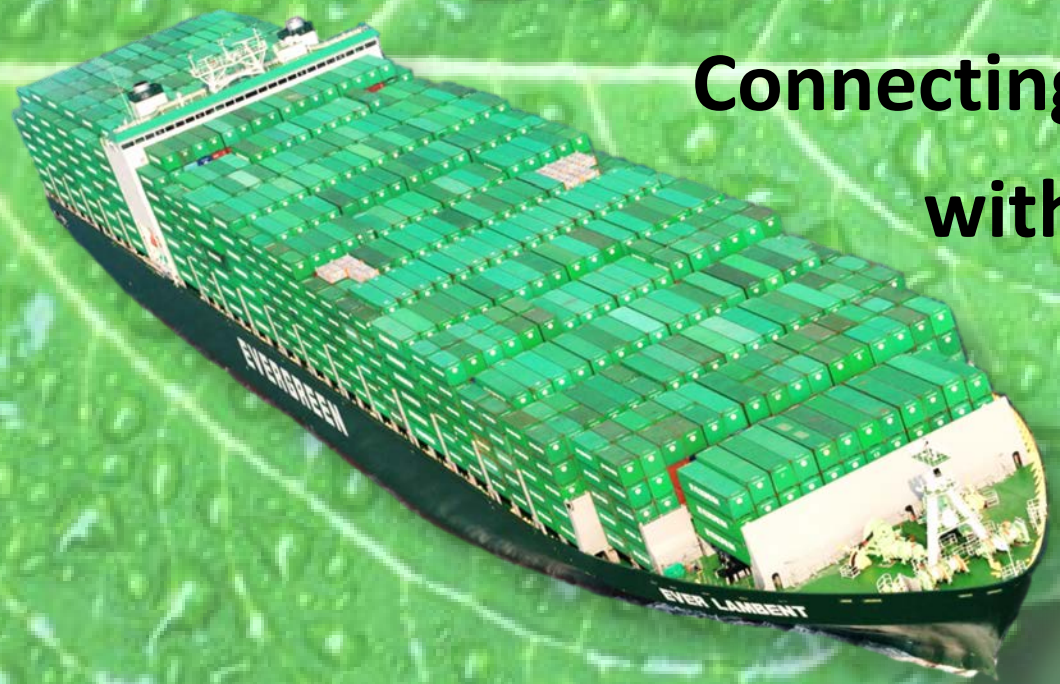
EVERGREEN LINE

Connecting the world with .



Presented by Patrick Lin@EMC

Environmental Philosophy of Evergreen Group

"We will not wait for legislation to be introduced. We will use the latest technology as soon as it is available so as to minimize the impact of container shipping operations both on marine life, on port communities and on humanity worldwide.“—Dr. Chang, Yung-Fa

