Experiences with CNG on board ferry Texelstroom

Bert de Jonge– project manager newbuilding TESO, (Texel, Netherlands)

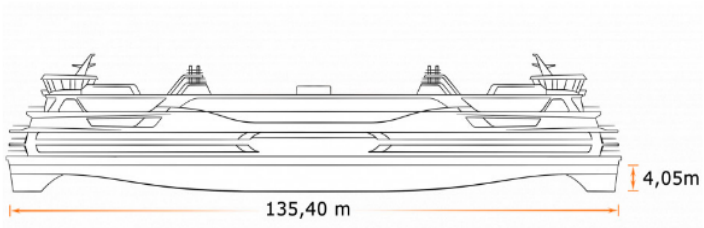
TESO: a short introduction

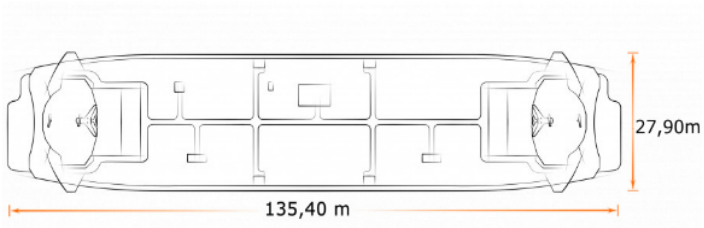
Ferry service Texel- Den Helder, The Netherlands
Founded in 1907

Local ownership by 3.137 shareholders
Non-profit organisation

Statutory objectives: quality, safety, affordability and sustainability

TEXELSTROOM





Current name:	Texelstroom
Type of vessel:	Double-ended ROPAX Ferry
Design number:	6994
Year of built:	2016
Length:	135,40 m
Beam:	27,90 m
Draft:	4,05 m
Designer:	Vripack & C-Job
Naval Architect:	C-Job
Structural Engineering:	C-Job
Interior Design:	Vripack
Builders:	Ext - La Naval Shipyard, Int - Oliver Design

Hull type:	Double-ended shallow draft hull
Material:	Steel
Classification:	Lloyds 100A1
Engine:	2x ABC Diesel Engines (2.000 kW) + 2x ABC Dual Fuel Engines (2.000 kW) + 1.500 kWh battery pack
Speed (cruising/max):	10 / 15 kts
Fuel capacity:	349000 ltrs
Fresh water capacity:	85000 ltrs
Grey / black water capacity:	15000 ltrs
Owner & Guest:	1750 persons
Tender / Toys:	340 cars

Economics + Environment = decision to implement:

- CNG/Diesel-electric
- 1,6 Mw Lithium-ion batteries
- 700 m2 solar panels
- Heat recovery
- Low energy consumption ‘hotel load’
- Auto-mooring
- Re-use of treated sewage water for flushing toilets
- Ultrasonic instead of anti fouling

Operating costs are an expense we need to tackle every day …….. and for years to come

TESO

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TEXELSTROOM - Battery packs

TEXELSTROOM - Battery packs

Every hour for 8 minutes the vessel is fixed to Cavotec **auto-mooring-system**.
As during these minutes no energy is needed for thrust the ABC dual fuel engine - running at 100% - boosts the battery packs up to 90% state of charge.

TEXELSTROOM - Automooring

In 2015 and 2016 use of Moormasters by DOKTER WAGEMAKER did reduce total fuel consumption with 130.000 liters per year.

