

No^oNOx

Hyundai SCR System

HYUNDAI-SCR
Selective Catalytic Reduction

The Globalization with green
technology

OFFERING HOLISTIC SOLUTIONS TO MARINE INDUSTRY

Our professional engineering and manufacturing enable us to offer flexible and easier solutions for our customers.

MARINE SOLUTION SCOPE

MARINE ENGINE	Engine	2-Stroke Diesel Engine	2-Stroke DF Engine	4-Stroke Gas Engine	4-Stroke DF Engine	4-Stroke Diesel Engine
	Application	Marine Genset	HiMSEN Propulsion System	HiEMS(Hyundai Intelligent Engine Monitoring System)	HiCAS(Hyundai Intelligent Combustion Analysis System)	
	Propeller		Shaft	Rudder Stocks	Engine Components	
MARINE MACHINERY		Hi-GAS(Fuel Gas Supply System)	Hi-ERS(Hyundai Innovative Economical Re-liquefaction System)	Hi-ReGAS(Hyundai Integrated Regasification System)	NoNOx(Selective Catalytic Reduction)	HiBallast,EcoBallast (Ballast Water Treatment System)
		Hi-Well(Cargo Pumping System)	Marine Pump			

EIAPP Certification of NoNOx SCR System



ABS Approval



DNV GL Approval



LR Class Type Approval



Korean Register Approval



BV Approval

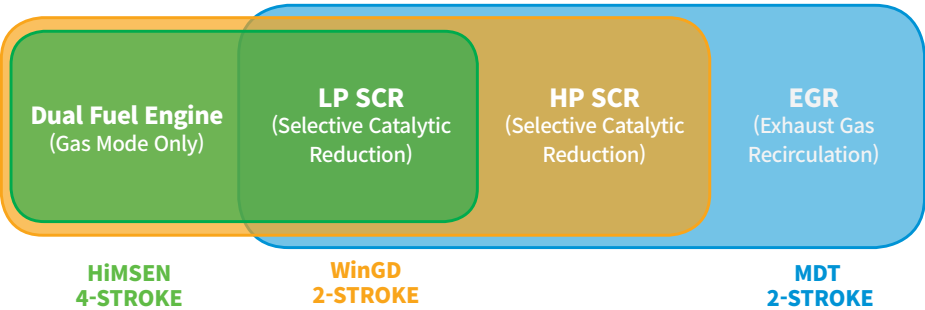


RS Approval



NK Approval

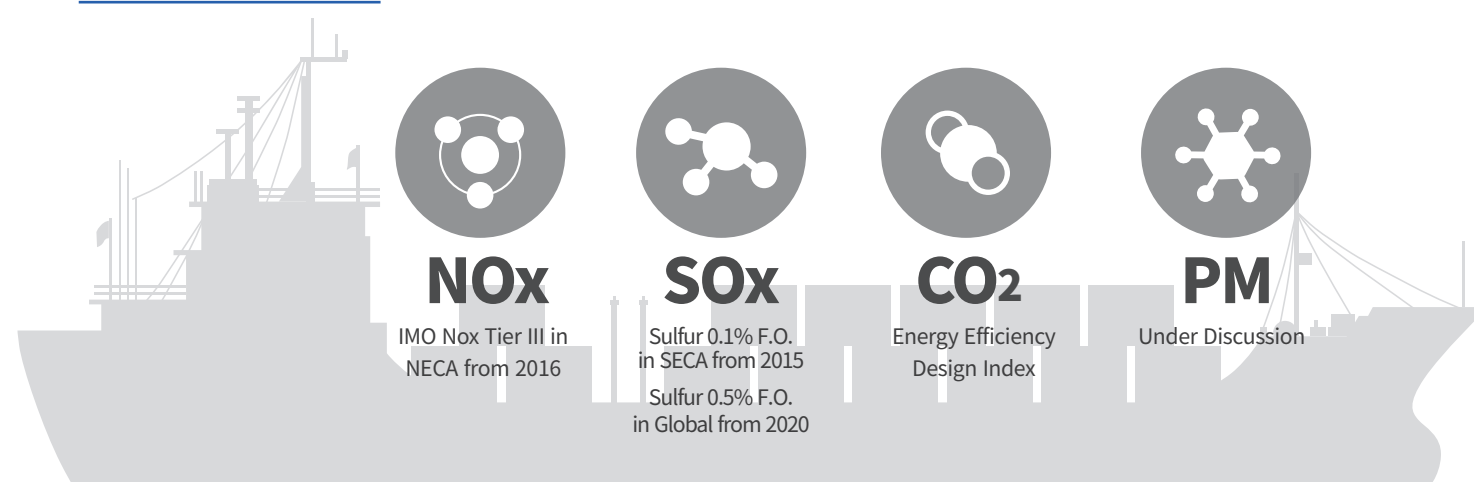
IMO NOx TIER III Solution (Full Line Up)



