S&SYS

Marine & Offshore Solution I Fuel Supply System

PURIGAS™

Fuel Supply System

PURIGAS™

PURIGAS™ is the package solution for alternative fuel supply system.

It is named after S&SYS's Ballast Water Management System, PURIMAR™, means PURe and Intelligent GAS storage and supply system.

Since LNG, LPG, Methanol and Ammonia are considered the eco-friendly fuel for IMO's SOx, NOx and GHG emissions restriction, a lot of ship owners are deeply looking into the alternative fuel supply system as best option for this barrier although CAPEX and installation space are heavy obstacles to adapt on board.

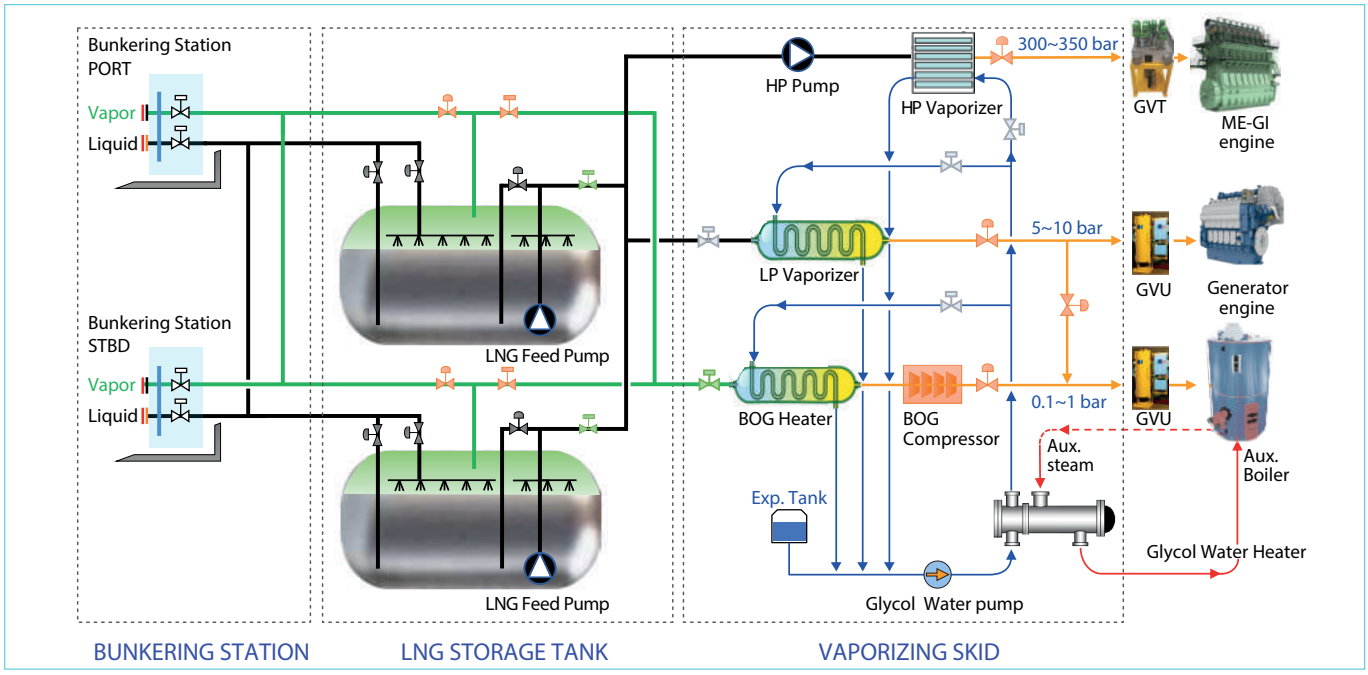
To solve this obstacles, PURIGAS™ has been developed from the accumulated technology and various experiences over past few years. Based on S&SYS's proven technology and know-how, PURIGAS™ will provide the most economical solution and the most reliable package system to our valuable customers with low CAPEX & OPEX in any kinds of fuels LNG, LPG, Methanol and Ammonia.

