JHW ENGINEERING & CONTRACTING LTD

ABOUT JHW

JHW公司介绍

Contents
目 录

I. General Company Description
公司概况

II. Products and Services
产品与服务

III. Business Model
商务模式

IV. Future Potential Opportunity
未来潜在发展机会

I. General Company Description
公司简介

1.1 Company Overview
公司概况

1.2 Shareholding Structure
股权结构

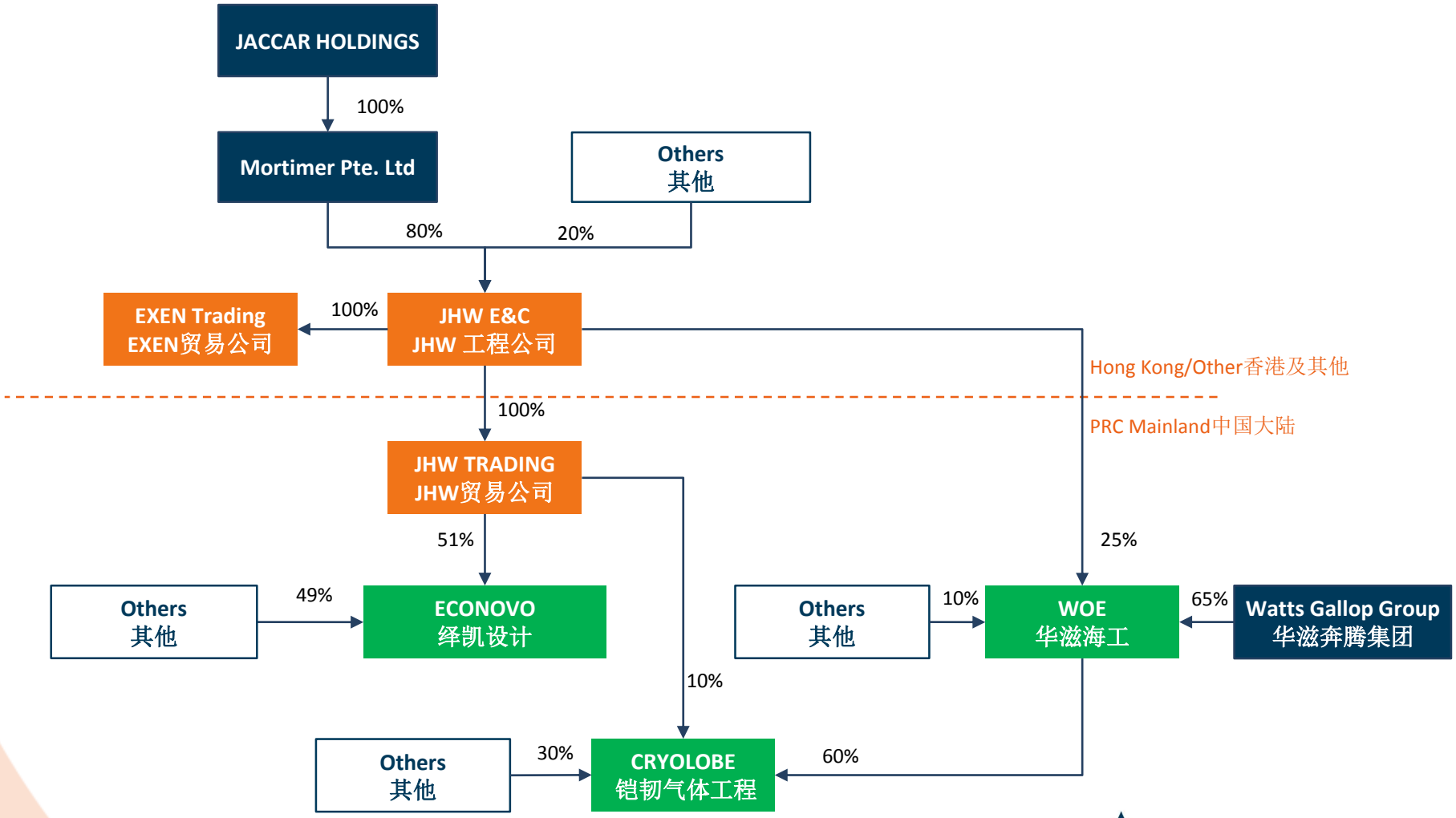
1.3 Organization Chart & Management Team
组织架构及管理团队

1.4 Key Facility
关键设施

1.1 Company Overview
公司概况

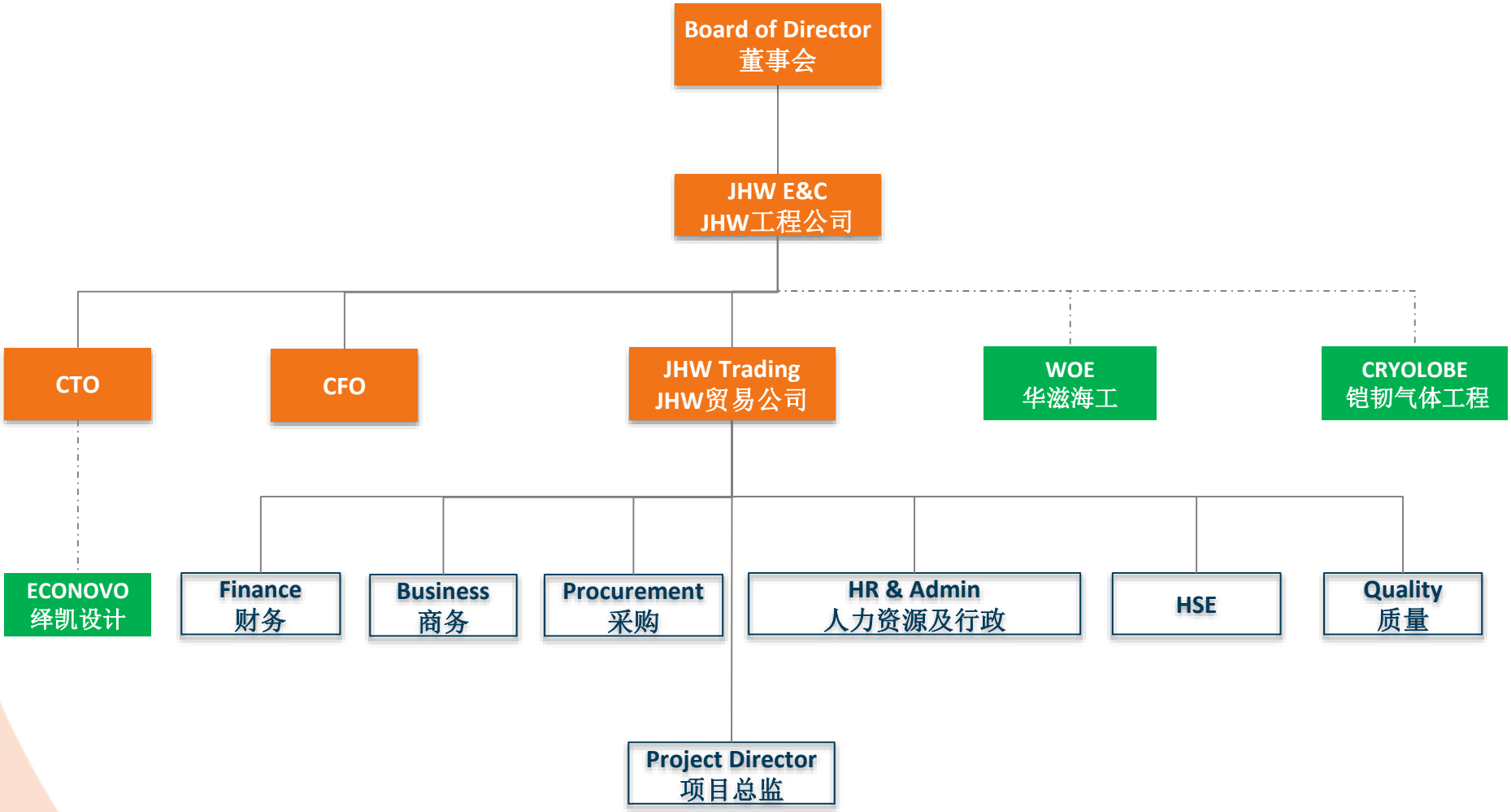
Vision——A New EPC Force with Advanced Technology Serving the Oil & Gas Market!
愿景——服务于油气市场的拥有先进技术的工程总承包新生力量！

