Topeka

A zero-emission shipping company

Wilhelmsen Group company

We are Wilhelmsen

A global maritime company

Onshore employees
5000+

Seafarers
10800+

Offices
247

Countries
58

Port Locations
2200+

Group structure

Wilh. Wilhelmsen Holding ASA (WWI)

Maritime Services

- Ships Service
- Port Services
- Ship Management
- Global Business Services
- Insurance Services
- Wilhelmsen Chemicals

(All Maritime Services companies are 100% owned)

New Energy

NorSea	99%
edda wind	
REACH SUBSEA	
Topeka	100%
massterly	50%

(Complete list of New Energy investments available on Wilhelmsen.com)

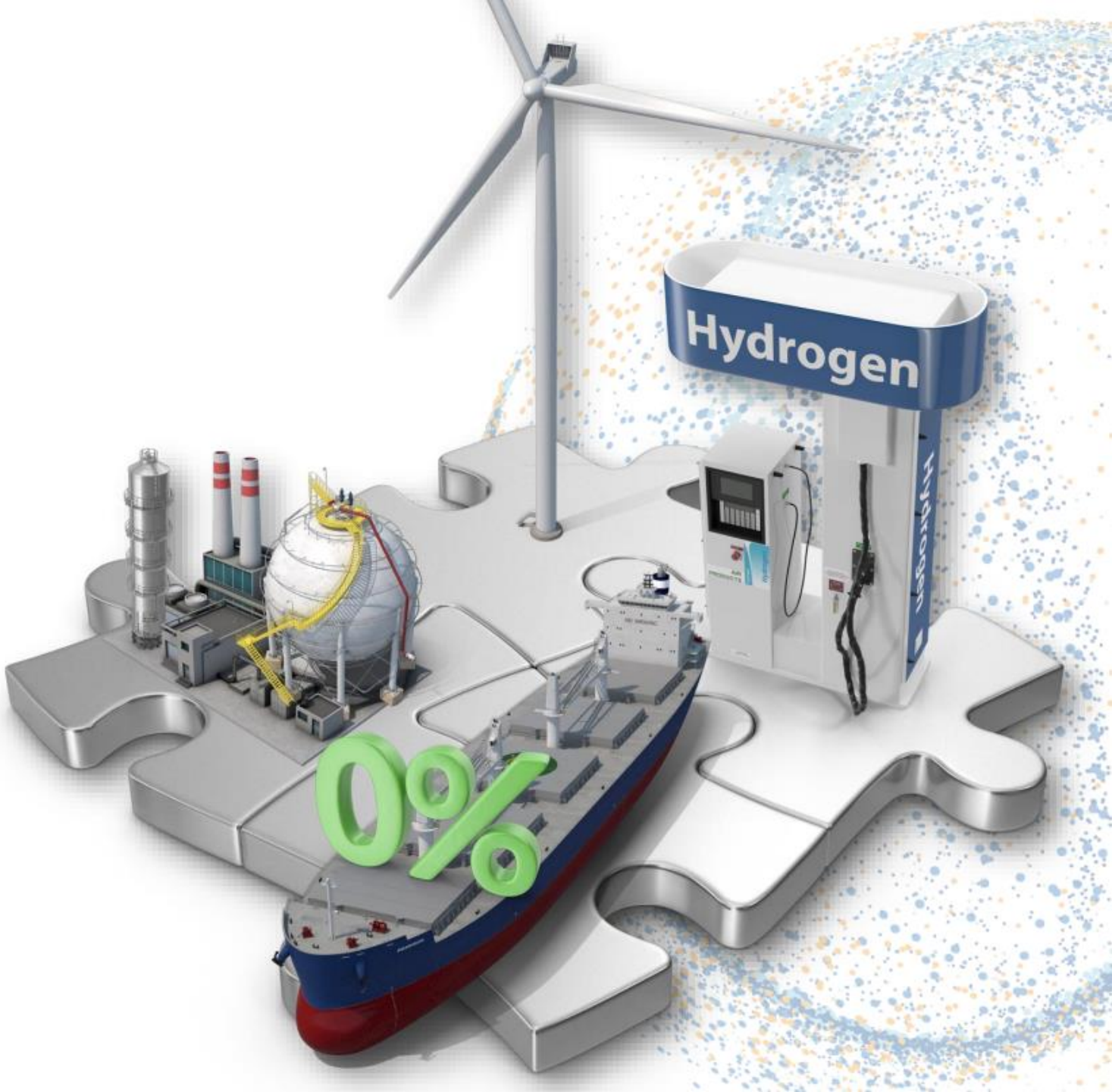
Strategic Holdings and Investments

Wallenius Wilhelmsen	38%
Treasure ASA	79%
WilNor Governmental Services	100%

(Complete list of strategic holdings and investments available on Wilhelmsen.com)

