



Certified  
Customized  
Compact

De-NOx SCR SYSTEM

**PaNOx™**

ENGLISH

**PANASIA**

# Company Profiles

**PANASIA CO.,LTD.**

**Global Leader in Smart & Green Technology**

- Since 1989



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### Established Date

Oct. 10th, 1989

### Product List

- De-NOx SCR System
- De-SOx Scrubber System
- Ballast Water Treatment System
- Retrofit Service
- Cargo Monitoring System
- Tank Level Gauging System
- MSCS (Marine Satellite Control System)
- HILS (Hardware In the Loop Simulation)
- FGSS (Fuel Gas Supply System)

### Achievement in PANASIA

|  |  |  |
|--|--|--|
| <p>2019.<br/>Apr.</p>  <p>IR 52 Jang Young Sil award *<br/>(16 week's) - De-SOx System</p> <p><small>* The award given weekly in the name of the Minister of Science and Technology is so widely recognized to be one of the highest for innovation in Korea that even the general public can approve the value of the award.</small></p> | <p>2016.<br/>Mar.</p>  <p>IR 52 Jang Young Sil award *<br/>(11 week's) - MEGA UV</p> <p><small>* The award given weekly in the name of the Minister of Science and Technology is so widely recognized to be one of the highest for innovation in Korea that even the general public can approve the value of the award.</small></p> | <p>2013.<br/>Dec.</p>  <p>Gold tower order of industrial service merit at 2013 Korea Technology</p>   |
| <p>2018.<br/>Sep.</p>  <p>Re-appointed as an Excellent Green Firm<br/>(18.09.05~23.09.05)</p>   | <p>2015.<br/>Jan.</p>  <p>Grand prize of technical commercialization from Research &amp; development special zone</p>   | <p>2012.<br/>Dec.</p>  <p>Korean world-class Product</p>  |
|  | <p>2014.<br/>Jun.</p>  <p>World Class 300</p>   | <p>2011.<br/>Aug.</p>  <p>IR 52 Jang Young Sil award *<br/>(32 week's)</p> <p><small>* The award given weekly in the name of the Minister of Science and Technology is so widely recognized to be one of the highest for innovation in Korea that even the general public can approve the value of the award.</small></p> |

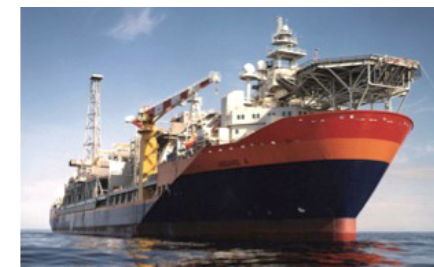


# De-NOx SCR system

## PRODUCT LINE UP

De-NOx SCR SYSTEM  
**PaNOx™ Marine**

De-NOx SCR SYSTEM  
**PaNOx™**



Panasia is focused on lowering overall industrial greenhouse gas emissions and increasing efficiency through innovative, low NOx air pollution control solutions.

We offer complete engineering and customer service support and start-up to ensure that each project will exceed our customer's expectations from start to finish. Based on proven Selective Catalytic Reduction system technology, PaNOx™, Panasia De-NOx system, are the proven choice to dramatically reduce NOx emissions for Marine application, Power plants, HRSG, Boilers and other demanding applications.

### MARINE APPLICATION

Panasia is one of the front line developers in the technology of De-NOx SCR system for Marine application based on the over 30 years marine industry experience and it has a wide range application such as 2 stroke main engine and 4 stroke generator engine to ensure compliance of IMO Tier III NOx emission standard.

### POWER PLANT

In power Plant, the same basic technology is employed for removal of NOx from the flue gas of boilers used in power generation and industry. The SCR unit is generally located between the furnace economizer and the air heater and the ammonia is injected into the catalyst chamber through an ammonia injection grid.

### HRSG

SCR for HRSG should be placed in between the two sections of HRSG. Reduction of NOx emissions from the turbine exhaust system with the ability for over 94% reduction.

### BOILER

Standardized SCR systems with Standard Catalyst Modules and AFCU Mainly supplied to US due to the Strict NOx level such as 9 ppm NOx for of 20 MMBtu/hr to < 75 MMBtu/hr and 5 ppm NOx for 75 MMBtu/hr boilers, effective January 1, 2012.

# Marine Application

## IMO REGULATIONS

**January 1, 2016**

Tier III NOx **80%** Reduced

- IMO MARPOL 73/78 ANNEX VI NTC 2008

- Timeline for Reduction in NOx emission

- MARPOL Annex VI on Regulations for the Prevention of Air Pollution from Ships.



The International Maritime Organization (IMO) announced that ships constructed on or after January 1, 2016 and entering into the North American or U.S. Caribbean Emission Control Areas (ECA) must comply with the Tier III NOx requirement of MARPOL Annex VI, Chapter 3, Regulation 13.5.1.1. So it is mandatory to reduce nitrogen oxides emitting from diesel engines by 80%. To obtain this certificate, you have to equip your Tier II -certified marine engine with an SCR system so that it can meet Tier III criteria.

This affects any ship whose keel is laid or where the vessel is at a similar stage of construction. The regulatory change also applies to a major conversion defined in Regulation 13. The standards set forth in Regulation 13.5.1.1 does not apply to marine diesel engines installed on a ship with a combined nameplate diesel engine propulsion power of less than 750 kW if it is demonstrated to the satisfaction of the administration and cannot comply with the standards set forth (in paragraph 5.1.1 of Regulation 13) because of design or construction limitations of the ship.