1.2 Shareholding Structure
股权结构



JHW ENGINEERING & CONTRACTING LTD

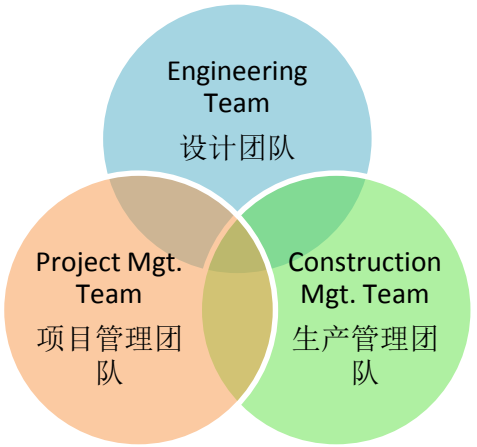
1.3 Organization Chart & Management Team
组织架构及管理团队



1.3 Organization Chart & Management Team
组织架构及管理团队

EPC Capability of GAS CARRIER

Experienced Team
富有经验的团队



Gas Carrier 液化气船	LPG	LEG	LNG
Small & Mid Sized 中小型	5000cbm 16500cbm	12000cbm 17000cbm 22000cbm 275000cbm 36000cbm	27500cbm
Large Sized 大型	86000cbm VLGC	85000cbm VLEG	

Project Experience
项目经验

EPC capability 总承包能力	Ship 船舶	Cargo Tank 液罐	Gas Plant 液货系统
Concept & Basic Design 概念设计	★	★	
Approval & Detail 详细设计	★	★	
Workshop Design 生产设计	★	★	★
Construction & Delivery 生产与交付	★	★	★

Collaboration with leading Engineering Company
与一流工程公司的合作

JHW ENGINEERING & CONTRACTING LTD

1.3 Organization Chart & Management Team
组织架构及管理团队

Experienced Team
富有经验的团队

Other Sized 其他大小的

27500m3 LNG

12000-22000m3 LEG

5000m3 LPG

团队核心成员为国家行业标准《船用半冷半压式液化气储罐》（编号CB-T4241-2013）主要编制人。

The core members of this team were the chief writers of the national industrial standard “Semi-refrigerated gas carrier tank”(#CB-T4241-2013).

多项专利发明人
Inventors of many patents

	NO	专利
著作权	1	生产设计内外场托盘自动抽取软件
	2	LPG液罐设计软件
发明专利	1	大型液罐轨道小车拖运装置
	2	一种天然气运输管系压力试验装置
	3	缠绕式冷弯试验机
	4	集电滑环随动装置
	1	大型活动胎架
	2	小型活动胎架
	3	运输胎架
	4	埋弧自动横焊机
	5	船用5%NI气保自动立焊机
	6	缠绕式冷弯试验机
	7	一种拉刀工具
	8	收放式T型测量工具
实用新型	9	一种可伸缩四边形仿形尺
	10	集电滑环随动装置

LNG Fuel Tank & System
LNG燃料储罐及系统

Regasification Modules
再气化模块

Offshore Module
海工模块

1.4 Our Facility
我们的设施

JHW ENGINEERING & CONTRACTING LTD

1.4 Our Facility
我们的设施

WOE
华滋海工

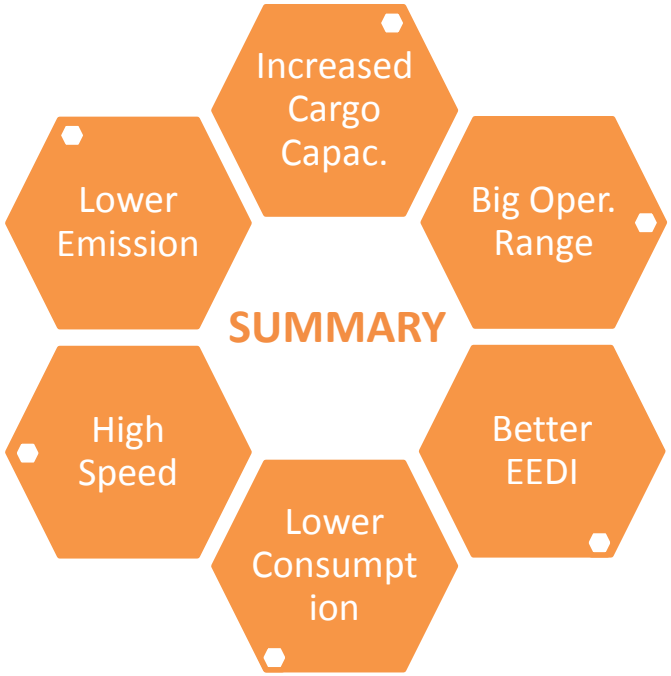
II. Products and Services

产品与服务

- 2.1 Gas Carrier Series
  气体船系列
- 2.2 Offshore Oil & Gas Module
  海上油气模块

2.1 Gas Carrier Series
气体船系列

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况



- 27,500M³ LNG Carrier
- 32,000M³ LEG Carrier
- 36,000M³ LEG Carrier
- 85,000M³ VLEC
- 86,000M³ VLGC

2.1.2 Technical Innovation
技术创新

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

27,500M^3 LNG Carrier

Ship Basic Information

Type

Semi-refrigerated carrier

Classification

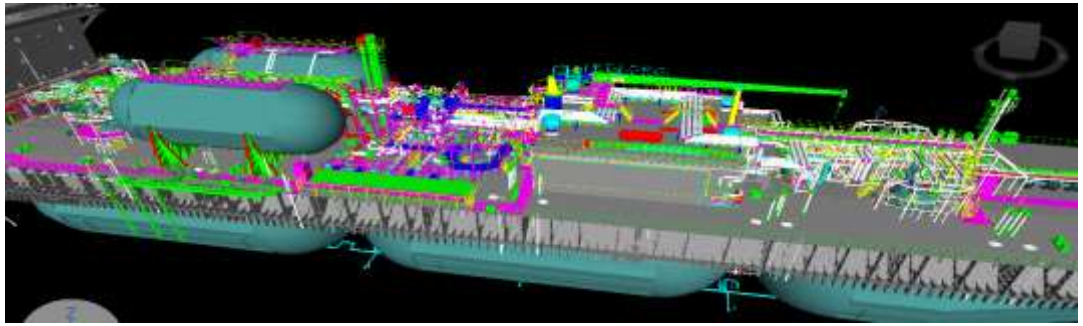
BV I, +HULL, +MACH, Liquefied Gas Carrier - Gas Fuel, Ship Type 2G (-104° C, 0.65 t/m3, 4.5 bar g), Unrestricted navigation, VeriSTAR-HULL DFL 25 years, AUT-UMS, SYS-NEQ, MON-SHAFT, INWATERSURVEY, GREEN PASSPORT, CLEANSHIP

Dimension and Main Data

Length o.a. 178.00 m
Length b.p. 168.40 m
Breadth max. 26.60 m
Depth 17.80 m
Deadweight max. abt. 23,600
Design draft 9.50 m
Speed loaded abt. 16 kn
Crew complement 26

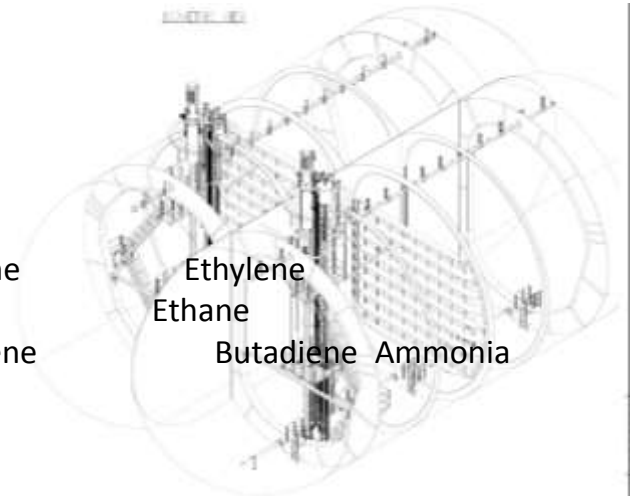
Highlights

- The LNG dual fuel propulsion and the optimized ECO hull design will significantly reduce emissions.
- The ballast water treatment system will protect the sea water environment.
- The vessels will receive Clean ship notation, Green Passport, EEDI compliance, NOx complianc etc



JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况



27,500M³ LNG Carrier

Tank Capacity

HFO	abt. 1,000 m³
LNG fuel Tank	abt. 2,000 m³
Freshwater	abt. 200 m³
Water ballast	abt. 7,000 m³

Cargo Capacity

Tank	Volume in m³ (100%)
1	abt. 8,500 m³
2	abt. 9,500 m³
3	abt. 9,500 m³
Total	**abt. 27,500 m³**

Cargoes

Propane	Butylene	Ethylene
Butane	VCM	Ethane
Propane/Butane	Propylene	Butadiene Ammonia
Methy Chloride	DME	

Cargo Pumps

Pumps	Deepwell
Number	6

Cargo Compressor

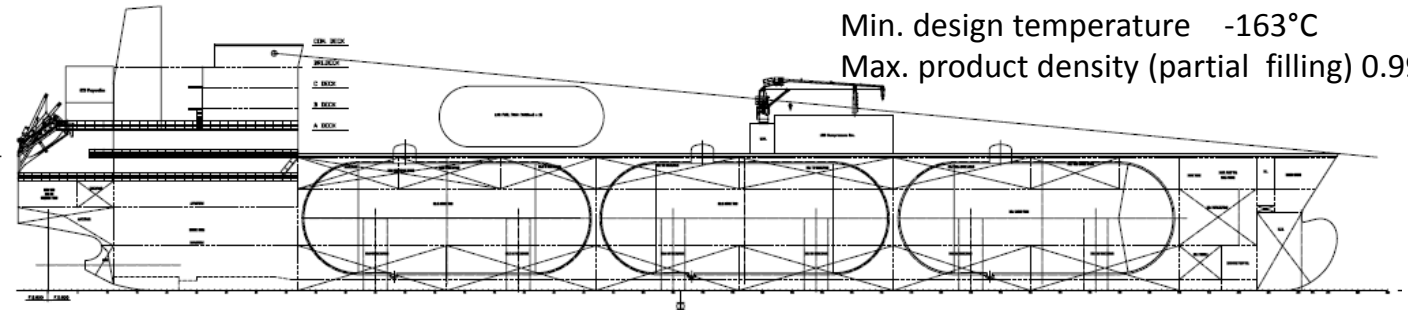
Number	3

Refrigerant Compressor

Number	2

Cargo Tanks Characteristics

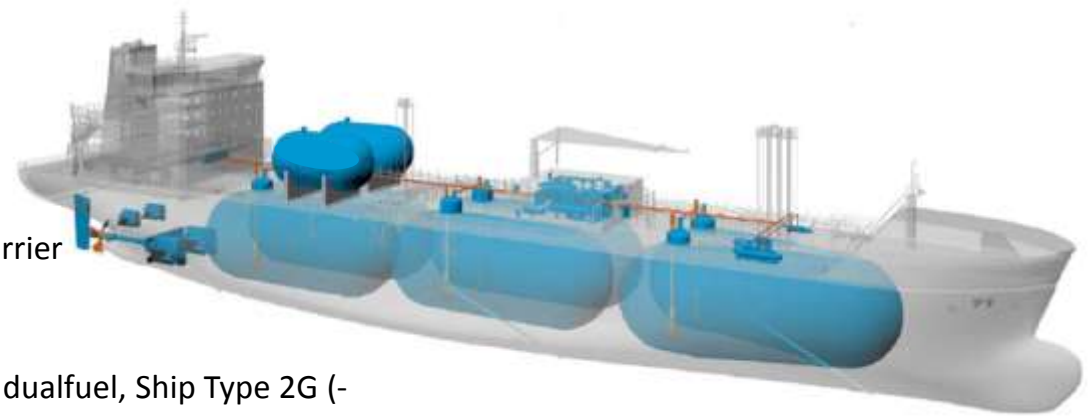
Number of tanks	3
Tank type	Independent C type, Bi-lobe, insulated
Construction Material	9% Ni
Max. Tank Pressure	IMO 4.5 bar (g)
Min. design temperature	-163°C
Max. product density (partial filling)	0.992 kg/dm³



JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

32,000M³ LEG Carrier



Type

semi-pressurized & semi-refrigerated LEG carrier

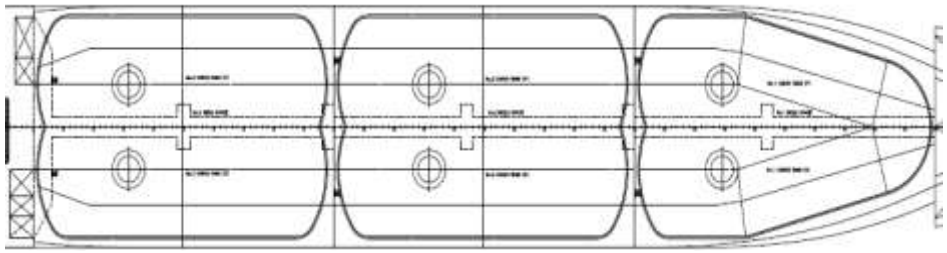
Classification

BV I, +HULL, +MACH, Liquefied Gas Carrier - dualfuel, Ship Type 2G (-104°C, 0.602 t/m3, 4.1 bar g), Unrestricted navigation, VeriSTAR-HULL DFL 25 years, AUT-UMS, SYS-NEQ, MON-SHAFT, INWATERSURVEY, GREEN PASSPORT, CLEANSHIP, BWT or equivalent.

Ines Max LEG32K optimized CTs design and applying MAN B&W DF M/E are bringing remarkable benefit on CTs Capacity, Lower Fuel Cons. and Better EEDI.

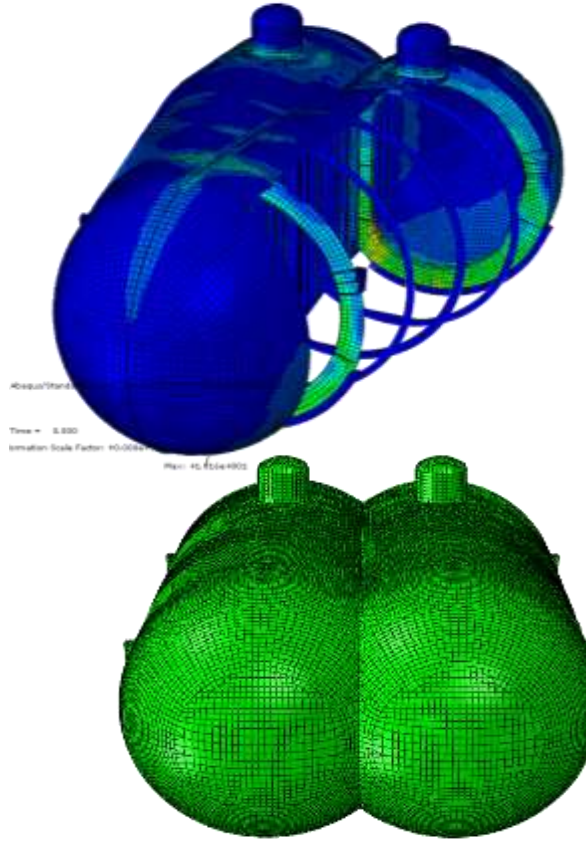
Dimension and Main Data (Ineos Max)

Length o.a.	182.95 m
Length b.p.	abt. 173.50 m
Breadth MLD	27.35 m
Depth	abt. 18.40 m
Design Draft MLD (Td)	abt. 9.30 m
Scantling Draft MLD (Ts)	abt. 10.00 m
Deadweight @ Td	abt. 19,800 t
Deadweight @ Ts	abt. 23,500 t
Service Speed @ Td	abt. 16.0 knots
GT	abt. 24,000 (Estimated)
NT	abt. 8,000 (Estimated)
Accommodations	26



JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况



32,000M³ LEG Carrier

Cargos

Ethylene Ethane Propane
Propane (Pure) C-Propane (2.5 mol% ethane in liquid phase)
Anhydrous Ammonia Butadiene VCM
Mix of Propane and Butane Butylenes (data for ISO) Etc.

