



KONGSTEIN GmbH and Northern Business School



# MariTAT Final Presentation

Elsfleth, Germany

Marea Frazel, Guilherme Romar, Prof. Dr. Jürgen Sorgenfrei

# Agenda

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- 1 MariTAT Introduction
- 2 MariTAT Project Team
- 3 Project Execution
- 4 Analysis Tool Demonstration
- 5 Benchmarking
- 6 Project Evaluation/Next Steps

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# MariTAT Project Introduction

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## **Project brief:**

MariTAT is a research project on alternative fuels funded by ZIM- “Zentrales Innovationsprogramm Mittelstand”  
MariTAT team consists of KONGSTEIN, Northern Business School(NBS), and industry partner (Arkon Shipping).

## **Aim:**

- Develop a digital tool, the "Fuel Analysis Tool" for the maritime industry ("MariTAT"), to assist in the choice of ship propulsion system based on vessel data, route profile, and alternative fuels considered by user.
- Results will serve as a basis for decision-making for informed decisions on the introduction of alternative fuels.
- The tool should present an overview on CAPEX contributions, fuel consumption, fuel cost scenarios and emissions impacts.
- Including assumptions and further information for changing to an alternative fuel.

## **User:**

- Shipyards or shipping companies in the short-sea shipping market as well as in the offshore sector.
- Shipping customers in the national and international market

# Market Demand for MariTAT

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## Motivation and Market Needs:

- IMO requirement for the emission reduction > high interest in alternative, renewable fuels
- Many different alternative fuels and engines available
- Difficulty in assessing application of alternative fuels for a given business

## Target Clients and Client 0:

- Target clients are companies that design, maintain, rent, lease and convert ships
- Seeking technical identification of the most suitable fuel for their operating profile



# Agenda

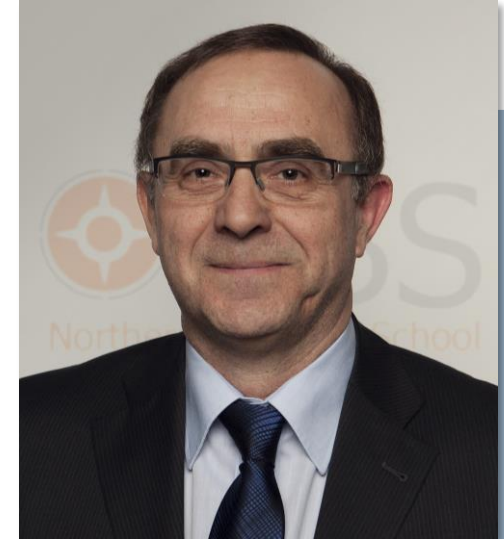
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# Northern Business School

The **NBS Northern Business School - University of Applied Sciences** is a nationally recognized and institutionally accredited university by the Science Council. In 2007, the NBS was founded on the initiative of companies and business associations from the Hamburg metropolitan region as a non-profit company, which has since grown into a university with over 1,200 students (as of summer semester 2019).

In addition to practical relevance in teaching, **research** is also an important pillar of the NBS. **Research** is carried out by the professors of the NBS both within the course and on an interdisciplinary basis. **The research always takes into account current developments and in particular, the cross-cutting issues of digitalization and sustainability.**



*Rector der Hochschule  
Prof. Dr. Uwe Här*

## Research Institutes

- Institute for Operations Research and Statistics (IORS)
- Institute for Northern European Economic Research (INER)
- Institute for Accounting, Controlling and Financial Management (IUCF)
- ....

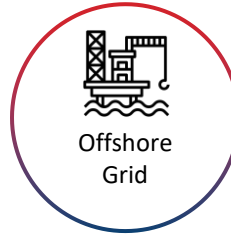
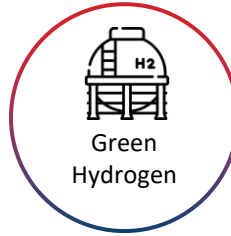
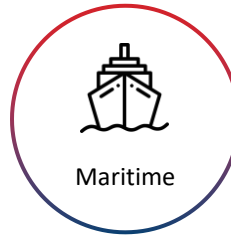


# We Enable The Green Shift

*By supporting you in your energy transition and a sustainable use of your resources.*

## WHAT IS OUR EXPERTISE?

We advise and support our clients in:

