WAH KWONG
MARITIME TRANSPORT HOLDINGS LIMITED

VENTURE
MARINE SERVICES

DECARBONIZATION STRATEGIES

WAH KWONG – EXISTING FLEET VESSELS

WAH KWONG
MARITIME TRANSPORT HOLDINGS LIMITED

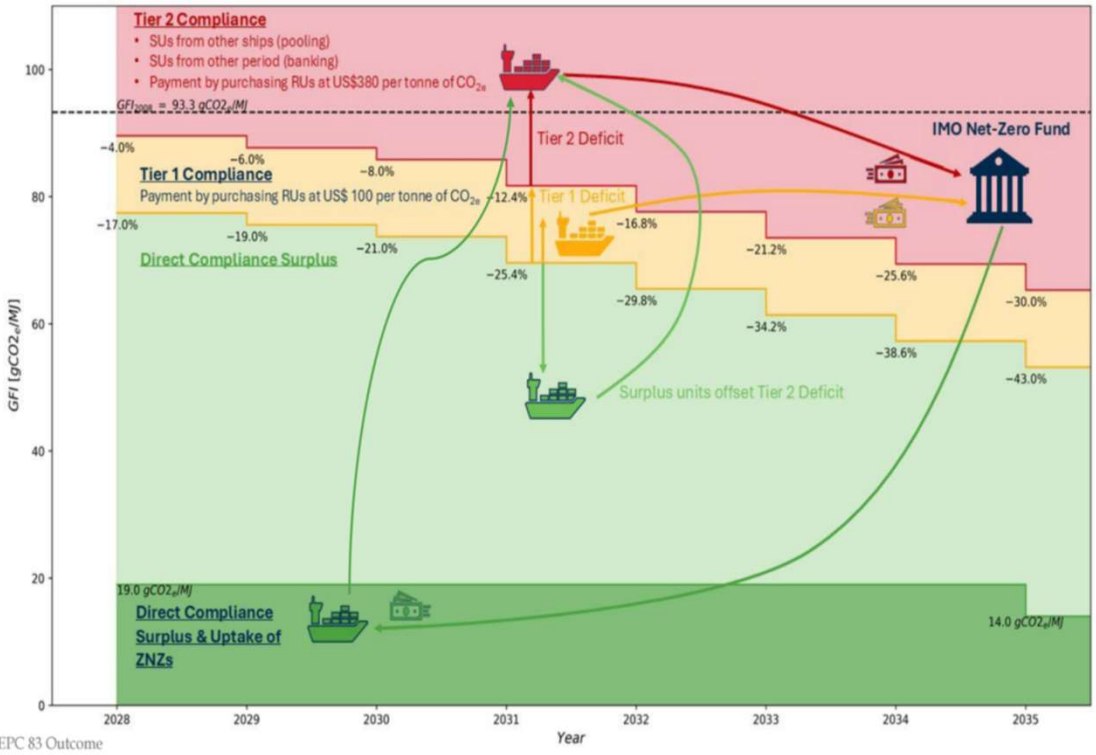
VENTURE
MARINE SERVICES

Agenda

1. MEPC 83 : brief recap
2. Efficiency improvement
   (a) Technical - upgrades and efficiency improvement
   (b) Operational - performance improvement
3. Options
   (a) Voyage Optimization
   (b) Installation of Energy Saving Devices
   (c) Innovation / New technology
   (d) Alternate Fuel
   (e) Retrofit – Dual fuel (LNG/Methanol/Ammonia)
   (f) Retrofit – OCCS / Carbon Capture System (CCS)
4. Decarbonisation strategies
   (a) Periodic maintenance / Dry docking
   (b) Energy- Fuel switch to green fuel (Biofuel) to minimise GFI Impact
5. Drydock upgrades
   (a) Efficiency improvement (Rotor Sail)
   (b) Decarbonization by use of CCUS
6. Conclusion

(1) MEPC 83 : brief recap

Strong Signal IMO to adopt decarbonization with 2 Tier tax and incentive mechanism



Compliance cost from 2028

* $380/ton CO2e, if not meeting base target

* $100/ton CO2e if not meeting direct target

VLSFO to incur both taxes from Day 1

Incentives to encourage the use of Green fuels

Surplus units : value TBD (might be $ 320~ 350/ton CO2e)

Net zero funds : benchmarks 19g/MJ (2028) & 14g/MJ (2035)

Uncertainties prevail : Voting in October 2025 for adoption, US showing reluctance.

Entry into force (year 2027) : 16 months after adoption

(2a) Technical – upgrades and efficiency improvement

OPERATIONS
VOYAGE OPTIMIZATION
SPEED MANAGEMENT
WEATHER ROUTING
JIT (JUST IN TIME)
CARGO HANDLING

TECHNCIAL
AUTO PILOT UPDATE
PMI VIT (MC ENGINE)
ME ECO TORQUE (GOVERNOR SPEED RANGE))
ME PMI ACCO(ADAPTIVECYLINDERCONTROL,PDEV)
ME ECO TUNNING
ULTRASONIC FOR HULL/PROPELLER
ESD-PSV / NOZZLE
ESD – HVAF / PBCF / PROPELLER CAP
ESD – RUDDER BULB
PROPELLER TRIMMING
PROPELLER EXCHANGE
LED LIGHTS
VFD
SHAFT GENERATOR
A)TURBOCHARGER UPDATE -NOZZEL RING +DIFFUSER
B) TURBOCHARGER UPDATE -NOZZEL RING +DIFFUSER +WHEEL
C) TURBOCHARGER UPDATE -SHAFT+WHEEL + (NOZZEL RING +DIFFUSER)
SHORE POWER AMP
WASTE HEAT RECOVERY
HEAT INSULATION PAINT ON MONKEY ISLAND

