NOR-SHIPPING 2015

Norway Japan Maritime Green Innovation Seminar

Mitsubishi Emission reduction technology

2015 06 04

SHIP & OCEAN ENGINEERING DEPARTMENT

MITSUBISHI HEAVY INDUSTRIES, LTD.

Our Technologies, Your Tomorrow

Commercial aviation & transportation systems

Product Keys

Domains

Division

Ship building & Ocean development

Commercial aviation

Transportation system

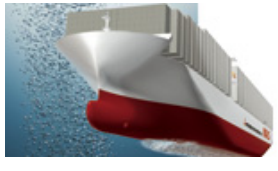
Ship building & Ocean development

Ship building

Koyagi & Nagasaki yard

Ship repair

Global partners



Engineering and Marine solution

Overseas Shipbuilding business

Engineering service and Marine solution

Bulk carrier (SEAHORSE series)

Container (MERMAID series)

Design package of Conventional ships

- Bulk carriers
- Container ships
- LPG carriers
- Chemical tankers

Green technology

✓ **CO2 emission reduction**

- Mitsubishi Reaction Fin
- Mitsubishi Stator Fin
- Mitsubishi Hub Vortex Free Cap
- Hybrid CRP pod system
- Solar power system
- Mitsubishi Air Lubrication System (MALS)

✓ **SOx emission reduction**

- LNG as fuel technology (MHI-GEMS)
- Emission abatement technology (MHI-EGCS)

About us & What we can do

Ship Design Package Line-up

MHI is providing …

Line-up for container carriers

- 1,000TEU
- 1,800TEU
- 2,600TEU
- 3,600TEU
- 4,900TEU
- 10,000TEU
- 18,000TEU

- Ready
- Coming soon
- Under development

Line-up for bulk carriers

- 35,000DWT “SEAHORSE 35”
- 37,500DWT “SEAHORSE 375”
- 38,000DWT “SEAHORSE 38”
- 41,000DWT “SEAHORSE 41”
- 61/62,000DWT “SEAHORSE 61/62”
- 180,000DWT