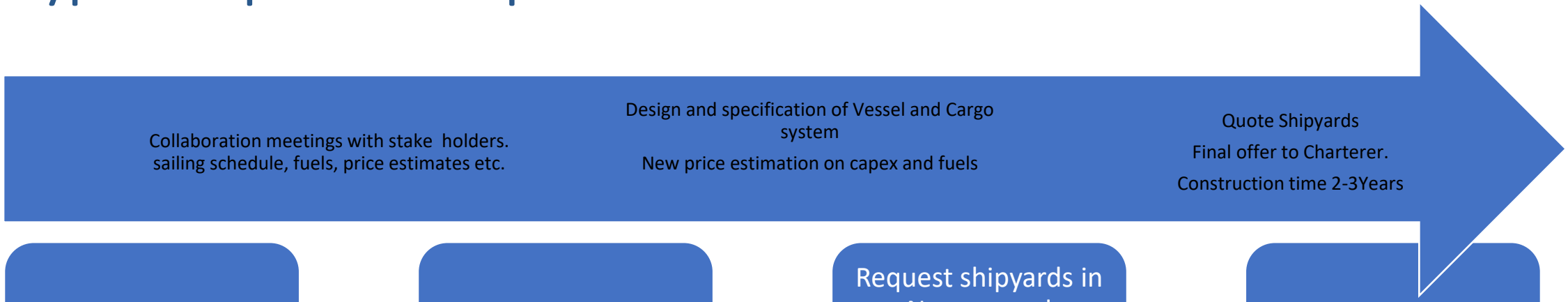
Wilhelmsen

Wilhelmsen New Energy – Putting the pieces together



Jan Eyvin Wang

Typical Topeka Work process



Concept development ship and tank system. Define an operational profile, range and cargo capacity. Roughly estimate freight rates

Develop a technical specification that can be used as a request to the Shipyard. Presentation for the Norwegian Maritime Directorate and class.

Request shipyards in Norway and internationally.

Evaluate, risk, prices etc.

Calculate cost on operation.

Capex, opex, crewing

Freight contract with end client

Evaluate offers and update calculations to ensure the correct shipping price.

FID


… we aim building, owning, and operating …

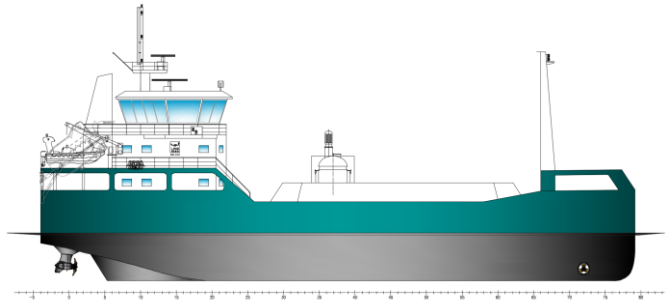

… zero emission vessels for our customers.