Cargo Capacity

Tanks incl. Domes	Volume in m³ (100%)
1 (P&S)	abt. 9,450 m³
2 (P&S)	abt. 11,430 m³
3 (P&S)	abt. 11,430 m³
Total	**abt. 32,310 m³**

Tank Capacity

HFO	abt.	1,000 m³
Gas fuel Tank	abt.	2x1,000 m³
MGO	abt.	250 m³
Freshwater	abt.	250 m³
Ballast Water	abt.	8,000 m³

Cargo Tanks Characteristics

Number of Cargo Tanks	Three (3) pairs (P&S)
Type	Independent IMO type C, bilobe shape, insulated (torispherical heads + hemispherical for No.1 cargo tank fwd head)
Construction Material	Low alloy 5% Ni steel
Max. Tank Pressure	IMO and USCG 4.1 bar (g) @ 0.602t/m³
cargo density	
Min. design temperature	-104°C
Max. product density	Up to 602 kg/m³ (full as 98% loading) Up to 972 kg/m³ (partial loading)

Cargo Pumps

Pumps	Deepwell
Number	6
Capac. Nominal	350 m³/h
Pumps	Booster
Number	2
Capac. Nominal	500 m³/h

Cargo Compressor

Number	2

Refrigerant Compressor

Number	1

JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

36,000M³ LEG Carrier

Environmentally Friendly, Cost-Effective LEG-Carrier with Dual-Fuel Engine

Tank Capacity

IFO 380	abt. 900 m³
LNG fuel Tank	abt. 1,600 m³
MGO	abt. 300 m³
Freshwater	abt. 160 m³
Water ballast (estimated)	abt.

Cargo Capacity

Tank	Volume in m³ (100%)
1	abt. 11,450 m³
2	abt. 12,175 m³
3	abt. 12,175 m³
Total	**abt. 35,800 m³**

Cargo Pumps

Pumps	Deepwell
Number	6
Type	Svanehoj
Max. density kg/dm³	0.972 kg/dm³
Capac. m³/h nominal	500
Total head (bar)	120 mlc

Cargo Compressor

Number	3

Refrigerant Compressor

Number	2

Ship Basic Information

Type

Semi-refrigerated LEG carrier

Classification

GL ✠ 100A5 Liquefied Gas Carrier, -104° C; 0,602 t/m³, 4,1 bar g; type 2-G; NAV, IW; BWM (D2); INERT; NLS; ERS

GL ✠ MC AUT GF; BGF; CM-PS; EP-D

Dimension and Main Data

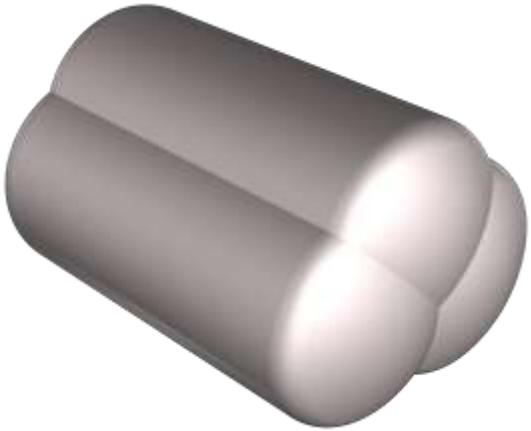
Length o.a.	188.30 m
Length b.p.	178.20 m
Breadth max.	29.00 m
Depth	17.50 m
Depth to trunk deck	23.56 m
Deadweight max. (estimated)	abt. 21290
Design draft	9.50 m
Speed loaded	abt. 18 kn
GT	abt. (estimated)
NT	abt. (estimated)
Crew complement	23

JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

36,000M³ LEG Carrier

STAR-TRILOBE INDEPENDANT TYPE C TANK

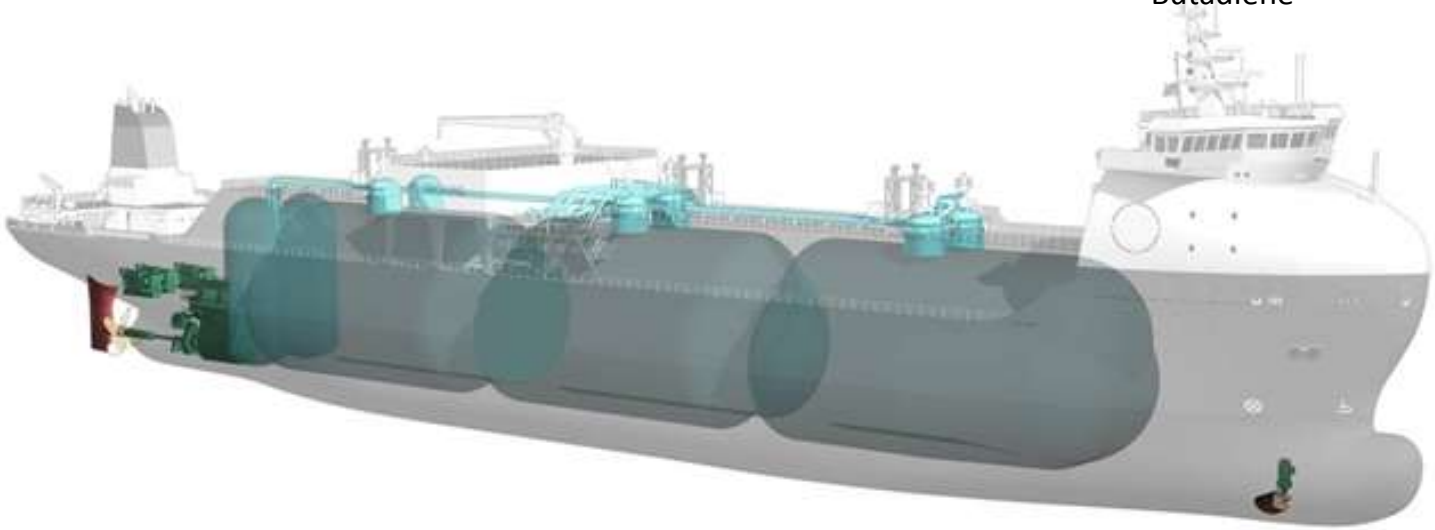


Cargo Tanks Characteristics

Number of tanks	3
Tank 1-3	Independent C type, star-trilobe, insulated
Construction Material	5% Ni
Max. Tank Pressure	IMO 4.1 bar (g)
Vacuum	0.7bar (a)
Min. design temperature	-104°C
Max. product density	0.6 kg/dm³

Cargoes

Propane	Butylene	Ethylene
Butane	VCM	Ethane
Propane/Butane	P.O.	Propylene
Isopropylamine	Ammonia	
Butadiene		



JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

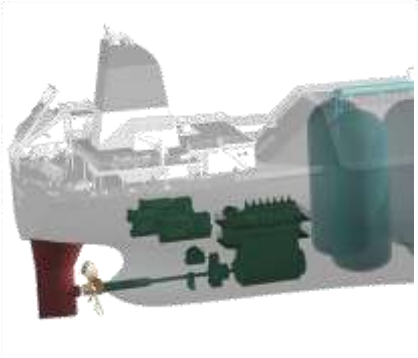
36,000M³ LEG Carrier

Other Highlights

SVELTE Bow
- Better comfort and safety
- Higher transit speeds at bad weather conditions
- Better protection of cargo area, tanks and gas plant