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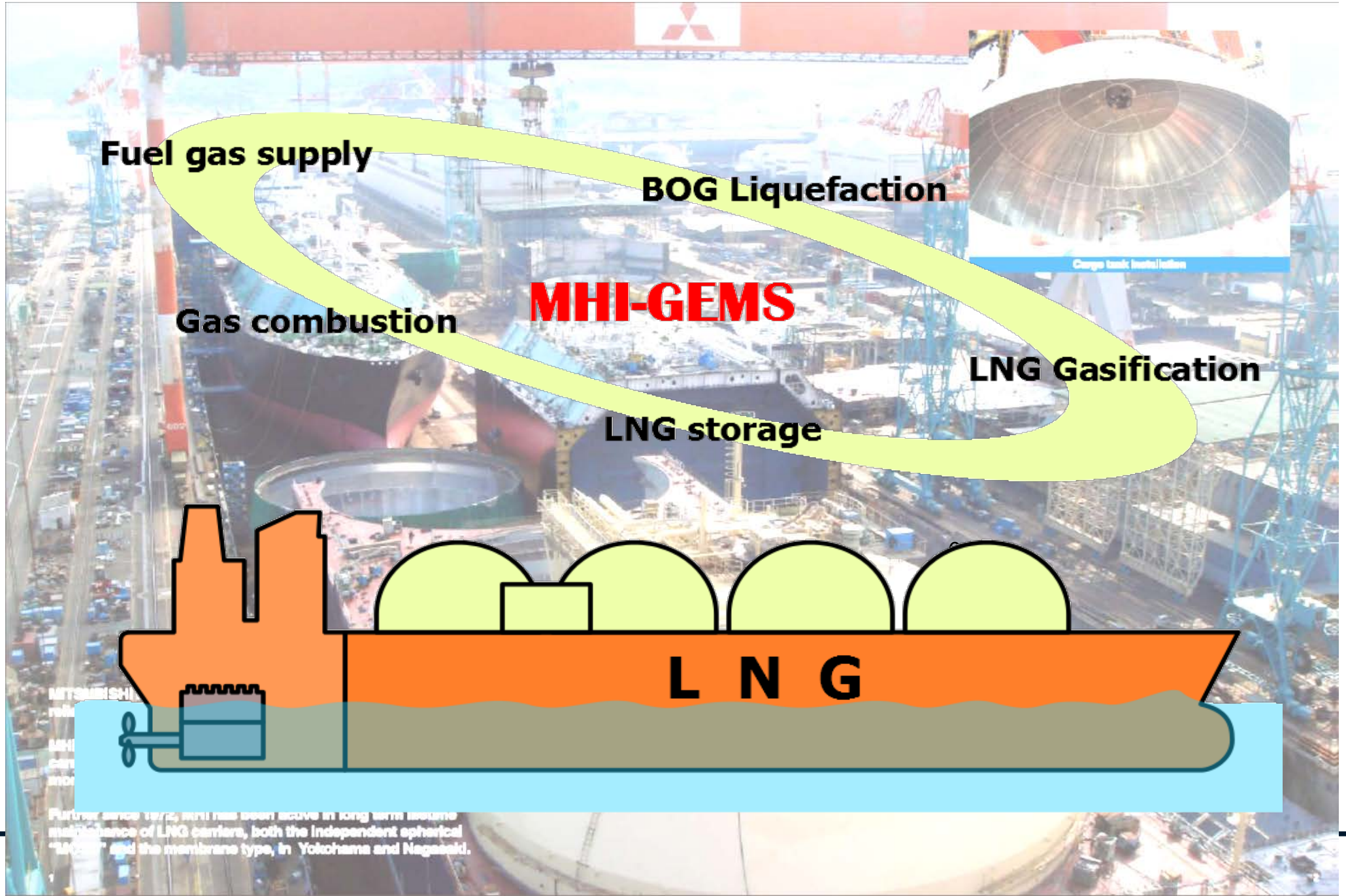
- **Emission abatement technology (MHI-EGCS)**

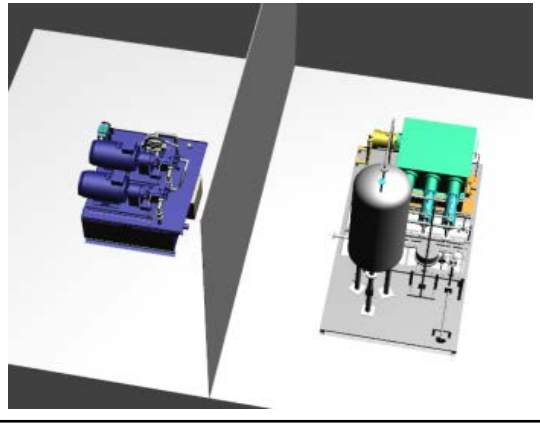
SOx Emission reduction technology (MHI-GEMS)



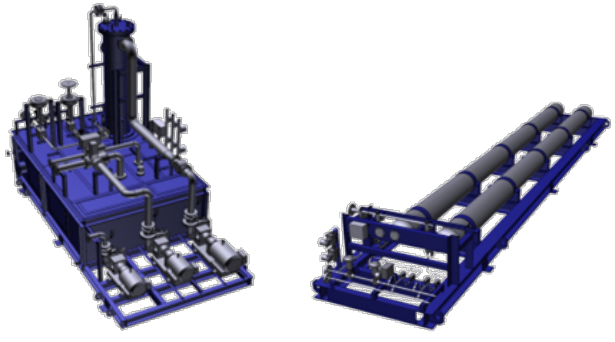
Provide Function in modules

Fuel Gas Supply System(FGSS) for GI engine and DF/Gas engine

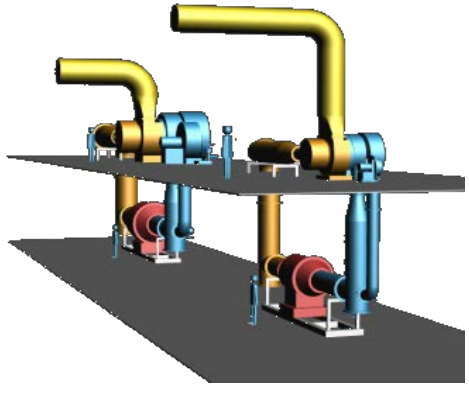
LNG Fuelling to GI engine (~40MPa)



