

# DECARBONISING SHIPPING Josu Goiogana Wärtsilä, Sales Manager Ship Powel

**WEBINAR** Decarbonising Small and Medium Ports



#### FOUNDED IN 1834

# **GLOBAL LEADER**

in sustainable solutions for the marine and energy markets



### **WEBINAR** Decarbonising Small and Medium Ports



# **ELEMENTS TO REDUCING GHG EMISSIONS**

#### Increasing cost per ton of CO2 emission avoided



### **WEBINAR** Decarbonising Small and Medium Ports

July 7th 2021

WÄRTSILÄ





# **DIGITAL MARINE OPERATIONS**

Transparency, integration and automation across value chain can help reaching IMO 2050



LIFECYCLE

Digital Asset Management enabling predictive & optimised maintenance

Lower cost Increased availability Supply chain integration



#### VOYAGE OPTIMISATION

Optimising Cruise Itinerary Planning and Voyages to reduce waste and optimise passenger experience

Just in time port arrival



#### **OPERATIONS**

Digitalising Marine Operations for efficiency, speed and quality

Health & Safety Cybersecurity Environmental Crew & Training Class & Insurance Ports & Destinations



#### AUTOMATION

Further efficiency and safety with new technology

Connectivity & Bandwidth Situational awareness Auto docking Collision avoidance



#### INTEROPERABILITY & OPEN DATA

Compatibility enables faster development, better quality and lower cost

Leverage industry ecosystem for flexibility & innovation





# SUSTAINABLE FUELS ARE NEEDED TO DECARBONISE THE CRUISE INDUSTRY

### But there are business risks that must be considered



Investing in flexible fuel solutions mitigates the business risks associated with future fuels. The combustion engine is fuel agnostic, and the business impact of a future conversion can be reduced further by preparing the fuel tanks.

July 7th 2021





# **ENGINE TECHNOLOGY DEVELOPMENT CONTINUES**

### Time schedule and cost impacts for engine performance

Verified: 2003

### CH<sub>4</sub> Bio- or Synthetic methane

Contains about 99% methane and can readily be used in liquid form with equipment made for LNG.

#### Verified: 2015

MeOH

Methanol Methanol technology development has been done and conversion capabilities are proven.

Next, we will industrialise this technology on the relevant portfolio engines according to market needs. Indicative: 2020, Verified\*: 2022

NH<sub>3</sub> Ammonia

We have already technologies that are capable of using Ammonia.

The needed combustion concepts to maximise engine performance and related safety technologies are currently being investigated Indicative: 2020, Verified\*: 2025

#### Our gas engines are already able to blend LNG with up to 20% hydrogen, and combustion concepts have made for 100% hydrogen.

Hydrogen

Our future efforts will be directed towards maximising engine performance.

Diesel and Otto combustion cycles Three **DF** separate Liquid and fuel-

injection

systems

\* timing depends on the market demand

### WEBINAR Decarbonising Small and Medium Ports

July 7th 2021

fuels

# **THE COMBUSTION ENGINE: A TRUE OMNIVORE**



### HFO, MGO, HVO, LNG, LPG, HYDROGEN, METHANOL, AMMONIA, ...



### WITH 95% PARTS COMMONALITY, THE ENGINE IS NOT THE LIMITING FACTOR

# Fuel availability, storage, safety and regulations determine the environmentally and economically sustainable solutions.

**WEBINAR** Decarbonising Small and Medium Ports





# HYBRID SYSTEMS SUPPORTING DECARBONISATION

**WEBINAR** Decarbonising Small and Medium Ports



# WÄRTSILÄ HY

**WEBINAR** Decarbonising Small and Medium Ports





# **A FULLY INTEGRATED SYSTEM**

Wärtsilä HY (Integrated system)



All the elements work seamless together which increases the total strenght of the system. Each element is modified specifically to be part of an integrated system.



### Why hybrid marine power?





### **WEBINAR** Decarbonising Small and Medium Ports

# Wärtsilä HY is different from a hybrid system





#### Ad-hoc components design

Internal components are pre-designed to work in the Wärtsilä HY environment, allowing best results and advanced features



#### Next-generation EMS:

The Energy Management System works as the brain, enabling advanced features (start&stop, cold starting...) and controlling energy flows towards energy efficiency, performance, safety, emissions and smoke levels, lifetime



#### **Customization:**

Hardware and software are optimized for specific ship types and they can be customized for specific requirements



#### Tuning:

Wärtsilä HY can be tuned over time based on field data collection and to cope with evolving requirements and operating profiles



### WEBINAR Decarbonising Small and Medium Ports



# Port operations Zero smoke Efficient operations

Battery capacity supporter by start & stop philosophy

**WEBINAR** Decarbonising Small and Medium Ports

# Sailing Zero emissions Silent operations

Battery capacity supported by start & stop philosophy

WEBINAR Decarbonising Small and Medium Ports

# Waiting

Zero smoke Efficient operations

Battery capacity supported by start & stop philosophy



**WEBINAR** Decarbonising Small and Medium Ports

#### HYBRID POWER SYSTEM



Wightlink hybrid ferry 4,8 mill passangers pr year, between Isle of Wight and «main land»

Delivery: LLC system, Hybrid system, IAS, PMS, Energy Management, battery, engines and propulsion motors



#### **INDUCTIVE CHARGING**

- Current in inductive sending coil creates a controlled magnetic field.
- Magnetic field from sending side creates a current in the inductive pick-up coil.
- High frequency current flowing in the inductive pick-up coil is rectified to DC Power.

July 7th 2021

Power is stored in the ship batteries

• Distance : 150-500mm +

- Power : 2 MW +
- Supply voltage : 690VAC / 1000VDC

**WEBINAR** Decarbonising Small and Medium Ports

### WÄRTSILÄ INDUCTIVE CHARGING



Can be standarized for alle ferries and port terminals

- Transfer of >2 MW power for a single system
- Increase time for energy transfer by fast connection and late disconnection
- Improved safety during operation as no mecanical connection is established
- Reduced maintenance cost



- Fully automated system
- Combined with auto mooring the propulsion can be shut down during docking

July 7th 2021

- Shore connection to AC or DC or both as standard
- Improve grid voltage quality

#### **NEW INTEGRATED HYBRID SOLUTIONS**



**WEBINAR** Decarbonising Small and Medium Ports



# COMBUSTION ENGINE + LNG AS A FUEL

185

IS A FUTURE-PROOF SOLUTION TO 2030

# COMBUSTION ENGINE + BIO/SYNTHETIC LNG

TO 2050





# THE WORLD DEMANDS CHANGE

We have a vision of a sustainable marine and energy vuture.

A future that depends as much on data as it does or technology and alternative sources of energy.

A future that is good for our industry, good for society



# THANK YOU FOR YOUR TIME

**WEBINAR** Decarbonising Small and Medium Ports