

# IS GAS THE FUEL FOR SUSTAINABLE SHIPPING?

Donsö Shipping Meeting, 3-4 Sept 2019

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# COMBUSTION ENGINE + LNG AS A FUEL

IS A FUTURE-PROOF SOLUTION **TO 2030**

# EMISSIONS FROM COMBUSTION ENGINES CAN BE DIVIDED IN TWO CATEGORIES



## Category 1: Local emissions: health & environment related

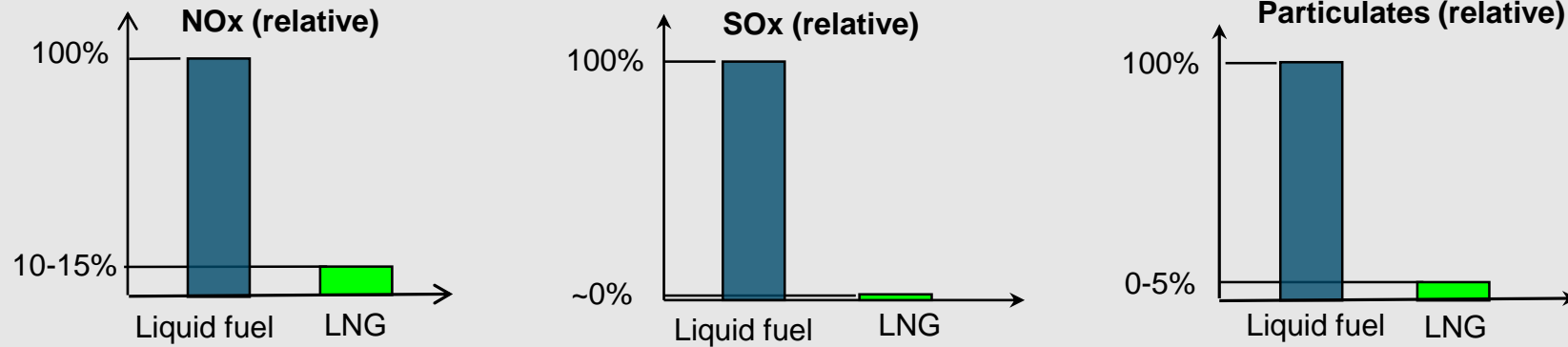
- Contribute to deterioration of human health, loss of wellbeing
- **Mainly NO<sub>x</sub>, SO<sub>x</sub> and particulates**
- Also impact the natural environment (flora & fauna) on short term
- Impact depends very much on location of emission. Focus on densely populated areas and sensitive ecosystems



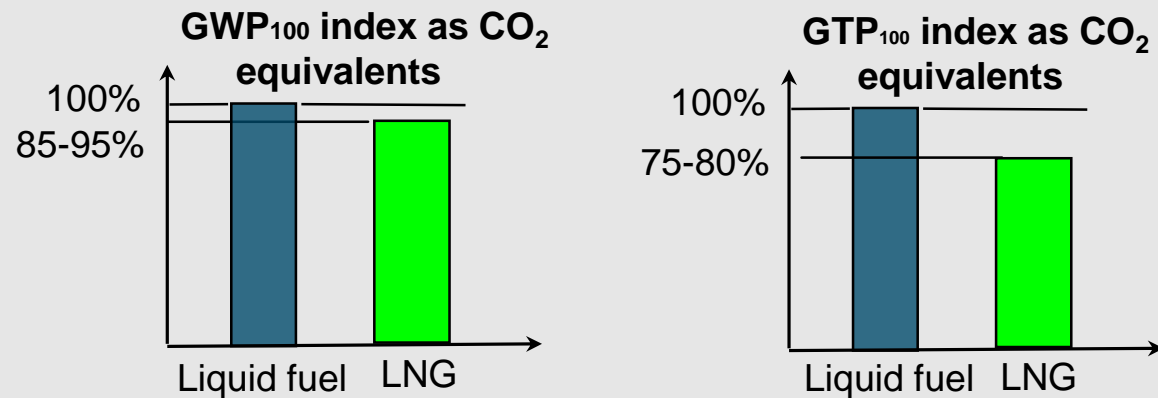
## Category 2: GHG emissions: climate related

- Contribute to global warming / climate change
- **Mainly CO<sub>2</sub> and CH<sub>4</sub> (methane)**
- Low to no impact on human health or the natural environment on short term
- Impact is not dependent on location of emission, as climate change is a global problem

