Decarbonising Commercial Vessels

Angus McDonald
CEO, Maritime Impulse

August 2024

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Maritime IMPULSE

About Maritime Impulse

Maritime Impulse exists to help domestic commercial vessel (DCV) owners in Australia decarbonise their existing vessel fleets.

CEO & Co-Founder
Angus McDonald

Director & Co-Founder
Christine McDonald

Energy Optimisation & Maritime Sustainability

Maritime EMISSIONS REDUCTION Coalition

(aka "MERC")

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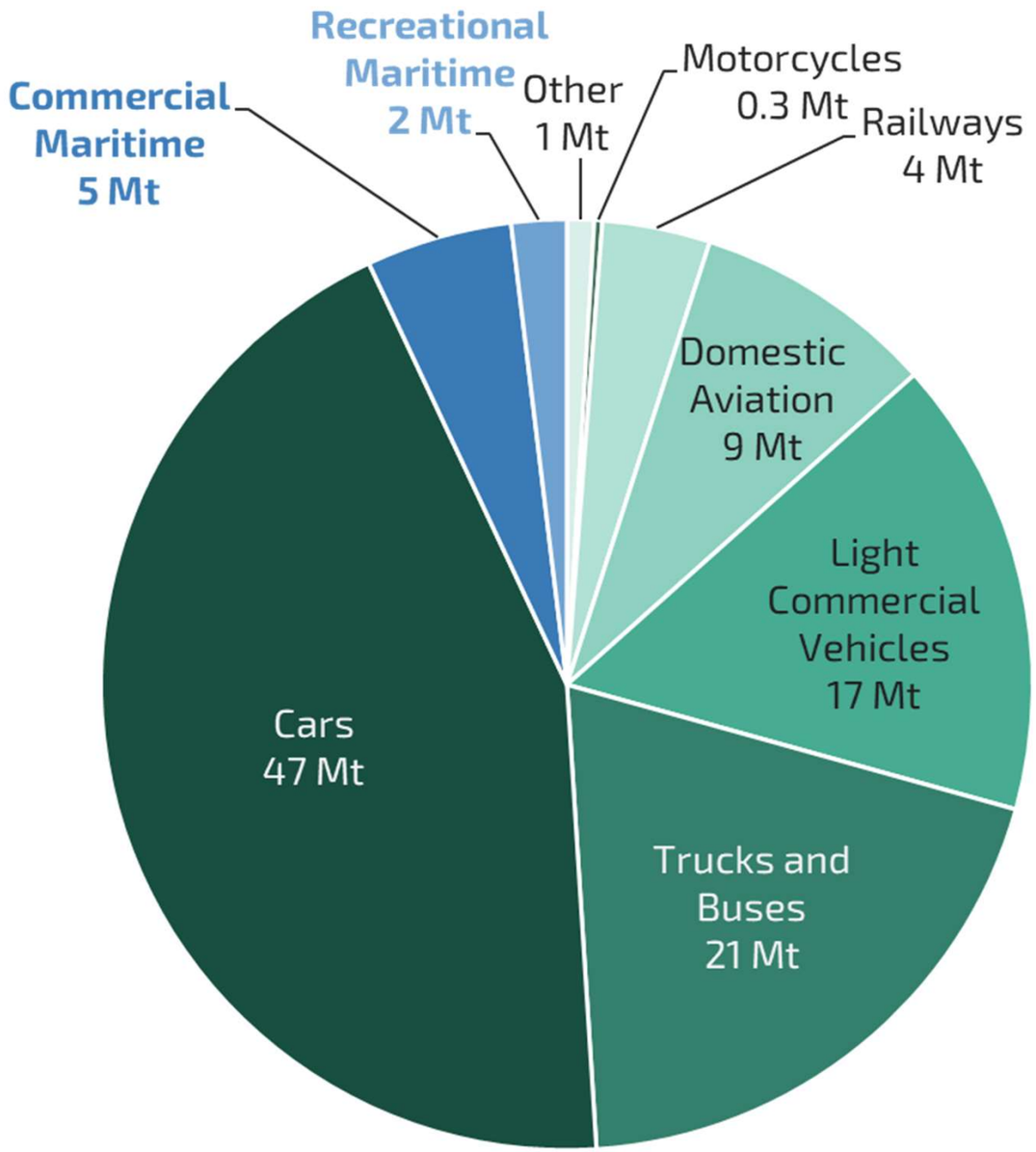

https://merc.blue/resources/

NGA* says 2 Megatons CO_2-e

MERC found 6 to 7.4 Megatons CO_2-e

300% - 370% difference!

* National Greenhouse Accounts

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Climate change is affecting us

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Fact 1

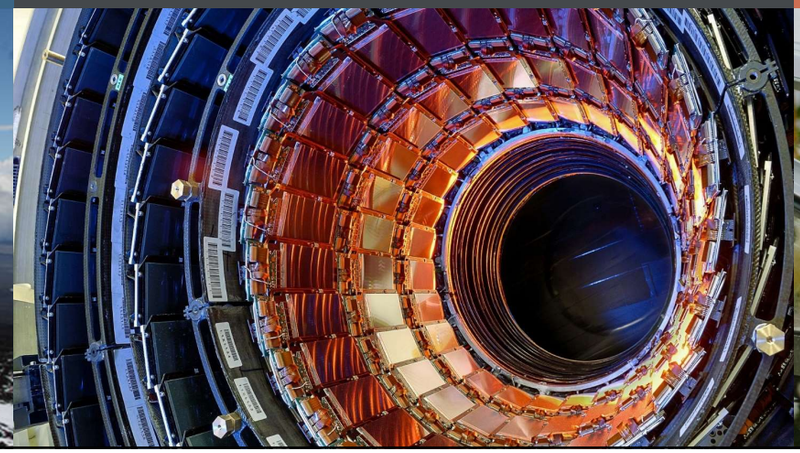
Atmospheric CO_2 concentrations have increased