HULL AND PAINT
100% HULL BLAST
LOW FRICTION ANTI-FOULING PAINT
PAINT FOR PROPELLER

ENERGEY
B30 BIO FUEL
B100 / GREEN BIO FUEL

INNOVATION
WIND ASSISTED PROPULSION
BATTERY BANK (PTO/PTI)
HYBRID
AIR LUBRICATION SYSTEM
SOLAR POWER
CCUS

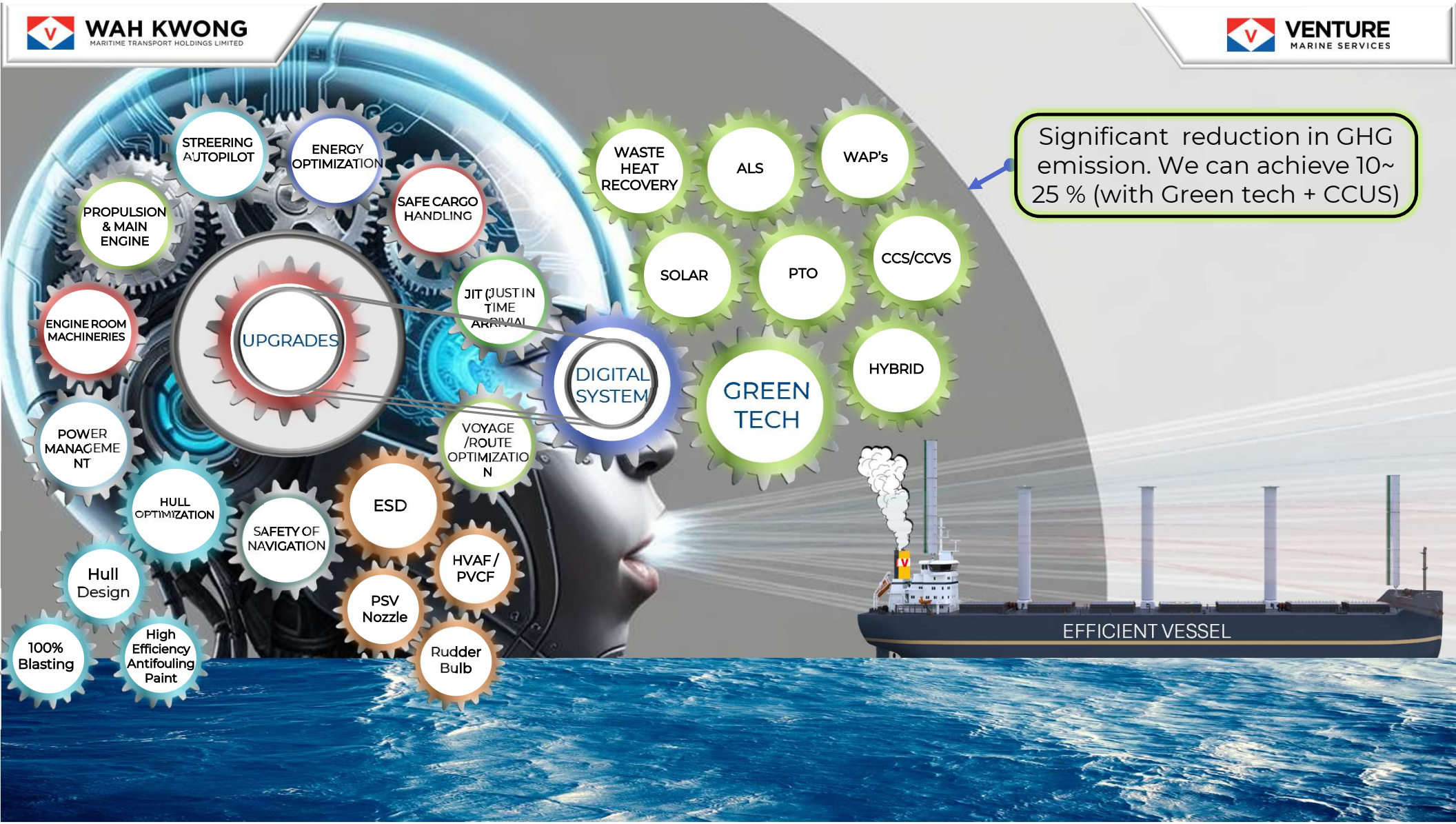
SMART System

SMART operation

Upgrades

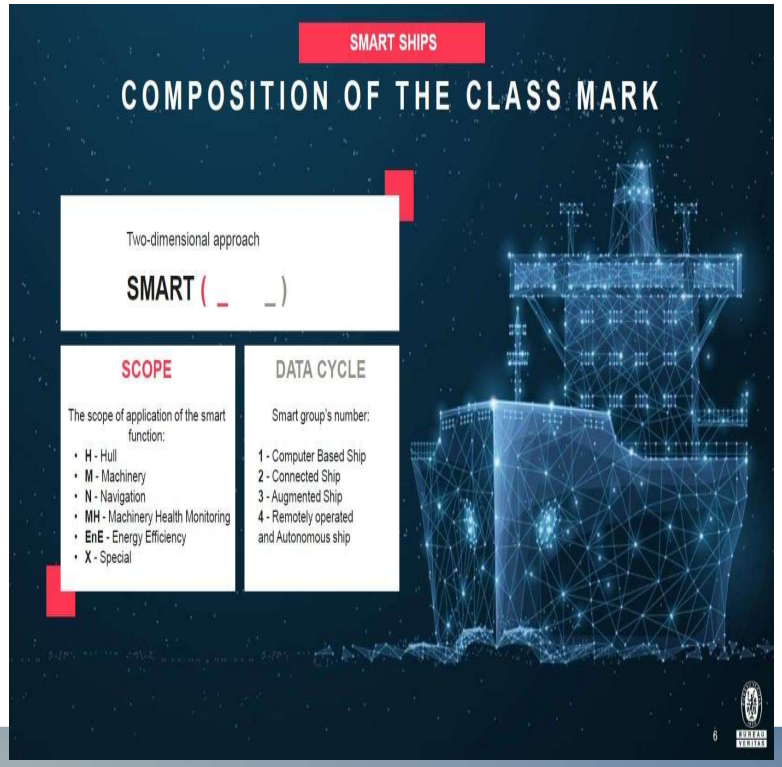
Green Tech

Green Energy


WAH KWONG
MARITIME TRANSPORT HOLDINGS LIMITED
VENTURE
MARINE SERVICES
STREERING AUTOPILOT
ENERGY OPTIMIZATION
SAFE CARGO HANDLING
PROPULSION & MAIN ENGINE
ENGINE ROOM MACHINERIES
UPGRADES
JIT (JUST IN TIME ARRIVAL
DIGITAL SYSTEM
POWER MANAGEMENT
VOYAGE /ROUTE OPTIMIZATION
HULL OPTIMIZATION
SAFETY OF NAVIGATION
ESD
HVAF / PVCF
PSV Nozzle
Rudder Bulb
Hull Design
100% Blasting
High Efficiency Antifouling Paint
WASTE HEAT RECOVERY