# USING LNG CONTRIBUTES TO REDUCED LOCAL EMISSIONS



# USING LNG CONTRIBUTES TO REDUCED GLOBAL WARMING

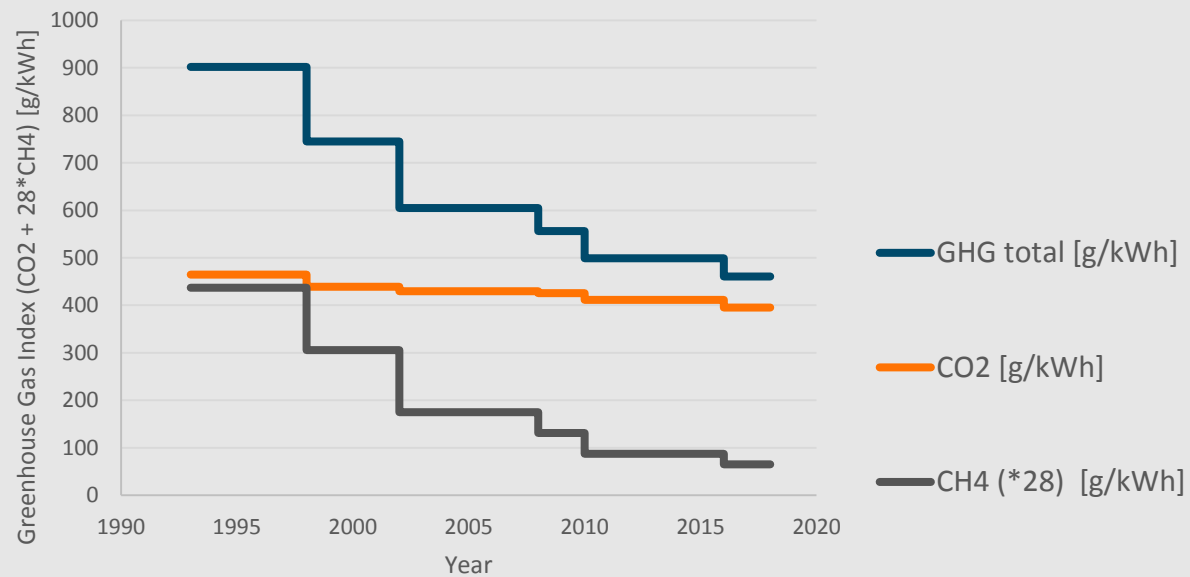


GWP = Global Warming Potential

GTP = Global Temperature Change Potential

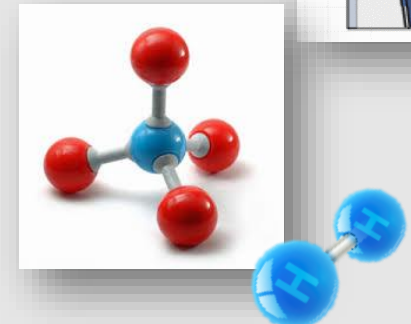
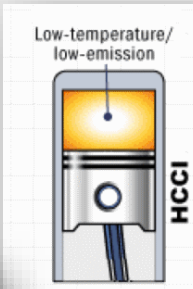
# DEVELOPMENT OF COMBUSTION ENGINES WILL CONTINUE