Fact 2

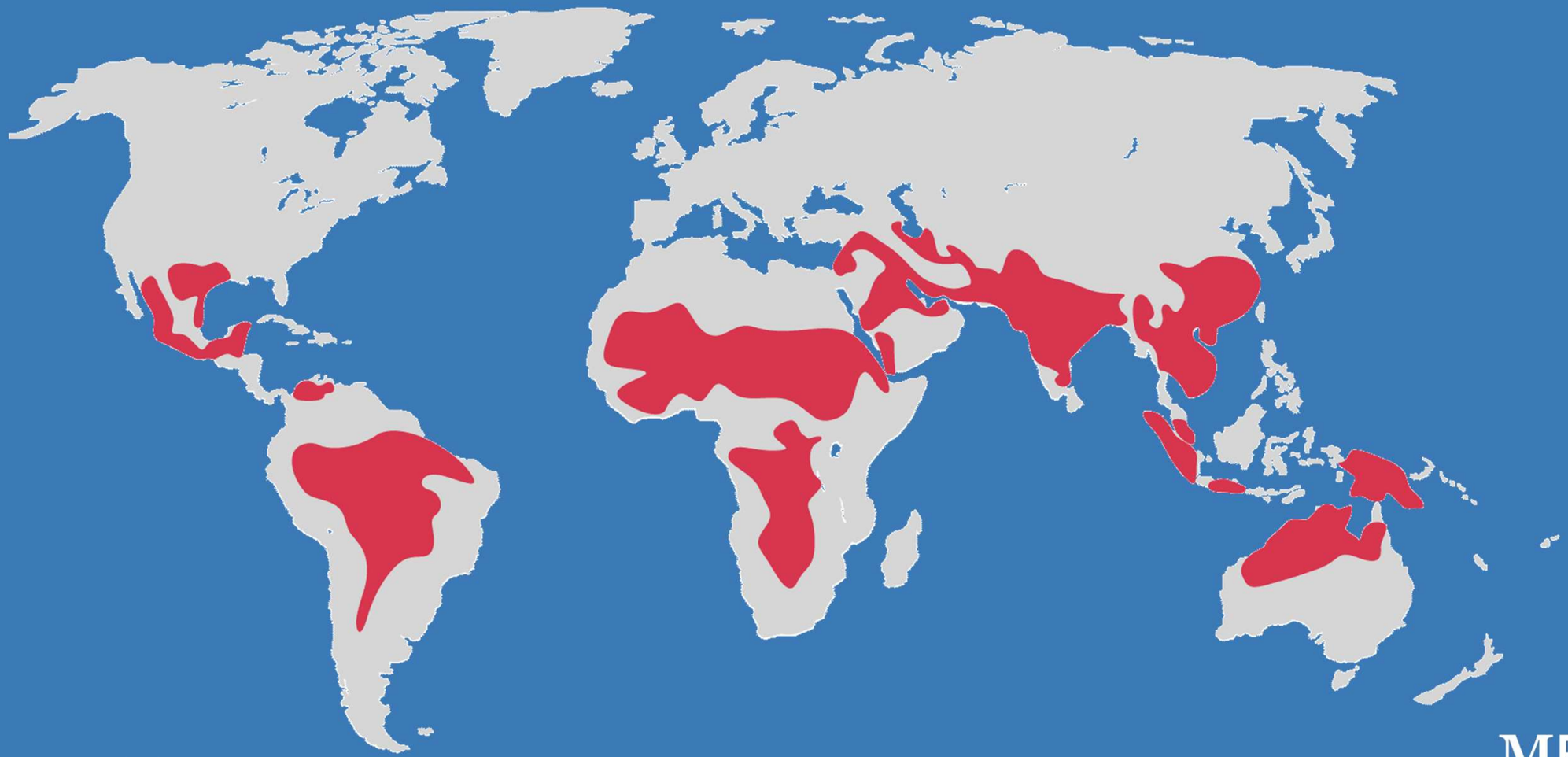
We caused the CO_2 increase, primarily by burning fossils

Fact 3

Extra CO_2 (and other greenhouse gases) cause radiative forcing



Lethal Wet Bulb Heat Risks at +2°C



Source: Met Office (UK)

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Business change will be required
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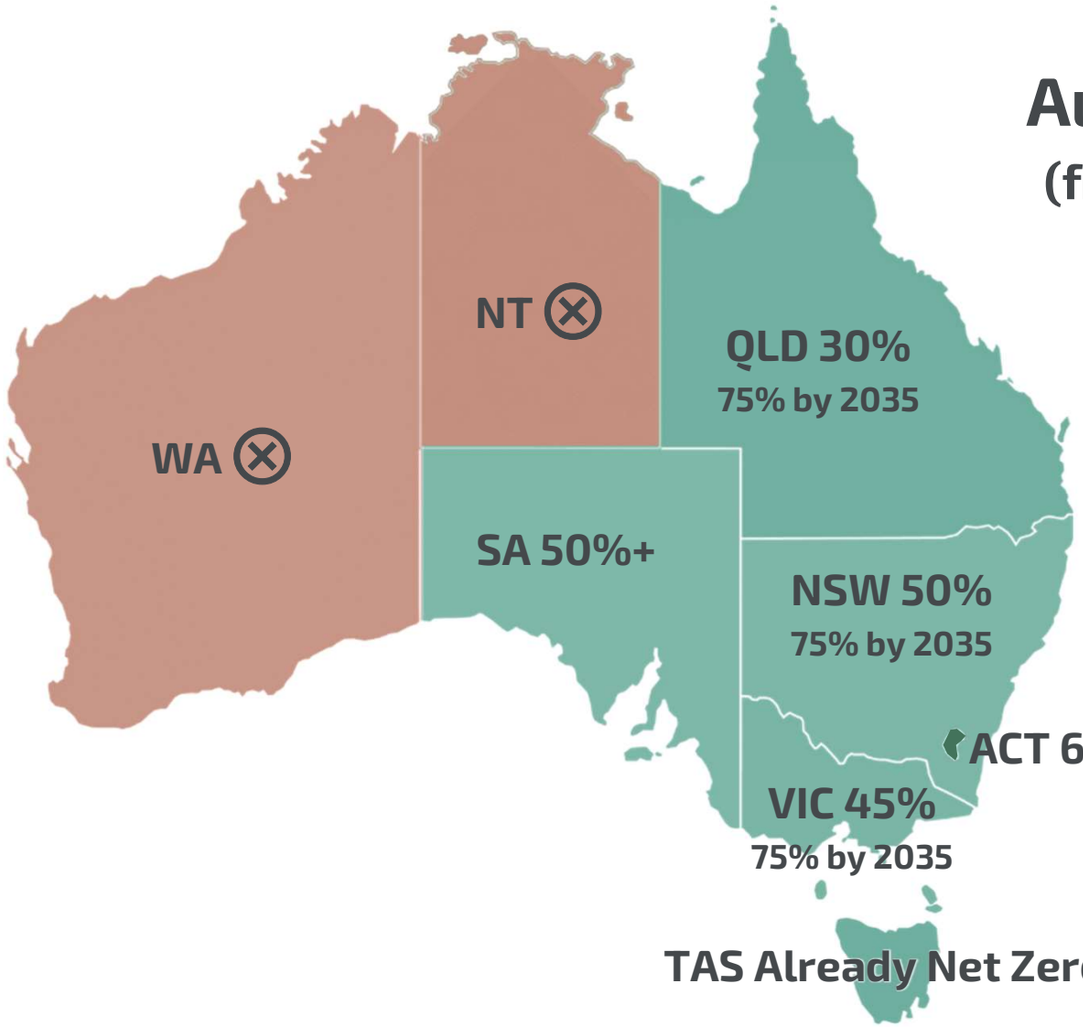
Emissions reduction targets vs 2005?