[Fuel Properties Comparison Table]

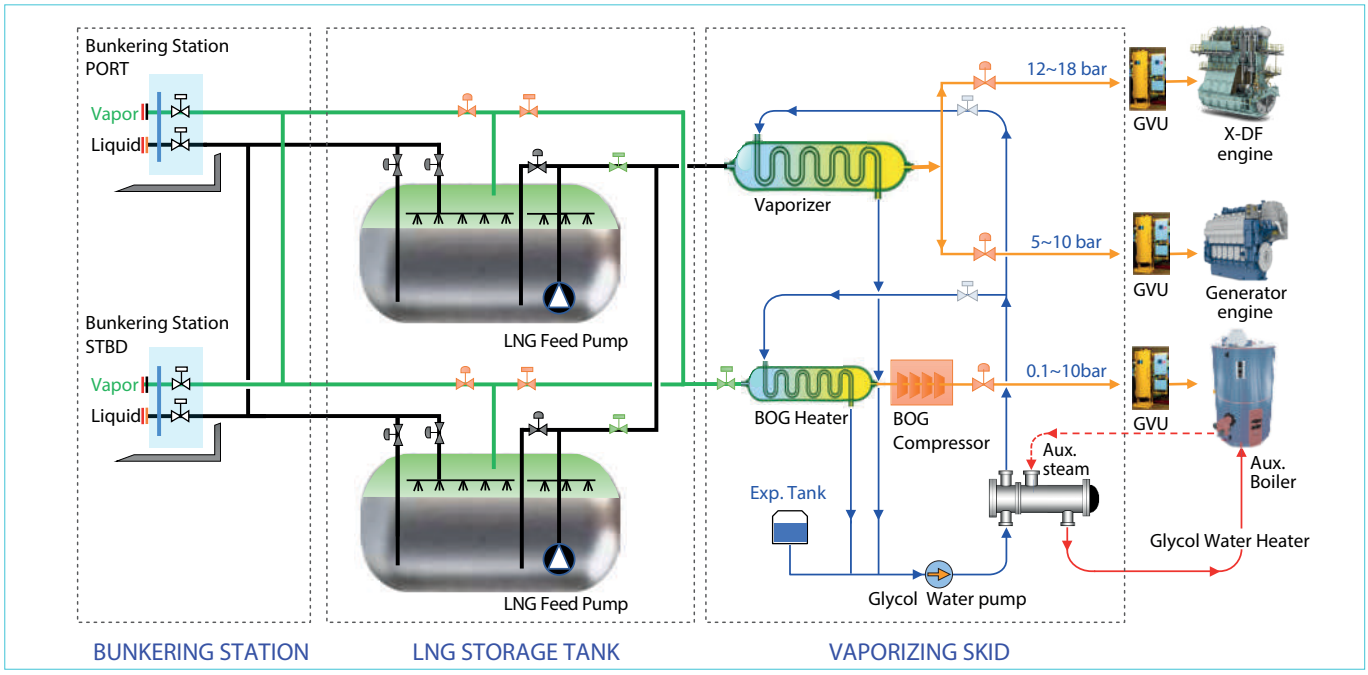
		Marine Gas Oil (MGO)	Liq. Natural Gas (LNG -162°C)	Methanol (CH3-OH)	Liq. Pet. Gas (LPG)	Ammonia (NH3)
Specific Energy		42.7 MJ/kg	50.0 MJ/kg	19.9 MJ/kg	46 MJ/kg	18.6 MJ/kg
Density		840 kg/m^3	430~470 kg/m^3	800 kg/m^3	470~590 kg/m^3 (508 at 15°C)	600 kg/m^3
Emission Reduction Compared to HFO Tier II	SOx	Base	90~99%	90~97%	92%	100%
	NOx	Base	20~30%	30~50%	84%	Compliant with Regulation
	CO_2	Base	24%	11%	10 ~ 14%	~ 90% (Using pilot oil)
	PM Particulate Matter	Base	90%	90%	90%	~ 90%
Boiling Temperature		200°C~370°C	- 161°C	64.7°C	- 44°C ~ - 40°C	-33.34°C
Flash Point (Low flash point : < 60°C)		63~87°C	-188°C	11°C	-106 ~ -100°C	132°C
Fuel storage condition		Liquid	Liquid	Liquid	Liquid	Liquid
Storage temperature		25°C	- 162°C	25°C	-32.6°C (at 0.5barg)	-24.7°C (To be discussed)
Supply Pressure		7~8 bar	300 bar	13 bar	50 bar	83 bar
Required Tank Volume		1,000 m^3	1,600 m^3	2,300 m^3	1,500 m^3	3,000 m^3