Greenhouse gas Index development for Wärtsilä gas engines 1993-2018



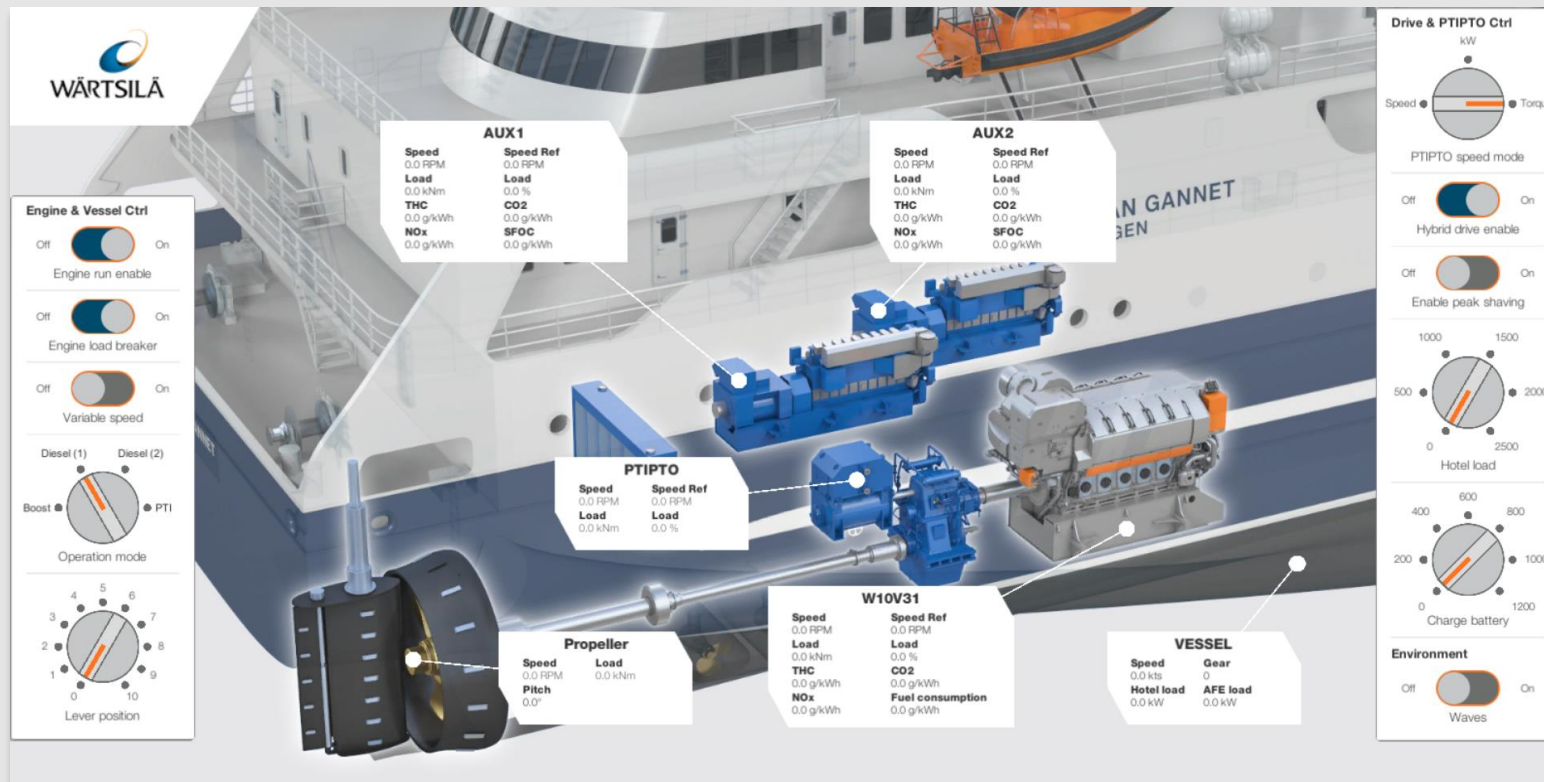
## GOING FORWARD:

- **NEW ENGINE TECHNOLOGIES**
- **FUEL STRATEGY**
- **SYSTEM INTEGRATION**



- Vessel type: Processing vessel – world's first hybrid fish processing vessel
- Seatrial October 2018
- Commercial operation since November 2018

## HYBRID INTEGRATION SIMULATION TOOL



### Wärtsilä Scope of Delivery:

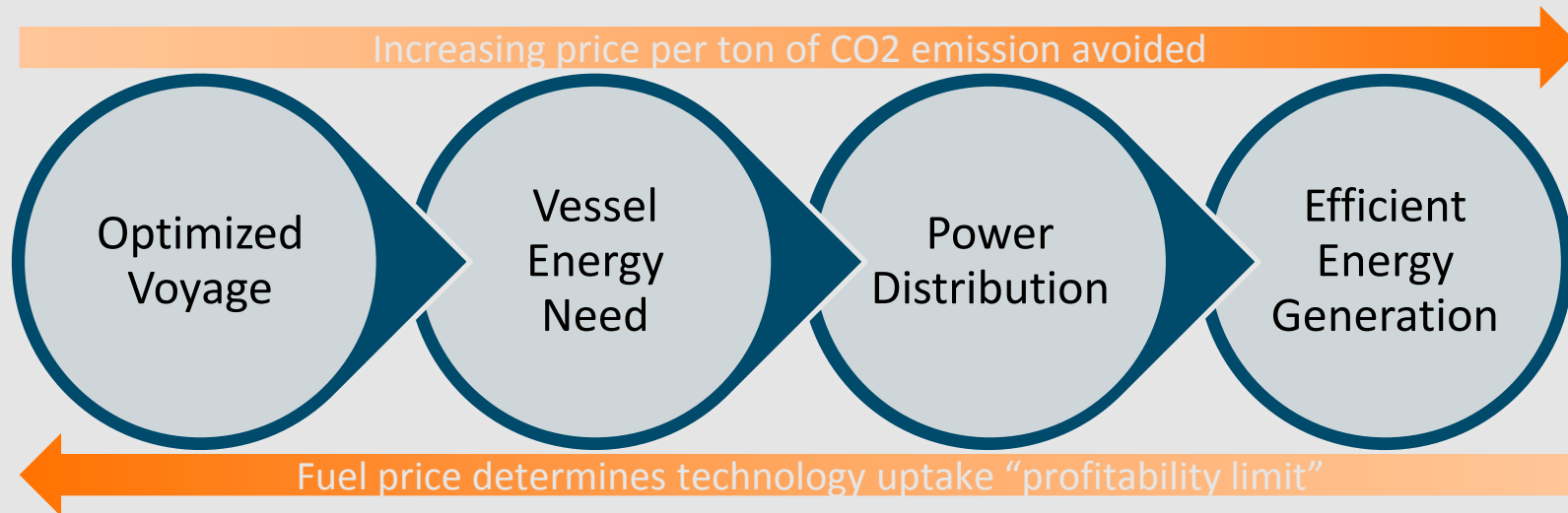
- Ship design & classification
- W10V31 main engine
- 2 x W9L20 aux engines
- Propulsion, shaft generator
- 2-speed gearbox
- Wärtsilä ProTouch propulsion control
- Electrical & automation incl. hybrid integration of battery packs with PTO/PTI capability