Our goal is …

… to decarbonise the merchant fleet …

Topeka/Wilhelmsen ongoing project involvement

Collaboration partner projects/Topeka projects

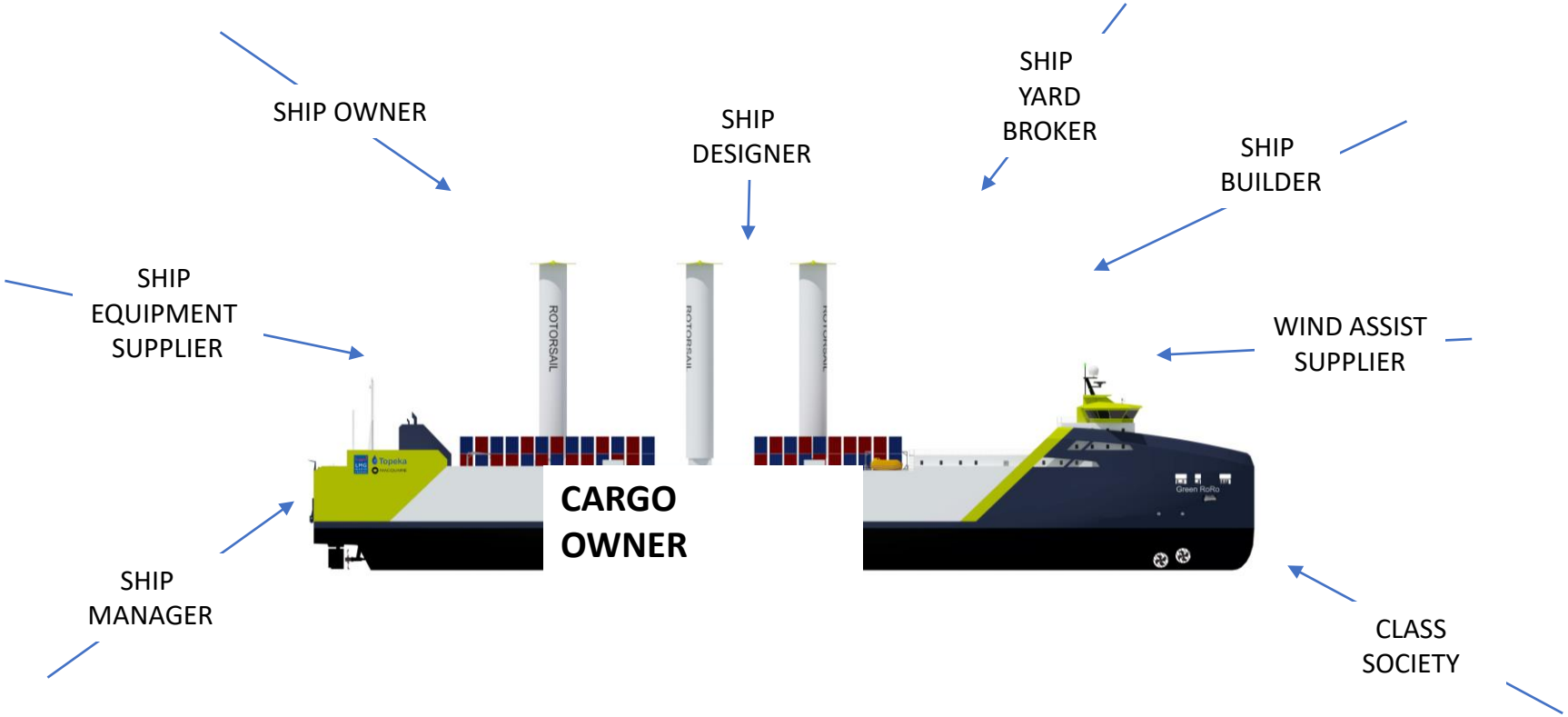


Ship NORSEA FIGHTER (Multi Purpose Offshor...