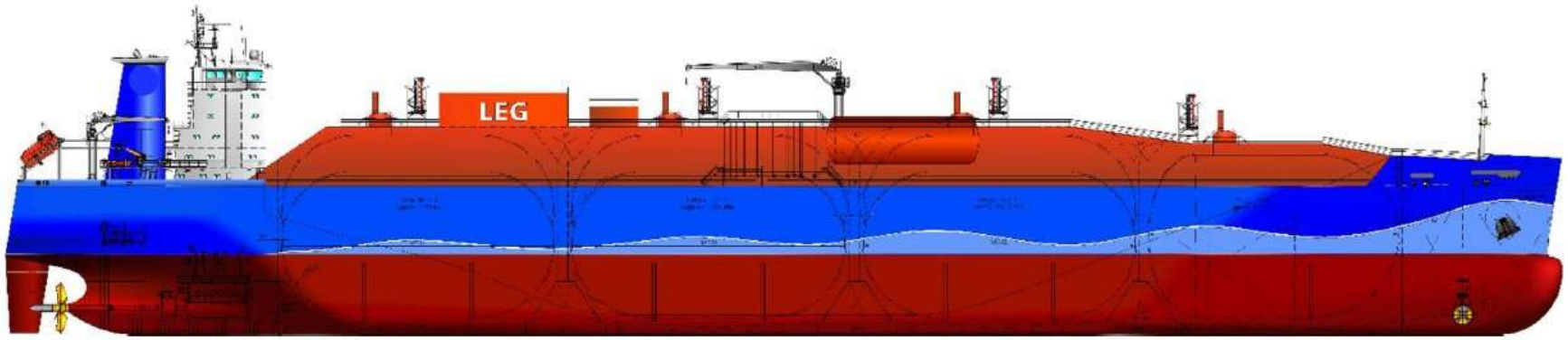
Main Engine and Shafting
- Higher reliability based on 2-stroke technology
- Higher efficiency based on 2-stroke technology
- Higher efficiency due to less losses within the propulsion plant

Propeller/Rudder
-Higher propeller efficiency and reduced cavitation and vibrations



2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

85,000M³ VLEC



Ship Basic Information

Type

Semi-refrigerated LEG carrier

Classification

GL ✠ 100A5 Liquefied Gas Carrier, -104° C; 0.602 t/m³, 4,1 bar g; type 2-G; NAV, IW; BWM (D2); INERT; NLS; ERS

GL ✠ MC AUT GF; CM-PS; EP-D

Dimension and Main Data

Length o.a. 231.60 m
Length b.p. 225.50 m
Breadth moulded 36.60 m
Depth 22.20 m
Deadweight max. abt. 50,000 (estimated)
Scantling draught 12.0 0m
Speed abt. 16 kn
Crew complement 23

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

85,000M³ VLEC

Cargo Capacity

Tank	Volume in m³ (100%)
1	abt. 13,920 m³
2	abt. 23,100 m³
3	abt. 23,100 m³
4	abt. 23,100 m³
Total	**abt. 83,220 m³**

Cargo Tanks Characteristics

Number of tanks	4
Tank 1	Independent C type, cylindrical, insulated
Tank 2-4	Independent C type, star-trilobe, insulated
Construction Material	5% Ni
Max. Tank Pressure	IMO 4.1 bar (g)
Vacuum	0.7bar (a)
Min. design temperature	-104°C
Max. product density	0.602 kg/dm³

Cargoes

Propane Butylene Ethylene
Butane VCM Ethane
P.O. Propylene Ammonia
Isopropylamine Butadiene
Propane/Butane mixtures

Tank Capacity

IFO 700	abt.	2000 m³
LNG fuel Tank	abt.	1600 m³
MGO	abt.	220 m³
Freshwater	abt.	250 m³

Cargo Pumps

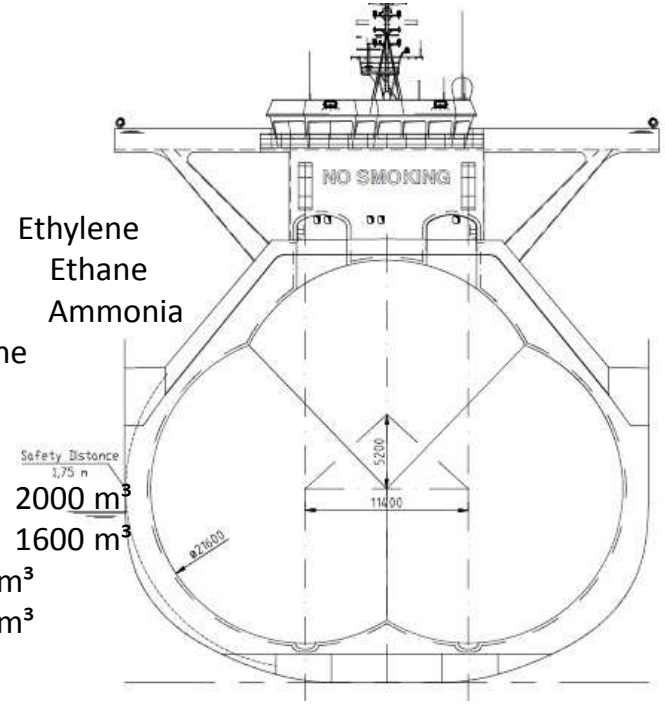
Pumps	Deepwell
Number	8
Capac. m³/h nominal	500
Pumps	Booster
Number	2
Capac. m³/h nominal	500

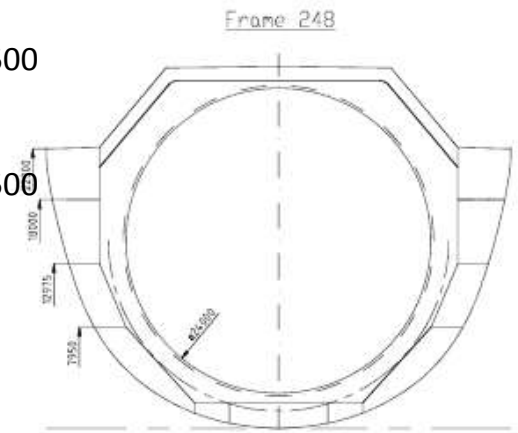
Cargo Compressor

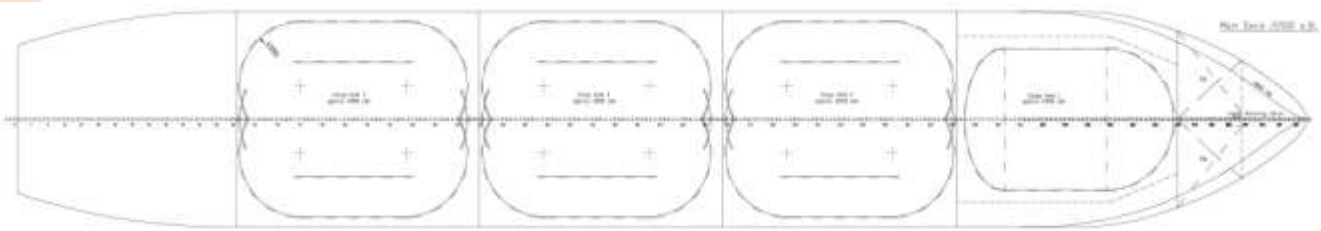
Number 4

Refrigerant Compressor

Number 4







JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

86,000M³ VLGC

Ship Basic Information

Type
Semi-refrigerated LPG carrier

Classification
GL ✠ 100 A5 LIQUEFIED GAS CARRIER
(-50°C, 4.5 bar gauge: 0.602 t/m³)
type 2-G, NAV, IW, BWM (D2), INERT, ERS
GL ✠ MC-AUT GF, CM-PS, EP-D

Dimension and Main Data

Length o.a.	231.60 m
Length b.p.	225.50 m
Breadth max.	36.60 m
Depth	22.00 m
Depth to trunk deck	30.95 m
Deadweight max.	abt. 50,000 (estimated)
Design draft	12.00 m
Speed loaded	abt. 16 kn
GT	abt.58100
NT	abt.17500
Crew complement	26