## Combination of efforts

Optimized propulsion systems, propulsion energy saving devices, hull and ballast optimization, trim optimization, air lubrication

Highest efficiency and cleaner fuels



Lowest possible speeds and optimum routing and digital port integration

Hybrids and associated battery storage, power-take-in from renewable sources such as wind, solar

# COMBUSTION ENGINE + LNG AS A FUEL

IS A FUTURE-PROOF SOLUTION **TO 2030**



# COMBUSTION ENGINE + BIO/SYNTHETIC LNG

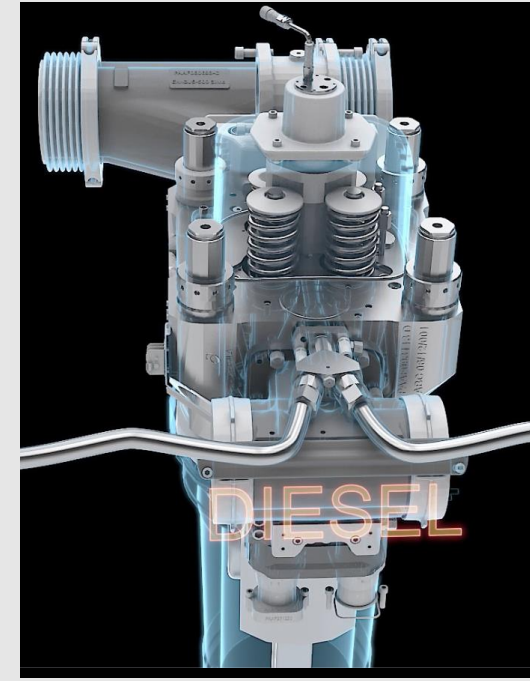
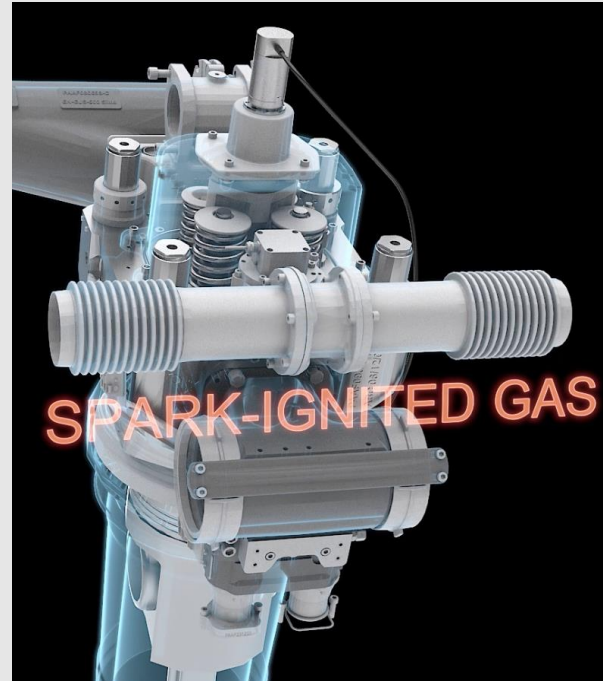
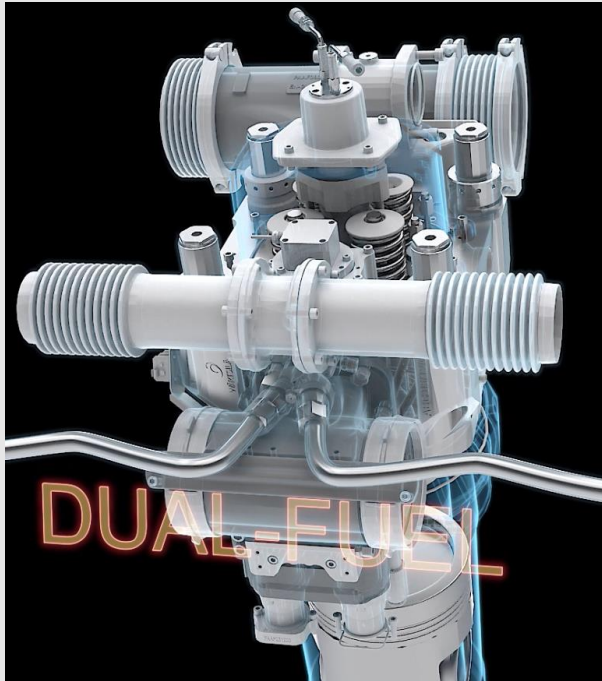
**TO 2050**