Initiatives on Eco-Sustainability

Green Ships Operation and Design

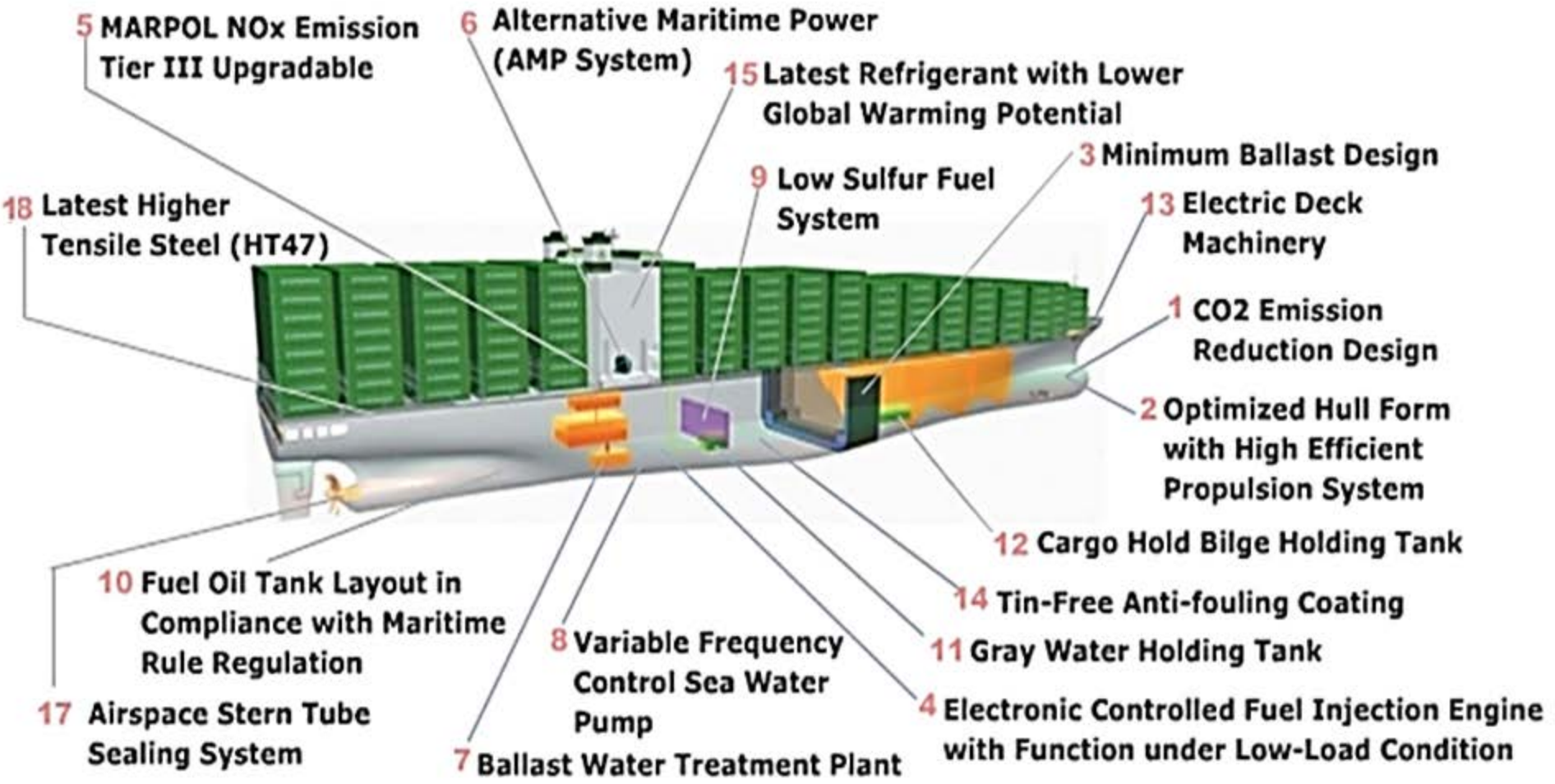
Green Terminal Facilities

Green Ships Operation

- Navigate with the most efficient and economical speed as practicable
- Carry minimum ballast water onboard
- Keep optimal trim to increase efficiency of ship's propulsion

Green Ships Design

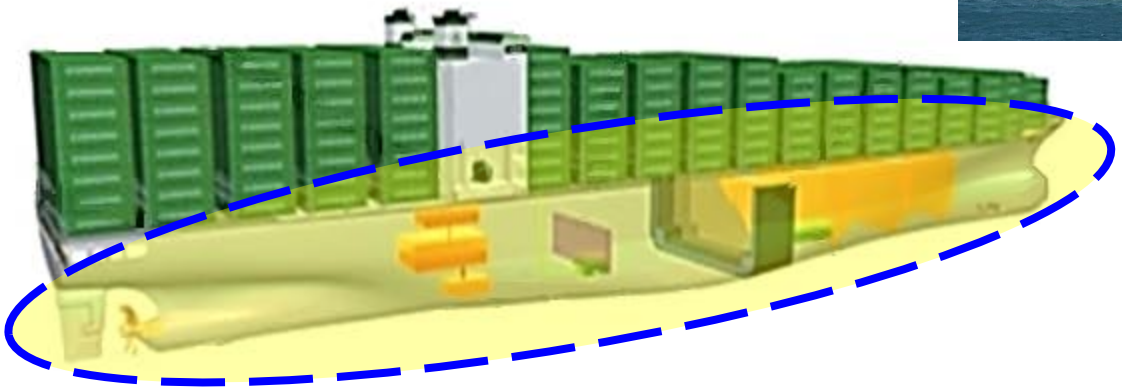
Environmental Features of Evergreen L-Type Green Ships



Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

1. CO2 Emission Reduction Design –

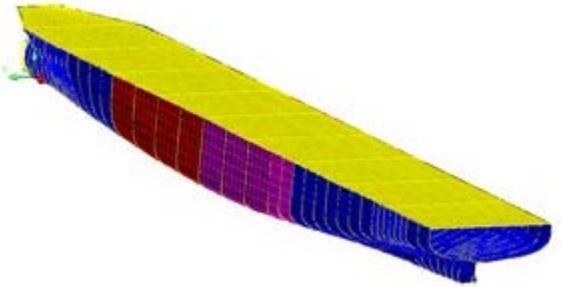


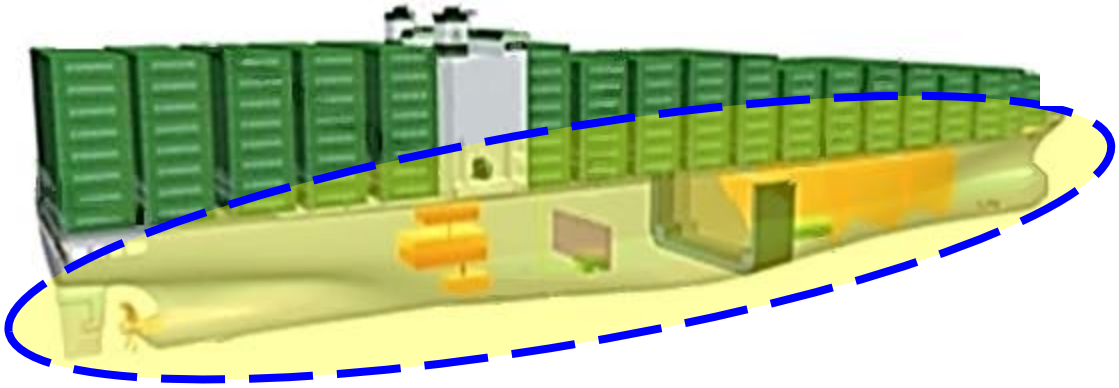
Evergreen's green ships are designed and built to reduce CO2 emission through technical and operational optimization. Compared with previous S-Type model, the new L-Type model is even 15% less in CO2 emission.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

2. Optimized Hull Form with High Efficient Propulsion System –

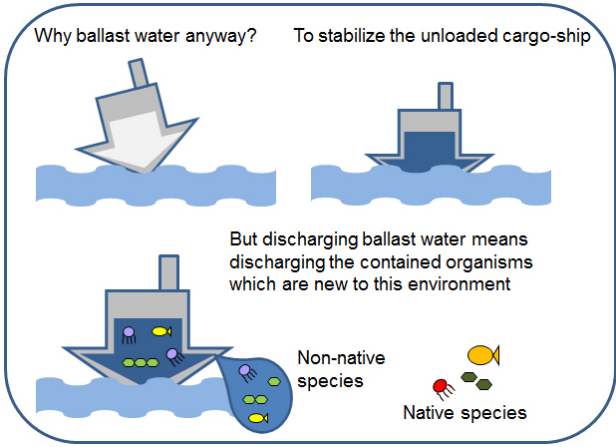




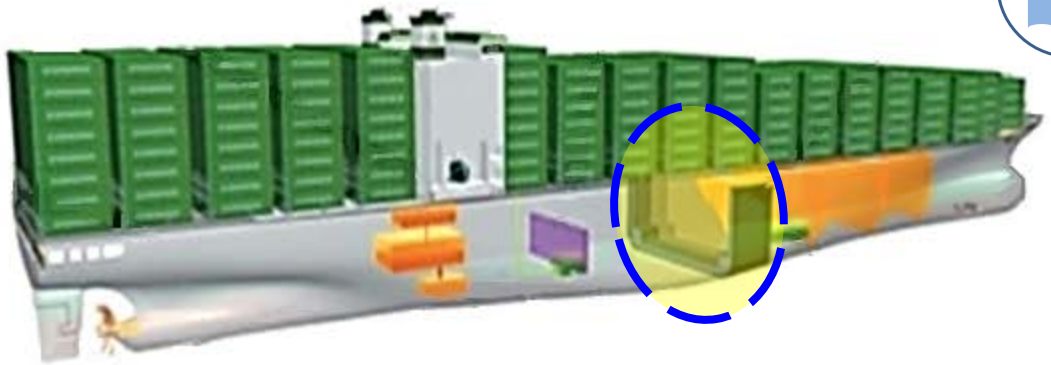
Evergreen's green ships are optimized in hull form with high efficient propulsion system to enhance power utilization yet with less fuel consumption and waste emission.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships



3. Minimum Ballast Design –

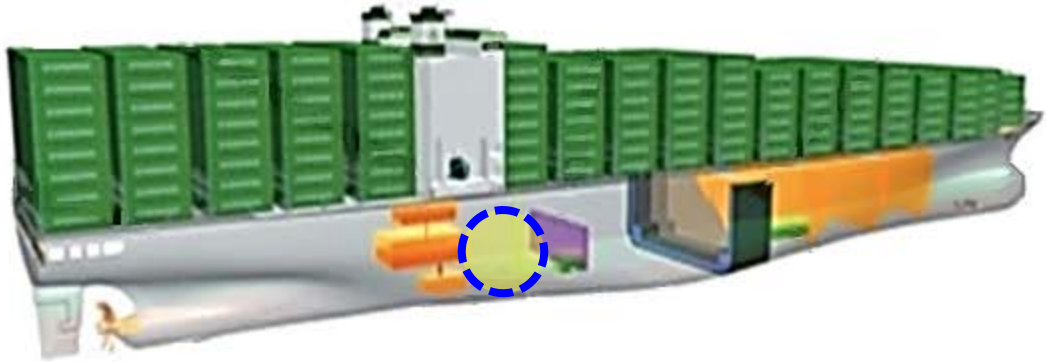


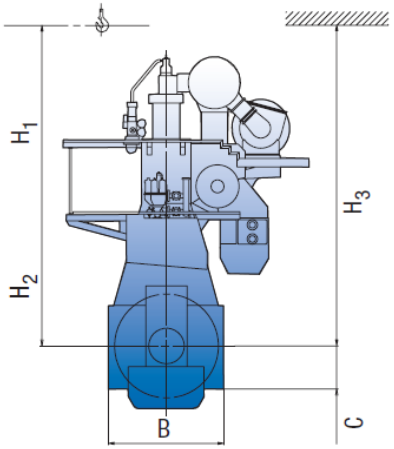
Evergreen's green ships are designed in "wide-beam" concept to improve ship stability so ships do not need much ballast water during the operation. With less ballast water it reduces environmental impact and enhances loading capacity and energy utilization.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

4. Electronic Controlled Fuel Injection Engine with Function of Low-Load Condition –





Evergreen's green ships are equipped with electronic fuel injection and valve control on the main engines which are in compliance with the MARPOL – Nitrogen oxide (NOx) emission Tier II level. In addition, "slow steaming" function are featured as well.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

5. MARPOL NOx Emission Tier III Upgradable –

Tier	Date	NOx Limit, g/kWh		
		n < 130	130 ≤ n < 2000	n ≥ 2000
Tier I	2000	17.0	$45 \cdot n^{-0.2}$	9.8
Tier II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
Tier III	2016†	3.4	$9 \cdot n^{-0.2}$	1.96

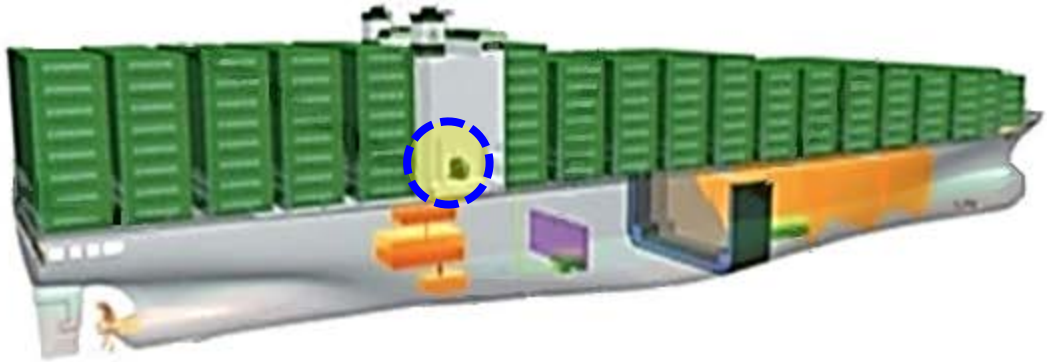
† In NOx Emission Control Areas (Tier II standards apply outside ECAs).

Evergreen's green ships also reserve extra space for future upgrades to install more emission cutting equipment, such as SCR & EGR, to qualify the MARPOL – Nitrogen oxide (NOx) emission Tier III level to be effective in 2016.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

6. Alternative Maritime Power (AMP System) –



Evergreen's green ships are installed with AMP (Alternative Maritime Power) system as same as previous S-Type model. By connecting shore power supply, the vessel generator engines could be shut down during the ship berthing to avoid air pollution.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

7. Ballast Water Treatment Plant –

Build date	Ballast water capacity (m3)	2009	2010	2011	2012	2013	2014	2015	2016
Pre 2009*	1,500 – 5,000	D1 or D2					D2*		
	< 1,500 or > 5,000	D1 or D2							D2*
2009 onwards	< 5,000	D2**							
2009 to 2011	> 5,000	D1 or D2							D2*
2012 onwards	> 5,000				D2				

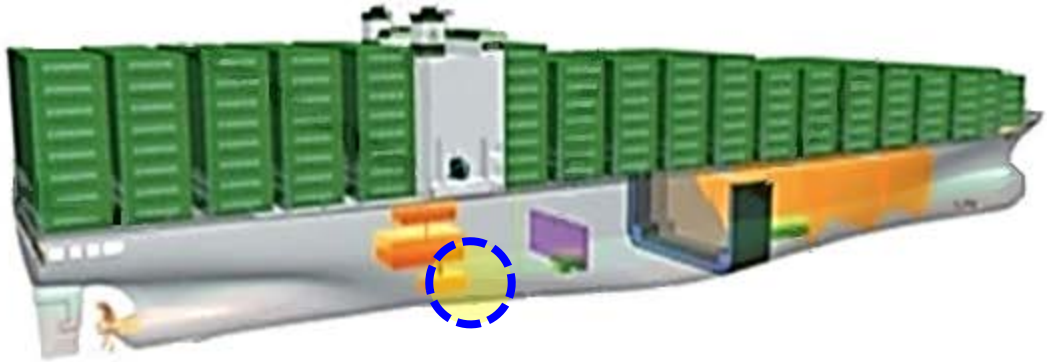
Table 1: Timescales for ballast water exchange and treatment. D1 = exchange; D2 = treatment.