ALS
WAP's
SOLAR
PTO
CCS/CCVS
GREEN TECH
HYBRID
Significant reduction in GHG emission. We can achieve 10~ 25 % (with Green tech + CCUS)
EFFICIENT VESSEL

SMART Operation : SMART SYSTEM for our NB Vessels

SMART Notations for : 4- LNG vessels, 2-LR2 Tankers and 4-NDY 63K Bulkers



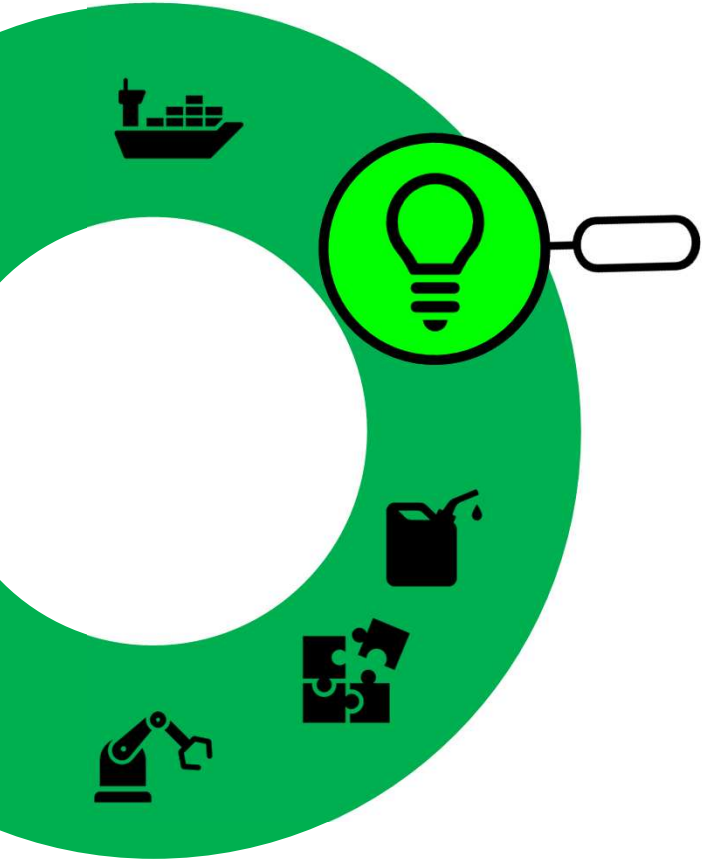
- NDY 63k bulker : SMART (EnE3), SMART (MH3)
- Hengli LR2 tankers : SMART (EnE3), SMART (MH3), H1 and M1
- LNG/C at DSIC : SMART (EnE3), SMART (MH3), H1 and M1

Propulsion efficiency
Main engine combustion optimization
Silicon paint / Premium quality Anti-fouling paints
Optimize usage of energy onboard
Save energy / no wastage of energy

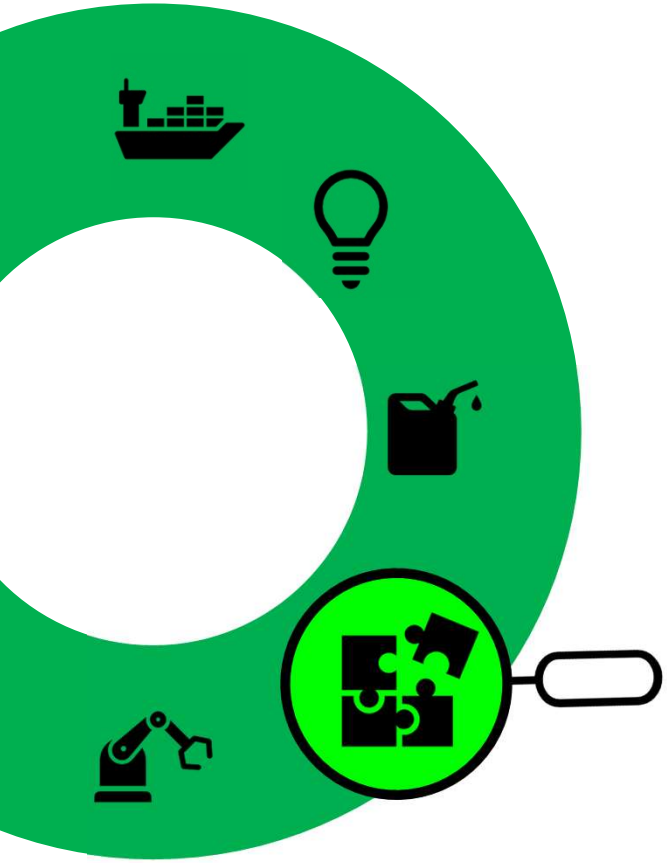
(3a) Voyage Optimisation

Options
Optimize Port Stay
Just in time (JIT)
Voyage/Speed Optimization
Weather Routing