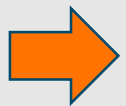
# WHAT ARE THE FUTURE FUELS?



# FUEL FLEXIBILITY BY MODULAR ARCHITECTURE

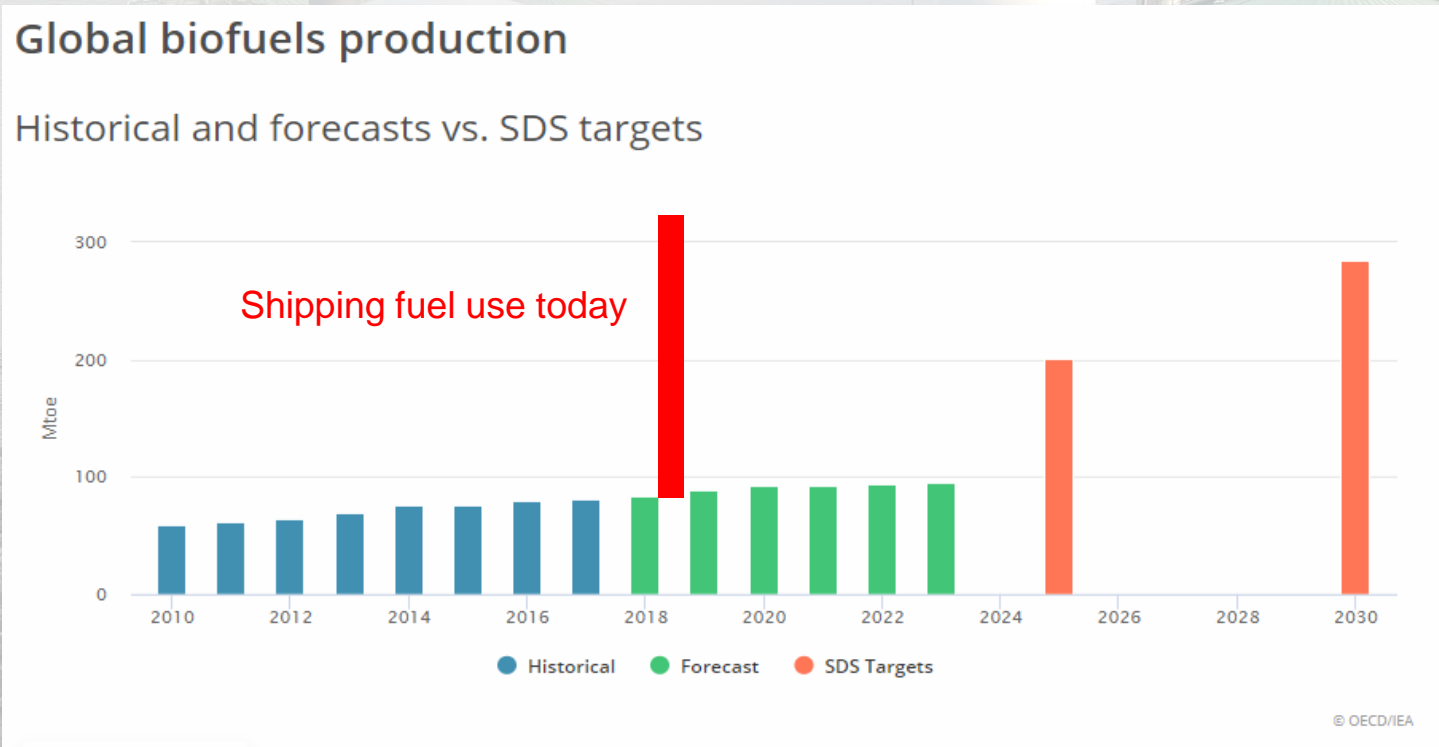


**THE COMBUSTION ENGINE CAN BURN WHATEVER FUEL, SUCH AS LNG OR BIO/SYNTETIC LNG, LPG, HYDROGEN, METHANOL AND AMMONIA**



**OTHER FACTORS PLAY A MORE IMPORTANT ROLE WHAT ARE SUSTAINABLE SOLUTIONS BOTH ENVIRONMENTALLY AND ECONOMICALLY**

# FUEL AVAILABILITY VS DEMAND A CHALLENGE



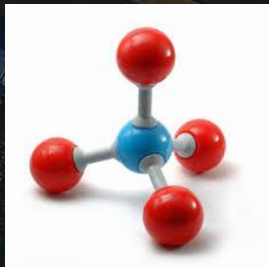
- WILL IMPACT FUEL PRICES
- ➔ EFFICIENT ENERGY GENERATION - DE-RISKING TODAY'S INVESTMENT
- FUEL BLENDING A FEASIBLE FIRST STEP