JHW ENGINEERING & CONTRACTING LTD

2.1.1 Current Products and Technologies Introduction
现有产品及技术概况

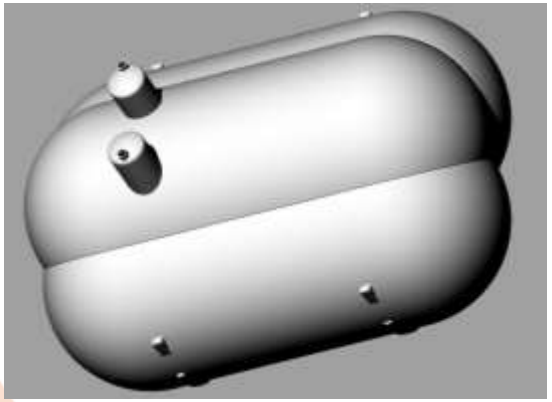
86,000M³ VLGC

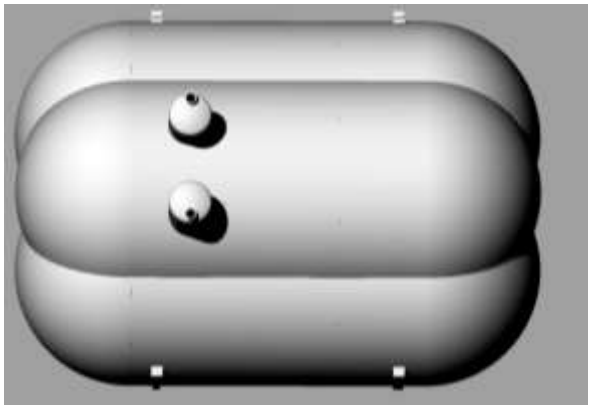
Products

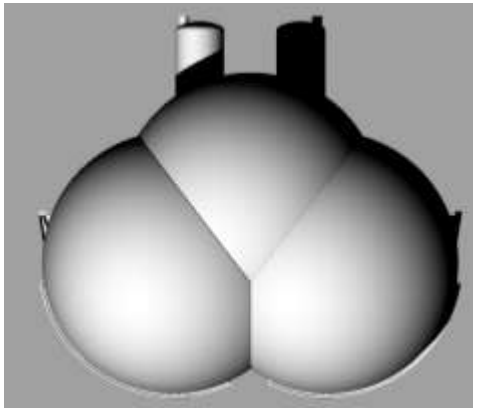
Propane	Butylene	Butane
Propane/Butane	Propylene	Butadiene

Cargo Tanks Characteristics

Number of tanks	4
Tank 1	Independent C type,clinder, insulated
Tank 2-4	Independent C type, trilobe, insulated
Construction Material	TBD
Max. Tank Pressure	IMO 4.5 bar (g)
Vacuum	0.7 bar (a)
Min. design temperature	-50°C
Max. product density	0,602 kg/dm³



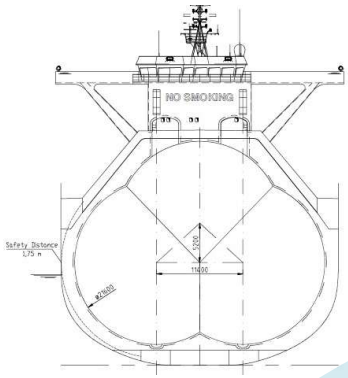




JHW ENGINEERING & CONTRACTING LTD

2.1.2 Technical Innovation
技术创新

Innovative Semi-refrigerated Solution with Trilobe C-TypeTanks for VLEC & VLGC
创新地将半冷半压的C型三罐技术方案应用于超大型液化乙烷/石油气运输船



GAS
气体

CARRIER
船型

Petrol Gas
石油气

Ethylene & Ethane
乙烯和乙烷

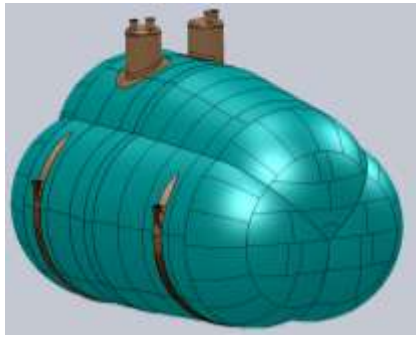
Natural Gas
天然气

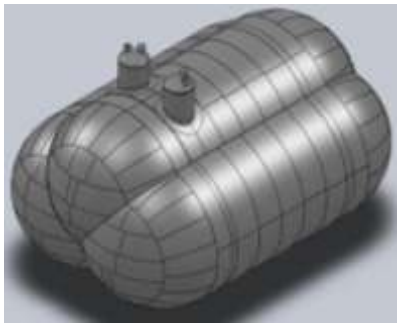
ECOSTAR 86K
VLGC

ECOSTAR 85K
VLEG

36K LEG

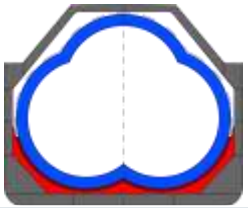
27.5K LNG





JHW ENGINEERING & CONTRACTING LTD

2.1.2 Technical Innovation
技术创新



Competitive edge of Type C Star Trilobe Tank & Semi-refrigerated Gas Handling System towards A-type cargo system
C型罐半冷半压式系统相较A型舱的竞争优势

Topic 项目	Type A 传统A型罐	Type C Star trilobe 创新C型3罐
Pressure range 压力范围	0 up to 0.25 bar	0 bar up to abt. 4.5 bar
Secondary barrier 次屏壁	Yes, needed 需要	No need 无需
Cargo warming up during passage 旅途中液货是否可升温	NO, impossible 不可以	YES, possible 可以
Required gas handling system 所需的液货系统	Fully-refrigerated 全冷系统	Semi-refrigerated 半冷半压式

Safety
安全

Type C pressure tank containment system with the highest safety level for the transport of liquid gas which even do not require a secondary barrier

Efficiency & Cost
效率&成本

Minimize energy consumption, due to no need for continuous cooling down of cargo during the passage

New regulation from IGC Code impacts the actual volume of the traditional design of VLGC **(around 1800cbm less).**
（Enter into force on 1 January 2016）

- V ≤ 1,000m3 — d = 0,80 m
- 1,000 m3 < V ≤ 5,000 n — d = 0,75+ V x 0,20/4,000
- 5,000 m3 < V ≤ 30,000 — d = 0,8 + V/25,000
- V > 30,000 m3 — d = 2 m

Environmental Friendly环保

Lower emission

Flexibility
灵活性

Multi LPG

Less Terminal Restriction

High Unloading Capacity

600 m^3/h × 7

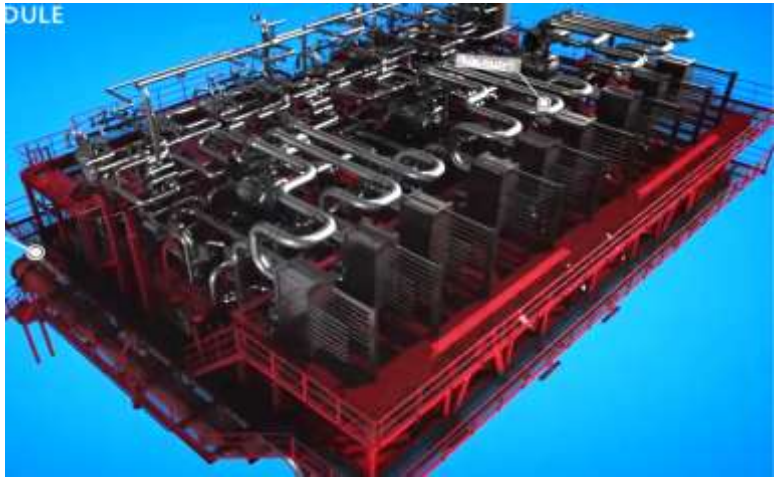
Type A — ECOSTAR

ECOSTAR's unloading of warmer storages with full pump capacity is possible.在卸载升温货物时深井泵的能力将不受限制

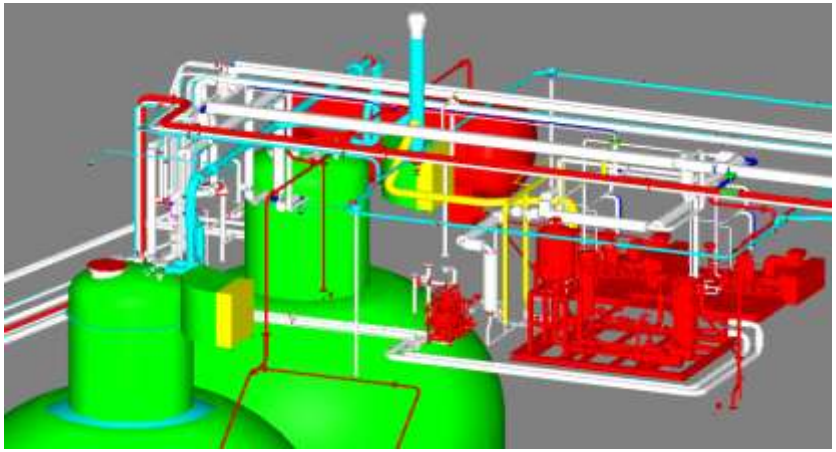
2.2 Offshore Oil & Gas Module
海上油气模块

Re-gas Module再气化模块

Number of trains	3~4
Pressure output	6~17Mpa
Capacity	300~500 MMSCF/D
Outline size	~21X18X13m
Total weight	500~700T