Evergreen's green ships are equipped with ballast water treatment plant in compliance with IMO guidelines to ensure ballast water exchange during ship operation does not impact marine ecosystems.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

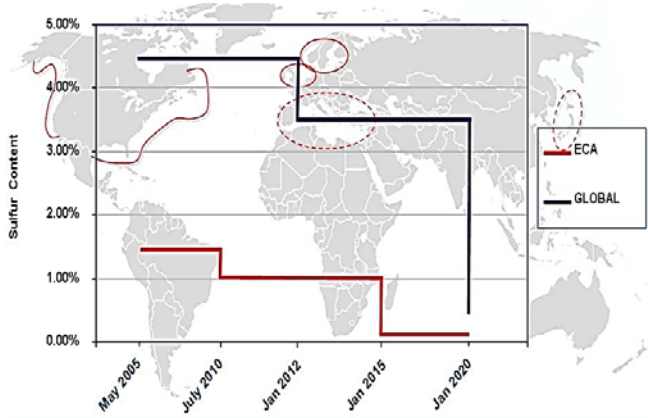
8. Variable Frequency Control Sea Water Pump –



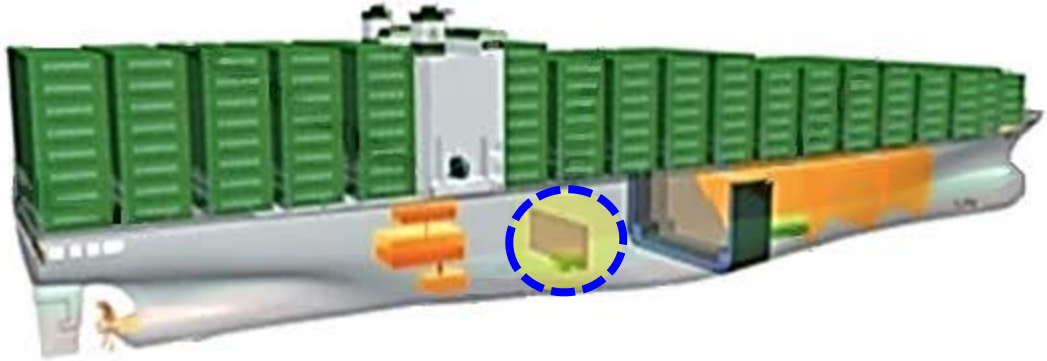
Evergreen's green ships adopt variable frequency control type motor on the main cooling sea water pump so the motor speed would be automatically controlled by both cooling sea water and central cooling fresh water to enhance electricity utilization and save energy.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships



9. Low Sulfur Fuel System –

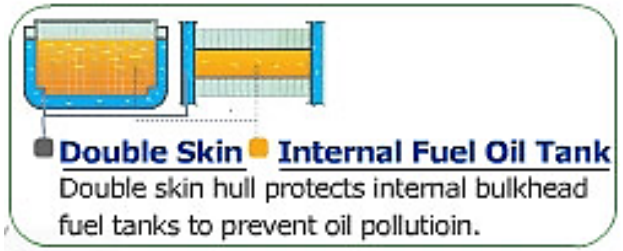


Evergreen's green ships are equipped with low sulfur fuel supply system in the main engine to reduce SOx exhaust to comply with regulations in areas such as Baltic Sea & North America ECA.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

10. Fuel Oil Tank Layout in Compliance with Maritime Rule Regulation –

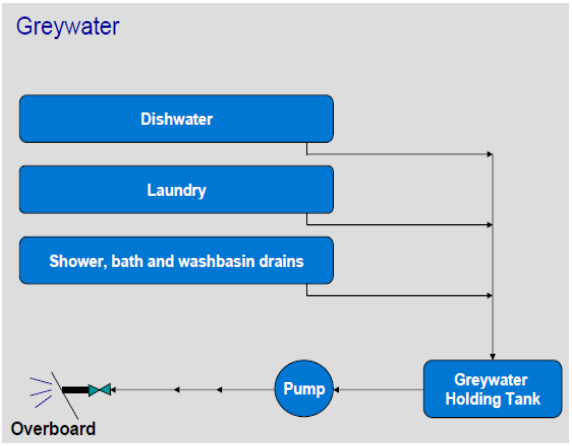


Evergreen's green ships have evolutional fuel tank layout protected by double hull which could prevent oil leak and fire upon ship collision.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