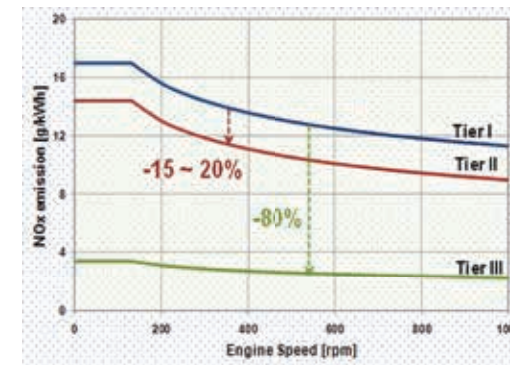
The North Sea and Baltic Sea Area become the NOx ECA and apply to ships with engines installed on or after January 1st 2021. Among the shipping community it is actively speculated that China is preparing its application for an ECA to be submitted to

the IMO. The scope and exact boundaries are not public knowledge yet but such a development will significantly help reduce dangerous NOx emissions and positively impact the lives of the Chinese population, who live near along the coast.

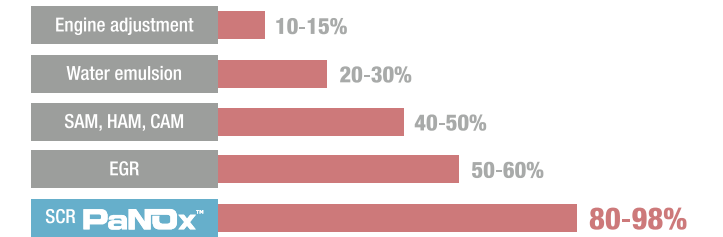
Panasia's SCR flue gas De-NOx system PaNOx™ Marine adopted the Selective Catalytic Reduction (SCR) method and therefore is environment-friendly equipment that decomposes NOx present in flue gas into harmless H<sub>2</sub>O and N<sub>2</sub> by making the NOx chemically react with a reducing agent at a catalyst layer and then discharges them to the air.

As the increases in international shipments and the amount of sailing ships continue to raise the levels of greenhouse gas emissions, the application of new and stricter gas emission standards is extending. In response to this, International Maritime Organization is gradually strengthening gas emission standards for ships with a view to preserving the ocean-atmosphere environment, reducing pollutants across the board, and decreasing greenhouse gas emission. Currently, the Marine Environment Protection Committee (MEPC) of the IMO is running an air pollution abatement agreement for regulating gas emissions from ships called MARPOL Annex VI, which was established in 1997 and last revised in 2008.