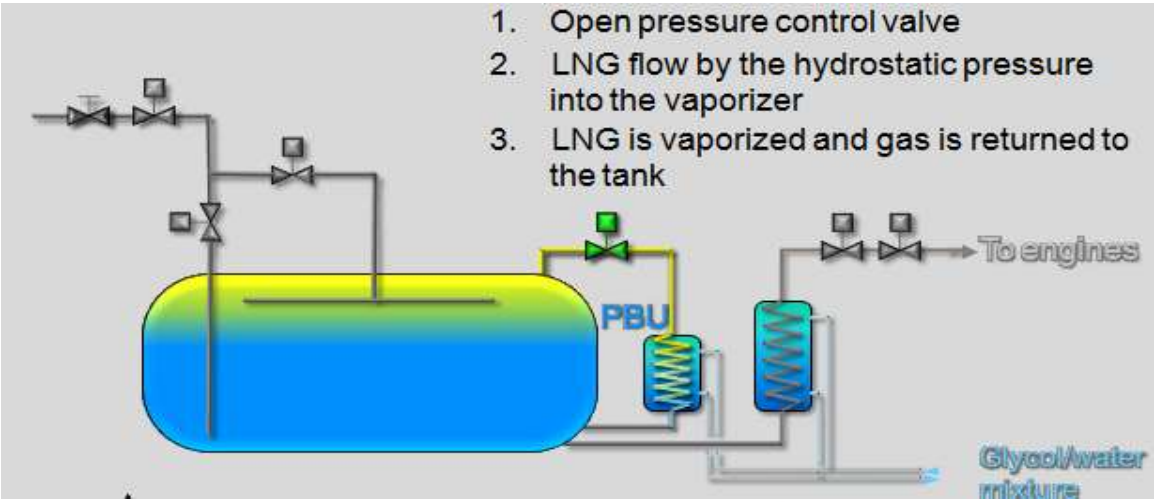


2.2 Offshore Oil & Gas Module
海上油气模块



Fuel gas supply system供气系统

Number of tanks 2
Tank 1&2 Independent C type, cylindrical
PU insulation 300mm
Construction Material X7Ni9
Max. Tank Pressure IMO 6 bar (g)
Min. design temperature -165°C



III. Business Model
商务模式

3.1 Market Trend & Segmentation
市场发展趋势与细分市场

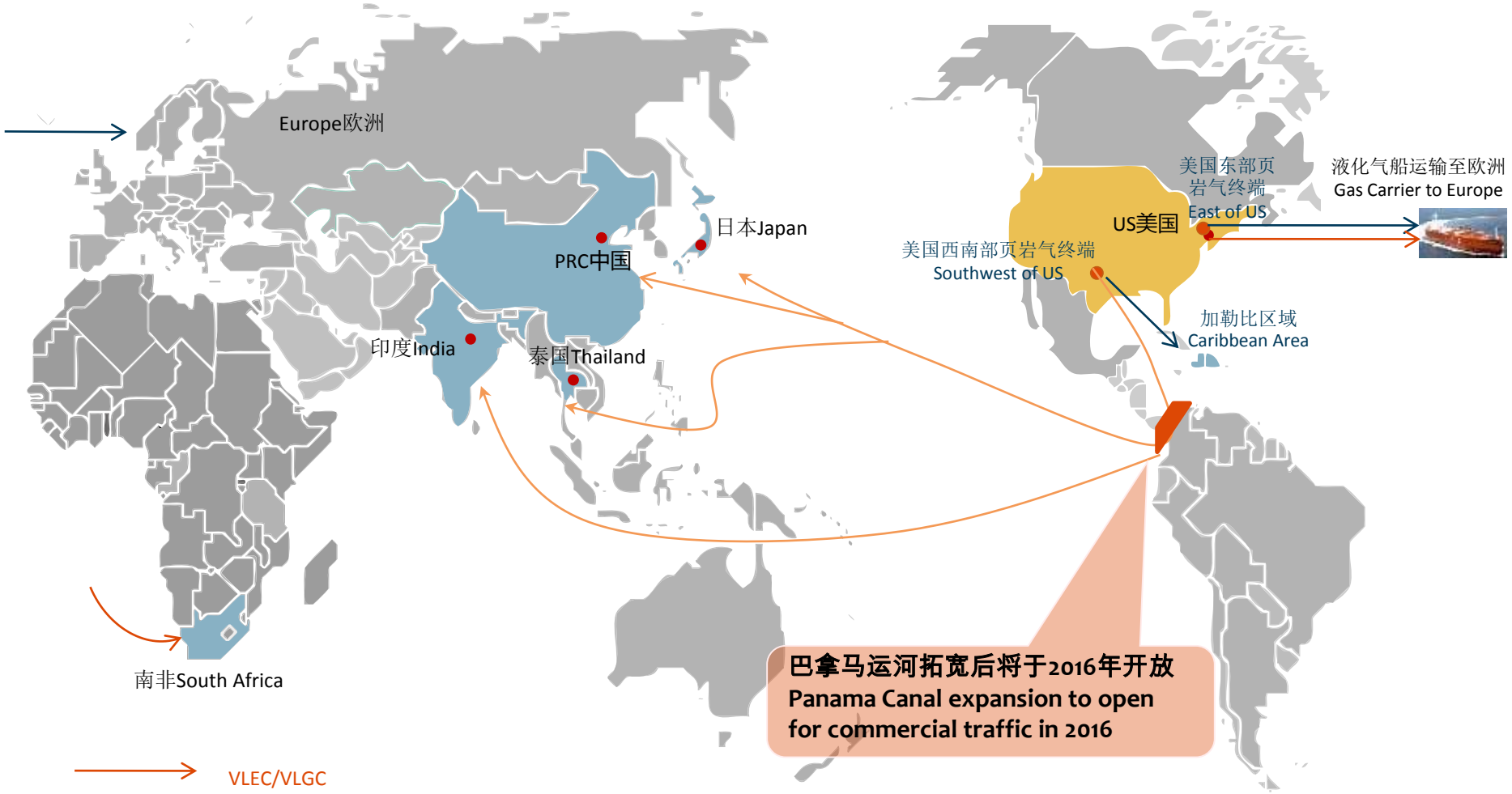
3.2 Business Model
商务模式

3.3 Core Competence
核心竞争力

JHW ENGINEERING & CONTRACTING LTD

3.1 Market Trend & Segmentation
市场发展趋势与细分市场

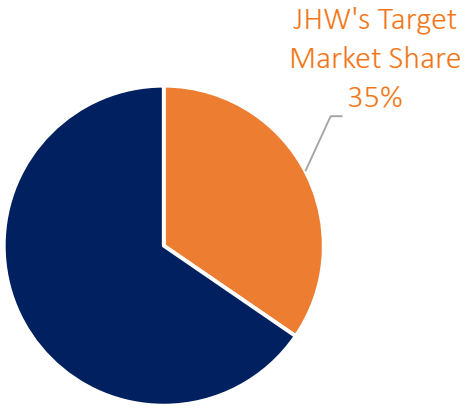
布局美国页岩气运输市场
Target US Shale Gas Transportation Market