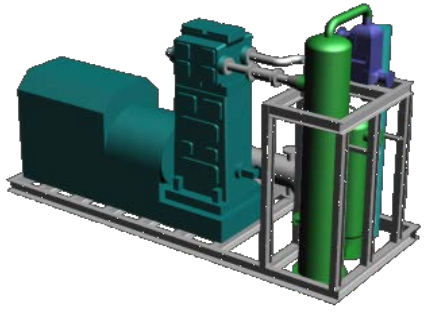
CNG production and regulation



Gas combustion

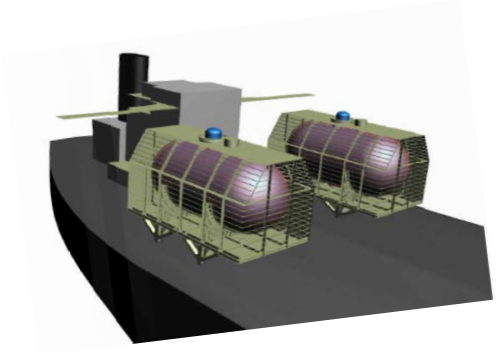
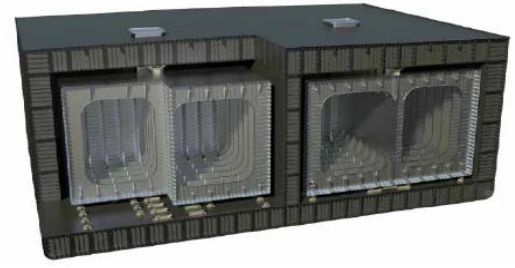


BOG Fuelling to DF/Gas engine (~1MPa)