11. Greywater Holding Tank –

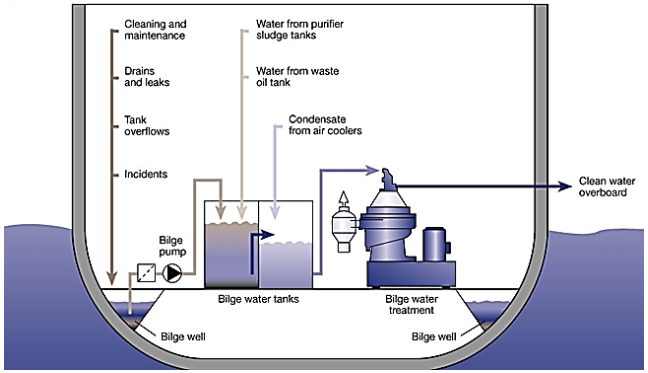


Evergreen's green ships are equipped with greywater holding tanks which can prevent unnecessary waste water discharge while berthing in port.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

12. Cargo Hold Bilge Holding Tank -



Evergreen's green ships are equipped with cargo hold bilge water holding tanks which can prevent unnecessary water discharge or dangerous cargo substance leaking while berthing in port.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

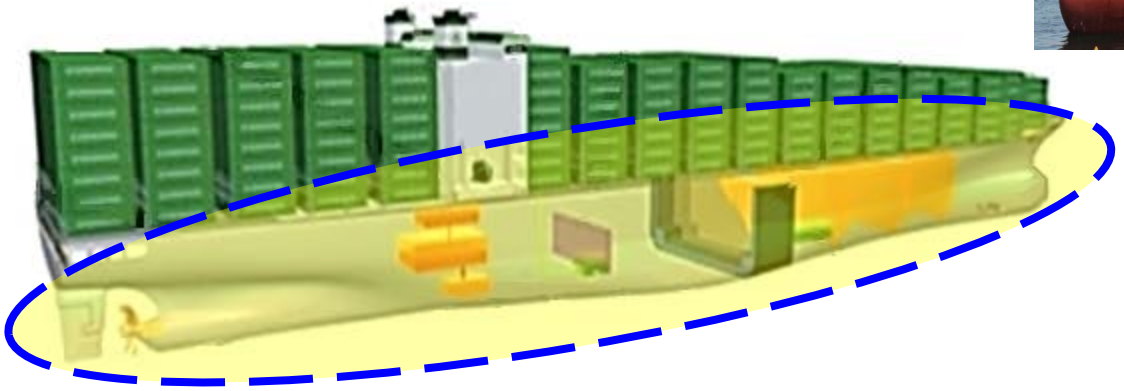
13. Electric Deck Machinery –

Evergreen's green ships are equipped with electric deck machinery which can prevent risk of oil leak and noise pollution that traditional electro-hydraulic deck machinery has.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

14. Tin-Free Anti-fouling Coating –

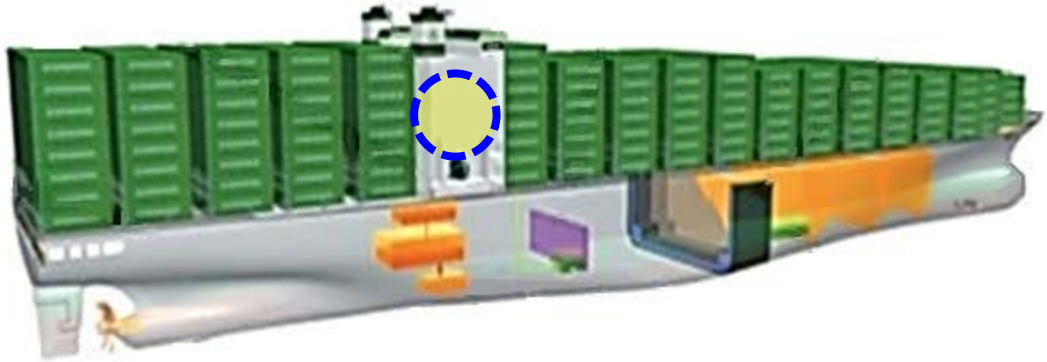


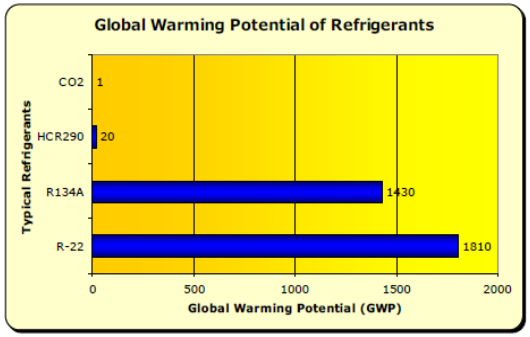
Evergreen's green ships adopt a new tin-free coating to protect the ocean. Research shows this coating has higher anti-fouling function and is non-toxic to the environment, compared with traditional coating with organotin substance.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