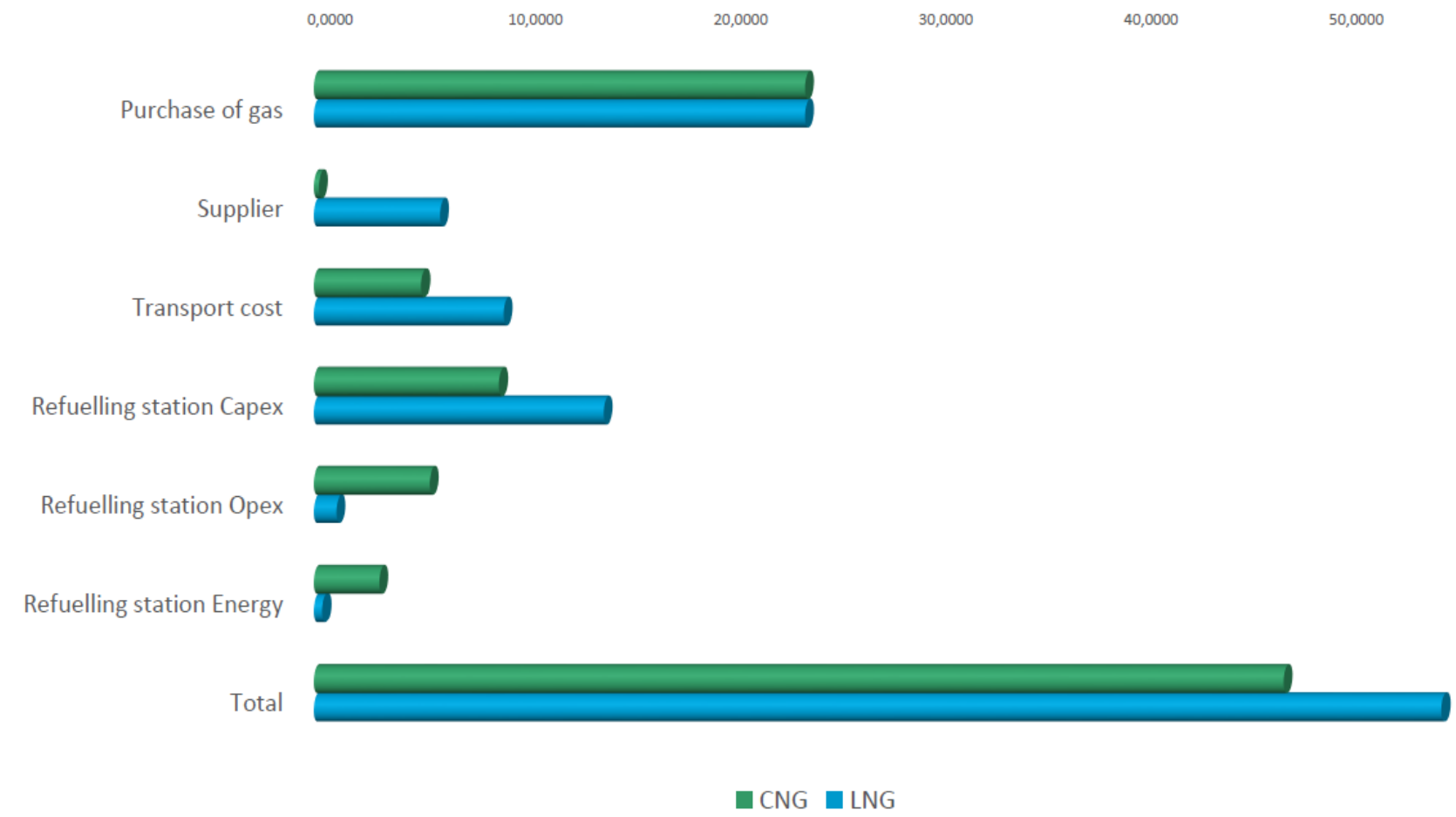
TEXELSTROOM - Going green with CNG

IMPLEMENTATION ADVICE

ENVIRONMENTAL & ECONOMIC ANALYSIS:

TEXELSTROOM - Going green with CNG

COST COMPARISON IN €/MWH



TEXELSTROOM - Going green with CNG

Compressed Natural Gas is clean burning fossil fuel which overall, compared to marine diesel fueled systems of similar propulsion capacity, produce 20% less CO2, 90% less SOx, 80% less NOx and 100% less particulate matter (PM). No smell from exhaust.