2030 emissions reduction targets



Australia's Target
(from Paris Agreement)
43%

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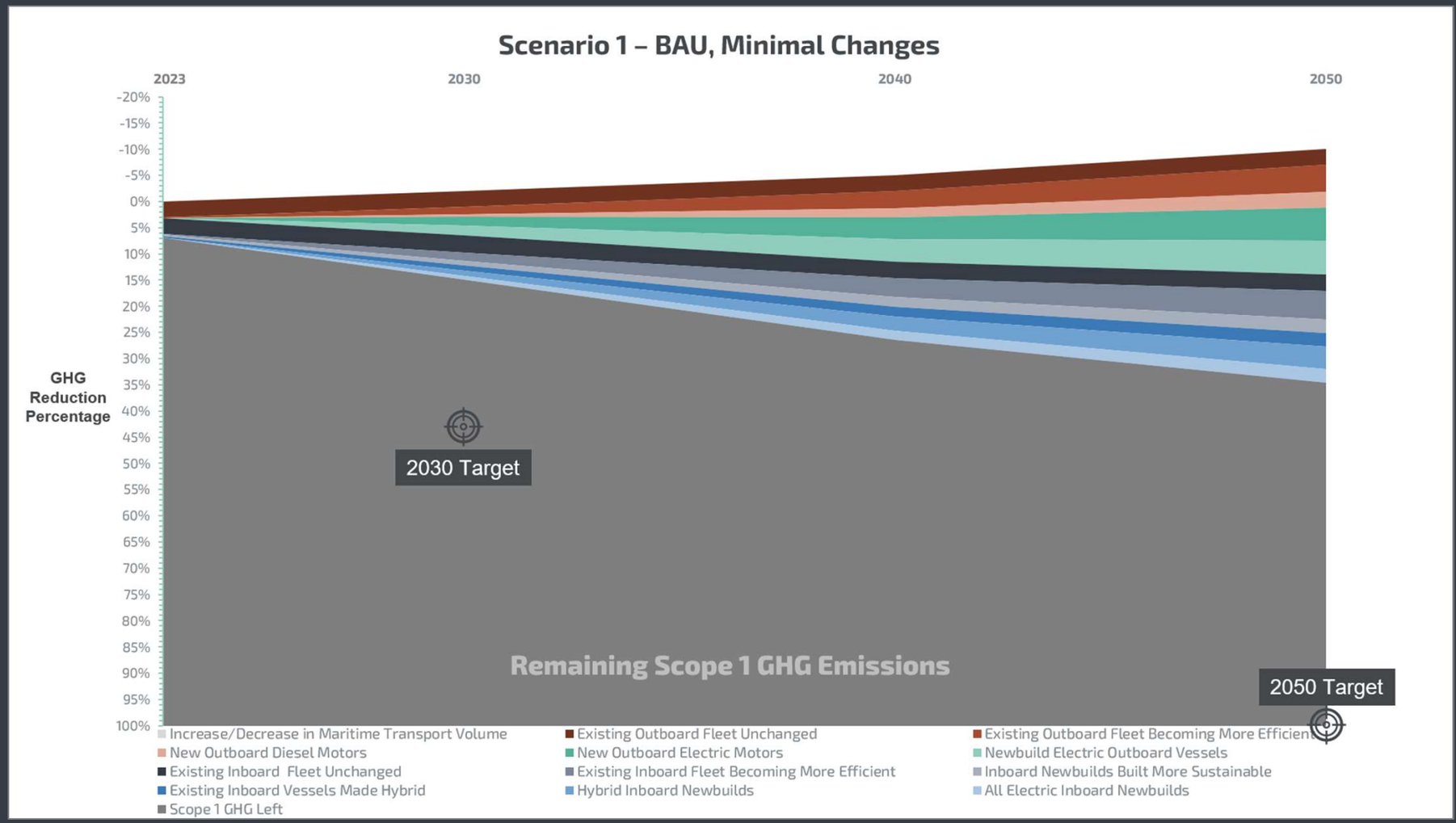
Scenario 1 – BAU, Minimal Changes
2023
2030
2040
2050
-20%
-15%
-10%
-5%
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%
55%
60%
65%
70%
75%
80%
85%
90%
95%
100%
GHG Reduction Percentage
2030 Target
Remaining Scope 1 GHG Emissions
2050 Target
Increase/Decrease in Maritime Transport Volume
Existing Outboard Fleet Unchanged
Existing Outboard Fleet Becoming More Efficient
New Outboard Diesel Motors
New Outboard Electric Motors
Newbuild Electric Outboard Vessels
Existing Inboard Fleet Unchanged
Existing Inboard Fleet Becoming More Efficient
Inboard Newbuilds Built More Sustainable
Existing Inboard Vessels Made Hybrid
Hybrid Inboard Newbuilds
All Electric Inboard Newbuilds
Scope 1 GHG Left