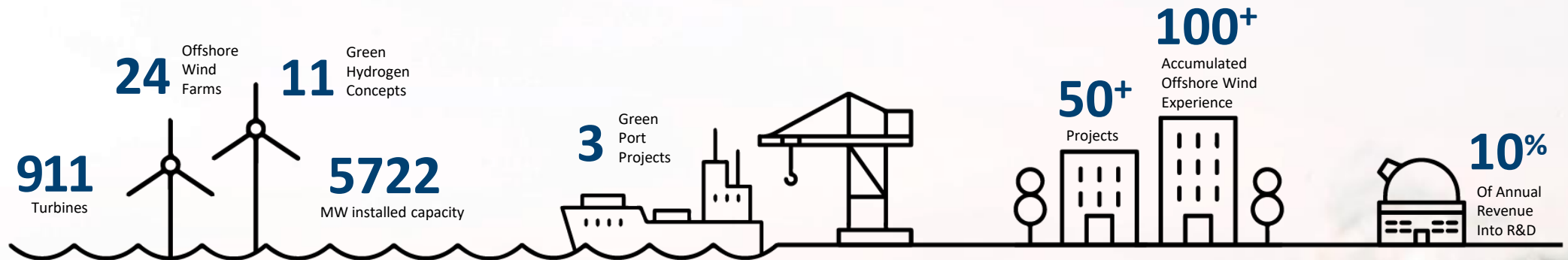


## WHOM DID WE TEAM UP WITH?

We partnered with top clusters in the industry



## HOW DO WE ACHIEVE SUCCESS?





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# Analysis Tool Overview

## Ship Profile

- Size
- Ship type
- Deadweight
- Main engine output
- Speed

## Route Profile

- Ports
- Distance
- Maximum sailed distance

USER INPUT

## Alternative Fuel Type

- Compared to fossil fuel:  
LNG, MGO, HFO
- Hydrogen
- Ammonia
- Ethanol
- Bio-diesel
- Different “colors”:
  - Grey
  - Blue
  - Green

USER SELECTION

## CAPEX

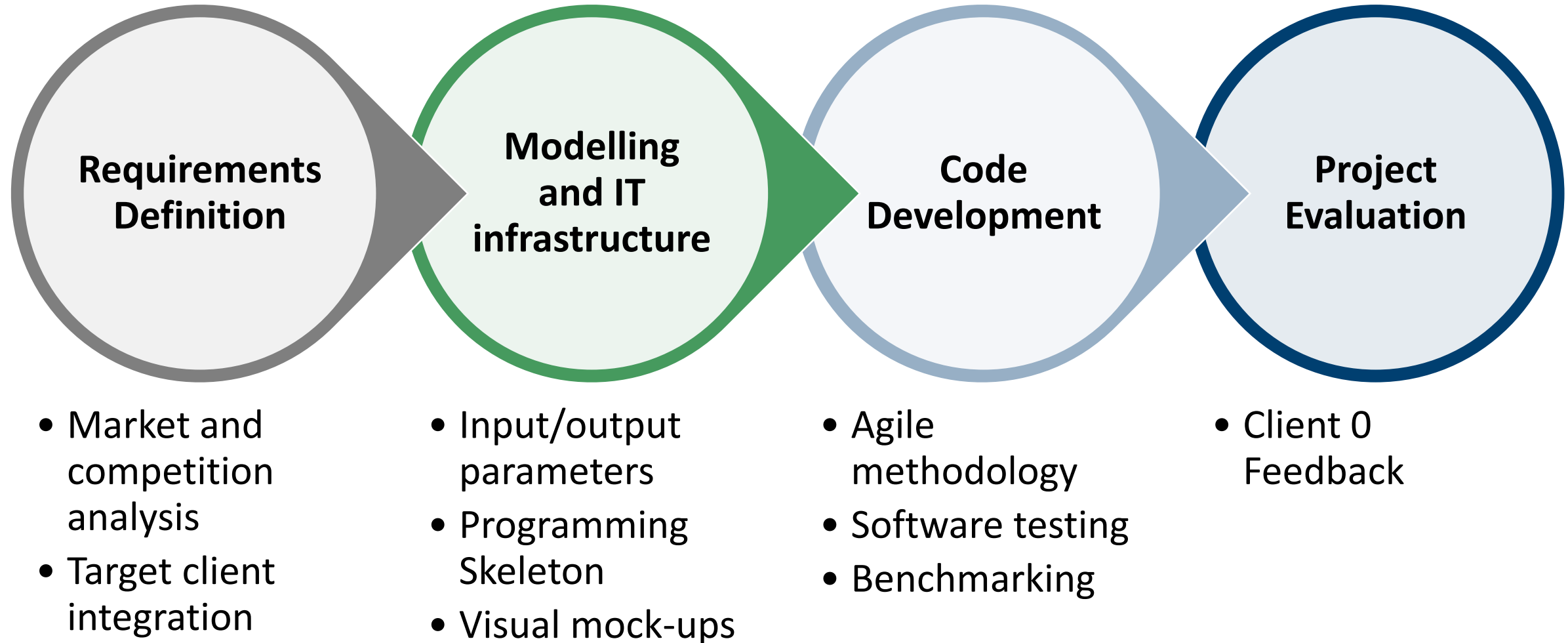
- CAPEX overview
- Tank size
- Auxiliary systems breakdown