TEXELSTROOM - Going green with CNG

Diesel-electric dual-fuel (CNG) hybrid ferry

- CNG is available by pipeline to our own filling station (no trucks/boats needed)
- Texelstroom takes CNG fuel on board during stay in homeport each night
- Capacity containers Texelstroom sufficient for sailing almost two days
- Dual fuel: CNG and ‘low Sulphur diesel’

TEXELSTROOM - Going green with CNG

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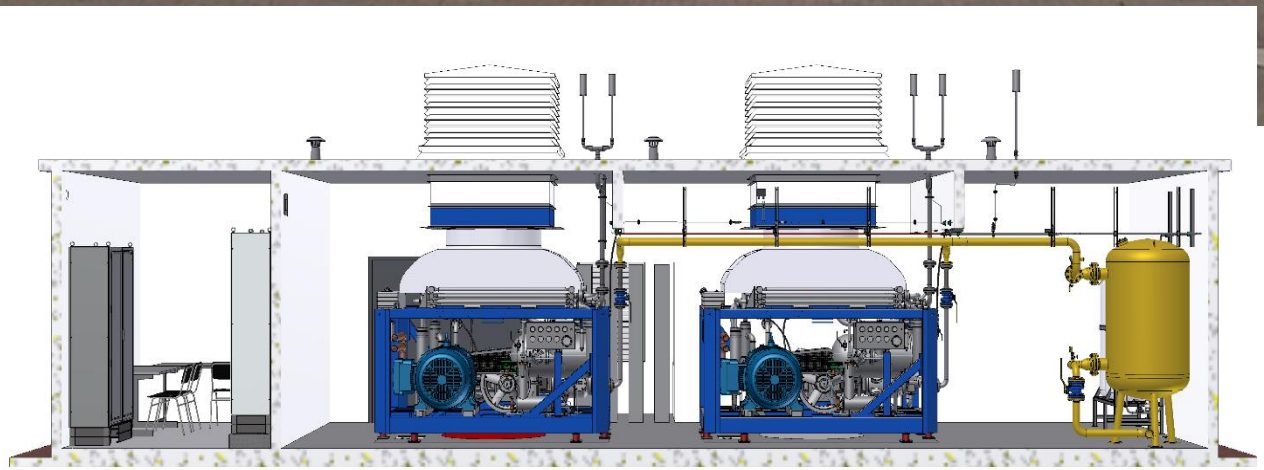
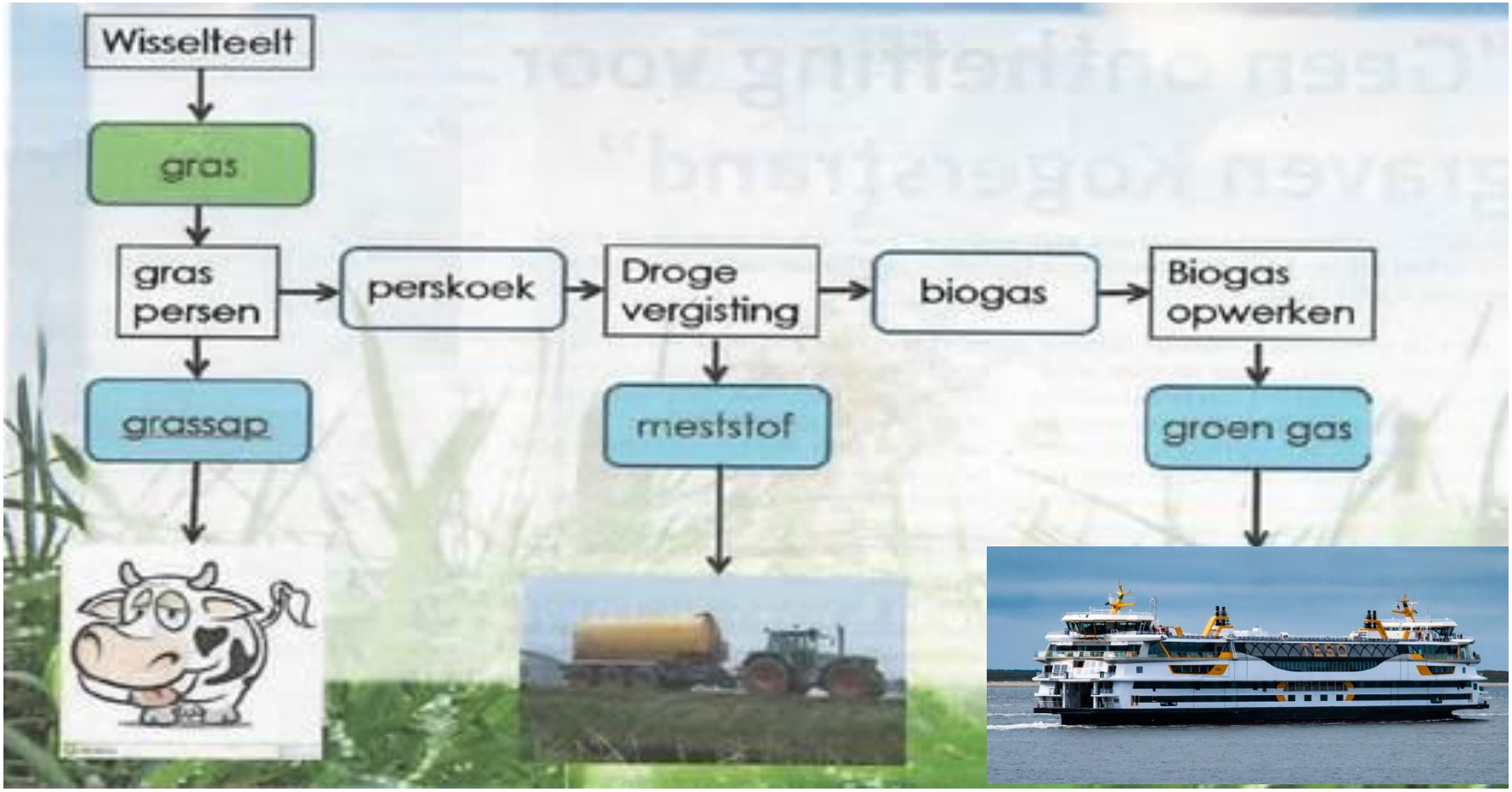