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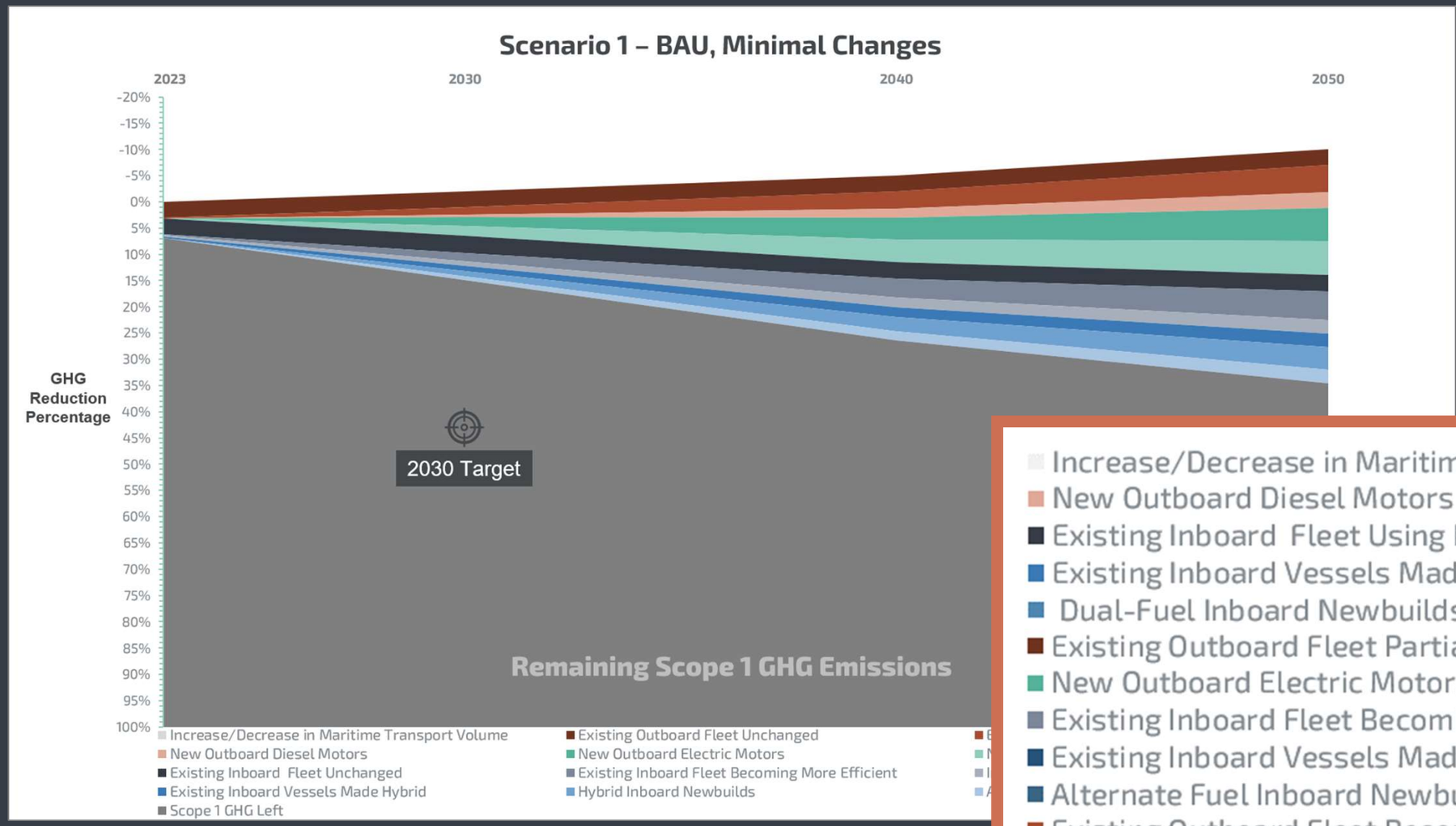
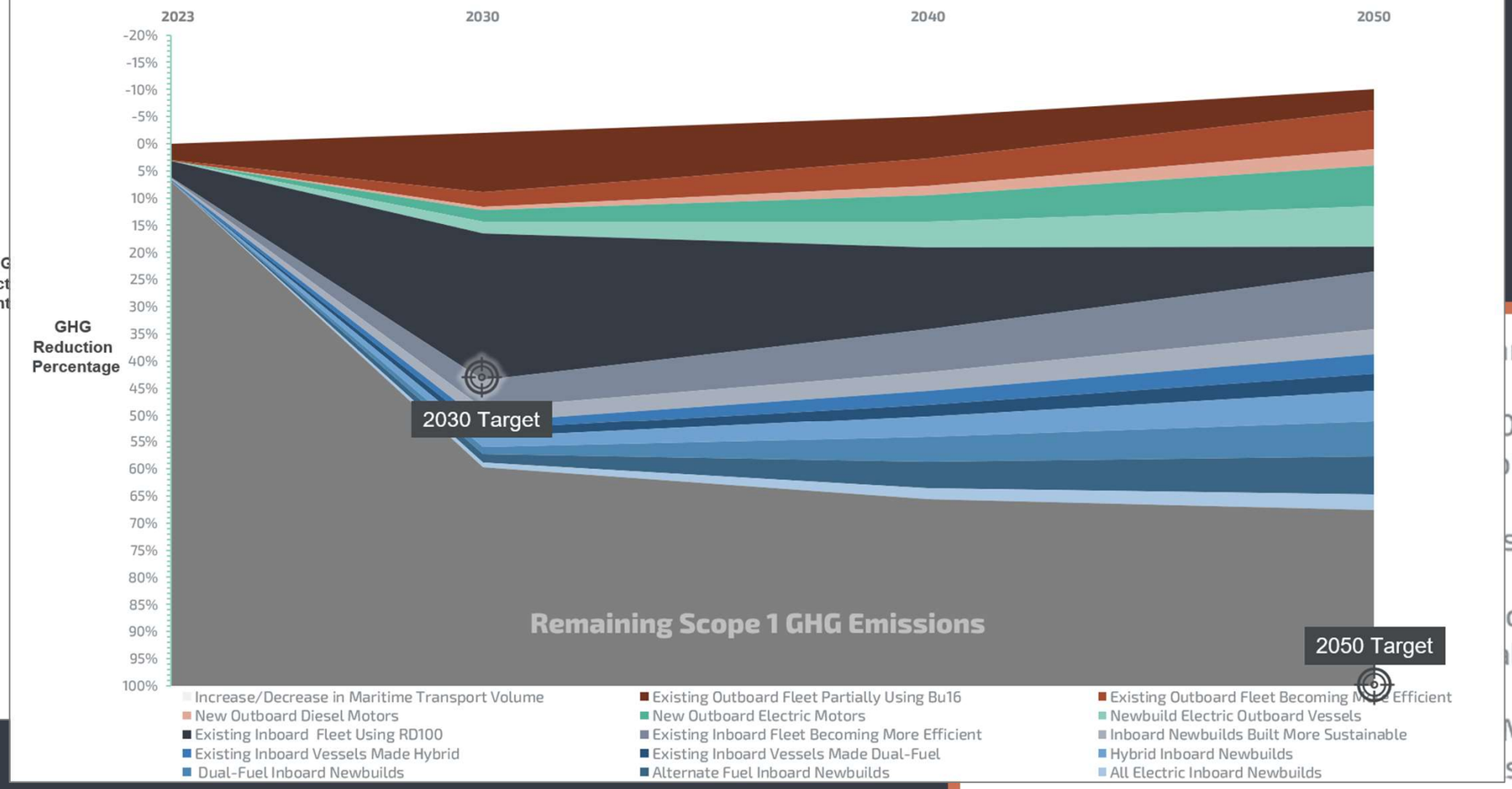