(3b) Energy Saving Devices

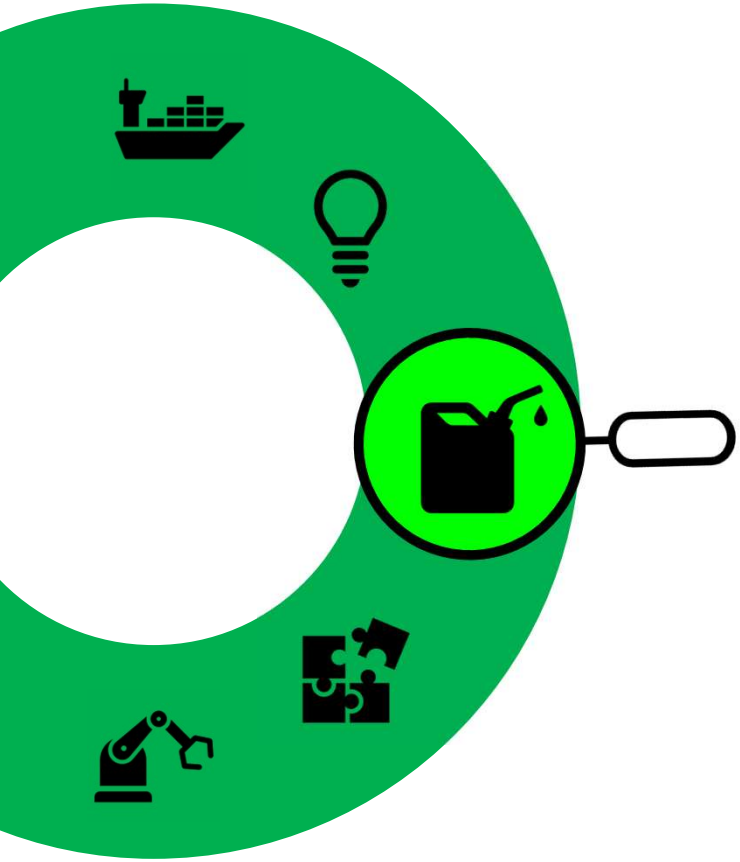


Options	ESD category
Hub Vortex Absorbed Fins (HVAF) / PBCF	A
Pre-Swirl Vanes – PSV/ Energo Pro Fin/ Mewis Duct	A
Rudder Bulb	A
Solar Panels for auxiliary loads	C-2
Shore power	C-2
Fuel cells for aux system	C-2
Kappel Propellers	A
Waste Heat Recovery generator	C-1
Power Take-off (PTO) or Shaft Generator	C-1



(3c) Innovation /New Technology

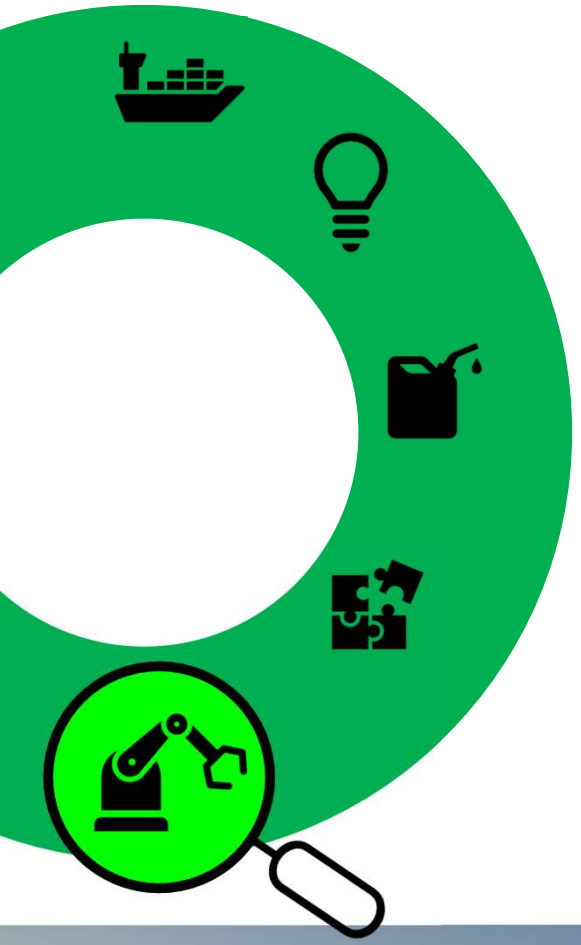
Options	ESD Category
Air Lubrication	B1
Rotor Sails	B2
Skysails (kites)	B2
Sail Wings	B2
Energy Storage Battery	C2



(3d) Alternative Fuel

Fuel Option
LNG Fuel (with Duel-Fuel Conversion)
LPG/Ethane (with Dual- Fuel Conversion)
Methanol (with Dual- Fuel Conversion)
Ammonia (with Dual- Fuel Conversion)
Hydrogen (with Dual- Fuel Conversion)
Nuclear power

Biofuels	Electro-fuels
Biofuels (with Dual-Fuel Conversion)	e-MGO
Bio-MGO	e- LNG
Bio- LNG	e-Methanol
Bio- methanol	e-NH3



(3e) Retrofit – Dual fuel (LNG/Methanol/Ammonia)

Retrofit existing Vessels to enable to use either LNG or Methanol or Ammonia.

Vessels can use Bio Fuel (B30 to B100) without retrofit taking certain operational precautions and following Maker's guidance

---

(3f) Retrofit – OCCS / Carbon Capture System (CCS)

Pre-combustion: Steam Methane Reforming

- an innovative way to use energy with fuel cells
- without hassles of storing H2 at very low temperature

Post-combustion:

- CCS (Carbon Capture Sequestration) / CCUS
- CO2 capture with use of Lime [CaO], convert to Lime Stone [CaCO3]. Reversible process.