SUSTAINABLE TECHNOLOGY, COMPLYING WITH EMISSION REQUIREMENTS

Special care is being taken to protect the environment from air pollution. IMO MARPOL NOx regulation is the dominant guideline for marine industries. IMO NOx Tier III regulations takes effect from 1 January 2016. This requires 80% less NOx emissions compared with NOx Tier I. This amount of NOx reduction is generally not achieved by the engine itself. Hence, a separate device is required to meet Tier III regulations in this respect.

Emission From Ship



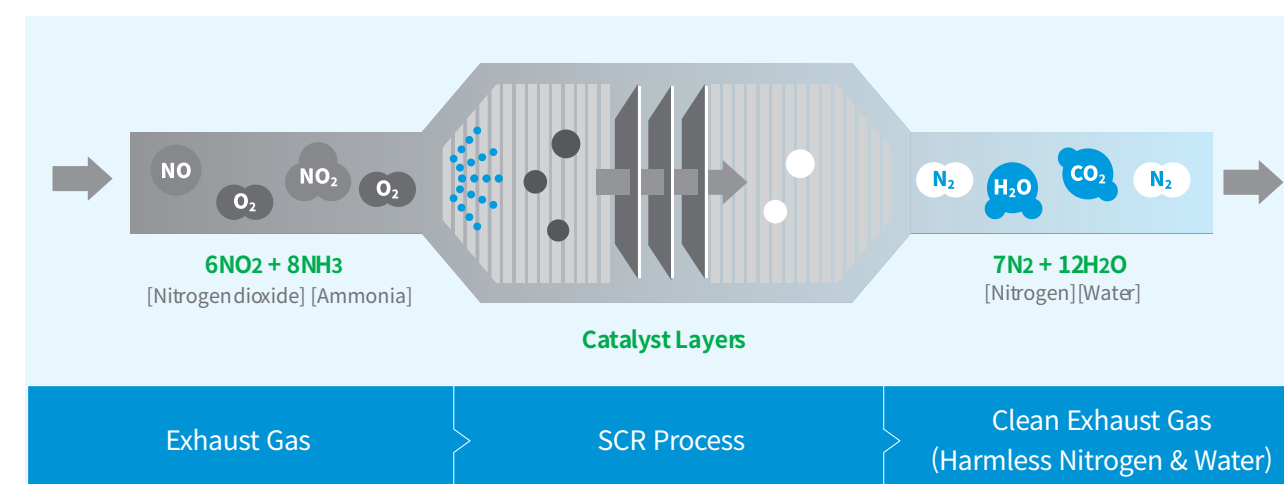
Emission Control Area



- Baltic/North Sea ECA
- North American ECA
- Discussed ECA'S

SCR(Selective Catalytic Reduction) Principle

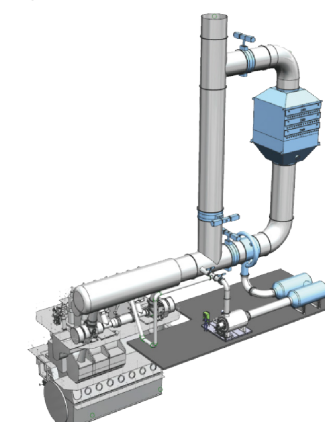
SCR is a technology which can reduce NOx in exhaust gas by a chemical reaction process. Urea solution is commonly adopted as the reductant as it decomposes into ammonia and carbon dioxide in hot gas stream.