- Increase/Decrease in Maritime Transport Volume
- New Outboard Diesel Motors
- Existing Inboard Fleet Using RD100
- Existing Inboard Vessels Made Hybrid
- Dual-Fuel Inboard Newbuilds
- Existing Outboard Fleet Partially Using Bu16
- New Outboard Electric Motors
- Existing Inboard Fleet Becoming More Efficient
- Existing Inboard Vessels Made Dual-Fuel
- Alternate Fuel Inboard Newbuilds
- Existing Outboard Fleet Becoming More Efficient
- Newbuild Electric Outboard Vessels
- Inboard Newbuilds Built More Sustainable
- Hybrid Inboard Newbuilds
- All Electric Inboard Newbuilds

Scenario 1 – BAU, Minimal Changes

Scenario 2 – Plenty of Drop-in LCLFs



nsport Volume

rid

sing Bu16

ore Efficient
l-Fuel

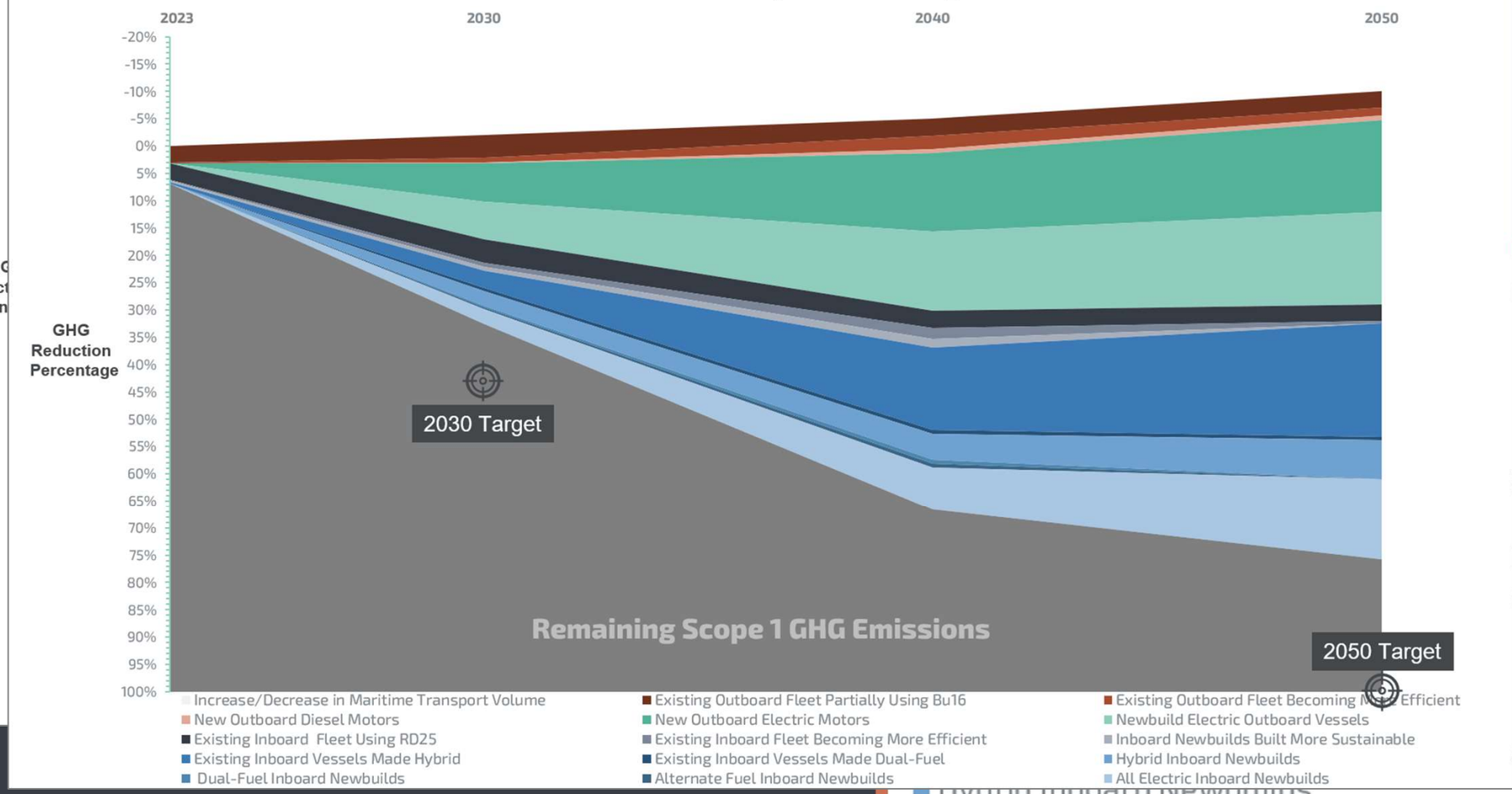
More Efficient
s

Inboard Newbuilds Built More Sustainable
Hybrid Inboard Newbuilds
All Electric Inboard Newbuilds