(4a) Decarbonisation strategies - periodic maintenance / Dry docking

DRY DOCKING 1		DATE	15/11/2025
No.	Levers	% Saving	Spend.
1	100% Hull Blast / HQ AF Paint (Paint+Yard)		
2	Auto Pilot Update		
3	ESD – Rudder Bulb		
4	Apply Paint For Propeller		
5	PMI VIT(MC Engine)		
6	ESD-PSV / Nozzle		
7	ESD – HVAF/ PBCF / Propeller Cap		
8	Propeller Trimming		
	In Total	9.01%	USD xxx
	GFI Sav.2026-2028		
	Oil Sav.2026-2028		

2025

DRY DOCKING 2		DATE	15/11/2028
No.	Levers	% Saving	Spend.
1	100% Hull Blast / HQ AF Paint (Paint+Yard)/2		
2	Propeller Exchanging		
3	LED Lights		
4	VFD		
	In Total	6.02%	USD xxx
	GFI Sav.2029-2031		
	Oil Sav. 2029-2031		

2028

DRY DOCKING 3		DATE	15/11/2031
No.	Levers	% Saving	Spend.
1	100% Hull Blast / HQ AF Paint (Paint+Yard)/2		
2	Shaft Generator (If vessel not sale in 3yrs)		
3	A.Turbocharger Update -Nozzel Ring +Diffuser		
4	CCUS (subject to MEPC approved & shore disposal facility available)		
5	PTI option with battery - to keep in mind (If vessel not sale in 3yrs)		
	In Total	4.55%	USD xxx
	GFI Sav.2032-2034		
	Oil Sav. 2032-2034		

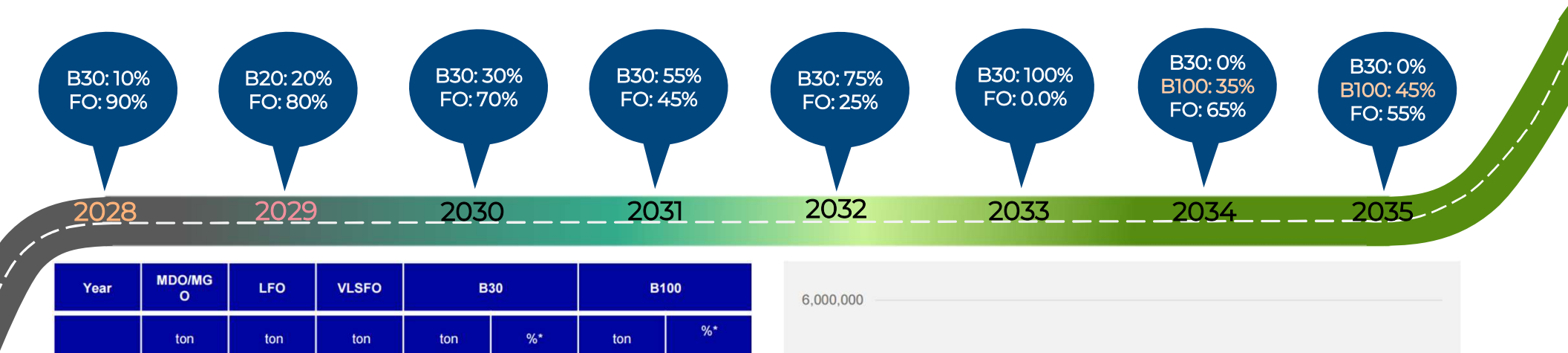
2031

Cape Size Bulker (Road Map)

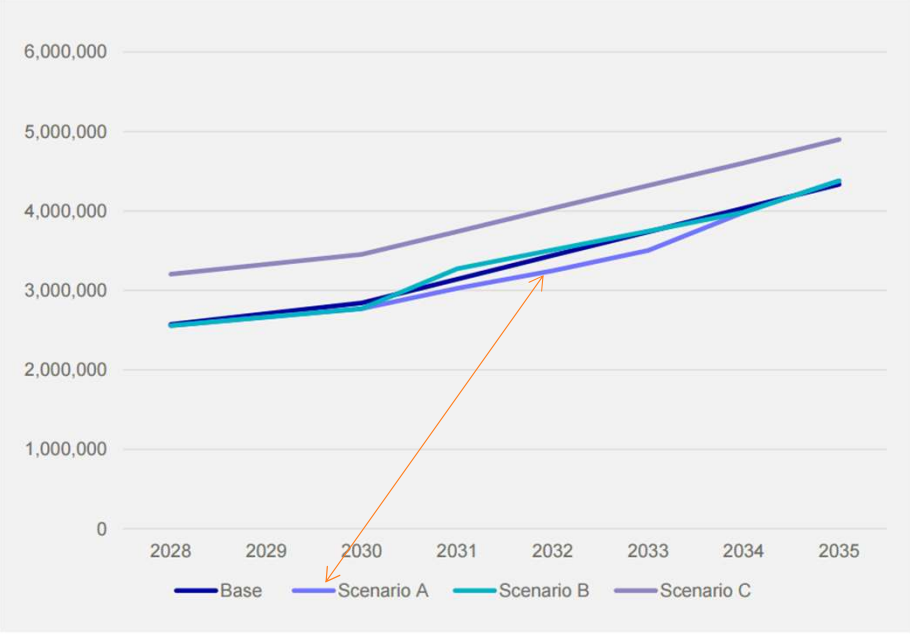
WAH KWONG
MARITIME TRANSPORT HOLDINGS LIMITED

(4b) Decarbonisation strategies Energy- Fuel switch to green fuel (Biofuel) to minimise GFI Impact