TEXELSTROOM - Going green with CNG

With local farmers, Dutch energy companies and BioGas2020
TESO investigates option to produce Bio CNG on the island.



TEXELSTROOM - Renewable energy (PV)

Solar panels

- 700 m2 on top deck = 150 kW

TEXELSTROOM - Hotel load

Heat recovery:

- with the cooling of the engines Texelstroom heats a water tank of 90 cubic meters up to around 85 degrees Celsius
- this heated water is used overnight for heating the vessel when it is not sailing
- we expect that only when outside temperature drops below 0 degrees, the boiler needs to help out.

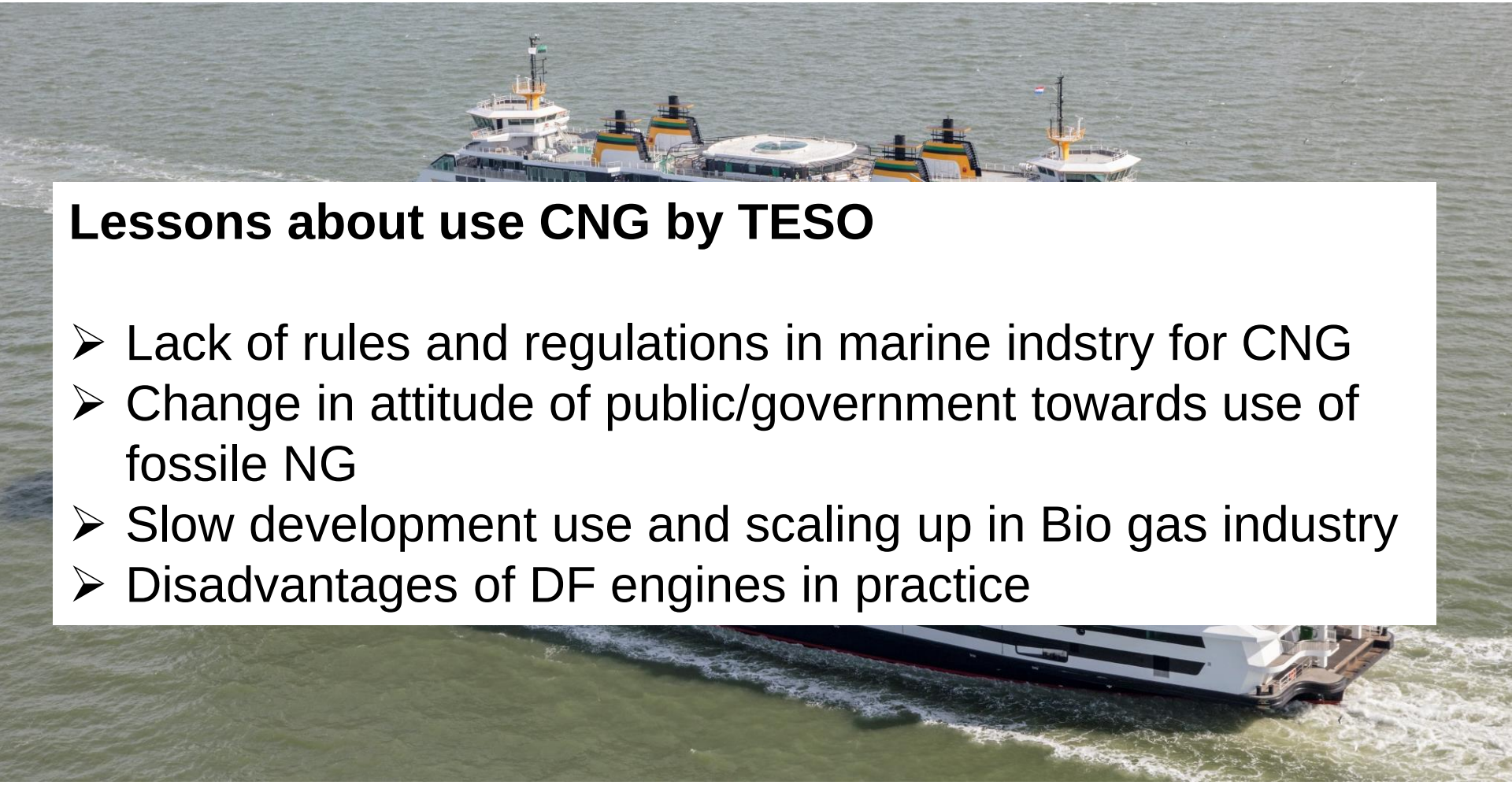
Reducing power consumption on board:

- installing intelligent sensors for lighting
- installing energy saving lamps (>2400)
- efficient ventilation strategy
- use of heat recovery

TEXELSTROOM – *Interior design*

TEXELSTROOM – More information

TEXELSTROOM – Lessons learned



Lessons about use CNG by TESO

- Lack of rules and regulations in marine indstry for CNG
- Change in attitude of public/government towards use of fossile NG
- Slow development use and scaling up in Bio gas industry
- Disadvantages of DF engines in practice