Fuel Gas Supply System (LNG)

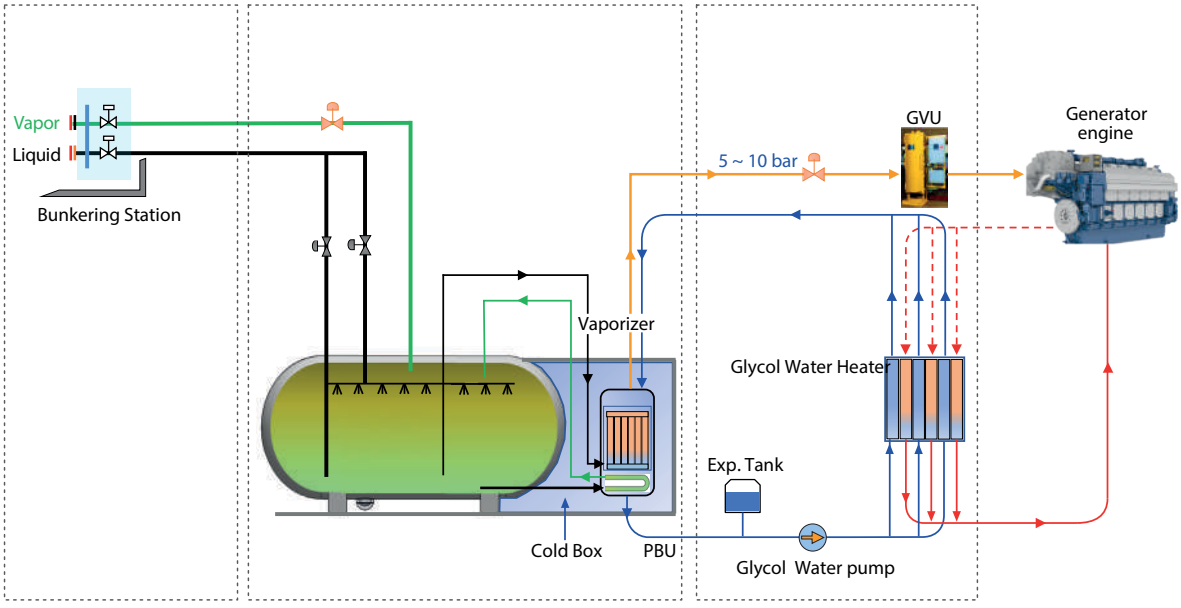
Flow Diagram for ME-GI Engine



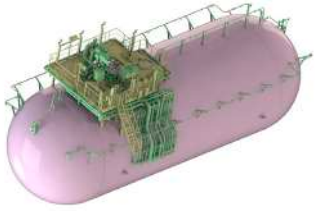
Flow Diagram for X-DF Engine



Flow Diagram for DFDE for Small Vessel

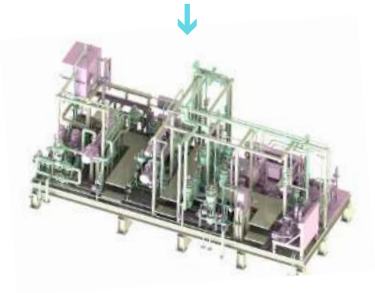


Equipment for PURIGAS™



LNG Storage Tank

Bunkering Station



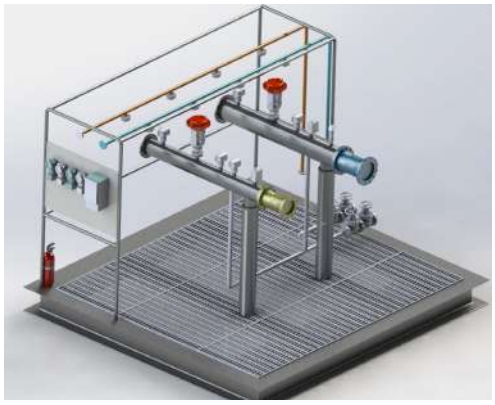
High Pressure Pump Skid

Veporizer Skid

Fuel Gas Supply System (LNG)