Scenario 1 – BAU, Minimal Changes

Scenario 2 – Plenty of Drop-in LCLFs

Scenario 3 – Battery Breakthrough

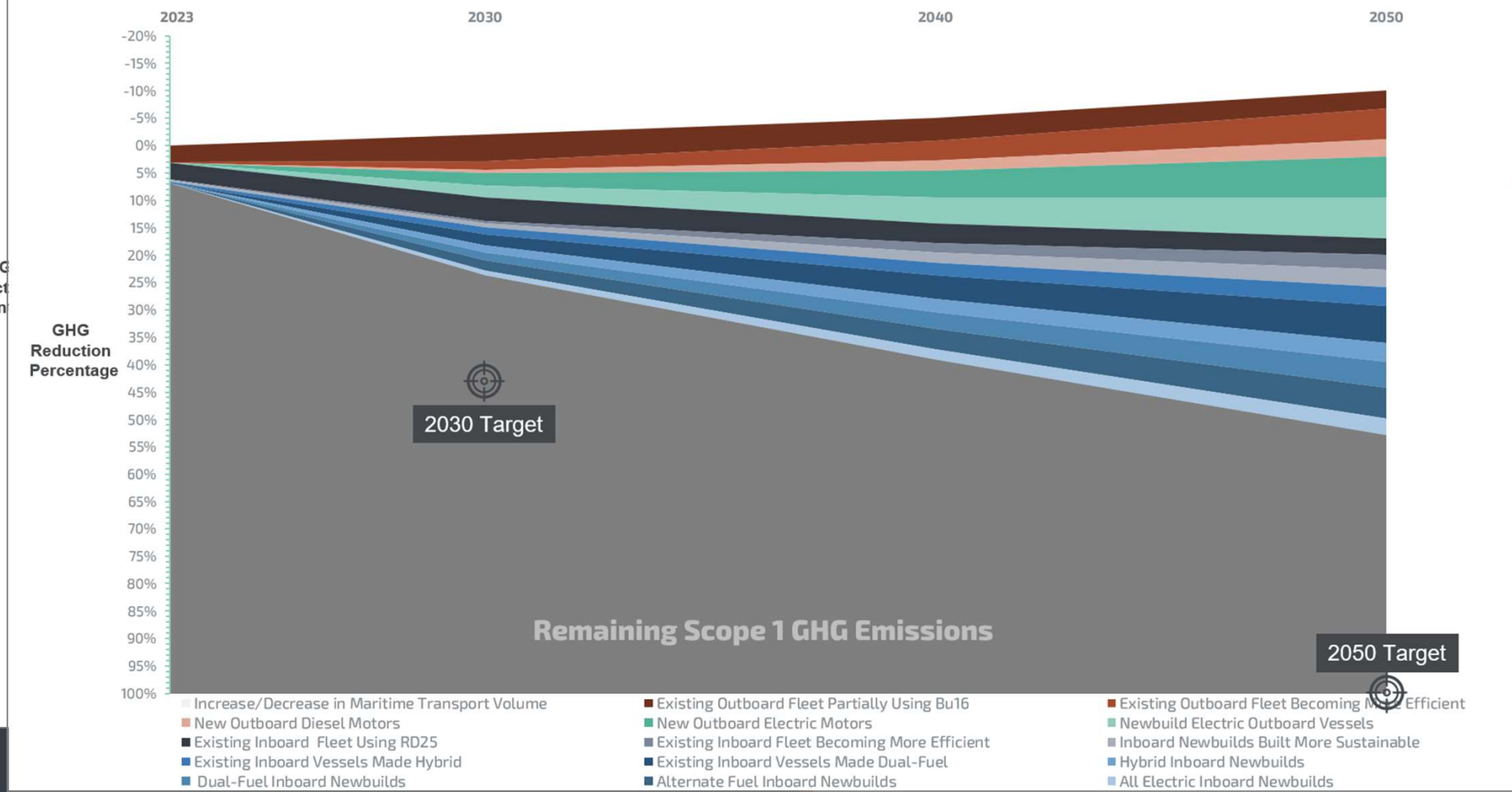


Scenario 1 – BAU, Minimal Changes

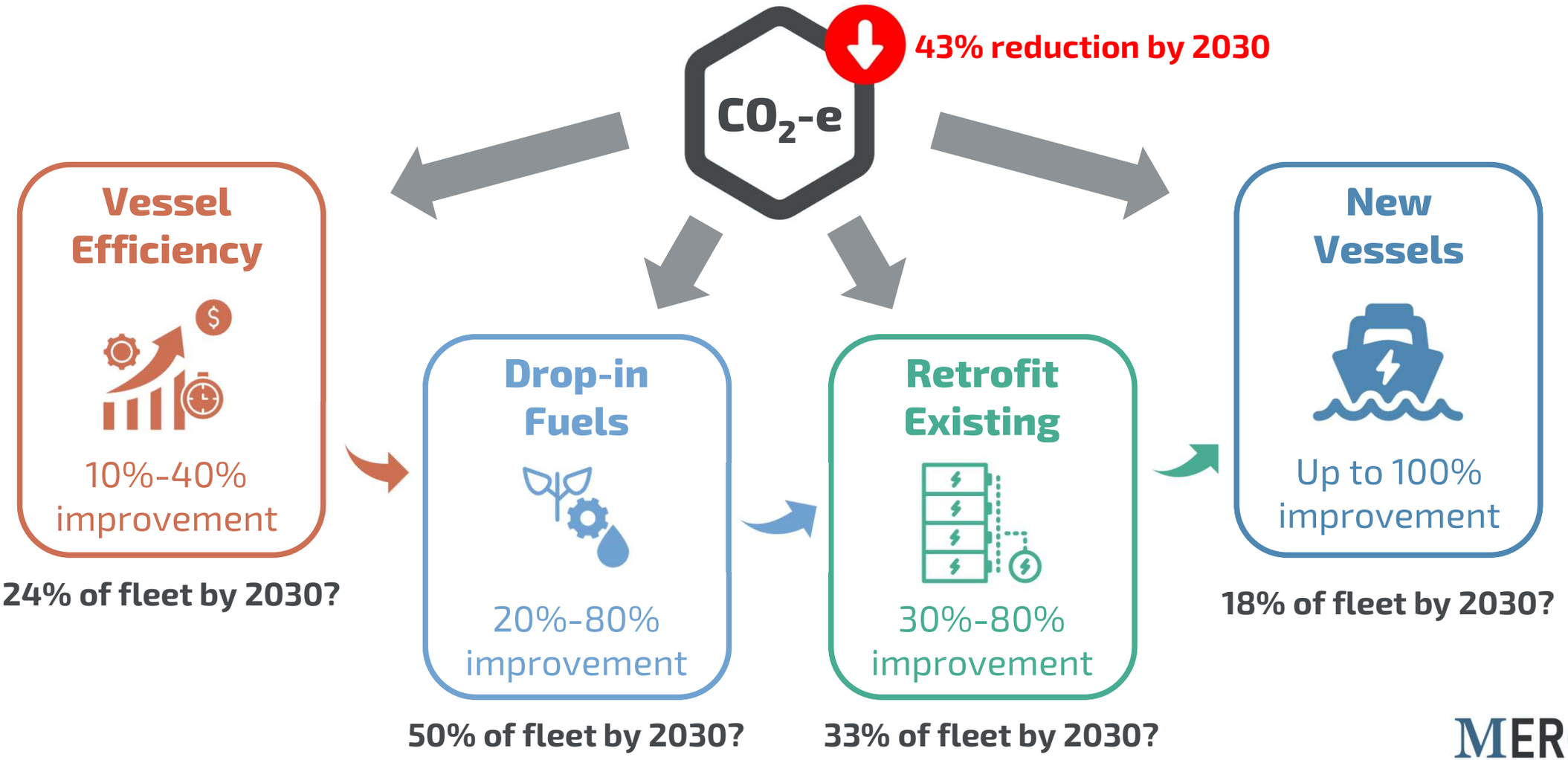
Scenario 2 – Plenty of Drop-in LCLFs

Scenario 3 – Battery Breakthrough

Scenario 4 – Hydrogen & E-fuels Breakthrough



Plan A: **Efficiency + Drop-in fuels + Electrify**



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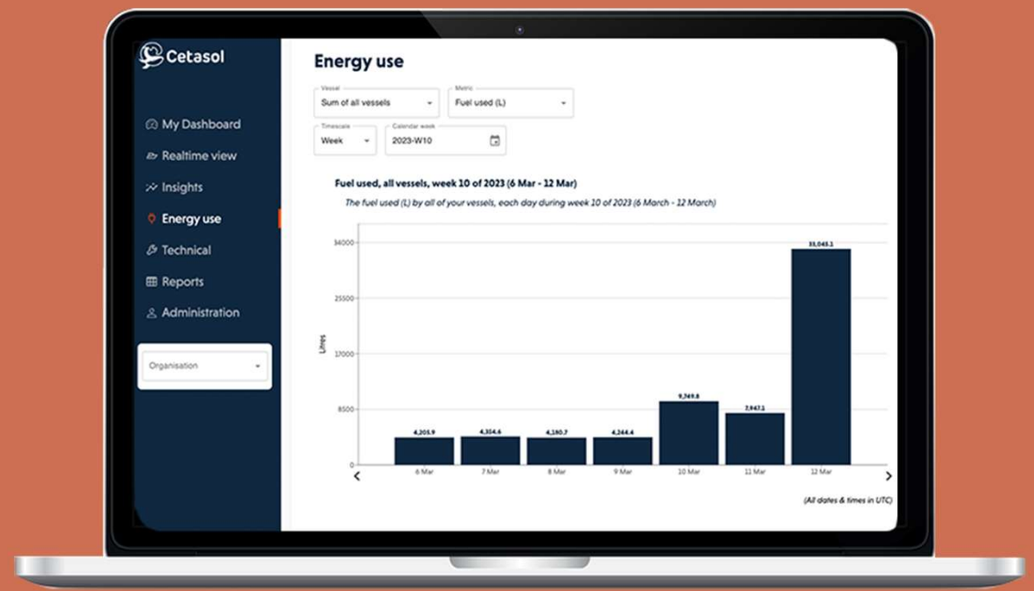