NoNOx SCR For Marine Engine

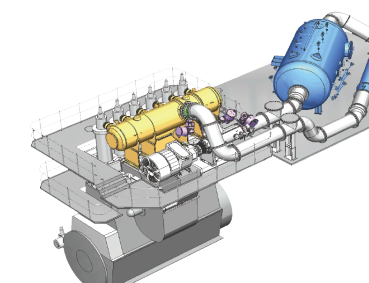
1. NoNOx-LP

Low pressure SCR for **2-Stroke** engine power up to 82MW(<0.1% fuel sulfur only)



2. NoNOx-HP

High pressure SCR for **2-Stroke** engine power up to 33MW(<0.1% or <3.5% fuel sulfur design)

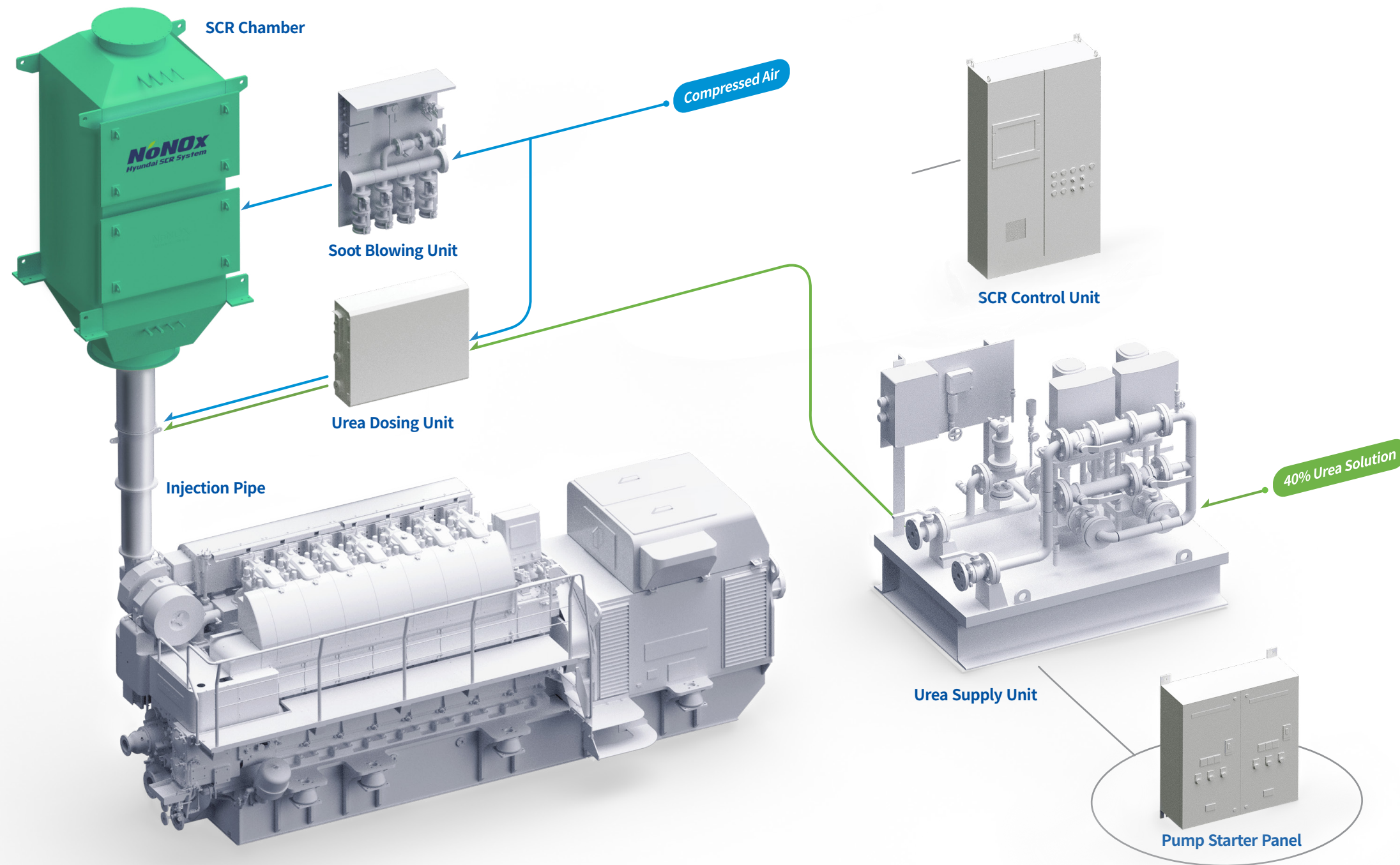


NoNOx-LP

LOW PRESSURE SCR FOR 4-STROKE

(<0.1% or <3.5% fuel sulfur design)

- Urea line
- Air line
- Wiring



Emission From Ship



COMPLIANCE WITH IMO TIER III

- High De-NOx Efficiency
- Patents of PILC catalyst
- Better Efficiency&Higher Strength



BEST ADOPTABILITY FOR ONBOARD INSTALLATION

- Compact components for easy installation
- Design flexibility aimed at optimum installation
- Good connectivity with other system units



MOST CONVENIENT FOR VERIFICATION AND OPERATION

- Verified SCR performance before onboard installation
- Low operating cost by closed loop dosing system
- Worldwide service and spare parts network