Bunkering Station

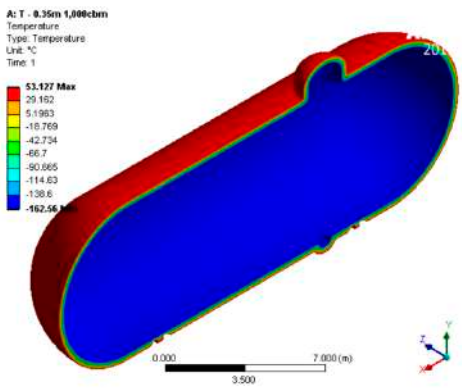
- Quantity : 2 sets(Port & Starboard shipside)
- Liquid Line : 4~8" Pipe
  Vapour Line : 4~6" Pipe
- Dimension(In accordance with SGMF guidance)
  - Distance of manifold flanges inboard from ship's side : 1,100mm
  - Horizontal distance Between Flange centers : 1250 mm
  - Vertical distance Between Flange center & working platform : *mm(*depend on ship's specification)



Type-C LNG Storage Tank

Design specification

- Independent Type-C tank(IMO/IGC)
- Single shell(with PUF) or Double shell(VACUUM with Perlite)
- Design pressure : 3~9 bar.G
- Working pressure : 1~9 bar.G



Heat analysis

FGSS SKID

Design Specification

- LNG HP pump unit
- LNG Vaporizer unit
- Glycol water supply system
- BOG compressor (Option)

Vaporizer

PCHE(Printed Circuit Heat Exchanger)type

- Proper for high pressure
- Diffusion Bonded
- Chemically etched fluid channels

Merit

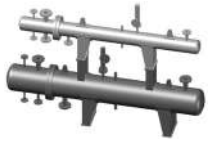
- Minimize area and size of heat exchange
- Maximize heat transfer efficiency

Shell & Tube Heat Exchanger type

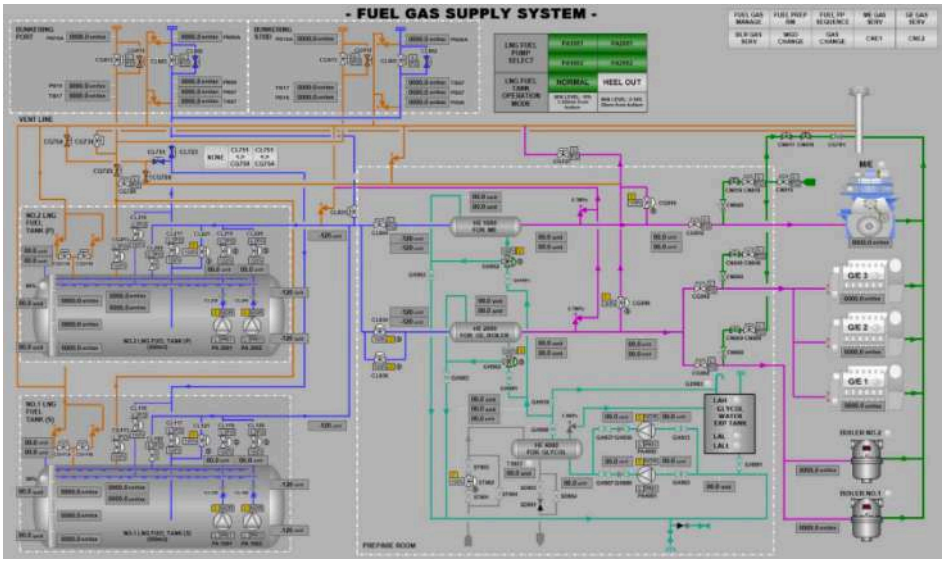
- Proper for low pressure
- Most commonly used