Get energy smart

Energy costs are going up



Good decisions need good data

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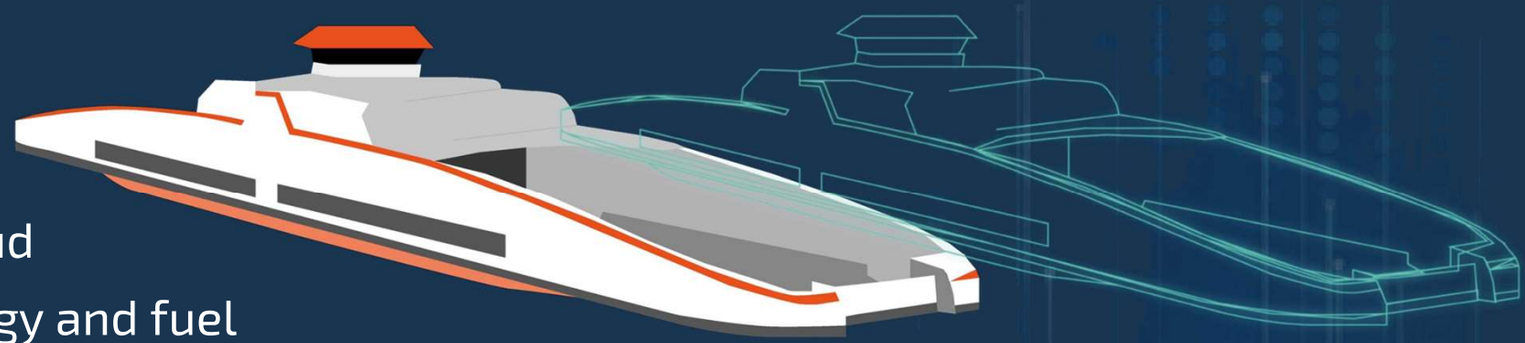
Good energy data

iHelm Platform

A digital twin of your **vessel**.

- Helps optimise energy use
- Digitises all data points to cloud
- Captains use 10-15% less energy and fuel

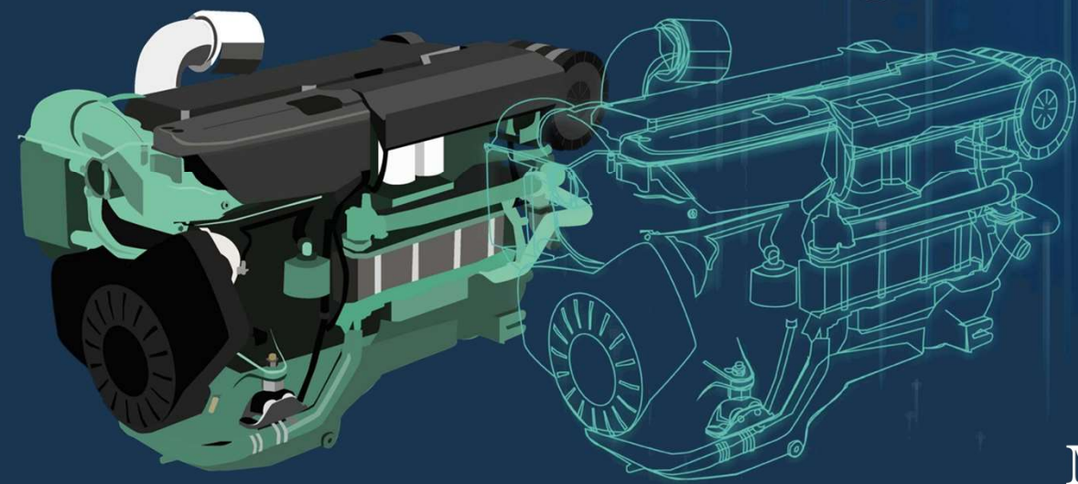


Digital Twins

Cetafuel Monitor

A digital twin of your **engine**.