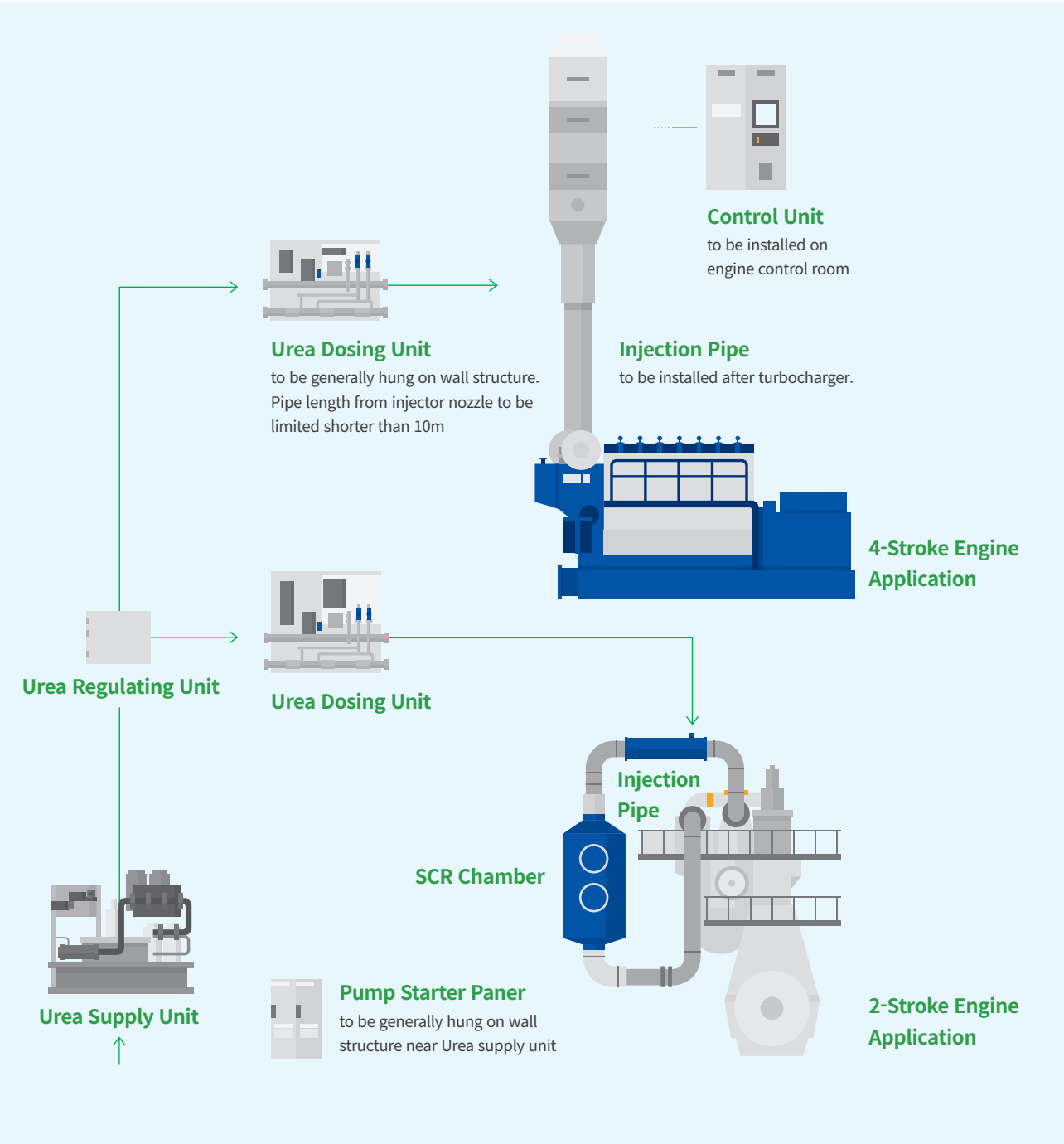
FULL AUTOMATIC CONTROL SYSTEM

- Full automatic control system
- Qualified design for marine requirements
- Online condition monitoring

2-STROKE & 4-STROKE INTEGRATION FOR COMMON USE COMPONENTS

- Urea supply unit & Pump starter
- SCR control unit

Integrated 2-Stroke & 4-Stroke SCR



Case ① : The World 1st Tier III Scheme A test

4-Stroke Engine with LP SCR Nov. 2012

Engine type	HiMSEN 16H32/40V (8,000kWx720rpm)
Specification	IMO Tier III compliance SCR design for MGO(<0.1% sulfur) Low pressure SCR system
Test	2012.11



Case ② : The World 1st Tier III Scheme A test

2-Stroke Engine with HP SCR Dec. 2015

Engine type	MDT 6S50ME-C8.2 (7,620kWx115rpm)
Specification	IMO Tier III compliance SCR design for HFO(<3.5% sulfur) HFO operation with scrubber High pressure SCR system
Power(kW)	7,620
Vessel	20.6k LPG
Test	2015.12