## Fuel Consumption/Emissions

- Total fuel consumption
- Fuel price
- Emissions overview (CO<sub>2</sub>eq)

ANALYSIS MODULES

# Execution Plan



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# Analysis Tool Demonstration - Inputs

[Create New Scenario](#) [Active Scenario](#) [Output Dashboard](#)

### Step 1 - Vessel definition

**Vessel Details**

Ship name:

IMO number:

Ship type:

DWT:  [t]

Ship Design Endurance:  [NM]

Ship Design Speed:  [kn]

Ship Operating Speed:  [kn]

**Main Engine Details**

Main Engine Output:  [kW]

### Step 2 - Fuel selection

**Base fuel for comparison:**

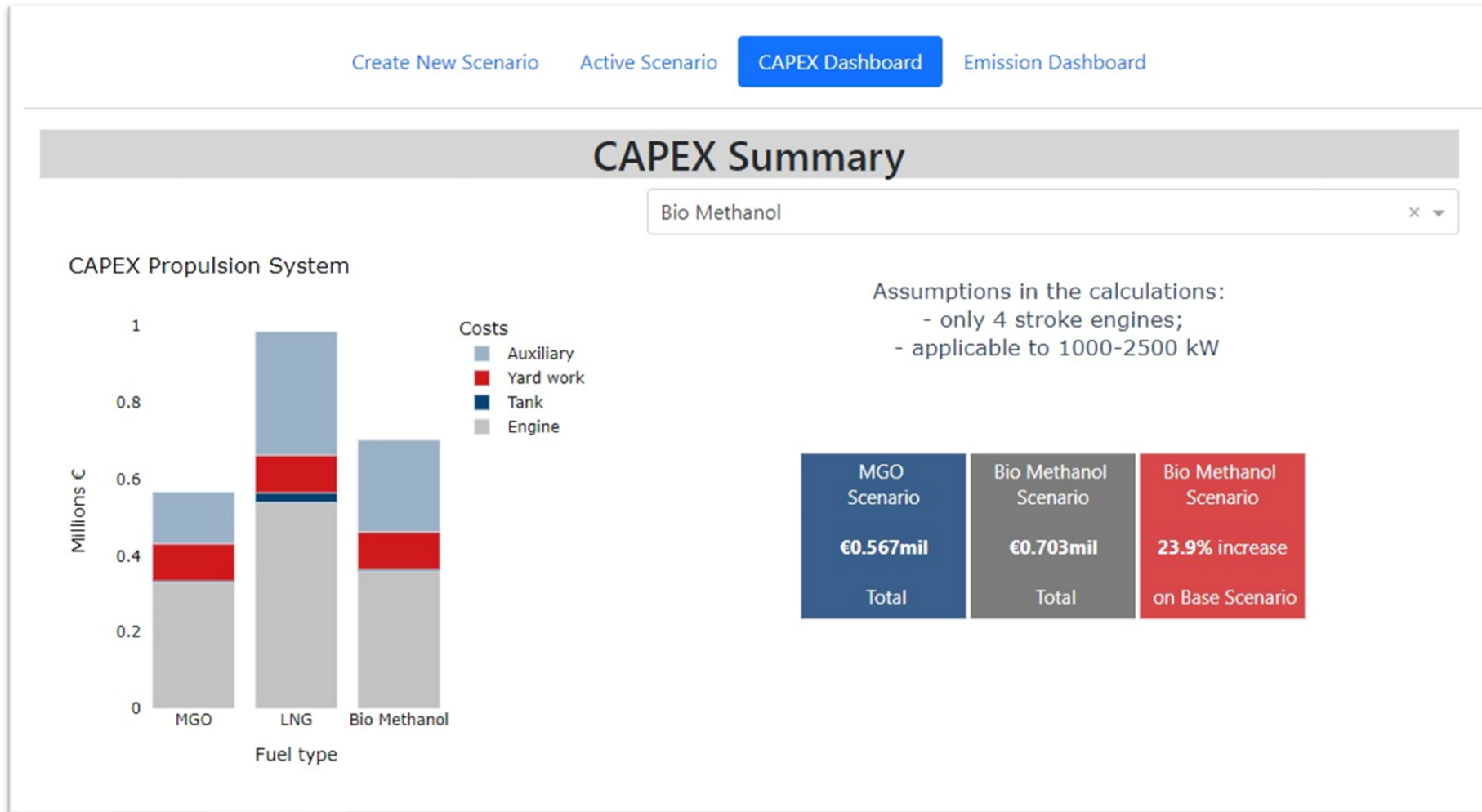
**Fuels to compare:**

Select up to 5 fuels:

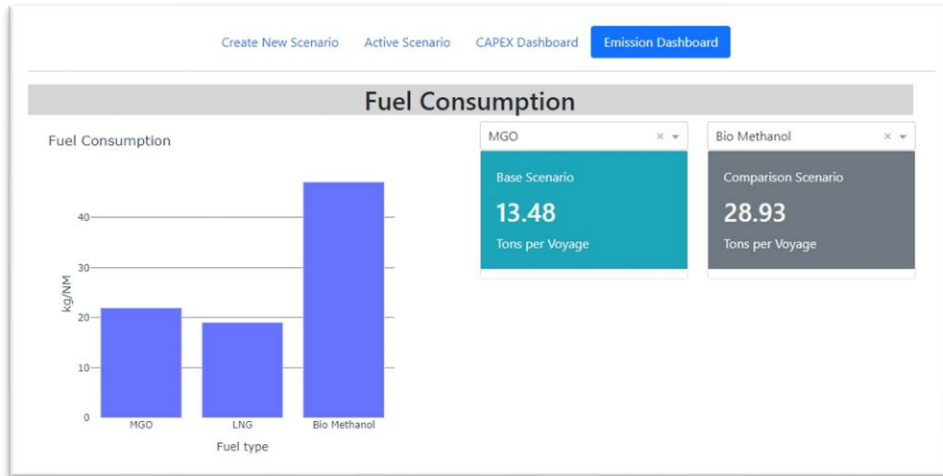
- MGO
- HFO
- LNG
- Grey Methanol
- Hydrogen
- E-Ammonia
- Bio-diesel
- Bio Methanol
- E-Methanol
- Blue Methanol

[Submit](#) [Home](#)

# Analysis Tool Demonstration – CAPEX dashboard



# Analysis Tool Demonstration - Emissions




Total emissions

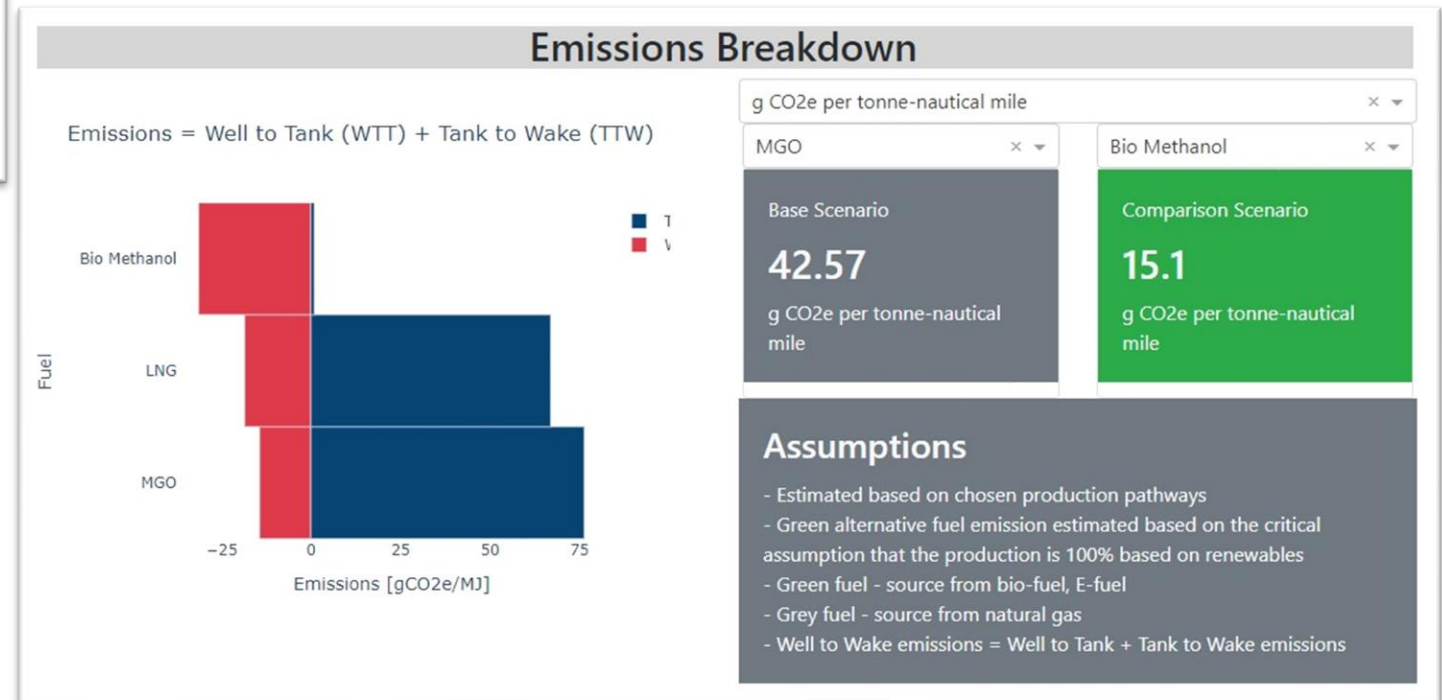
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Well to Tank