4.95% ownership

Stakeholders in a Project

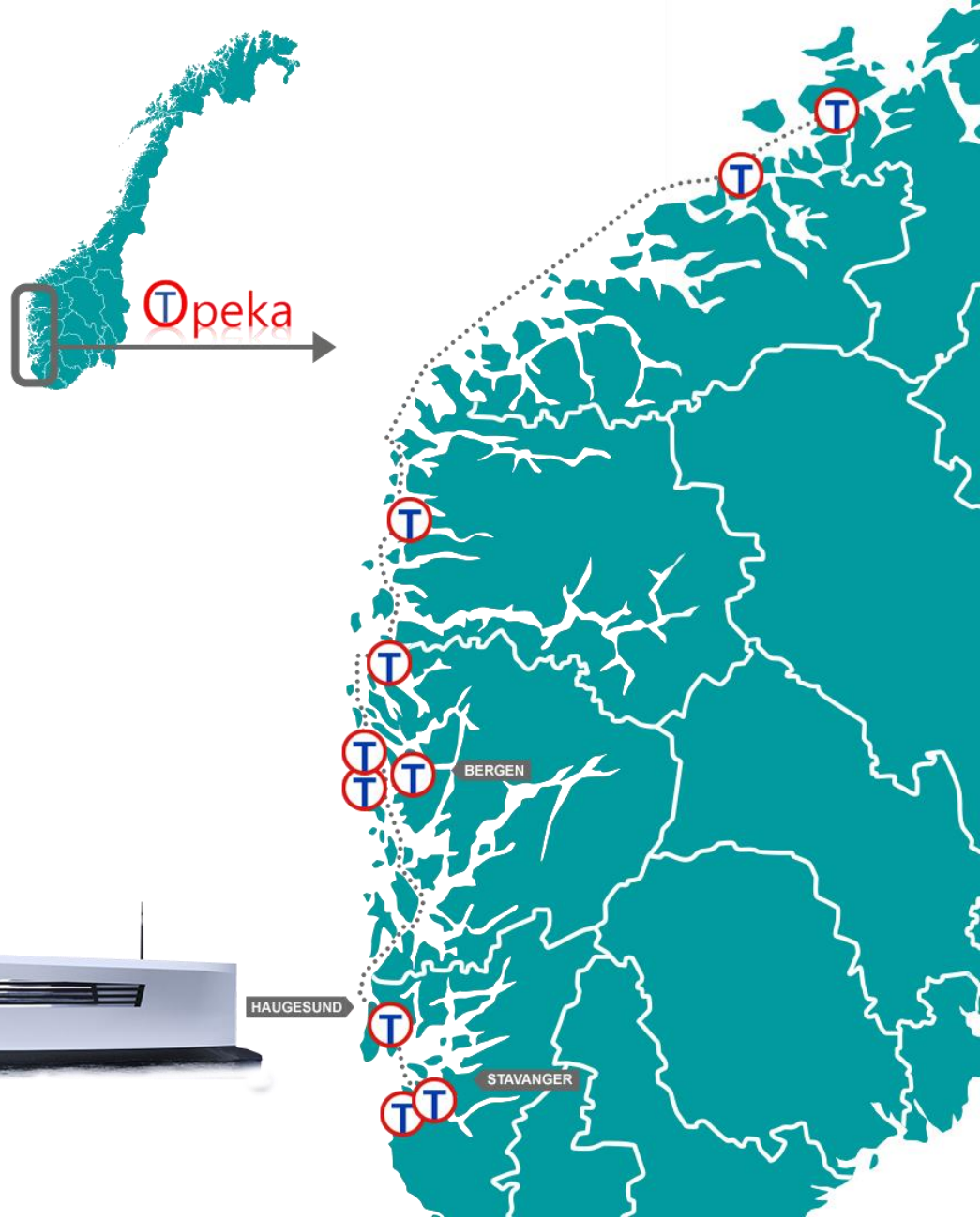
Its normally Cargo Owner ho pays the fuel



Topeka base-base

Zero emission seaborn transport:

- Oil and gas industry – supply bases
- General cargo - public ports
- Hydrogen distribution - hydrogen hubs
- Paused in 2023 due to lack of LH2