15. Latest Refrigerant with Lower Global Warming Potential –



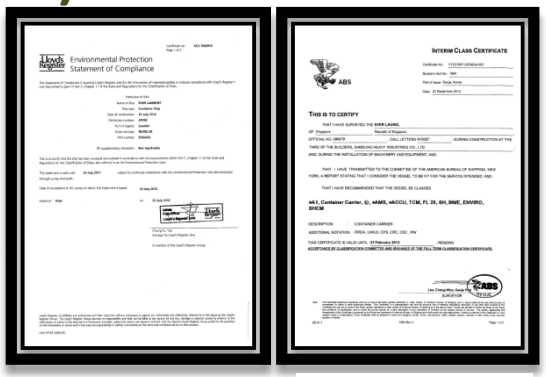


Evergreen's green ships adopt the latest refrigerant which is free of Ozone-depleting and has low global warming potential to ensure compliance with the requirement of MARPOL and helps restrain the global warming problem.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

16. Environmental Protection Notation Issued by Classification Society (ABS：ENVIRO Notation、LR：EP Notation) –



Lloyd's Register

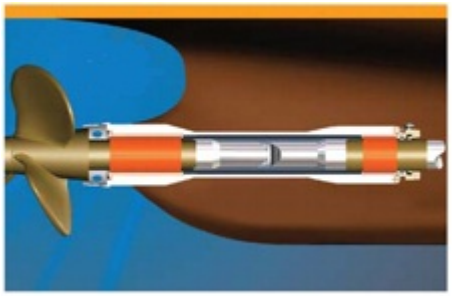
ABS FOUNDED 1862

Evergreen's green ships have applied for the environment notation from Classification Society in order to comply with the requirement of environment protection.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

17. Airspace Stern Tube Sealing System –

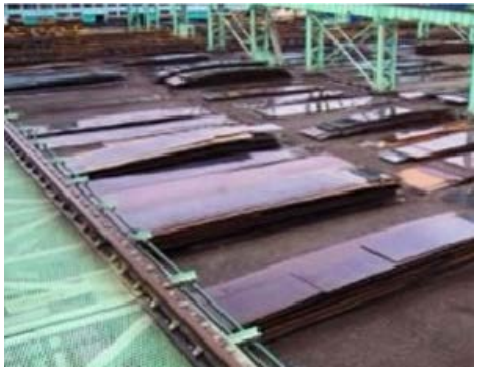


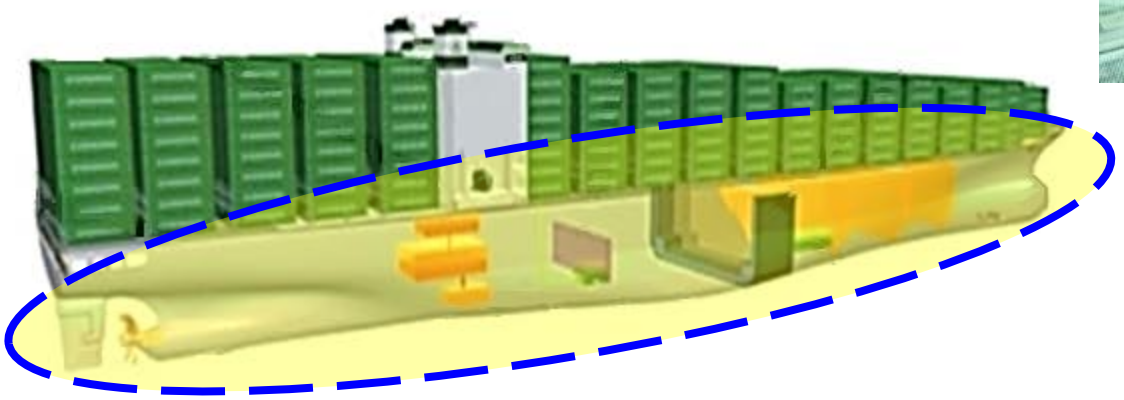
Traditional stern tube seals are lubricated by oil with risk of oil leak and pollution; Evergreen's green ships are equipped with airspace stern tube sealing system which can prevent such risk.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

18. Latest Higher Tensile Steel (HT47) –





For the purpose of reducing the hull structure weight, Evergreen's green ships adopt higher tensile steel (HT47) on the main hull structure. Lighter ship weight means less need of propulsion power, less emission and energy saving.

Green Ships Design

Environmental Features of Evergreen L-Type Green Ships

19. Green Passport to comply with Convention of Ship Recycling –

Evergreen has adopted the “Green Passport” to comply with the IMO – Ship Recycling Convention” and takes responsibility for environment protection.

Green Terminal Facilities

Higher efficiency gantry crane : reduce berthing time and waste emission.