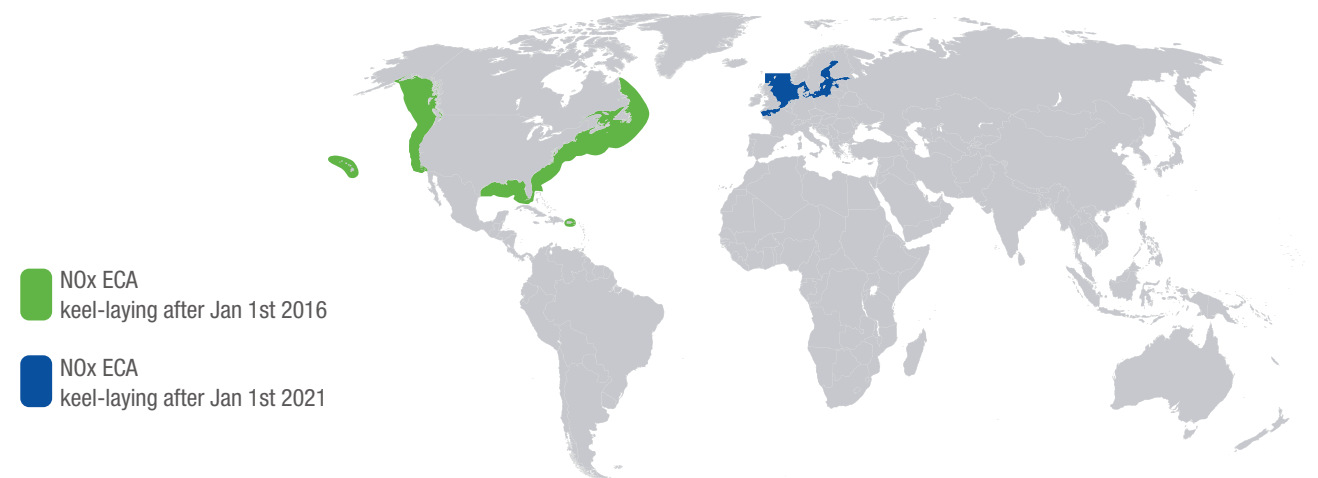
## NOx EMISSION LIMIT



## NOx TECHNOLOGY

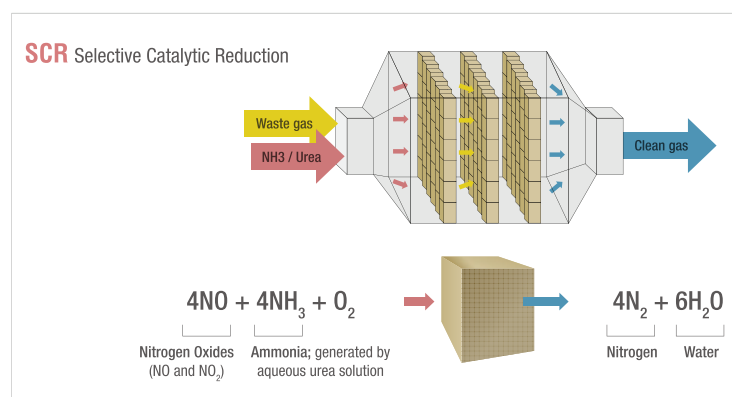


## WORLD MAP ECA (Emission Control Area)

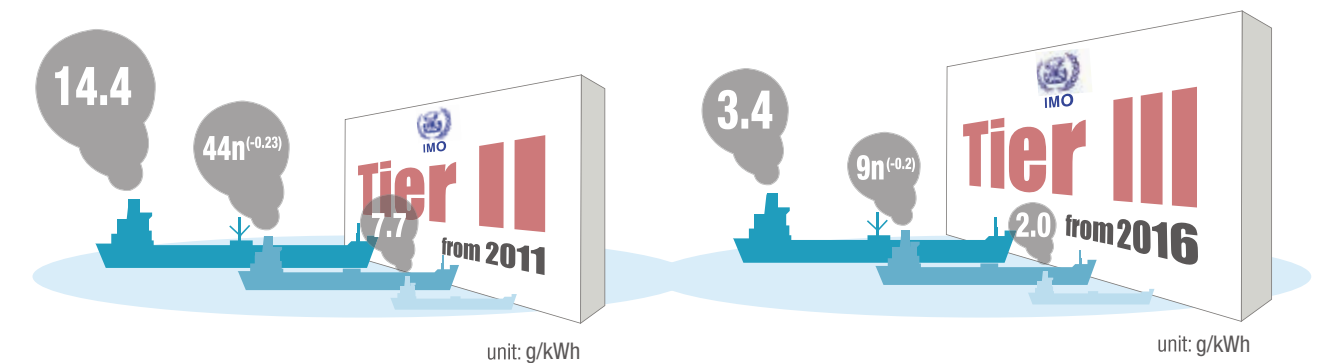


## FEATURES

- Component concept for stabilized capacity expansion
- Simple operating system
- Easy installation
- Skid / vertical, horizontal arrangement, separate components

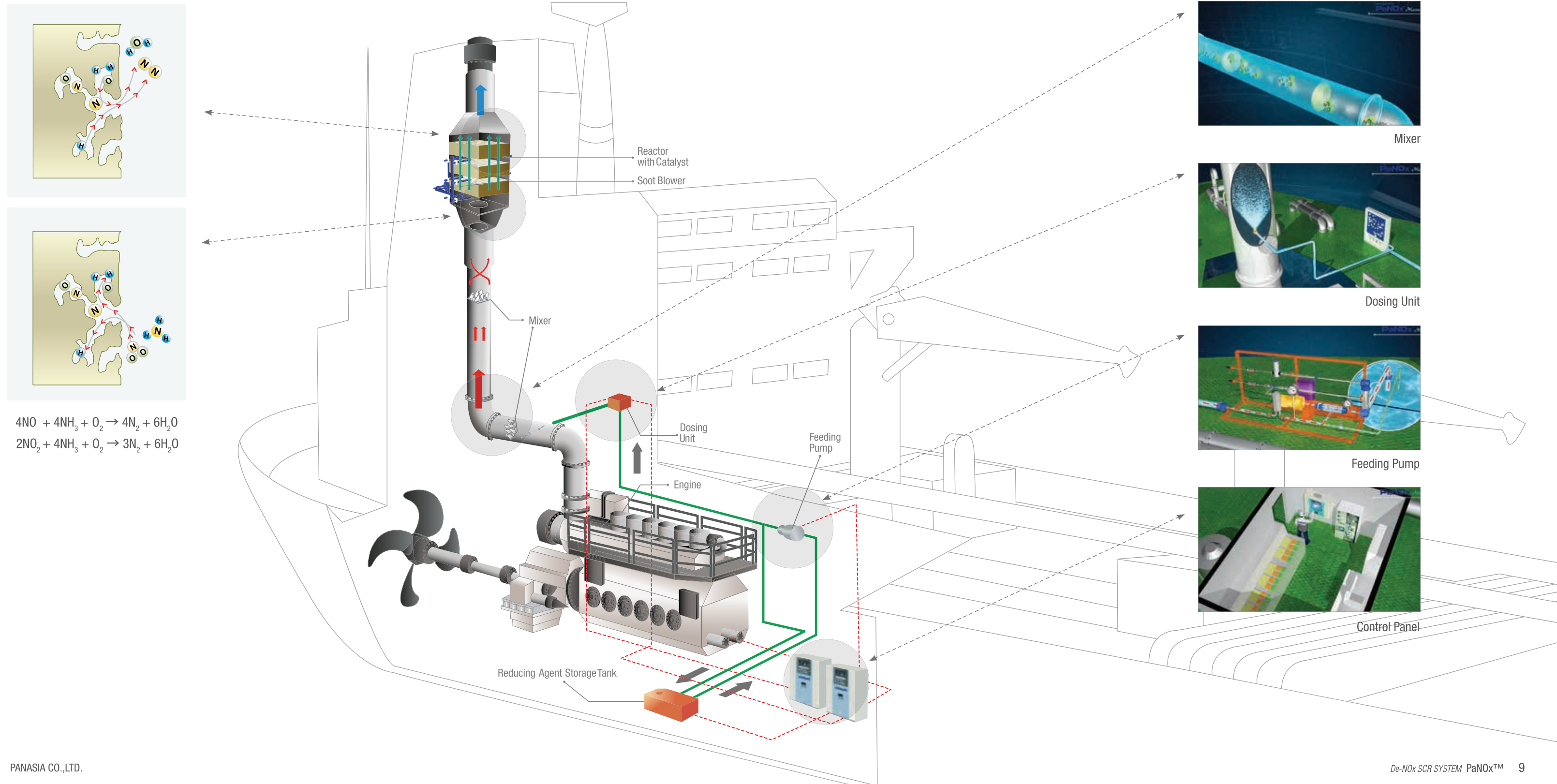


## TIER III CRITERIA



# Marine Application

## SYSTEM CONFIGURATION



# Marine Application

## PROJECT INFORMATION



|            |                          |
|------------|--------------------------|
| Shipyard   | Samsung Heavy Industries |
| Ship owner | Seadrill                 |
| Capacity   | 8,000kW x 6sets          |
| Reductant  | Aq. Urea (40%)           |



850,000 BBLS FSU(Floating Storage Unit)