Merit

- Low cost
- Easy maintenance

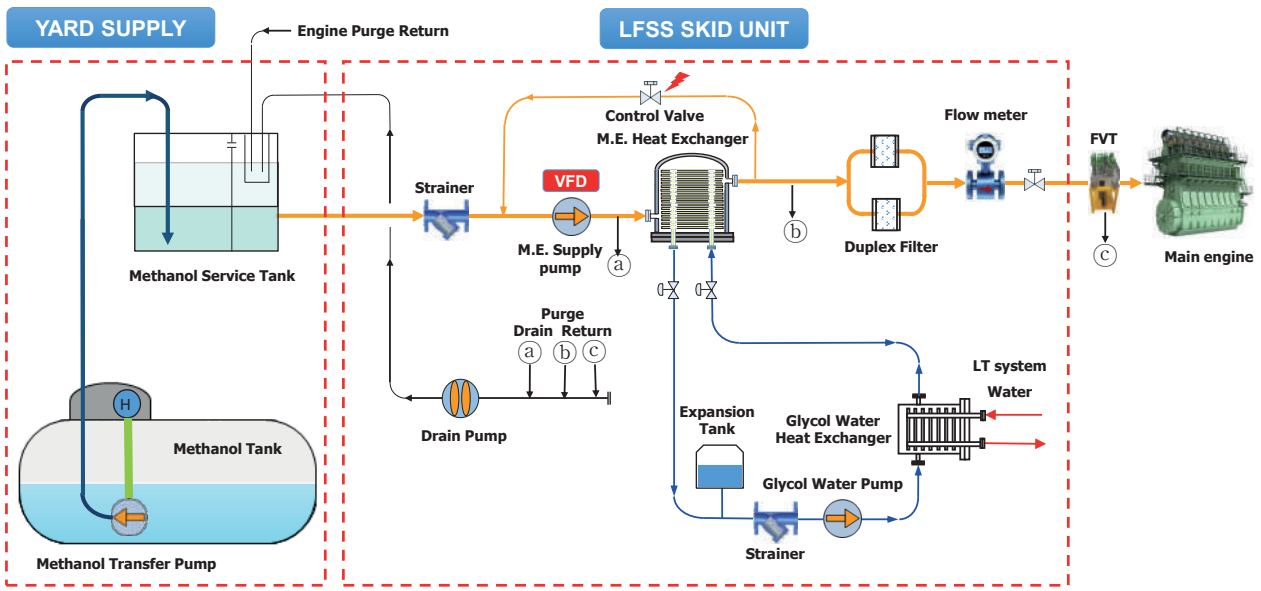


FGSS Control & Monitoring Mimic (SSAS-MASTER)