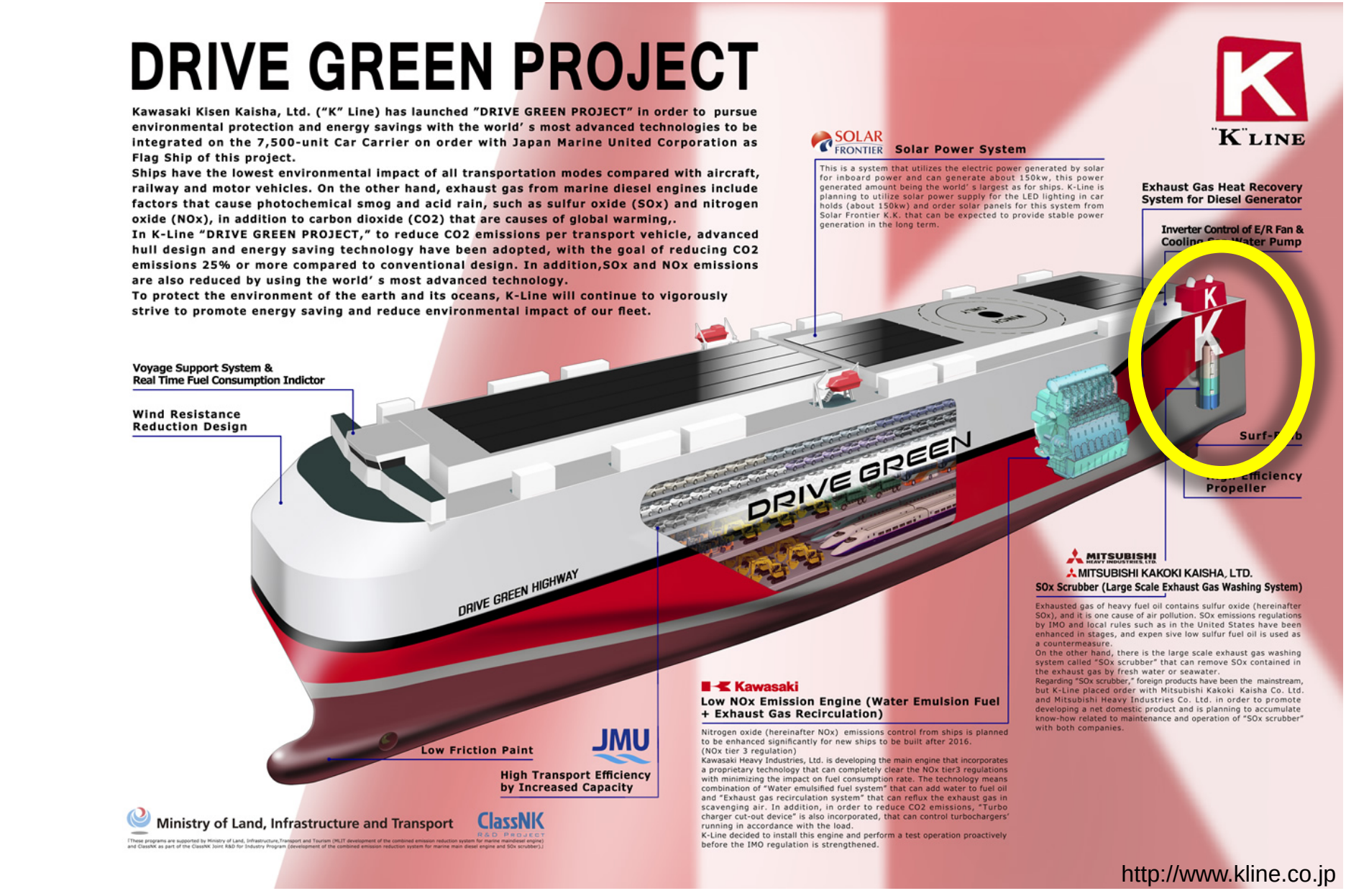


Provide Function in modules

LNG containment system (Storage tank)

Double wall tank	IMO type C tank	IMO type B tank
		
• Engine factory • Ferry • Tag etc...	• Partial LNG fuel ship (LNG for ECA)	• Full LNG fuel ship

SOx Emission reduction technology (MHI-EGCS)



Bulk Carrier Developed by MHI Wins Nor-Shipping Energy Efficiency Award

Harvest Frost is a 95,000 dwt bulk carrier designed by Mitsubishi Heavy Industries, built by Oshima Shipbuilding and delivered to Archer Daniels Midland USA on October 29, 2014. MHI provided most of its innovative features, including the conceptual design, various green technologies and the Mitsubishi Air Lubrication System. The vessel also features a new bow shape designed to reduce wave-making resistance. For propulsion, it has adopted an innovative system that effectively converts the main engine power into propulsion power by positioning fins forward of the propellers and placing special grooves in the propeller boss cap.

(http://messe.no/en/nor-shipping/Spotlight-on-excellence/Energy-Efficiency-Award-2015/)

Conclusion

With the increasing adoption of international rules on easing environmental burdens imposed by marine transport, expectations of and demand for environmentally harmonious “Eco-ships” are steadily rising.

In response MHI is not only developing and constructing Eco-ships of every kind, MHI is also applying its expertise accumulated in its shipbuilding and ocean development businesses to provide engineering support to other shipbuilders.

MHI has adopted a long-term strategy for its shipbuilding and ocean development business to focus on high-value-added vessels and to strengthen its engineering operations by providing a wide spectrum of energy efficiency technologies to other shipbuilders both in Japan and abroad.

We want to keep possible future in mind during developing collaborative relationship with you.

Our Technologies, Your Tomorrow