotechnik AG

Project schedule:

- Contract placement in June 2012
- Equipment delivery in August 2013
- Successful Performance Test Run in May 2014

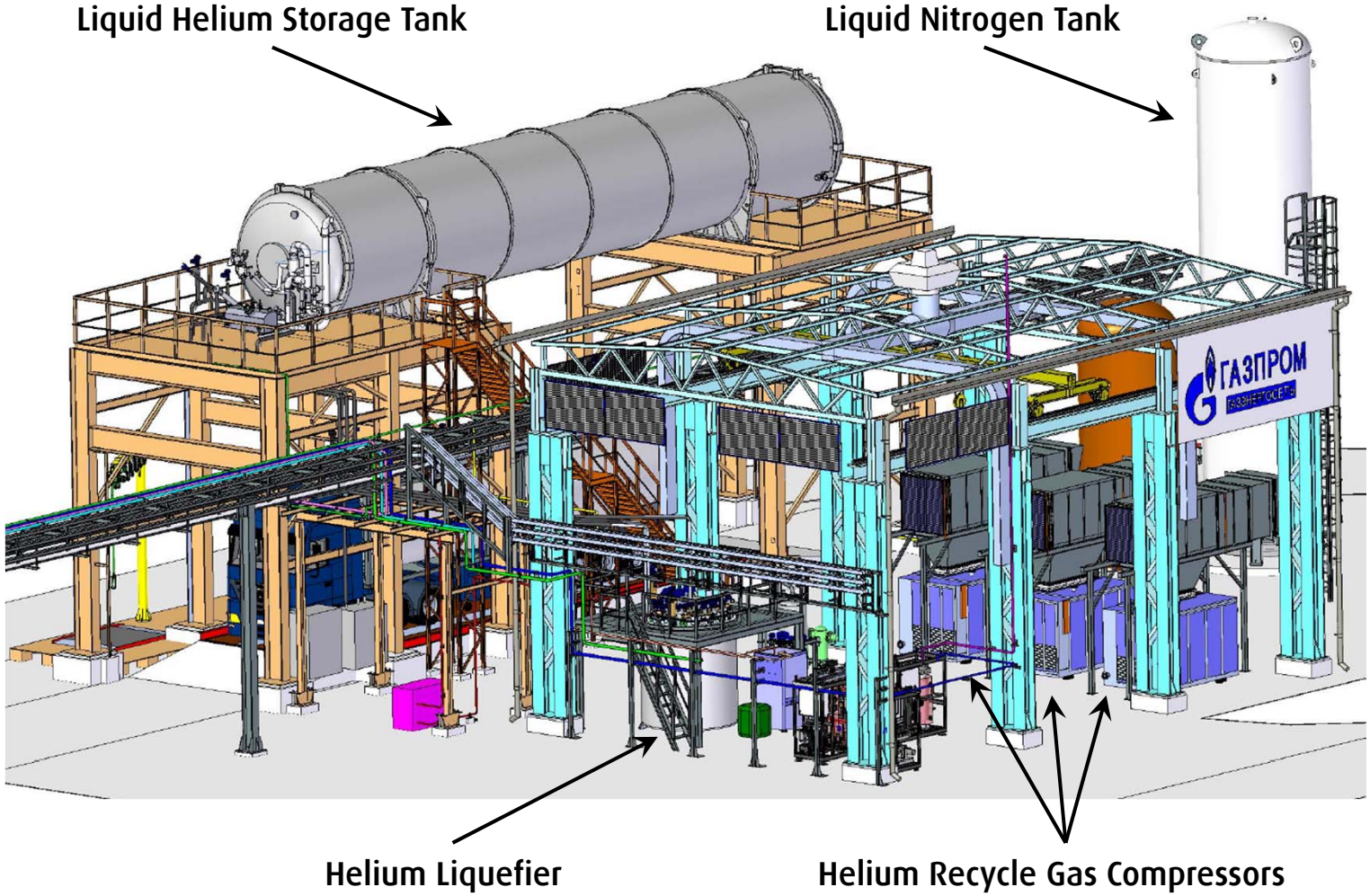
Liquefaction capacity

- Design 500 l/h
- Actual 550 l/h

Special design requirements

- Design according to Russian standards (e.g. GOST) with approval by Rostechnadzor
- Unfavourable climatic winter conditions with low temperatures and snowfall during installation

The Orenburg Helium Facility
Plant Design



The Orenburg Helium Facility
Site Impressions

The Orenburg Helium Facility
Site Impressions

Trailer Filling Station with Storage Tank and ISO Transport Container

ISO Transport Container Ready for Filling

Summary

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Linde Kryotechnik AG has successfully designed, supplied and commissioned a helium liquefaction plant for Gazprom Gazenergoset in Orenburg:

- Design and supply by Linde Kryotechnik AG
- Plant design and installation in close cooperation with Cryogastech LLC
- Design according to Russian codes, standards, and regulations
- Successful commissioning
- Outstanding performance of the plant exceeding guaranteed liquefaction rate by 10%

Thanks for your attention.