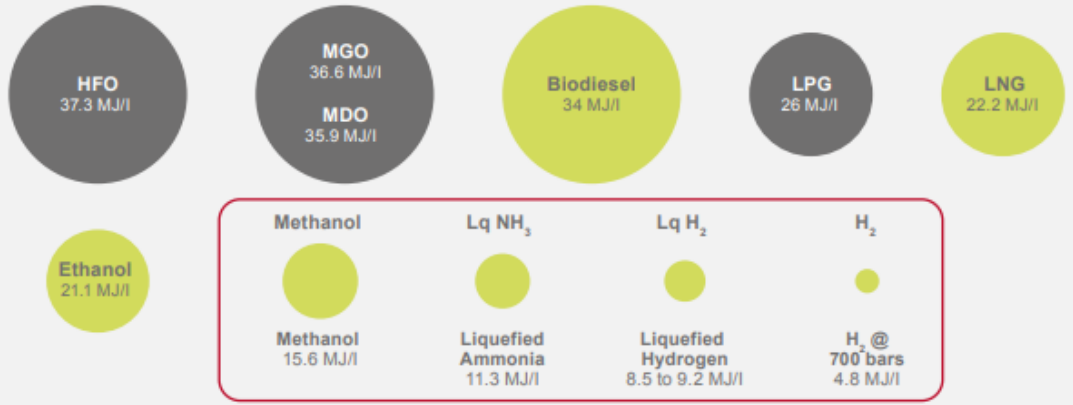
Some comparison with MGO

TYPICAL PROPERTIES OF MAIN ALTERNATIVE FUELS

	LNG	LPG	Methanol	Bio-Diesel	Ammonia	Hydrogen
Physical properties for storage	Liquid at -162°C	Liquid at 18 bar or at -42°C or semi-20°C at 7 bar	Liquid (up to 65°C)	Liquid	Liquid at -33°C	Compressed gas at > 250 bar or liquid at -253°C
Fuel tank size for same energy content as MDO	1.8 times	1.5 times	2.5 times	1 time	3 times	5-7 times
Fuel Containment System (Cryo/ conventional)	CRYO	COLD	CONV	CONV	COLD	CRYO
Flammability limits in air (%V/V)	5%-15% (Methane)	1% to 11%	6%-36.5%	/	15%-28%	4-75%
Minimum Ignition Energy (mJ)	0.3 (Methane)	0.25	0.14	/	8 to 680	0.017
Flashpoint (°C)	-188	-104	12	>61	132	
Density of liquid phase (kg/m^3)	450	493	790	900	696	71
LCV (MJ/kg)	50	46.4	19.9	42.7	18.6	120
Energy density (MJ/L)	21.2	26.5	15.7	35.7	12.7	8.5