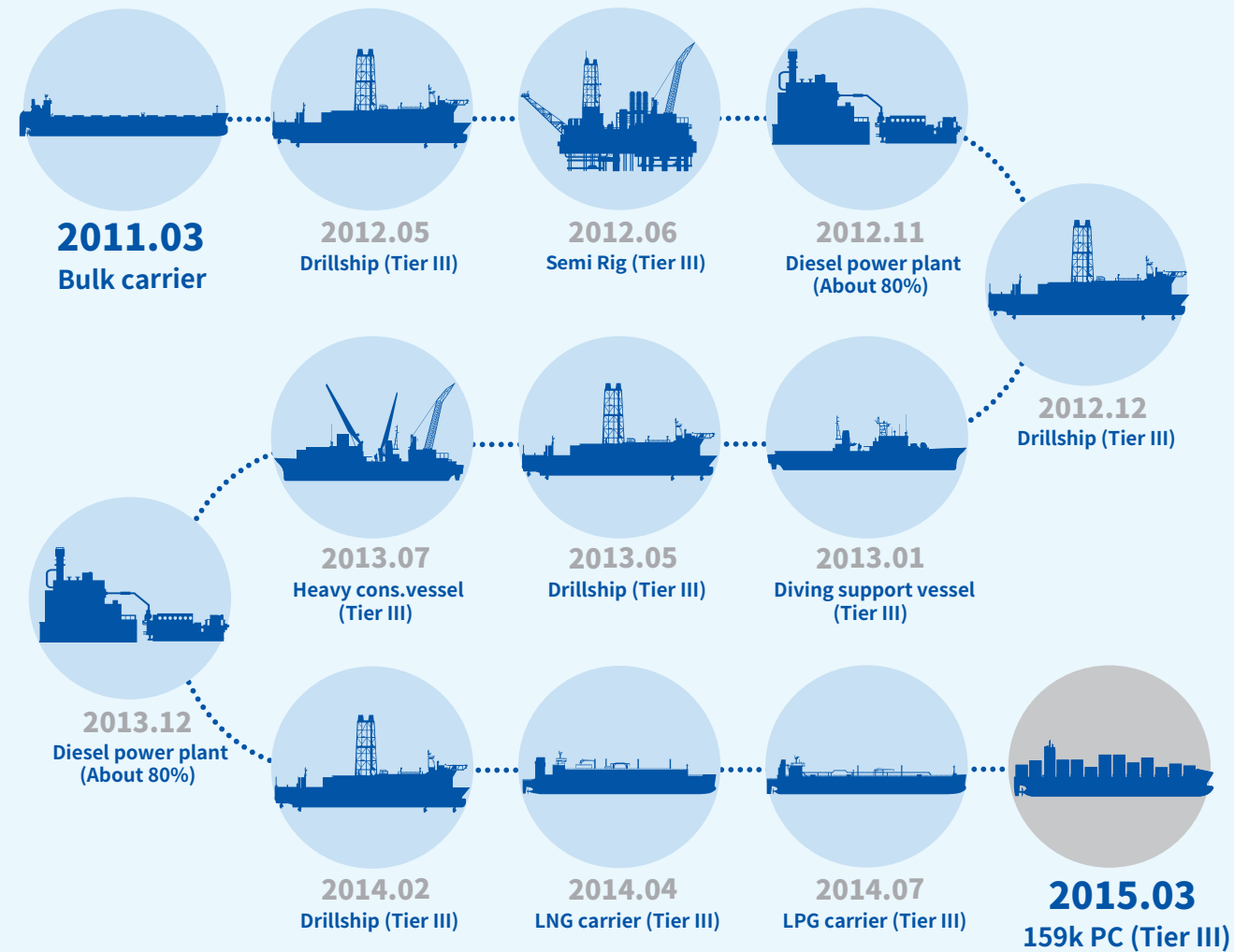
Case ③ : The Largest Tier III Scheme A test

2-Stroke Engine with LP SCR Dec. 2017

Engine type	WinGD W10X92 (44,118kWx80rpm)
Specification	IMO Tier III compliance SCR design for MGO(<0.1% sulfur) Low pressure SCR system Chamber: 6000x6000x7100,70ton
Power(kW)	44,118
Vessel	14.5K TEU COT
Test	2017.12



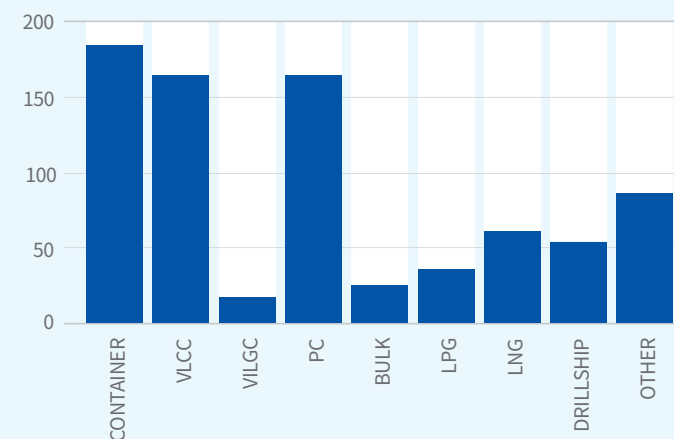
EXPERIENCE MILESTONE



Vessel Type

TOTAL
2-Stroke + 4-Stroke

835sets
(Dec. 2018)



04 Service

Make your vessel with Optimal Solution

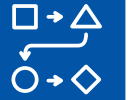
Suitable solution for your needs will be provided through single responsibility of SCR as part of engine. We can make sure your system performance and is properly installed by our professional experience – throughout the vessel lifetime.