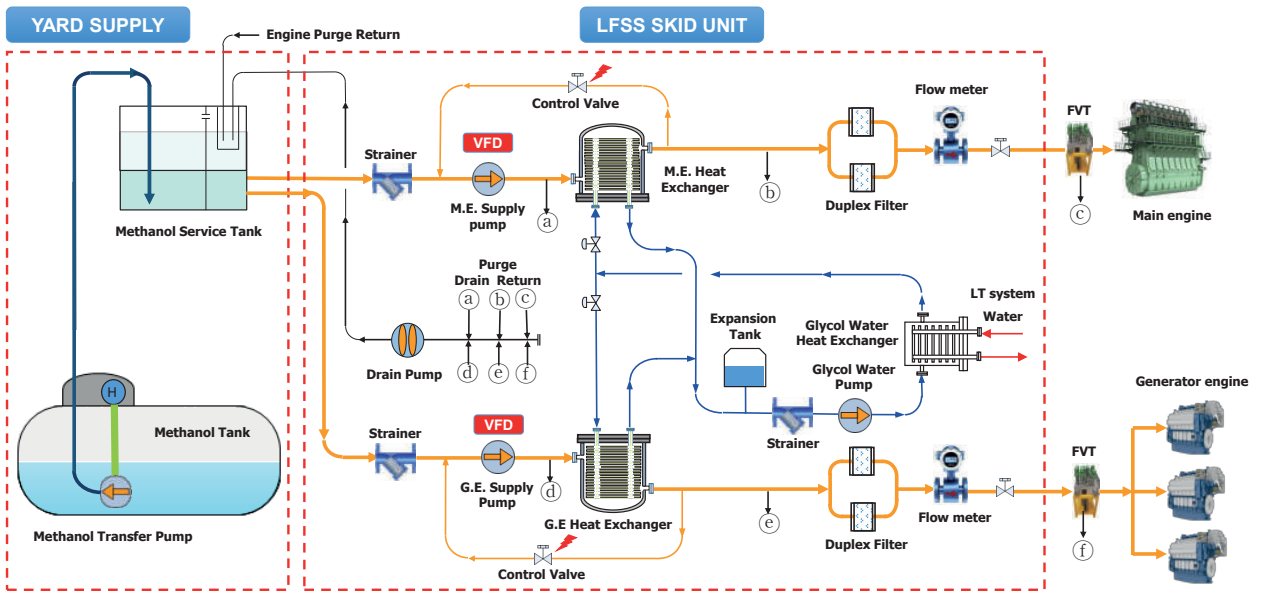


Low flashpoint Fuel Supply System (METHANOL)

Flow Diagram for Main Engine



Flow Diagram for Main Engine and Generator



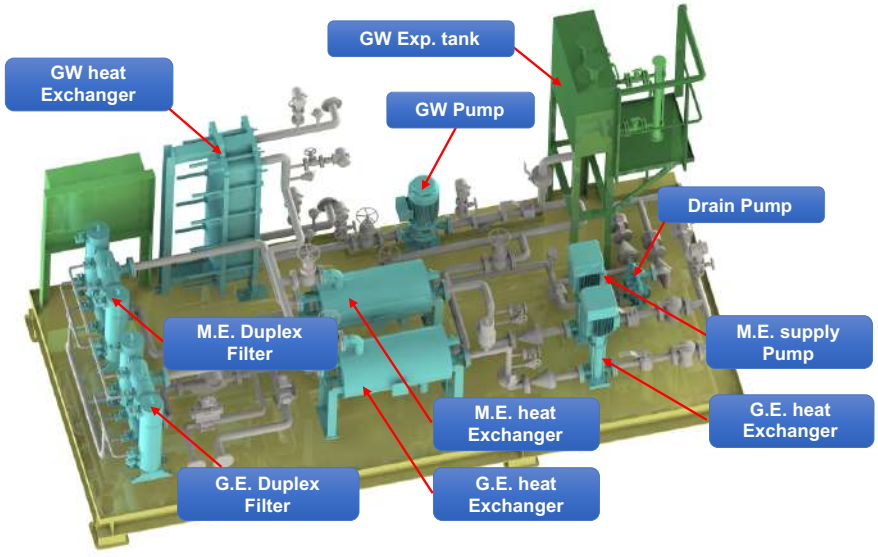
Low flashpoint Fuel Supply System (METHANOL)

LFSS SKID UNIT for Main Engine and Generator

LFSS SKID

Design Specification

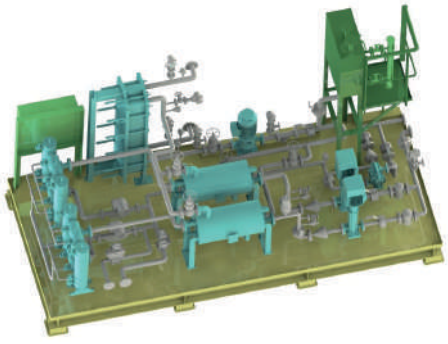
- Me-OH supply pump
- Drain pump
- Me-OH heat exchanger
- Me-OH duplex filter
- Glycol water pump
- Glycol water heat exchanger
- Glycol water expansion tank
- Control/Manual valve
- Instruments