Source: Bureau Veritas

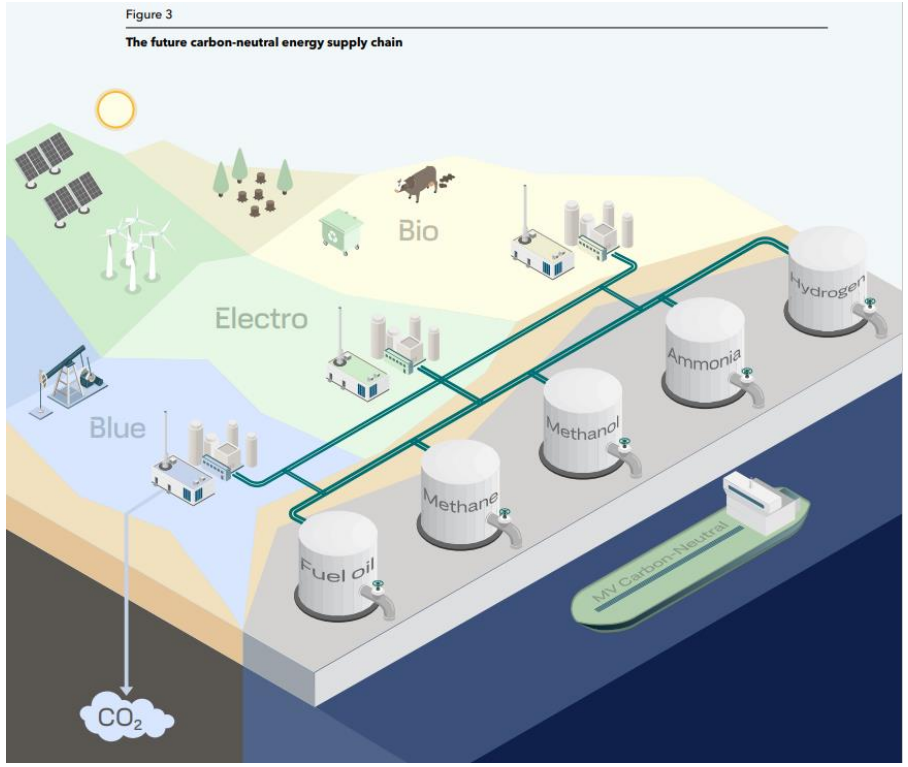
FIGURE 29: VOLUMETRIC ENERGY CONTENT OF ALTERNATIVE FUELS

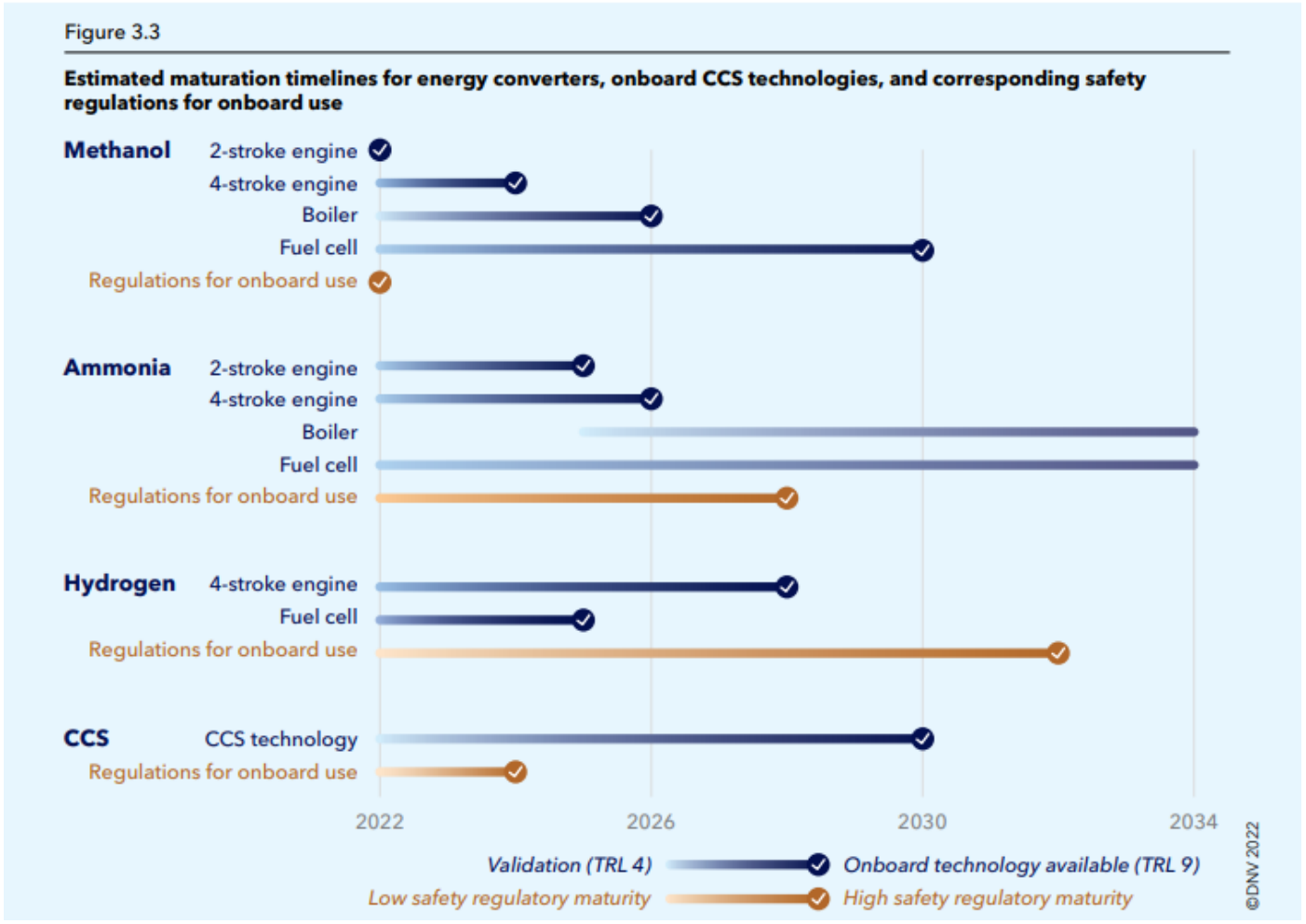


Source: Bureau Veritas

Green transition traction

Technology availability





Wilhelmsen

Most important!!