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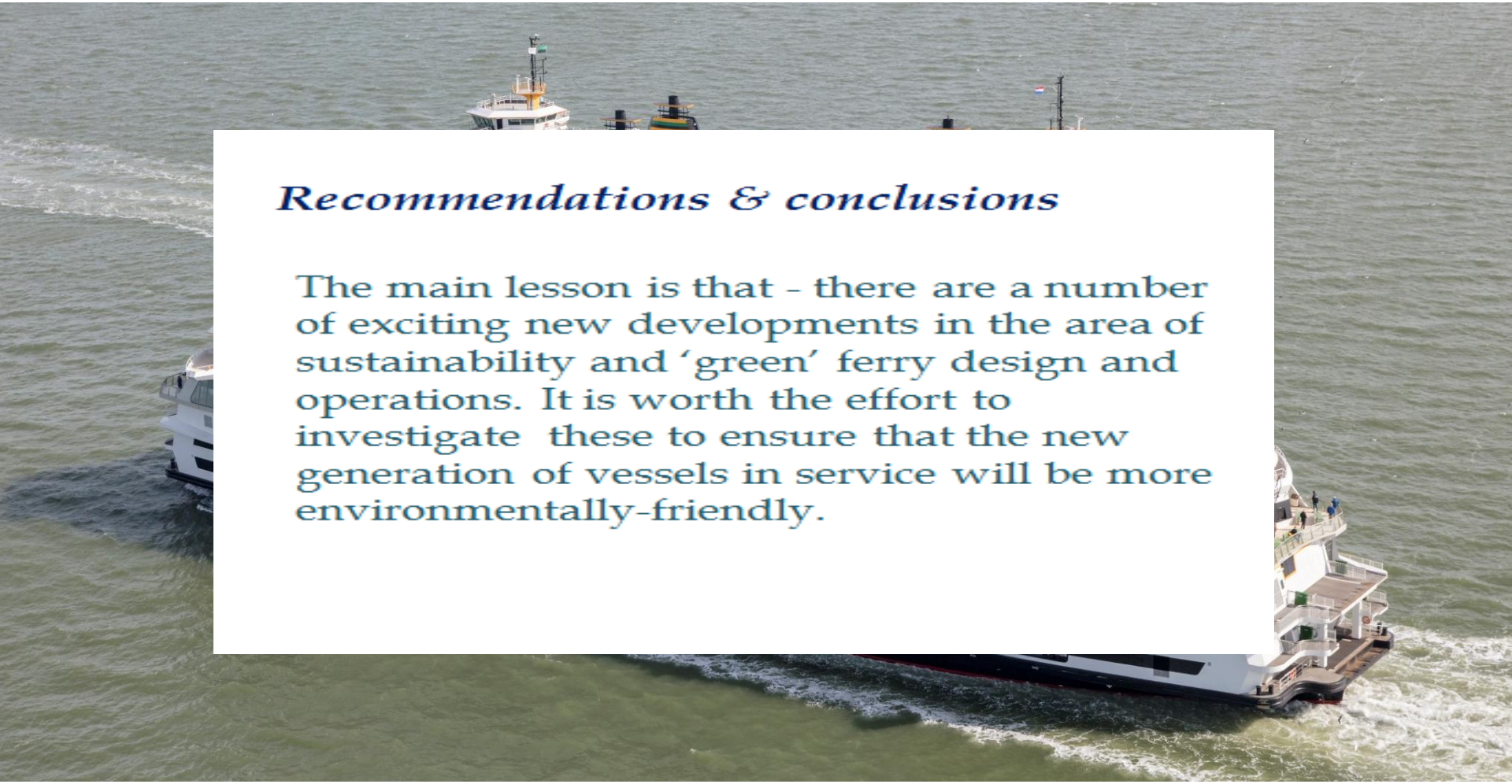
TEXELSTROOM – *Lessons learned*



Recommendations & conclusions

The main lesson is that - there are a number of exciting new developments in the area of sustainability and 'green' ferry design and operations. It is worth the effort to investigate these to ensure that the new generation of vessels in service will be more environmentally-friendly.

Thanks for your attention
We like to welcome you on board!

Any questions ????

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C-JOB
NAVAL ARCHITECTS / ENGINEERS

LaNaval
CONSTRUCCIONES NAVALES DEL NORTE