# Skogn LBG factory

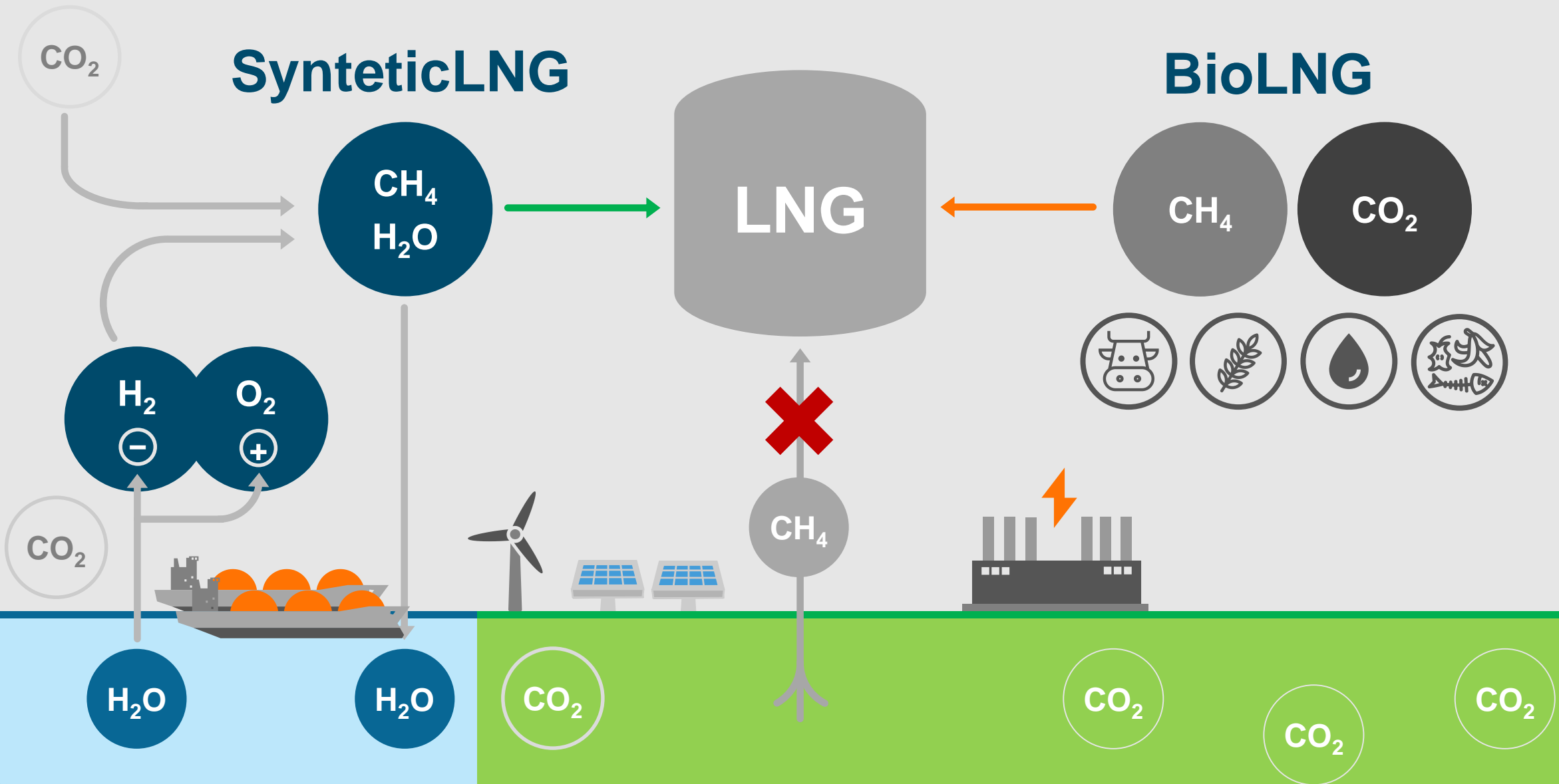
World largest

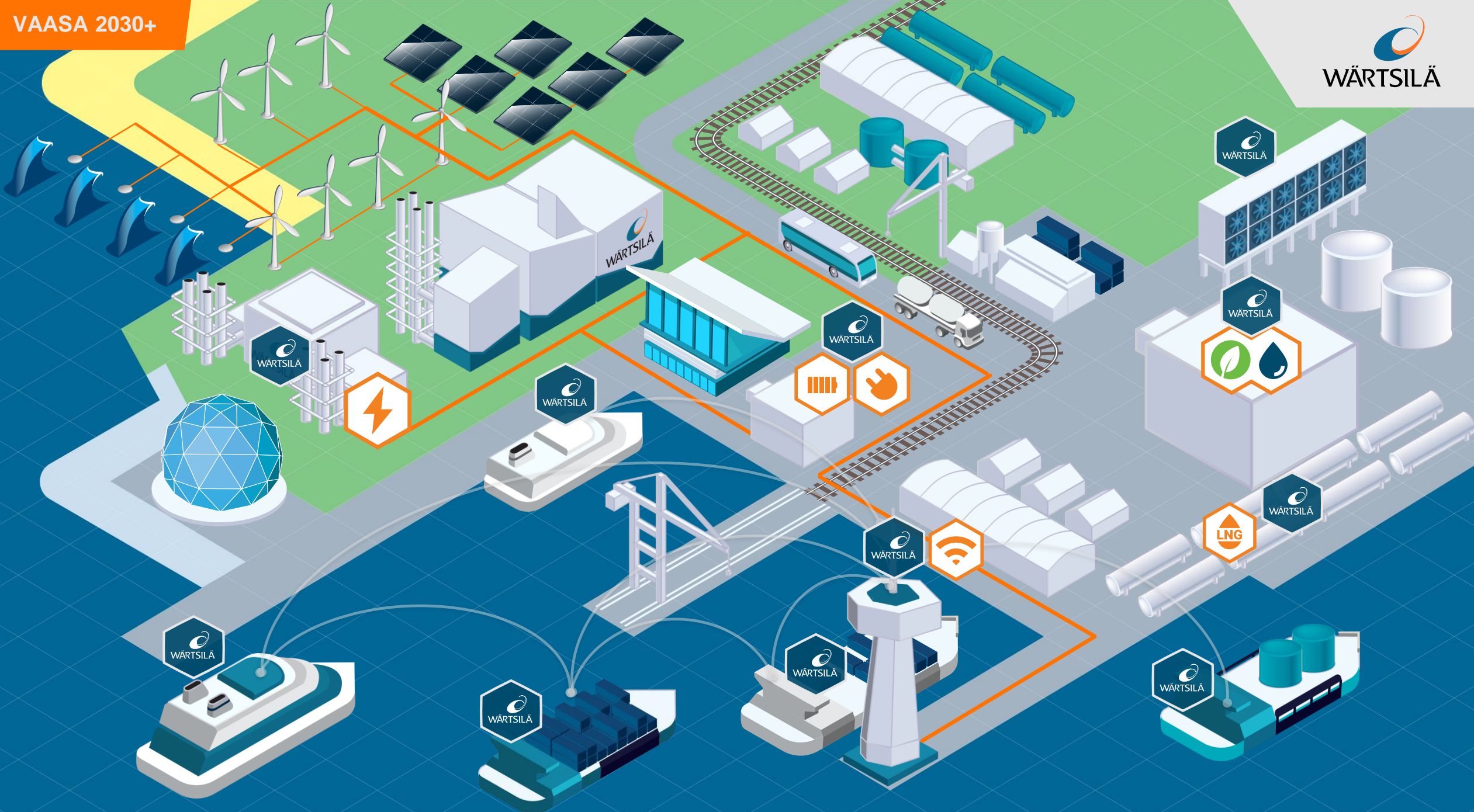
25 tons / day

First bioLNG August 2018



# WELL TO PROPELLER AN IMPORTANT ASPECT



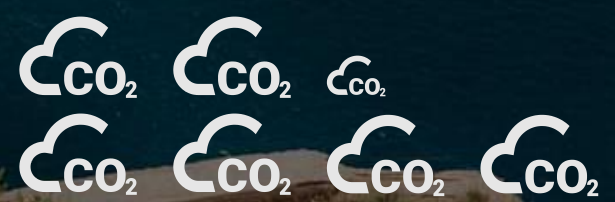
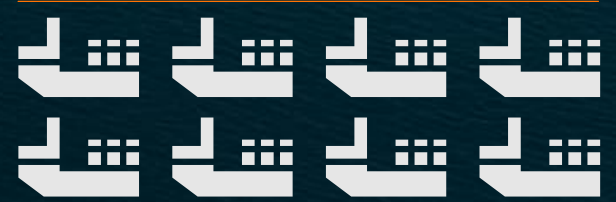
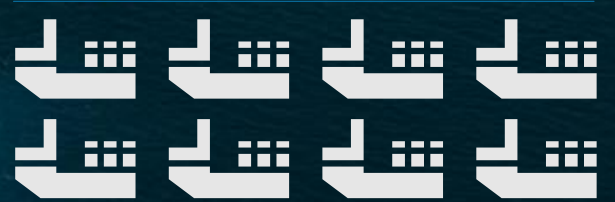
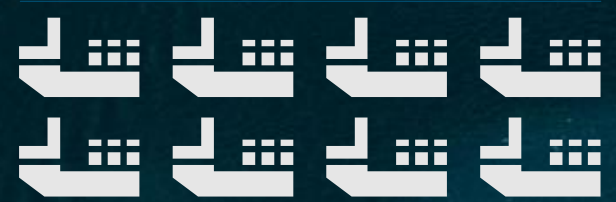


# ONE SOLUTION WILL NOT TAKE US TO THE TARGET

Vessel emissions

-40%

-70%



Fleet emissions