Equipment for LFSS

Methanol Pump
Magnetic drive type

Methanol Heat Exchanger
Shell & Plate type



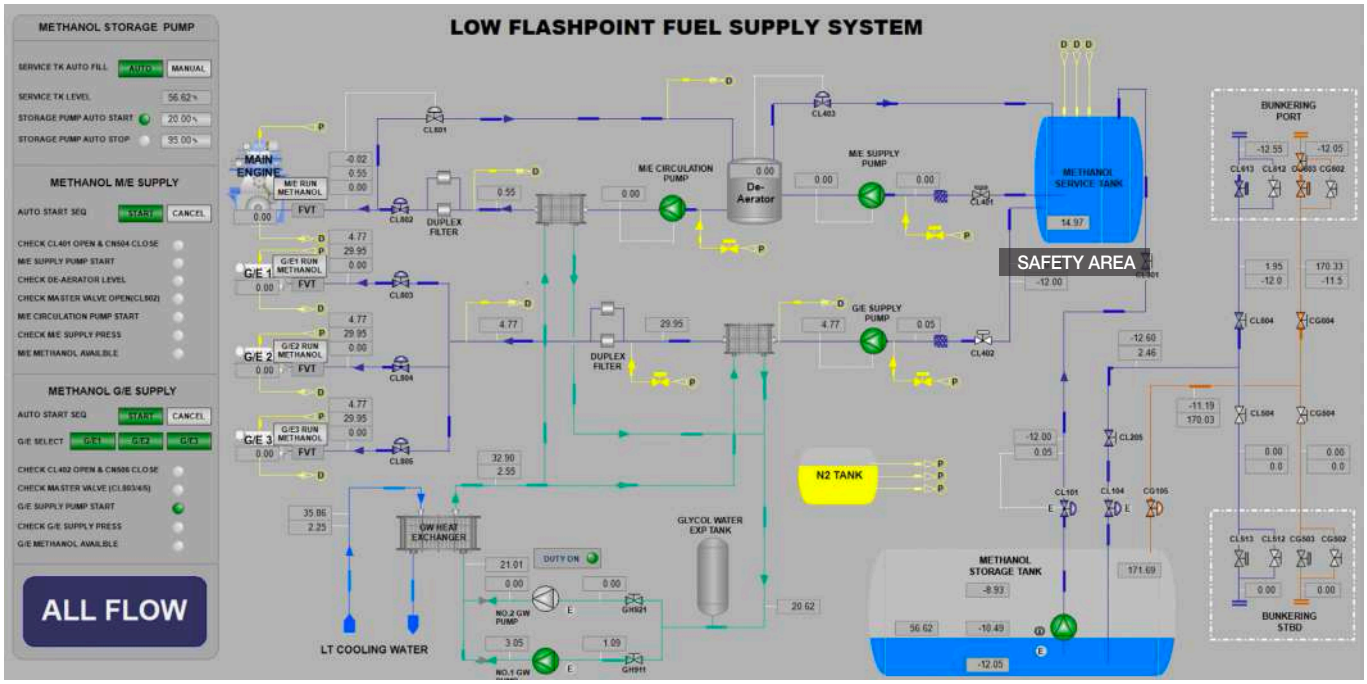
LFSS SKID UNIT

Methanol Filter
Duplex filter, 10 micron

Methanol Flowmeter
Coriolis mass flow type

Low flashpoint Fuel Supply System (METHANOL)

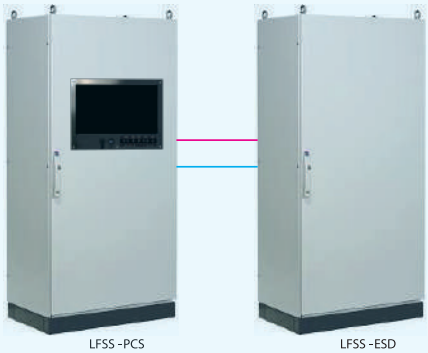
LFSS Control & Monitoring Mimic (SSAS-MASTER)