VENTURE
MARINE SERVICES



Year	MDO/MGO	LFO	VLSFO	B30		B100	
	ton	ton	ton	ton	%*	ton	%*
2028	553	425	3,357	382	10%	0	0%
2029	553	425	2,984	763	20%	0	0%
2030	553	425	2,611	1,145	30%	0	0%
2031	553	425	1,679	2,099	55%	0	0%
2032	553	425	933	2,862	75%	0	0%
2033	553	425	0	3,816	100%	0	0%
2034	553	425	2,425	0	0%	1,411	35%
2035	553	425	2,052	0	0%	1,814	45%



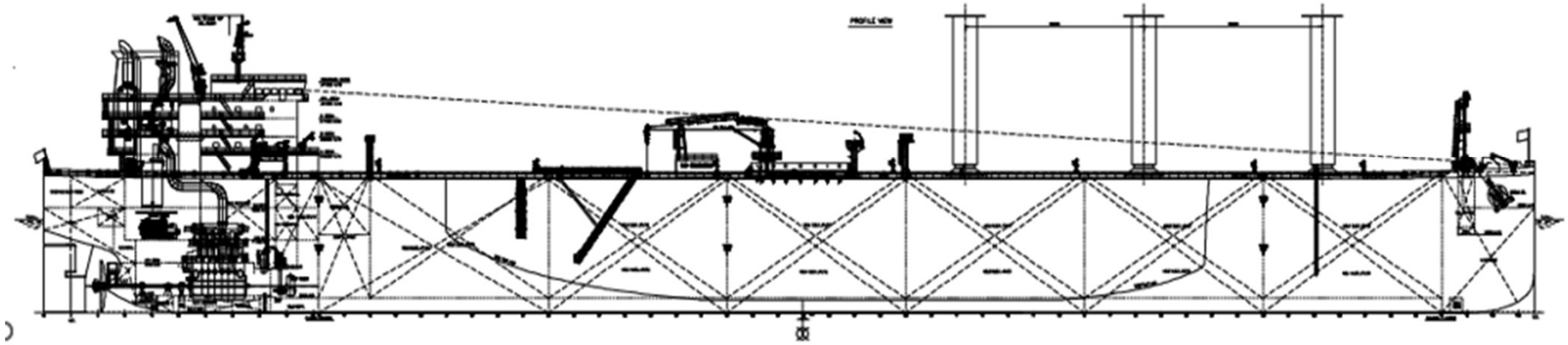
Scenario A

Upgrade option - Rotor Sail and CCUS

Mid size tanker– Arrangement of Rotor Sails on main deck

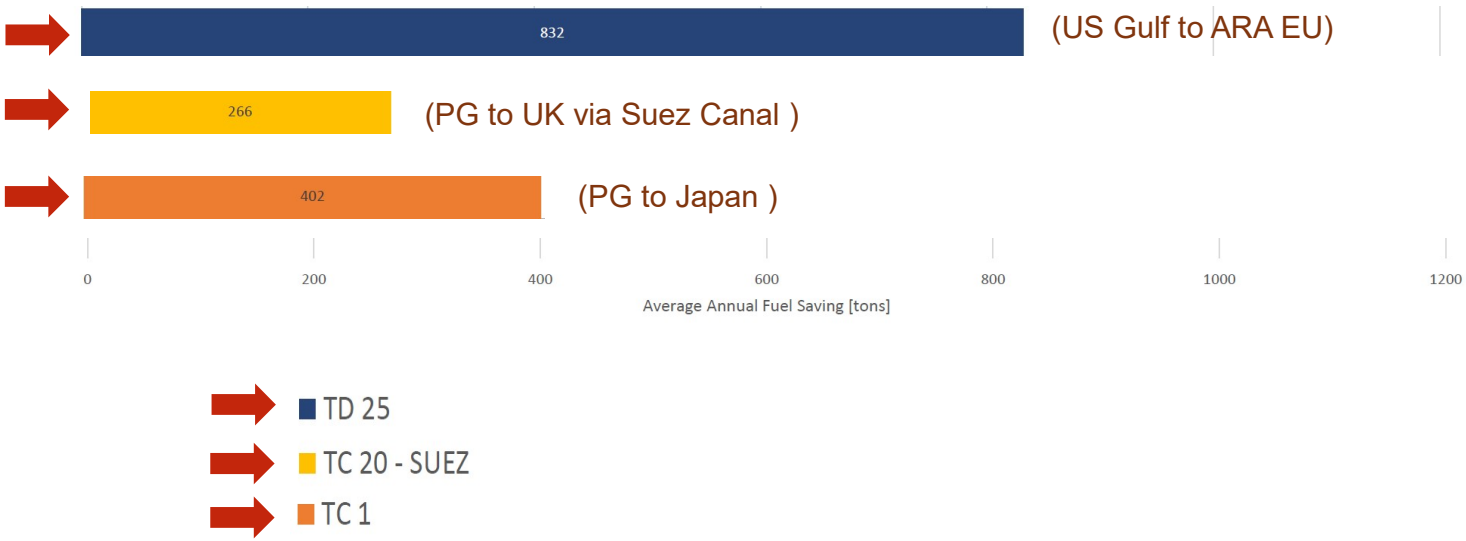
Upgrade option - Rotor Sail and CCUS

Midsize tanker – Arrangement / Configuration of Rotor Sail



A Study: The comparison between CCUS and Rotor Sail

LR2 Rotor Sail case study – Comparison of fuel savings for 3 routes (among several routes)