- Tailored solution of the whole system for your need
- Simple interface & easy integration
- Quality Assurance
- Minimizing time & money
- Long-term partnership

Planning &
Design



Manufacturing &
Test



Installation

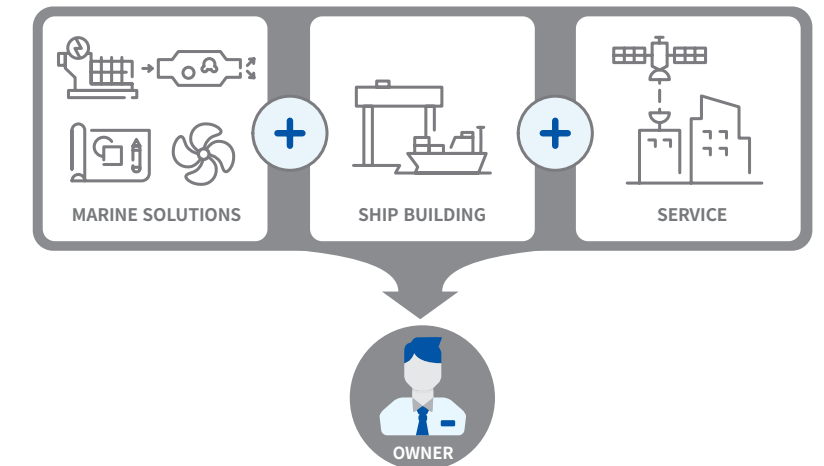


Maintenance
& Service



HYUNDAI Total Solutions

- One Technical File for complete system
- One EIAPP Certificate
- One responsibility for corrective action