LFSS CONTROL SYSTEM

LFSS SKID UNIT

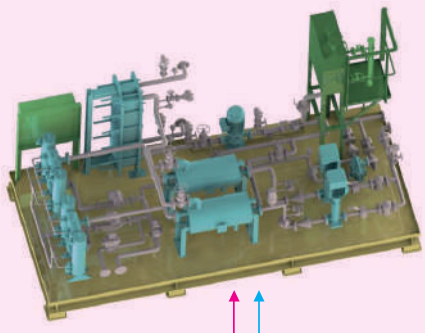
SAFETY AREA



LFSS -PCS System Cabinet

LFSS -ESD System Cabinet

HAZARUS AREA

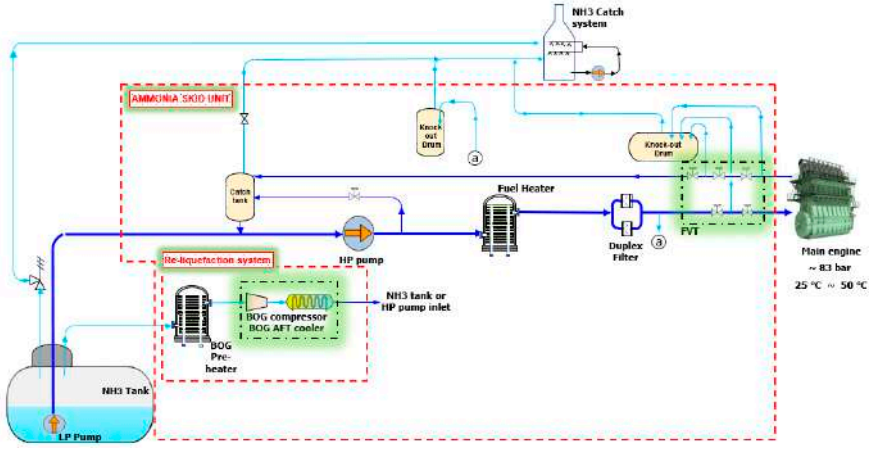


- S&SYS automation system will be applied for LFSS to optimize whole LFSS system.

OTHER Fuel Supply System (AMMONIA, LPG)

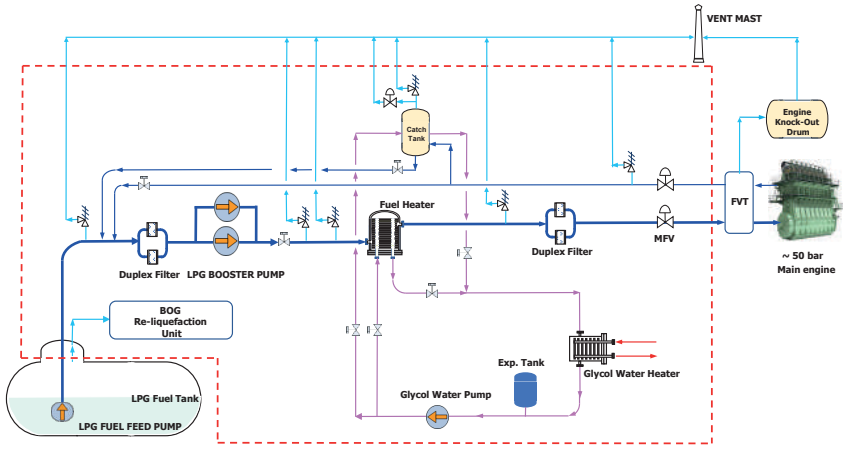
Flow Diagram for AMMONIA

- Demand from governments and stakeholders around the world for the carbon-free fuel is widely growing, and ammonia seems likely to be a next alternative fuel.
- The Ammonia fuel supply system is being developed based on the technology of the LNG & Methanol fuel supply system.



Flow Diagram for LPG

- Liquefied Petroleum Gas (short as LPG) fuel supply system has been developed from the accumulated technology for other related fuel supply system (LNG, Methanol) and engineering capability of S&SYS.
- PURIGAS™- LPG fuel supply system will provide the most economical solution and the most reliable package system to our valuable customer with low CAPEX & OPEX in ME-LGIP engine.



PURIGAS™ Global Network

A/S Network
Sales Agency

ASIA	
KOREA	S&SYS Co.,Ltd. (HQ)
KOREA	STK Engineering Co.,Ltd.
KOREA	JEWON Engineering Co.,Ltd.
KOREA	STA
KOREA	DEX
CHINA	Seven Seas Electronic Co.,Ltd.(Shanghai)
CHINA	Seven Seas Electronic Co.,Ltd.(Qingdao)
CHINA	Seven Seas Electronic Co.,Ltd.(Dalian)
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JAPAN	Tsuneishi Co.,Ltd.
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MIDDLE EAST	
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NORTH AMERICA	
USA	MarineBCTec(LA)
USA	MarineBCTec(NJ)
OCEANIA	
Australia	UNION
SOUTH AMERICA	
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BRAZIL	DZETA Marine & Offshore
EUROPE	
GERMANY	Mare systems
ITALY	MASTER CONTROL
GREECE	D.C.S.I Ltd.
TURKEY	Oceanist
AFRICA	
Nigeria	Radial Circle

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