4,900Ton PSV(Platform Supply Vessel)



|                        |  |
|------------------------|--|
| Application            | 850,000 BBLS FSU (Floating Storage Unit) |
| Engine Capacity        | 4,600 kW X 4 / 1,500 kW X 1              |
| Classification Society | DNV/CLEAN DESIGN, NORSOK                 |
| Reductive Agent        | Aq. Urea (40%)                           |

|                        |                                       |
|------------------------|---------------------------------------|
| Application            | 4,900Ton PSV (Platform Supply Vessel) |
| Engine Capacity        | 1,900 kW X 4                          |
| Classification Society | DNV/CLEAN DESIGN                      |
| Reductive Agent        | Aq. Urea (40%)                        |

## MAIN COMPONENTS

SCR Reactor



Control Panel



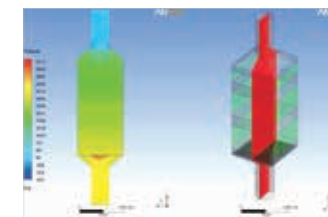
Dosing Unit



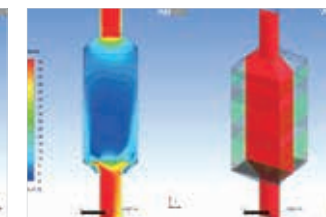
Feeding Pump



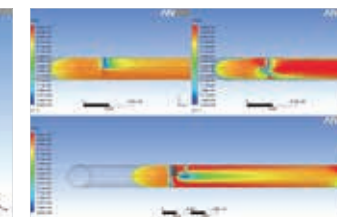
## CFD ANALYSIS



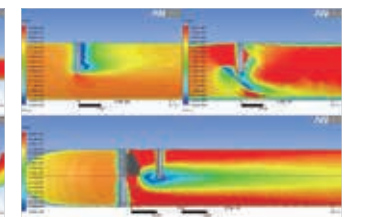
Internal Reactor Flow Analysis Results Pressure distribution  
(Maximum display pressure 4,400 Pa)



Internal Reactor Flow Analysis Results  
(Maximum display flow speed 60 m/sec)



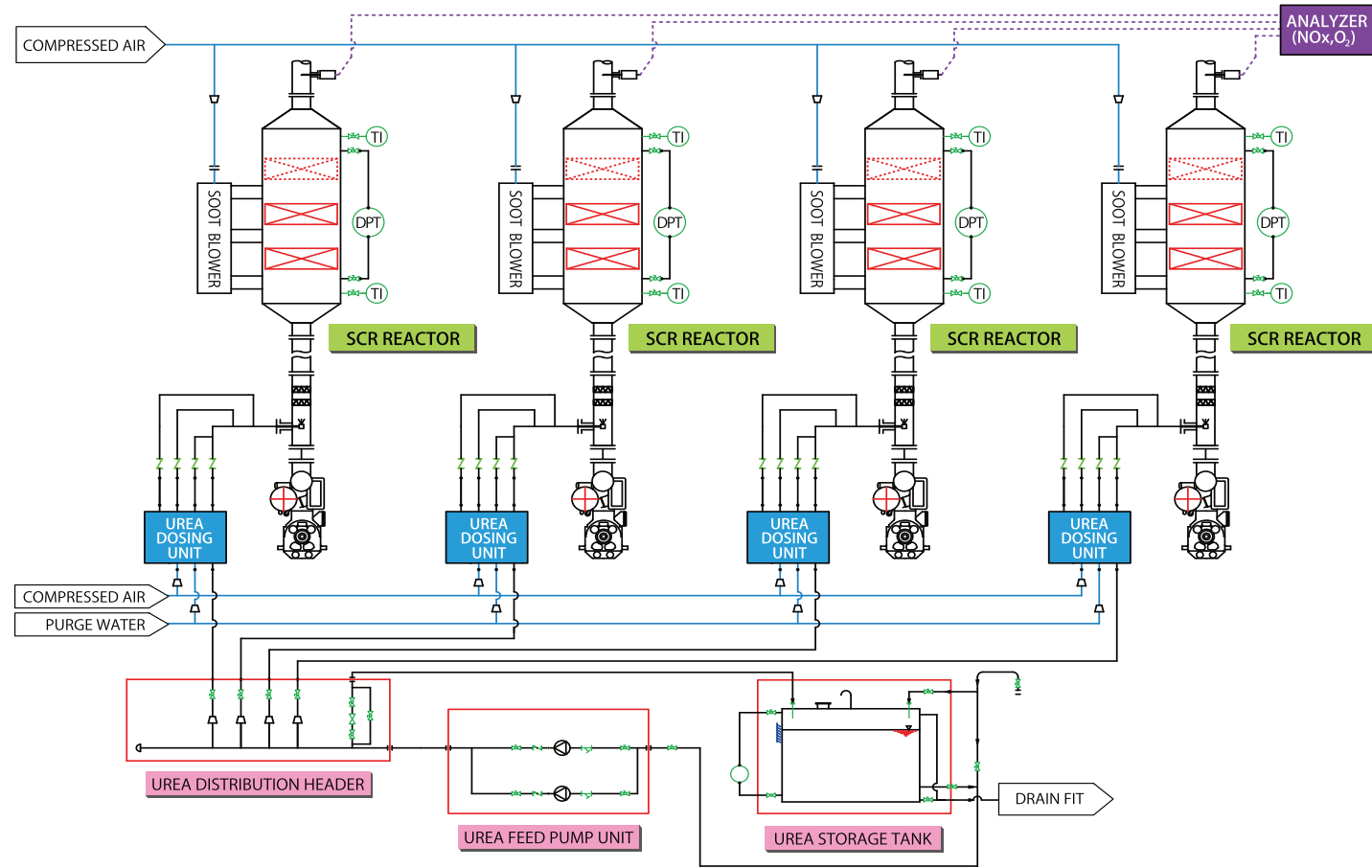
Internal Duct Flow Analysis Results  
(Maximum display speed 70 m/sec)



Internal Duct Flow Analysis Results  
(Maximum display speed 70 m/sec)