Support for engine and SCR from Single Maker

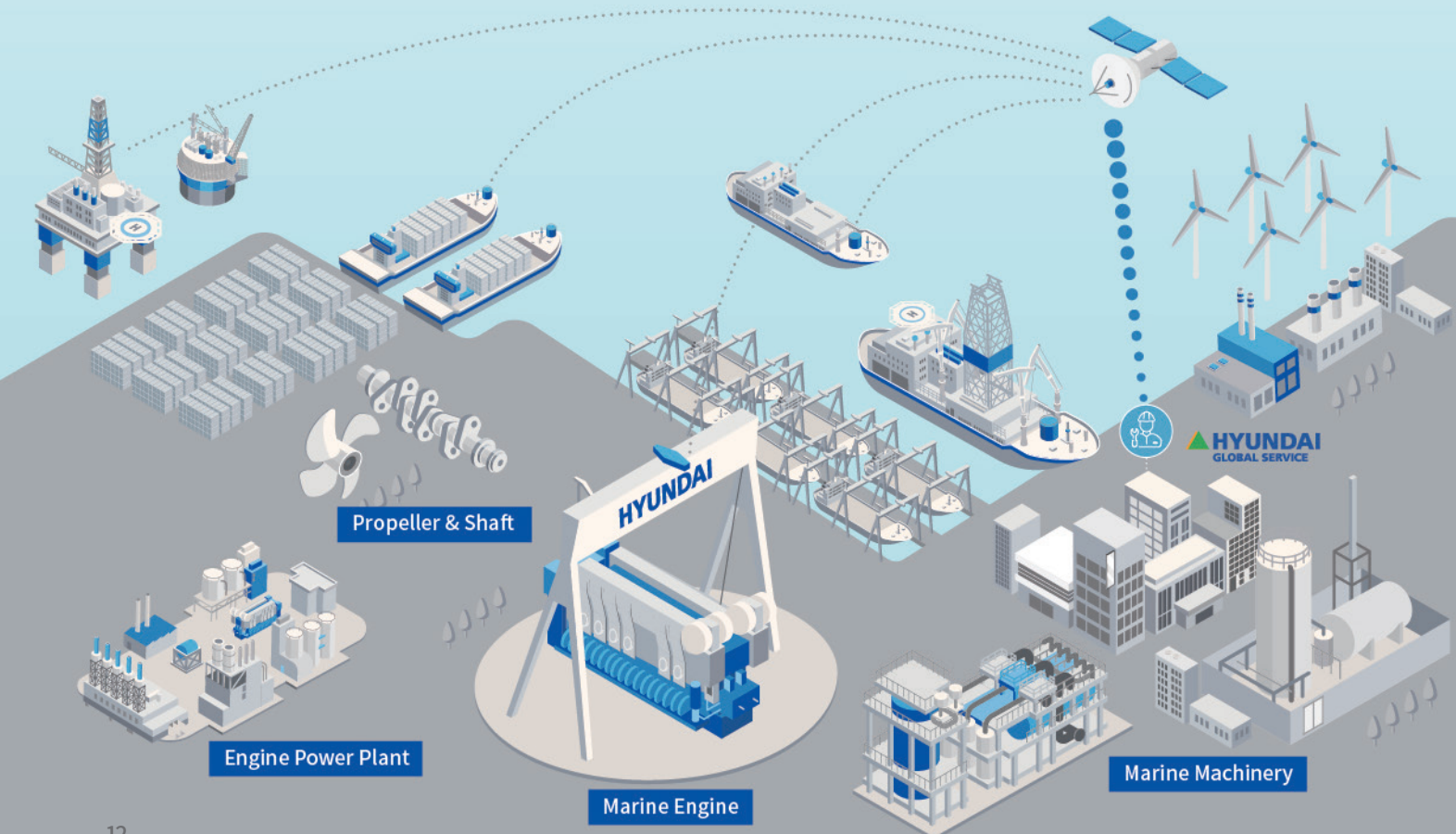
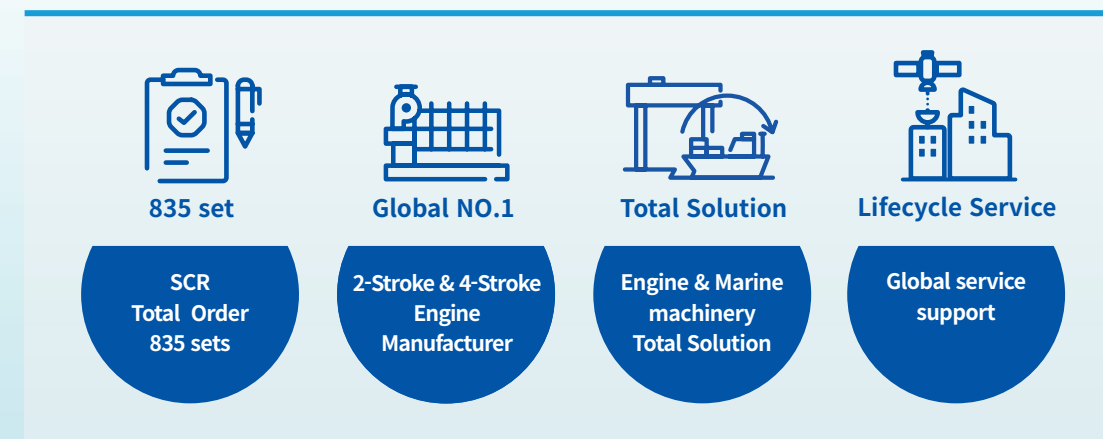


HYUNDAI HEAVY INDUSTRIES

Engine & Machinery Business

Unit(EMBU)LANDSCAPE

Hyundai Heavy Industries Co., Ltd.(HHI) has been leaving a remarkable footprint in global shipbuilding industry since 1972. In 1978, as one of the business units of HHI, the Engine & Machinery Business Unit (HHI-EMBU) was launched to manufacture marine and stationary engines and has enjoyed the dominant position as the world's leading engine manufacturer until now. HHI-EMBU has taken up 35% of the world's market share in 2-Stroke engines covering marine and stationary purposes. HYUNDAI provides optimal marine solutions and proven quality Retrofit Arrangement by Ship Builder itself.



RELIABLE & POWERFUL

SUPPORT AROUND THE WORLD

- Optimized Solutions For Each Customer's Needs
- Genuine Spare Parts From The Original Equipment Manufacturer
- Fast and Reliable Response Through Our Global Service Network
- 24/7, Immediate Support



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