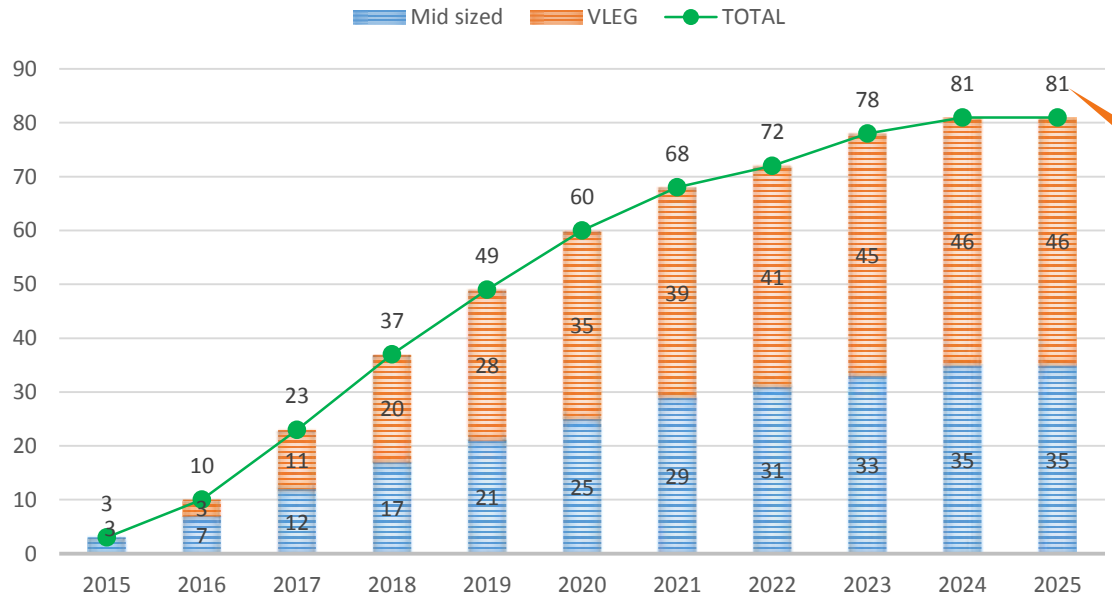


JHW ENGINEERING & CONTRACTING LTD

3.1 Market Trend & Segmentation
市场发展趋势与细分市场

美国乙烷运输市场
US Ethane Transportation Market



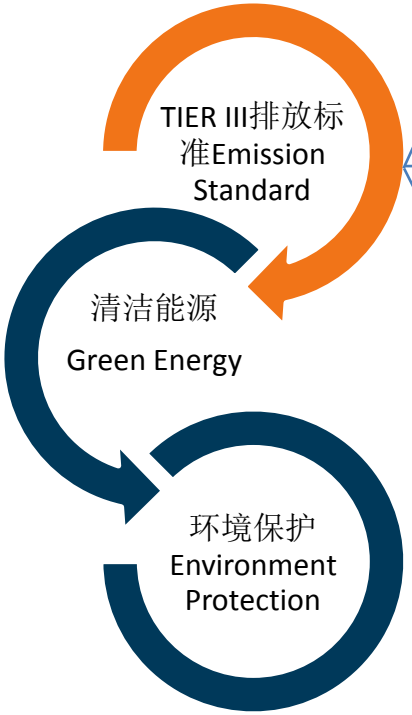


Total Demand for Gas Carriers
气体船总需求：81

Source: EIA, Bentek, Platts, CERI, EnVantage，Argus Media，Petrochemical Europe; Estin & Co analysis and estimations

3.1 Market Trend & Segmentation
市场发展趋势与细分市场

从2016年1月1日起，国际海事组织(IMO)Tier III船机排放标准将强制实施。
IMO Tier III Emission Standard will be implemented on to vessels constructed on or after January 1 of 2016



氮化物排放标准
NOx Emission Standards

硫化物排放标准
Sulfur Content of Fuel

温室气体排放标准
Greenhouse Gas Emissions

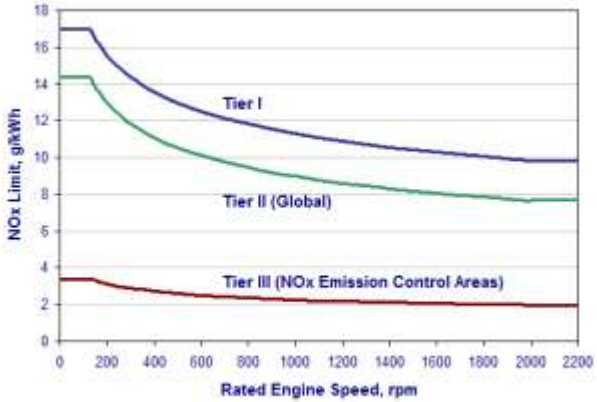


Figure 1. MARPOL Annex VI NOx Emission Limits

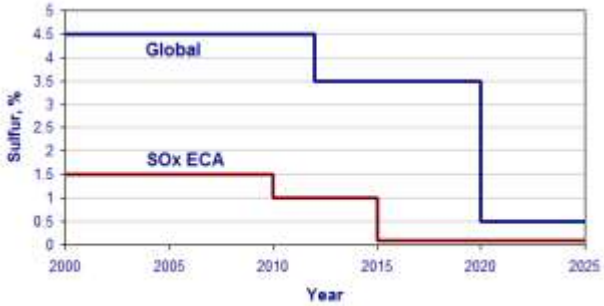
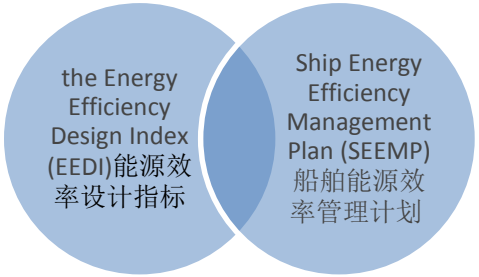


Figure 2. MARPOL Annex VI Fuel Sulfur Limits



3.2 Business Model
商务模式

Support from Owners
来自船东的支持

欧洲
Europe

JHW E&C

EPC of Gas Projects
气体项目总承包

Basic, Detail Engineering
基本、详细设计

Procurement, Contracting, Project Management
采购、合同、项目管理

Construction, Commissioning, Delivery
建造、调试、交船

Marine
船

ECONOVO

Marine Engineering
船舶设计

JHW Trading

Contracting Mgt.合同管理
Procurement & Subcontracting Mgt.
采购及分包管理
Project Mgt项目管理

WOE

Gas Unit
气体装备

Cryolobe Gas Technology

CRYOLOBE

Engineering Solution Of Offshore Gas Unit
海上气体装备的技术、工程解决方案

Other Shipyard
其他船厂

Construction Mgt.
建造管理

JHW ENGINEERING & CONTRACTING LTD

3.3 Core Competence
核心竞争力

Overseas 海外 | China 中国

Experienced Operators
富有经验的运营商

JHW E&C

- JHW Trading
- Econovo
- Cryolobe
- WOE
- The 3rd Party

Bridge to the real customer（End user）
与最终用户之间的桥梁

Determined Shareholders
目标坚定的大股东

Experienced Mgt Team富有行业经验的管理团队

Engineering Capability
设计能力

Project mgt项目管理

Construction mgt team
建造管理

Key Facility关键设施

Support from Jaccar Strategy
来自Jaccar 集团战略的支持

Creative Business Model
创新商务模式

Product Delivery Capacity
产品交付的能力

JHW ENGINEERING & CONTRACTING LTD

IV. Future Potential Opportunity
未来潜在发展机会

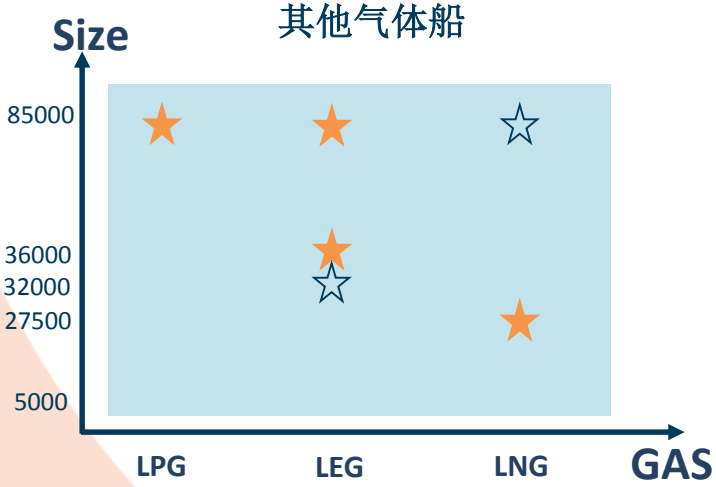
Apply the innovative technology & business model into the new products
将创新的技术方案和商务模式应用到新产品中

LNG-FSRU
浮式存储再汽化装置

Offshore Equipment/Modules
海工装备及模块

Offshore Vessel or Other Special Ships
海工船及其他特种船

Other Gas Carriers
其他气体船



JHW ENGINEERING & CONTRACTING LTD

The END

JHW ENGINEERING & CONTRACTING LTD