# Marine Application

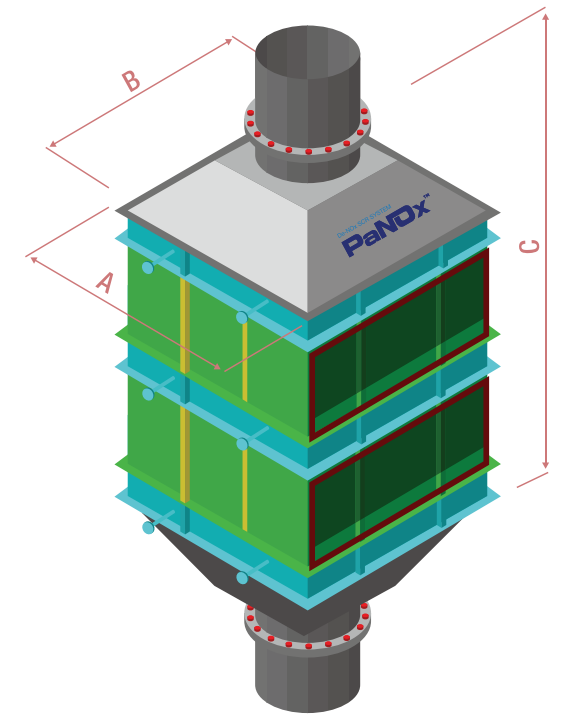
## PIPING & INSTRUMENTATION DIAGRAM



## STANDARD SIZE OF REACTOR BY ENGINE POWER

| Num | Model     | Engine Power kW | Reactor dimension |       |       | Weight Reactor + Catalyst |
|-----|-----------|-----------------|-------------------|-------|-------|---------------------------|
|     |           |                 | A                 | B     | C     |                           |
| 1   | PNX-N0048 | ≤480            | 850               | 850   | 2,200 | 1,400                     |
| 2   | PNX-N0075 | ≤750            | 850               | 850   | 2,200 | 1,460                     |
| 3   | PNX-N0120 | ≤1,200          | 1,170             | 1,170 | 2,200 | 1,940                     |
| 4   | PNX-N0160 | ≤1,600          | 1,170             | 1,170 | 2,600 | 2,030                     |
| 5   | PNX-N0220 | ≤2,200          | 1,500             | 1,500 | 2,600 | 2,500                     |
| 6   | PNX-N0300 | ≤3,000          | 1,500             | 1,500 | 2,740 | 2,680                     |
| 7   | PNX-N0470 | ≤4,700          | 1,820             | 1,820 | 2,740 | 2,680                     |
| 8   | PNX-N0520 | ≤5,200          | 2,140             | 2,140 | 2,740 | 3,570                     |
| 9   | PNX-N0650 | ≤6,500          | 2,140             | 2,140 | 3,200 | 4,340                     |
| 10  | PNX-N0780 | ≤7,800          | 2,470             | 2,470 | 3,200 | 4,700                     |
| 11  | PNX-N0890 | ≤8,900          | 2,470             | 2,470 | 3,200 | 5,230                     |
| 12  | PNX-N1150 | ≤11,500         | 2,790             | 2,790 | 3,200 | 6,220                     |
| 13  | PNX-N1200 | ≤12,000         | 3,110             | 3,110 | 3,200 | 6,780                     |

DESIGN BASE : Temperature (after T/C) : 310 ~ 410°C , RPM : 510~720 , Fuel : LS MGO (Sulphur contents limit 0.1%)



## CERTIFICATES



## HYBRID SYSTEM FOR SCR AND SILENCER



# Stationary Plant Application

## PROJECT INFORMATION (KOREA)



### Incheon

- Application : Bio Gas Turbine
- Engine Capacity : 5MW x 1 Unit
- Reductive Agent : Aq. NH<sub>3</sub>(25%)



### Iksan

- Application : Bio Gas Engine
- Engine Capacity : 350kW x 1 Unit
- Reductive Agent : Aq. Urea(40%)



### KCES

- Application : Incinerator
- Capacity : 33,800 Nm<sup>3</sup>/hr x 1 Unit
- Reductive Agent : Aq. Urea(40%)



### Jeju

- Application : HRSG + YPAS
- GT Power : 120MW x 2 Unit
- Reductive Agent : Aq. Urea(40%)



### Hanam

- Application : HRSG
- GT Power : 425MW x 1 Unit
- Reductive Agent : NH<sub>3</sub>(25%)
- YPES + SCR Hybrid system



### Pyeongtaek

- Application : HRSG
- GT Power : 475MW x 2 Unit
- Reductive Agent : Anhydrous NH<sub>3</sub>



### Ulsan

- Application : HRSG
- GT Power : 425MW x 2 Unit
- Reductive Agent : Anhydrous NH<sub>3</sub>



## PROJECT INFORMATION (IRAN)



### Tombak

- Application : Diesel Engine
- Capacity : 7MW x 2 Unit
- Reductive Agent : Aq. Urea (40%)
- Delivered : December 2011



## PROJECT INFORMATION (SAUDI)



### Yanbu

- Application : HFO Boiler
- Capacity : 117 ton
- Reductive Agent : Aq. Urea (40%)
- Delivered : August 2012





# Stationary Plant Application

# Track Record

## PROJECT INFORMATION (USA)



### Fresno WWTP

- Application : 2-HRSG retrofit (CCP-004)
- Capacity : 3MW (126,000 lb/hr)
- Reductive Agent : NH3 Gas
- Supply Items : Catalyst/Reactor/AFCU
- Delivered : October 2011



### Diamond Pet Foods

- Application : 2-Industrial Boiler (CCP-002)
- Capacity : 12MMBtu/hr (350HP)
- Reductive Agent : Anhydrous NH3 Gas
- Supply Items : Catalyst/Reactor/AFCU
- Delivered : July 2011



### CO-OP City PP-New York

- Application : OTSG
- Capacity : 350 HP
- GT Power : 12MW x 2 Unit
- Reductive Agent : Aq. NH3 (19%)
- Supply Items : AFCU, ADM, AIG, Control Panel
- Delivered : January 2007