Electric powered rubber-tired and rail-mounted gantry cranes (RTG & RMG) : reduce fuel & CO2.

Automatic Vehicle Monitoring System & Gateway Control : reduce vehicle idle time & air pollution.

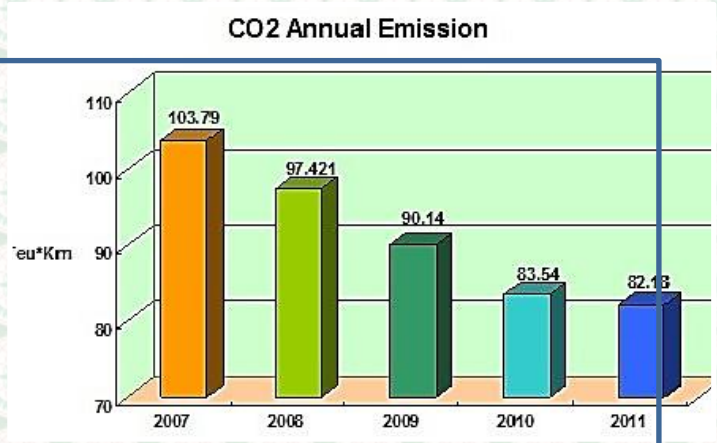
Green Terminal Facilities

Sewage Treatment Plant: produces purified water and drain the water into the ocean.

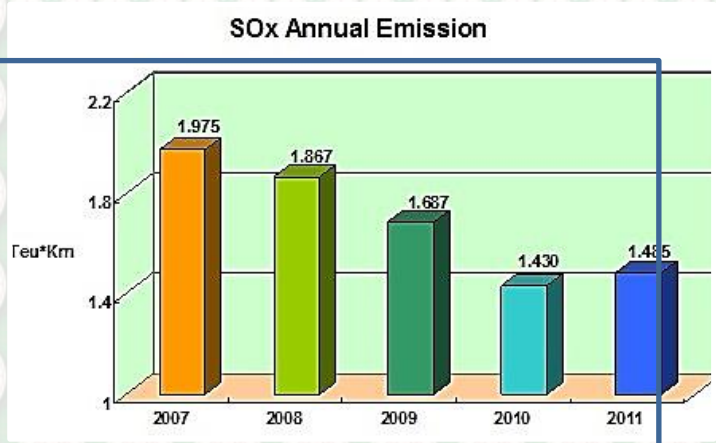
Eco-friendly pavement: drains off rains from the surface separated from sewer.

Solar powered lighting : utilizes renewable energy to protect environment.

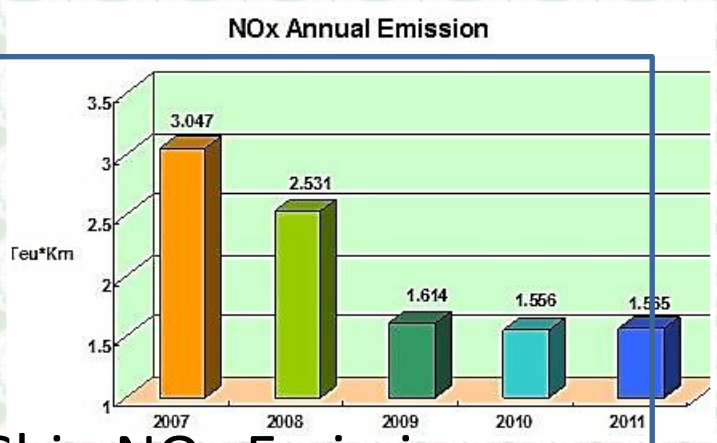
Our Green Efforts



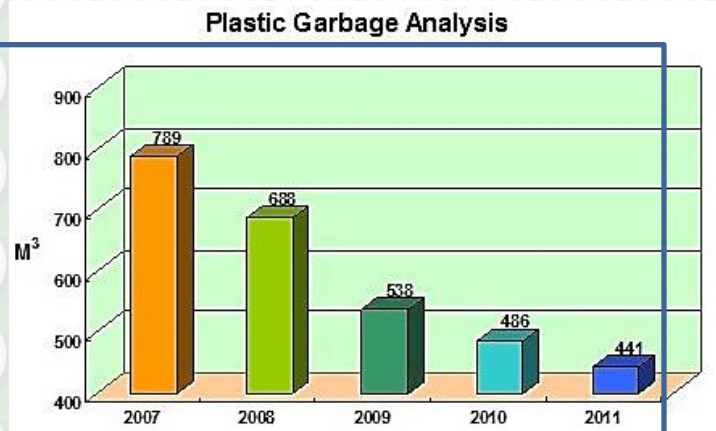
Ship CO2 Emission



Ship SOx Emission



Ship NOx Emission



Ship Plastic Garbage

Our Green Devotion & Recognition

Thank You!