-50%

2008

2030

2050

# KEY TAKE AWAYS

1. The energy sources at hand including alternative fuels and fuel flexibility are important elements on the road to sustainable shipping
2. Fuel flexibility and high efficiency, enabled by the combustion engine, is more important now than ever, de-risking today's investment decisions
3. We need to invest in future fuel and fuel logistics where applicable and feasible – and we need to invest today
4. With existing products, solutions and infrastructure at hand we can reach the 2030 target if we act now – for 2050 targets there must be further developments done
5. LNG is the best route to decarbonisation, transitioning from fossil LNG to bio- and synthetic LNG

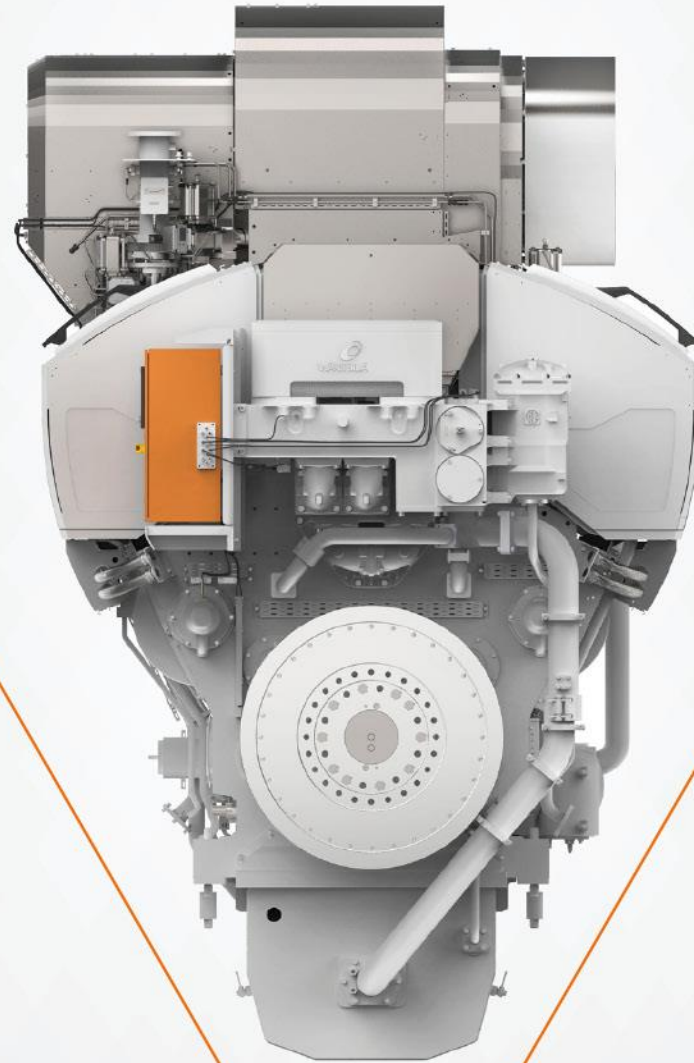


**GAS IS THE FUEL FOR  
SUSTAINABLE SHIPPING**

**COMBUSTION ENGINE  
IS A FUTURE-PROOF  
ENABLER**



**FUEL FLEXIBLE &  
UPGRADABLE**



**EFFICIENT  
ENERGY  
GENERATION**