### Hawaii

- Application : OTSG
- GT Power : 24MW x 2 Unit
- Reductive Agent : Aq. Urea (40%)
- Supply Items : AFCU, ADM, AIG, Control Panel
- Delivered : August 2008



### Corn Products

- Application : 1-Solar Turbine/Deltak HRSG (CCP-003)
- Capacity : 3MW
- Supply Item : Catalyst/Reactor/AFCU
- Reductive Agent : NH3(19%)
- Delivered : Jan. 2011



### Univ of California-Riverside

- Application : Industrial Boiler (CCP-009)
- Capacity : 1000 HP \* 3 Unit
- Supply Items : SCR systems
- Reduction Agent : NH3 Gas
- Delivery : Mar. 2013
- \*\*5ppm NOx & NH3 Slip



### ConAgra Foods-Helm

- Application : Industrial Boiler (CCP-005)
- Capacity : 100,000 lbs/hr steam \* 2 Unit
- Reduction Agent : NH3 Gas
- Supply Items : SCR SYSTEMS
- Delivery : Feb. 2012



### VA-Long Beach

- Application : Industrial Boiler (CCP-010)
- Capacity : 1000 HP \* 2 Unit
- Reduction Agent : NH3 Gas
- Supply Items : SCR systems
- Delivery : 2014
- \*\*5ppm NOx & NH3 Slip



### UC-Irvine Med Center

- Application : 2-Industrial Boiler (CCP-007)
- Capacity : 750 HP \* 2 Unit
- Reductive Agent : NH3 Gas
- Supply Item : Catalyst/Reactor/AFCU
- Delivered : Feb. 2012