Operational issues that needs to be addressed

Examples:

-Safe handling of new fuels onboard, Ammonia(toxic), Hydrogen(Explosive), Batteries(Thermal runaway/Fire), Methanol(EX Zones)

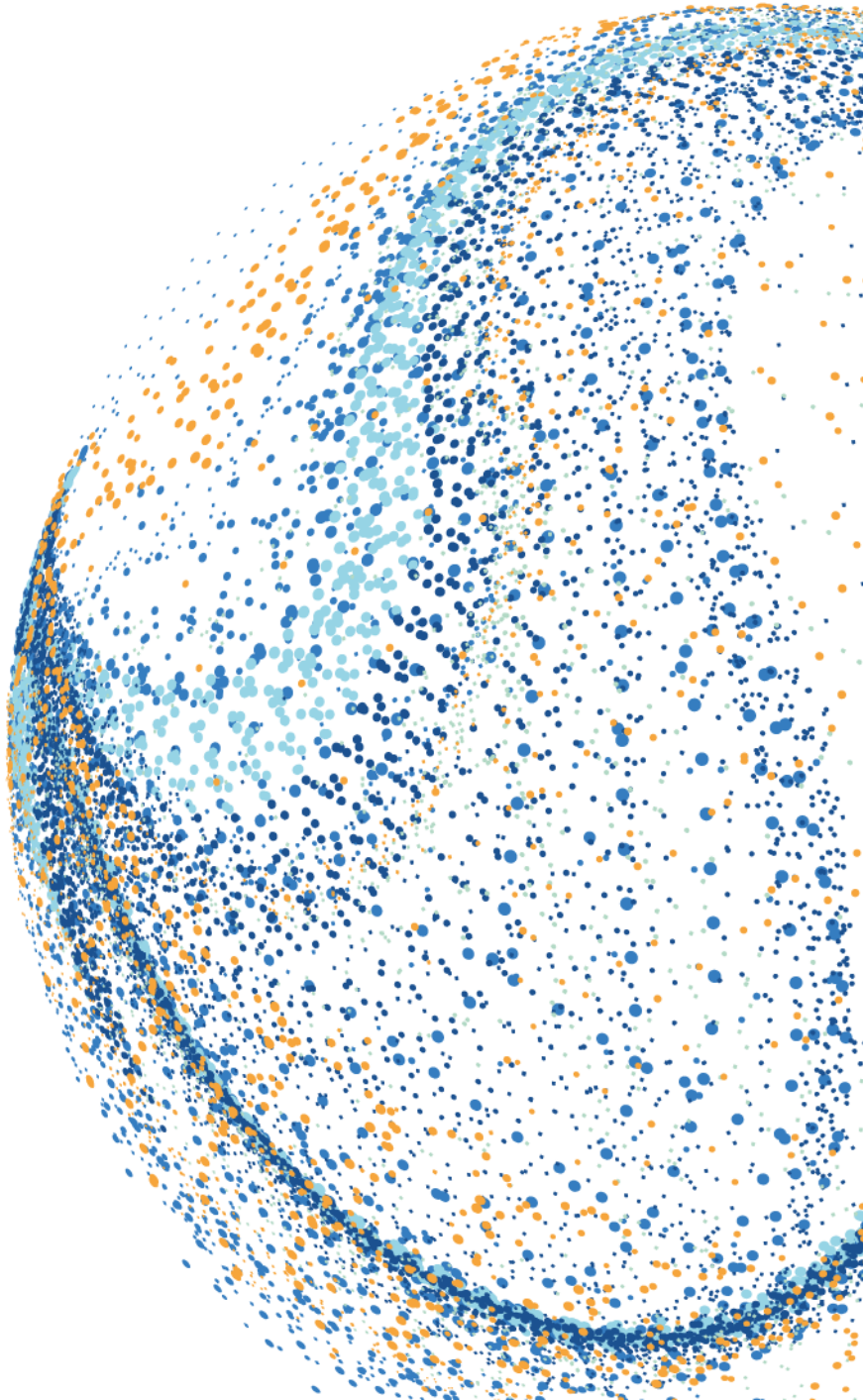
-Maintenance onboard;

New fuel treatment systems, Dual fuel systems, more complex automation systems, more electrical power systems, energy recovery systems, sourcing of skilled technicians and spares.

-Operational;

Fuel treatment, wind assist systems and route planning, focus on energy efficient operations, Safe entering to shore and dockings, Lay up procedures, Reporting of emissions (ETS), Secure skilled crew and avoid turnover.

-Sourcing of new fuels, Charging infrastructure, delivery of captured CO2.



Topeka

Thanks for listening,
Sigvald Breivik, CTO Topeka