+

Tank to Wake





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# Benchmarking Study Cases Summary

## Aim:

- Agree on the primary metrics of MariTAT project target, "Fuel Analysis Tool" for the maritime industry.
- Evaluated metrics: fuel consumption, tank to wake (TTW) CO2eq emission

6 study cases are tested, for which the fuel type and ship types are listed below:

## Fuel types:

MGO	HFO	LNG
3	1	2

## Ship Categories:

Container	Bulker	Tanker	General Cargo
1	1	2	2



Case study 4: Handymax bulk carrier

# Results of Benchmarking

Technical characteristics	Case1	Case2	Case3	Case4	Case5	Case6
Type	Container ship	Oil Tanker	Oil Tanker	Coastal bulk carrier	RO-RO	RO-RO
Engine Power (kW)	10080	2880	9067.72	9480	8640	8640
Fuel type	LNG	MGO	HFO	MGO	MGO	LNG
Design Speed (knots)	19	12	14	15	20	20
Fuel consumption (kg/nm)	83.8 / <b>76.6</b> (-9%)	36.1 / <b>41.3</b> (15%)	131.3 / <b>123.2</b> (-6%)	86.0 / <b>88.8</b> (3%)	84.5 / <b>77.4</b> (-8%)	70.8 / <b>67.2</b> (-8%)
TTW_CO2e Emissions (kg/nm)	234.6 / <b>253.3</b> (8%)	118.6 / <b>134.8</b> (14%)	416.4 / <b>390.8</b> (-6%)	275.7 / <b>289.7</b> (5%)	265.7 / <b>252.5</b> (-5%)	227.2 / <b>222.1</b> (-2%)

# Challenges

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- CAPEX for engines and auxiliary systems is not easily shared by companies
- Engines for new fuels, as ammonia and hydrogen, are still under development
- Emission factors may vary according to source
- “Well to tank” emissions are not always considered in emissions analyses so far



# Main Take-Aways

## Why were we here today?

- **Many alternative fuels** for the maritime sector, and difficult to determine which fuel to invest in
- To stay competitive in future markets, ship owners must be proactive in their **emissions-reduction initiatives**

## How did the project go?

- Increase of **technical knowledge and collaboration** within KONGSTEIN/NBS consortium
- Improvement in **innovation management** and innovation competences
  - **Future problems, creative solutions!**

## What happens now?

- Results include the capability to offer new services and new products to the maritime sector
- New products: **MariTAT; digital tool development for clients**
- **Enhanced alternative fuel analysis, collaborative research projects**



**Marea Frazel**  
Project Engineer

maf@kongstein.com  
+491728628098

**Guilherme Romar**  
Project Engineer

grb@kongstein.com  
+491728628011

**Prof. Dr. Jürgen Sorgenfrei**  
Project Manager

Sorgenfrei@nbs.de  
+49 170 777 2278