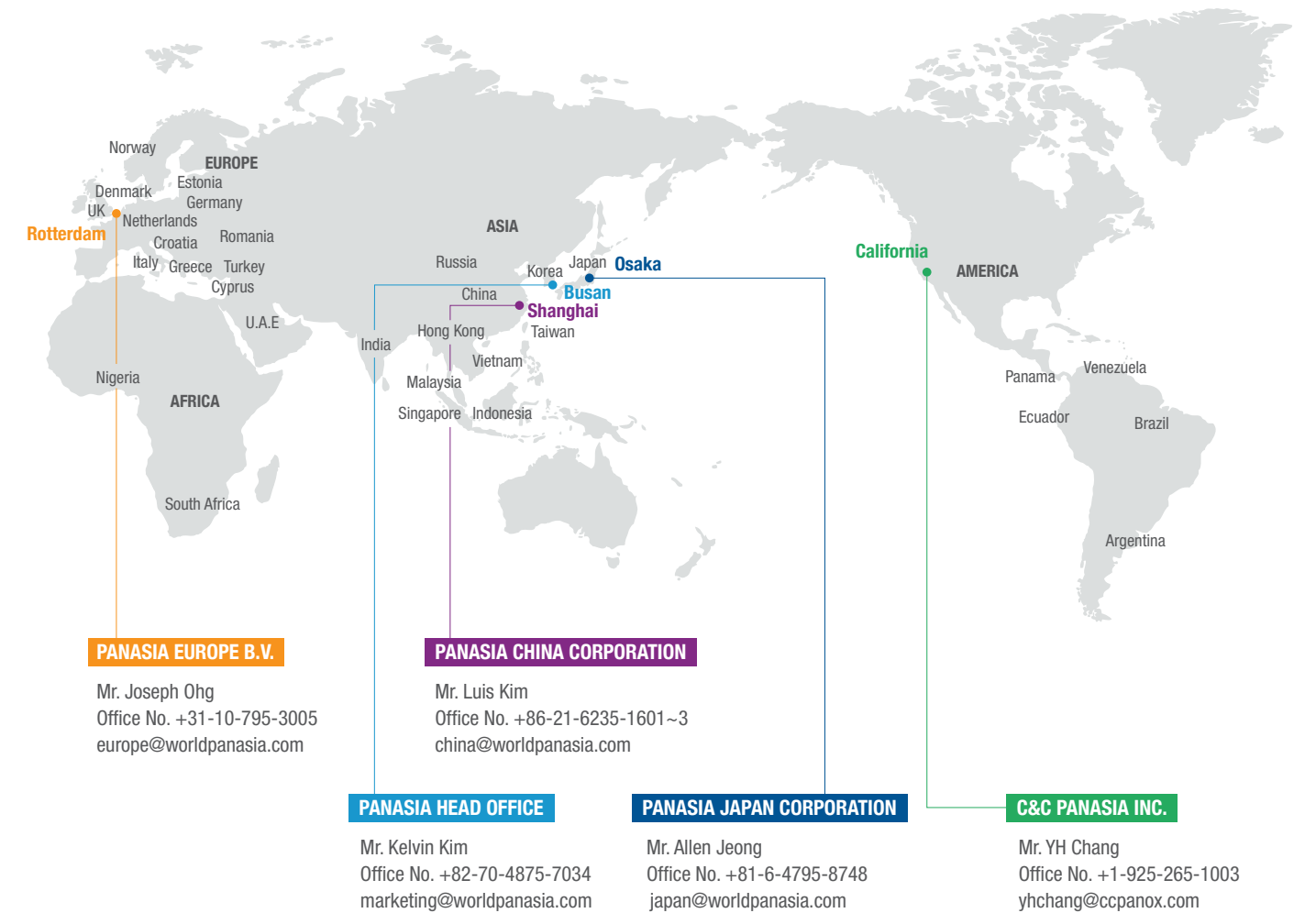
| NO. | Application        | Project Name         | Customer                     | Country          | Capacity             | Reductant         | Q'ty      | Year | Remark                      |
|-----|--------------------|----------------------|------------------------------|------------------|----------------------|-------------------|-----------|------|-----------------------------|
| 1   | Power Plant (HRSG) | ULSAN Chemical Plant | SK corp.                     | KOREA            | 8MW                  | NH3 Gas           | 1         | 2002 | Steam Generator             |
| 2   |                    | CO-OP CITY PP        | IST, KEPCO ENC               | USA(New York)    | 12MW                 | NH3(19%)          | 2         | 2007 | OTSG                        |
| 3   |                    | HELCO KEAHOLE        | IST, KEPCO ENC               | USA(Hawaii)      | 24MW                 | Urea(40%)         | 2         | 2008 | OTSG                        |
| 4   |                    | CCP-003              | Corn Products                | USA (California) | 3MW                  | NH3(19%)          | 1         | 2011 | Solar Turbine/Deltak HRSG   |
| 5   |                    | CCP-004              | City of Fresno               | USA (California) | 3MW                  | NH3 gas           | 2         | 2011 | Allison Turbine/Deltak HRSG |
| 6   |                    | PYEONGTAEK CCPP      | Western Power                | KOREA            | 475MW                | NH3(99.9%)        | 2         | 2013 |                             |
| 7   |                    | ULSAN CCPP           | East Western Power           | KOREA            | 475MW                | NH3(99.9%)        | 2         | 2013 |                             |
| 8   |                    | INCHEON CCPP         | East Western Power           | KOREA            | 5MW                  | NH3(25%)          | 1         | 2013 | BIO GAS                     |
| 9   |                    | HANAM CHPP           | Doosan Construction          | KOREA            | 425MW                | NH3(25%)          | 1         | 2013 | SCR & YPES                  |
| 10  |                    | JEJU CCPP            | GE POWER SYSTEMS KOREA       | KOREA            | 225MW                | NH3(25%)          | 2         | 2016 | SCR & YPAS                  |
| 11  | Boiler             | CCP-001              | California Sheets            | USA(California)  | 600 HP               | NH3 Gas           | 1         | 2010 |                             |
| 12  |                    | CCP-002              | Diamond Pet Foods            | USA(California)  | 350 HP               | NH3 Gas           | 2         | 2010 |                             |
| 13  |                    | CCP-005              | ConAgra Foods-Helm           | USA(California)  | 100,000 lbs/hr steam | NH3 Gas           | 2         | 2012 |                             |
| 14  |                    | CCP-006              | ConAgra Foods-Oakdale        | USA(California)  | 150,000 lbs/hr steam | NH3 Gas           | 3         | 2012 |                             |
| 15  |                    | CCP-007              | UC-Irvine Med Center         | USA(California)  | 750 HP               | NH3 Gas           | 2         | 2012 |                             |
| 16  |                    | Yanbu II Power Plant | DKME                         | SAUDI(Yanbu)     | 117 Ton Boiler       | Urea(40%)         | 1         | 2012 | HFO Boiler                  |
| 17  |                    | CCP-008              | ConAgra Foods-Oakdale        | USA(California)  | 150,000 lbs/hr steam | NH3 Gas           | 1         | 2013 |                             |
| 18  |                    | CCP-009              | Univ of California-Riverside | USA(California)  | 1000 HP              | NH3 Gas           | 3         | 2013 | 5ppm NOx & NH3 Slip         |
| 19  |                    | CCP-011              | ConAgra Foods-Oakdale        | USA(California)  | 150,000 lbs/hr steam | NH3 Gas           | 1         | 2013 |                             |
| 20  |                    | CCP-010              | VA-Long Beach                | USA(California)  | 1000 HP              | NH3 Gas           | 2         | 2014 | 5ppm NOx & NH3 Slip         |
| 21  |                    | CCP-012              | VA-Long Beach                | USA(California)  | 1000 HP              | NH3 Gas           | 1         | 2015 | 5ppm NOx & NH3 Slip         |
| 22  |                    | CCP-013              | Univ of California-Irvine    | USA(California)  | 1000 HP              | NH3 Gas           | 1         | 2016 | 5ppm NOx & NH3 Slip         |
| 23  |                    | CCP-014              | VA-West Los Angeles          | USA(California)  | 1000 HP              | NH3 Gas           | 3         | 2016 | 5ppm NOx & NH3 Slip         |
| 24  |                    | CCP-015              | UC-Irvine                    | USA(California)  | 1000 HP              | NH3 Gas           | 1         | 2016 | 5ppm NOx & NH3 Slip         |
| 25  |                    | Incinerator          | National development project | KCES Co.,Ltd.    | KOREA                | 33,800 Nm3/hr,wet | Urea(40%) | 1    | 2004                        |