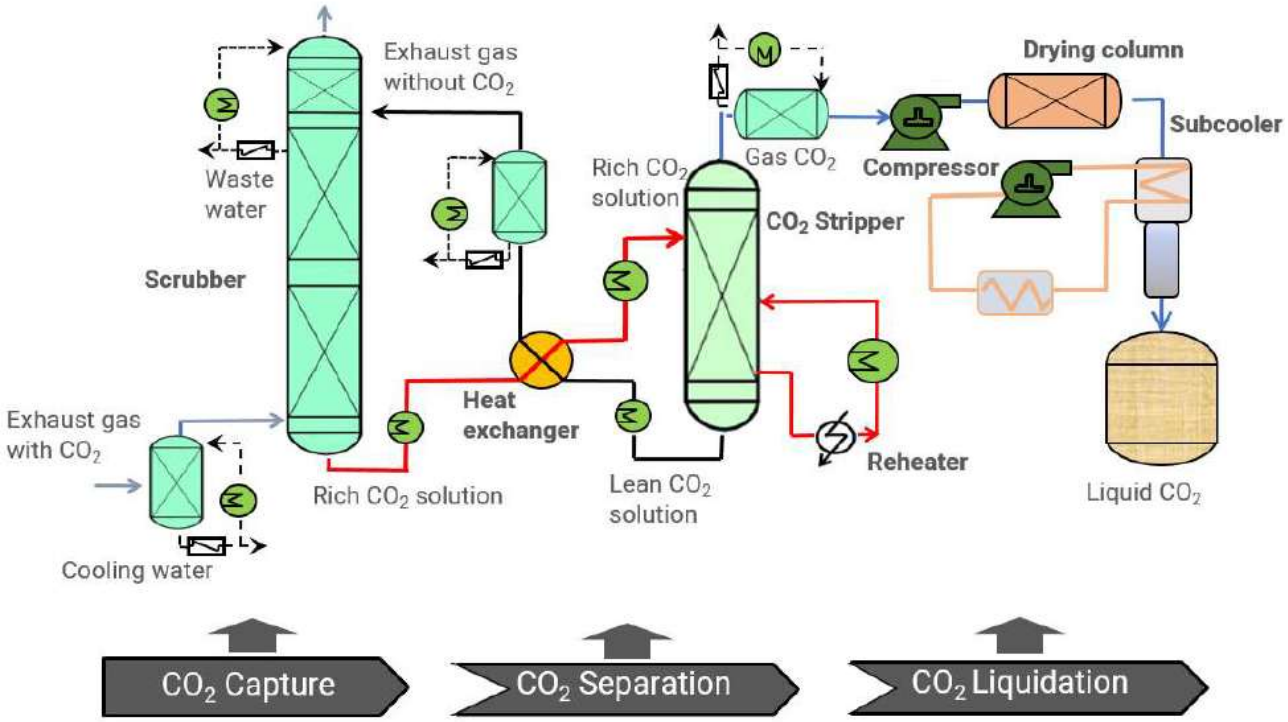
A Study: The comparison between CCUS and Rotor Sail