# Reference List

| NO. | Application               | Project Name                             | Ship            | Customer                                 | Country | Capacity                         | Reductant | Q'ty | Year | Remark                 |
|-----|---------------------------|--|-----------------|--|---------|----------------------------------|-----------|------|------|------------------------|
| 1   | Marine<br>(Diesel Engine) | National development project             | -               | KIMM                                     | KOREA   | 240kW                            | Urea(40%) | 1    | 2001 |                        |
| 2   |                           | Pilot Project                            | -               | Hyundai Heavy Industry                   | KOREA   | 1,200kW                          | Urea(40%) | 1    | 2002 |                        |
| 3   |                           | National development project             | -               | Iksan City Hall                          | KOREA   | 350kW                            | Urea(40%) | 1    | 2009 | Bio Gas                |
| 4   |                           | National development project             | -               | Pilot Test Facility                      | KOREA   | 350kW                            | Urea(40%) | 1    | 2010 |                        |
| 5   |                           | SPGD12                                   | -               | Hyosung                                  | IRAN    | 7,000kW                          | Urea(40%) | 2    | 2011 | 2 stroke engine        |
| 6   |                           | Pilot Project                            | -               | STX Engine                               | KOREA   | 600kW                            | Urea(40%) | 1    | 2011 | Stationary power plant |
| 7   |                           | DSERE                                    | -               | Doosan Engine                            | KOREA   | 10,000kW                         | Urea(40%) | 1    | 2012 |                        |
| 8   |                           | PSV(Platform Supply Vessel)              | -               | Shinan Heavy Industries                  | KOREA   | 1,900kW X 4set                   | Urea(40%) | 1    | 2012 |                        |
| 9   |                           | Statoil / FSU<br>(Floating Storage Unit) | SN2067          | Samsung Heavy Industries/Statoil         | NORWAY  | 5,220kW X 4set<br>1,600kW X 1set | Urea(40%) | 1    | 2013 |                        |
| 10  |                           | Seadrill / Drillship                     | HN2100/01       | Samsung Heavy Industries/Seadrill        | NORWAY  | 8,000kW X 6set                   | Urea(40%) | 2    | 2013 |                        |
| 11  |                           | Gaslog / LNGC                            | SN2212          | Samsung Heavy Industries/GASLOG          | U.S.A   | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 1    | 2016 |                        |
| 12  |                           | NAT / 157K COT                           | SN2214/15/16    | Samsung Heavy Industries/NAT             | NORWAY  | 1150kW x 3set                    | Urea(40%) | 3    | 2017 |                        |
| 13  |                           | CAPITAL / 319K VLCC                      | SN2225/26/27/28 | Samsung Heavy Industries/ CAPITAL        | GREECE  | 1600kW x 3set                    | Urea(40%) | 4    | 2017 |                        |
| 14  |                           | BW / 319K VLCC                           | SN2229/30/31/32 | Samsung Heavy Industries/ BW             | NORWAY  | 1450kW x 3set                    | Urea(40%) | 4    | 2017 |                        |
| 15  |                           | Caterpillar                              | -               | 500톤 탐사선                                 | KOREA   | 430kW x 2set                     | Urea(40%) | 1    | 2017 |                        |
| 16  |                           | Caterpillar                              | -               | 1,500톤 탐사선                               | KOREA   | 250kW x 2set                     | Urea(40%) | 1    | 2017 |                        |
| 17  |                           | Gaslog LNGC                              | SN2213/62/74    | Samsung Heavy Industries/GASLOG          | U.S.A   | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 3    | 2018 |                        |
| 18  |                           | Evergreen                                | SN2263-70       | Samsung Heavy Industries/EVERGREEN       | TAIWAN  | 4,000kW x 2set<br>3,500kW x 2set | Urea(40%) | 8    | 2018 |                        |
| 19  |                           | Cardiff / 174k LNGC                      | SN2271          | Samsung Heavy Industries/Cardiff         | Greece  | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 1    | 2018 | Bypass Line            |
| 20  |                           | AP / SHTL Tanker                         | SN2277/78/79/80 | Samsung Heavy Industries/AP              | U.S.A   | 4,000kW x 2set<br>3,500kW x 2set | Urea(40%) | 4    | 2018 |                        |
| 21  |                           | Cardiff / 174k LNGC                      | SN2275          | Samsung Heavy Industries/Cardiff         | Greece  | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 1    | 2018 | Bypass Line            |
| 22  |                           | Cardiff / 174k LNGC                      | SN2276          | Samsung Heavy Industries/Cardiff         | Greece  | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 1    | 2018 | Bypass Line            |
| 23  |                           | Eurogas / 174K LNGC                      | SN2304          | Samsung Heavy Industries/Minerva         | Greece  | 3,880kW x 2set<br>2,880kW x 2set | Urea(40%) | 1    | 2018 |                        |
| 24  |                           | Celsius / 180K LNGC                      | SN2297/98       | Samsung Heavy Industries/Celsius         | U.S.A   | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 2    | 2018 |                        |
| 25  |                           | Gaslog LNGC / 174k LNGC                  | SN2300/31       | Samsung Heavy Industries/GASLOG          | U.S.A   | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 2    | 2018 |                        |
| 26  |                           | NYK LNGC                                 | SN2302          | Samsung Heavy Industries/NYK,LNGC        | U.S.A   | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 27  |                           | AP SHTL Tanker                           | SN2277          | Samsung Heavy Industries/AP SHTL         | U.S.A   | 4,500kW x 2set<br>2,700kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 28  |                           | Gaslog LNGC / 174k LNGC                  | SN2311/12       | Samsung Heavy Industries/GASLOG          | U.S.A   | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 2    | 2019 |                        |
| 29  |                           | Minerva-Eurogas / 174K LNGC              | SN2305          | Samsung Heavy Industries/MINERVA-EUROGAS | Greece  | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 30  |                           | NYK, LNGC                                | SN2306/07       | Samsung Heavy Industries/NYK             | U.S.A   | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 2    | 2019 |                        |
| 31  |                           | BK-Navigare / 174K LNGC                  | SN2310          | Samsung Heavy Industries/BK-Navigare     | U.S.A   | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 32  |                           | Celsius / 180K LNGC                      | SN2313          | Samsung Heavy Industries/Celsius         | U.S.A   | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 33  |                           | Celsius / 180K LNGC                      | SN2314          | Samsung Heavy Industries/Celsius         | U.S.A   | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 34  |                           | Cardiff / 174k LNGC                      | SN2308          | Samsung Heavy Industries/Cardiff         | Greece  | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 1    | 2019 | Bypass Line            |
| 35  |                           | Minerva-Eurogas / 174K LNGC              | SN2332          | Samsung Heavy Industries/Minerva-Eurogas | Greece  | 3,840kW x 2set<br>2,880kW x 2set | Urea(40%) | 1    | 2019 |                        |
| 36  |                           | Hoegh Galleon / 180K LNGC                | SN2220          | Hoegh LNG                                | Norway  | 7,800kW x 4set                   | Urea(40%) | 1    | 2019 | Retrofit               |
| 37  |                           | JP Morgan / 180K LNGC                    | SN2336/7        | Samsung Heavy Industries/JP Morgan       | U.S.A   | 3,650kW x 2set<br>2,750kW x 2set | Urea(40%) | 2    | 2019 | Bypass Line            |

# Worldwide Service Network

Effective Follow-up Service, Prompt Action for Spare Parts





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