LR2 Rotor Sail case study – Performance of the sails

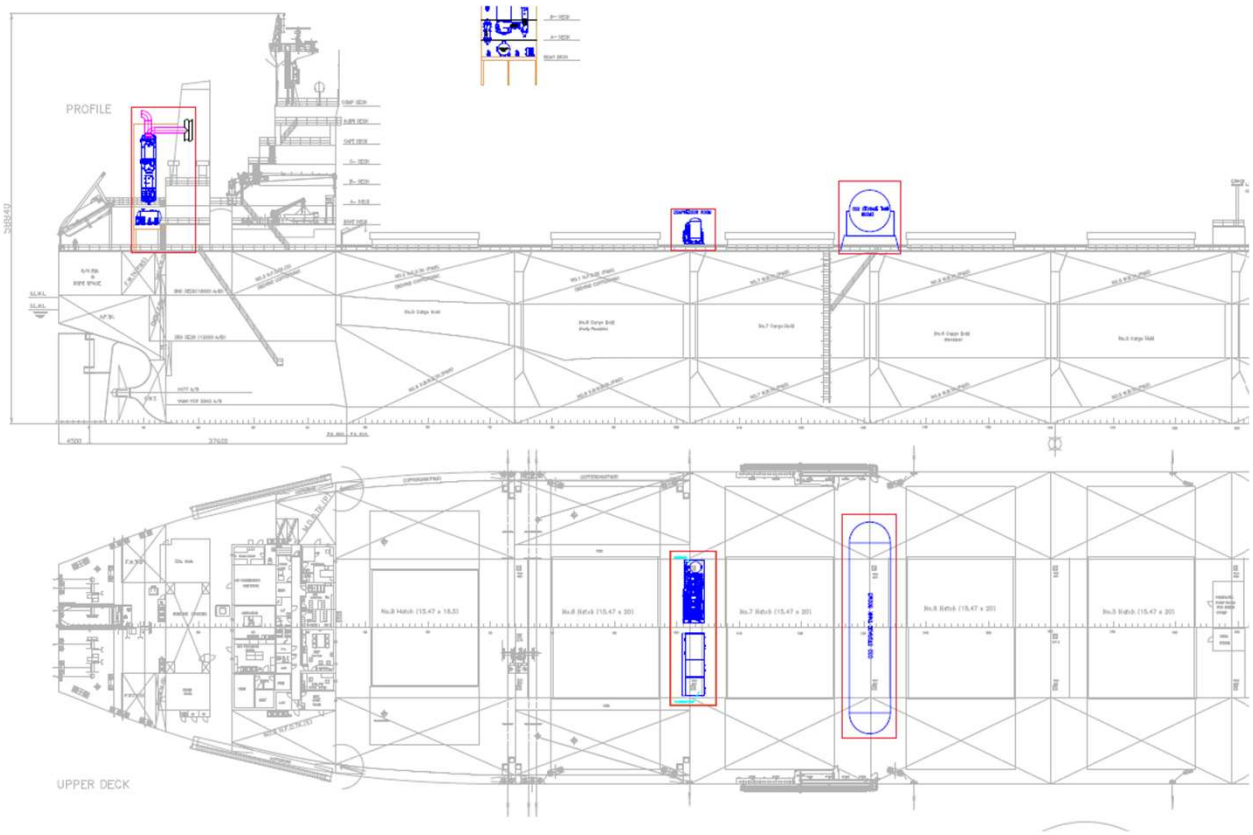
Summary of Savings

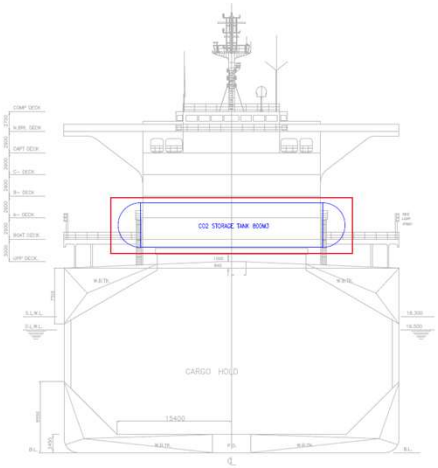
	(Case 2)	(Case 3)	(Case 1)
Route	TD 25	TC 20 - SUEZ	TC 1
Average net savings (kW)	810	259	391
Average net savings (%)	9.1 %	2.9 %	4.4 %
Annual fuel savings (tons/year)	832	266	402
Annual CO2 reduced (tons/year)	2 587	829	1 249
	(US Gulf to ARA EU)	(PG to UK via Suez Canal)	(PG to Japan)

CCS - System layout



CCS and LCO2 tanks arrangement for a typical Capesize Bulker





6. Conclusion

Which ever fuel is used in future and irrespective of type of Vessels (old or new) :

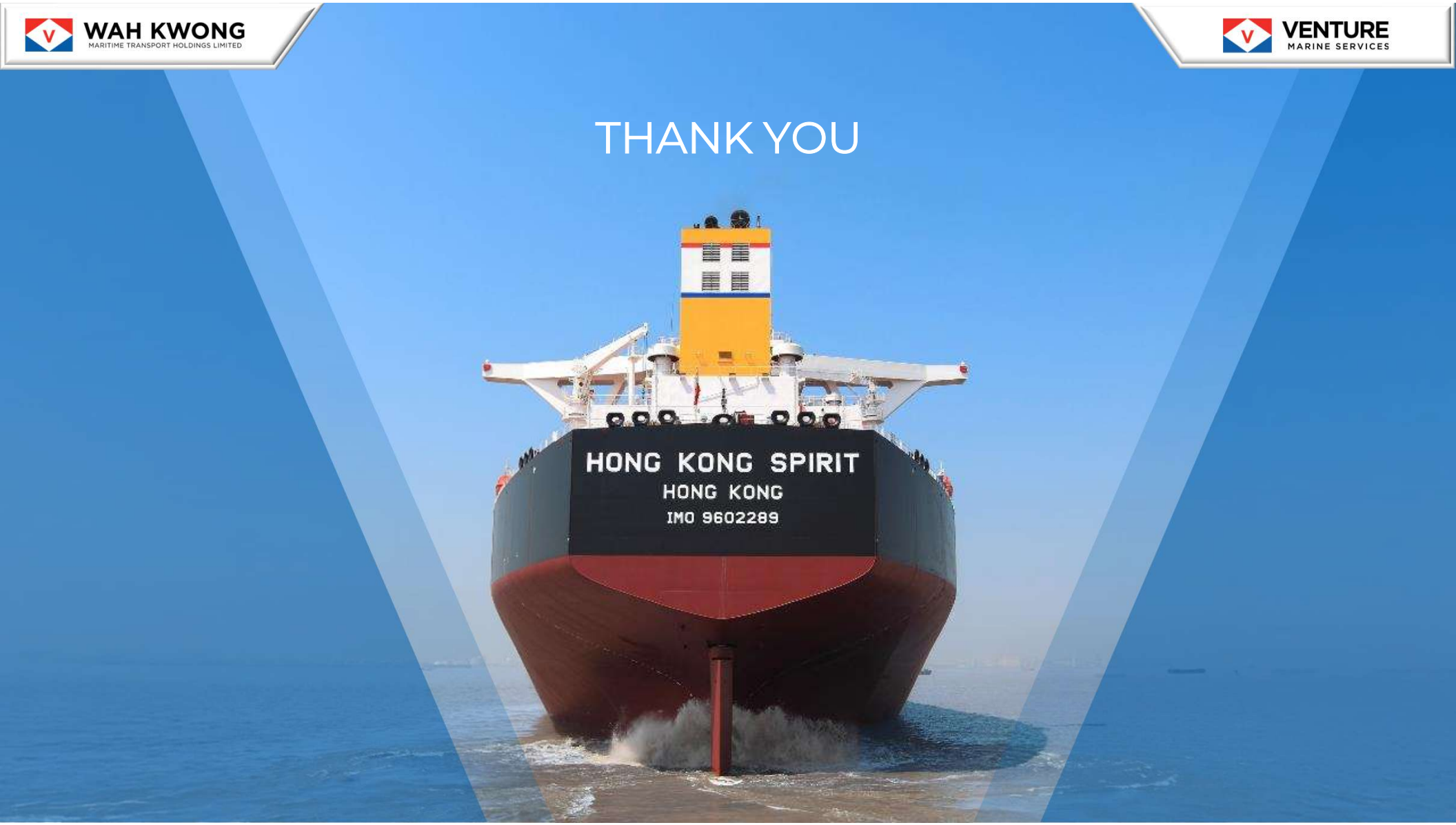
- Retrofit and upgrade the Vessel
- Install ESD, use suitable green Technologies
- Improve efficiency
- SMART operation
- Use low GFI fuel as available and suitable for Engine

Above are keys to success and helping to low total Opex

WAH KWONG
MARITIME TRANSPORT HOLDINGS LIMITED

VENTURE
MARINE SERVICES

THANK YOU



CONTACT US

www.wahkwong.com.hk

info@wahkwong.com.hk

+852 2863 5333