- Monitors fuel flow virtually
- Only needs RPM, temp. and pressure
- 97%+ accuracy



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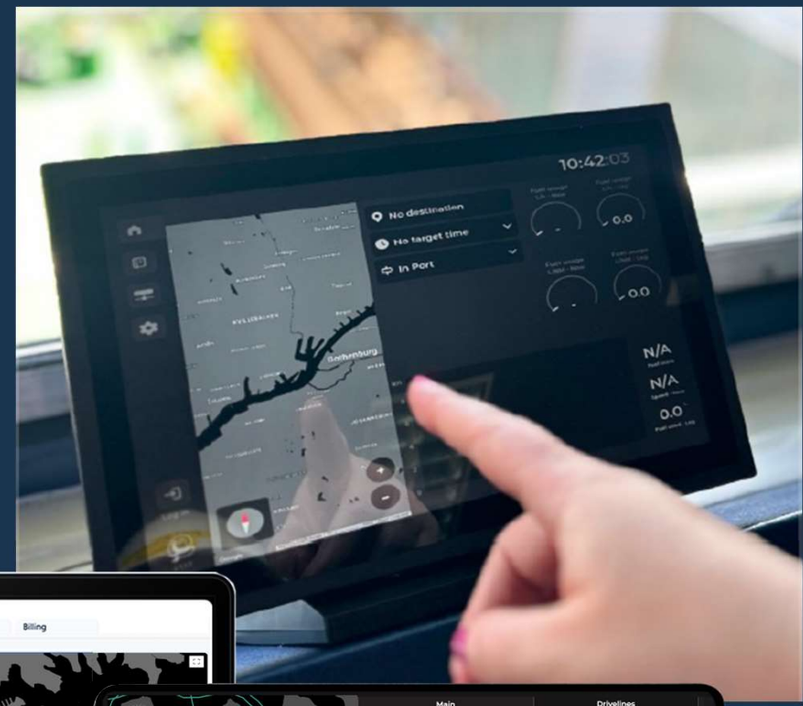
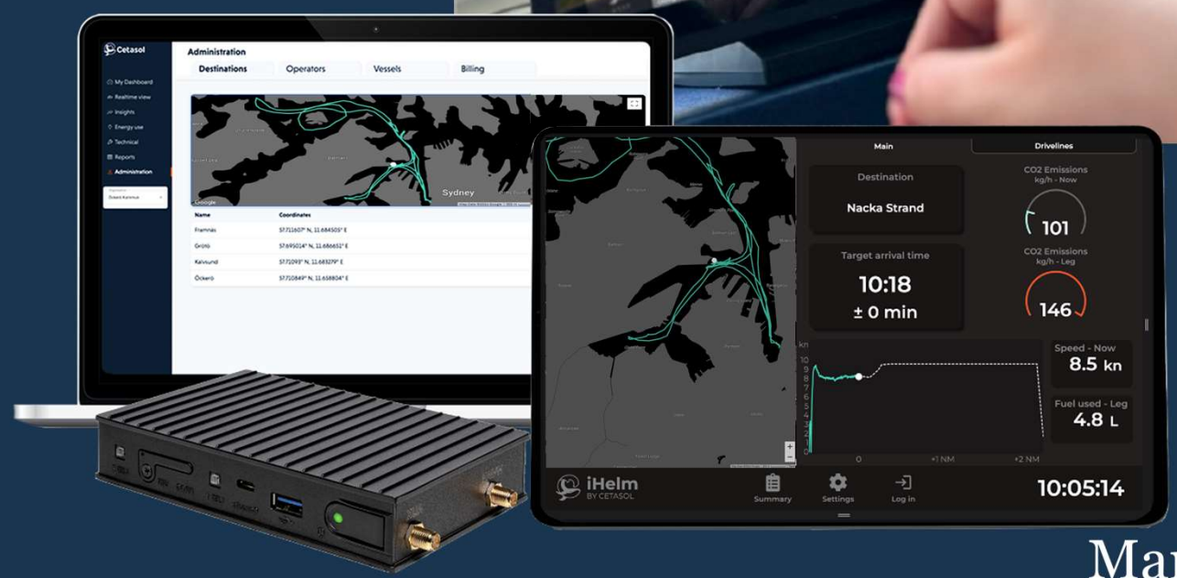
Digitise with iHelm

The iHelm platform uses an **industrial PC** on the boat to capture data from a wide range of sensors and protocols.

The captain has a **monitor** to show them optimal energy use and guide their decisions.

The **cloud app** gives real-time view of the boat's data, and provides a reporting function.





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DECARBONISATION MYTHS
BUSTED!
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Myth: **Hydrogen & e-fuels are the answer**

Bad news for Hydrogen fuel and e-fuels derived from it:

17 Mt/yr **Green Hydrogen** projects have been announced globally for 2030.

But only **1.9 Mt**/yr has reached **Final Investment Decision** or is under construction.

80 Mt/yr of **Fossil Hydrogen** is used **now** by industrial processes (fertiliser, etc.) and even more will be needed for green iron/steel.

If production targets are hit by 2030 then we will still see only **21% of existing Hydrogen uses** decarbonised.

Conclusion:
We can't afford to use Hydrogen as fuel, or to create e-fuels.

Source: IEA's Global Hydrogen Review 2023

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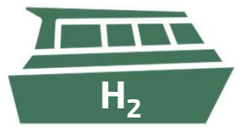
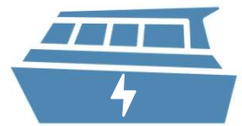
Myth: **Hydrogen & e-fuels are the answer**



Hydrogen Fuel-Cell



Battery Electric

17% of Diesel	**RANGE**	13% of Diesel
Non-existent - major work needed	**SUPPLY**	Available now - minor work in fast charging
38% Energy Usefully Used	**EFFICIENCY**	80% Energy Usefully Used
Expensive, especially infrastructure	**CAPITAL COST**	Expensive, especially infrastructure
Much higher than Diesel	**OPERATING COST**	Much lower than Diesel
Much less safe than Diesel	**SAFETY**	Slightly less safe than Diesel

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Myth: **Hydrogen & e-fuels are the answer**

Price operators are willing to PAY for Hydrogen fuel (affordable)

Price producers are willing to SELL Hydrogen fuel for (profitable)

MAGIC HAPPENS!

Transport and storage costs are high for *any* colour Hydrogen,

Battery electric options keep falling in price, Hydrogen *doesn't*, and

Governments must subsidise *operating expenses* for it to happen.

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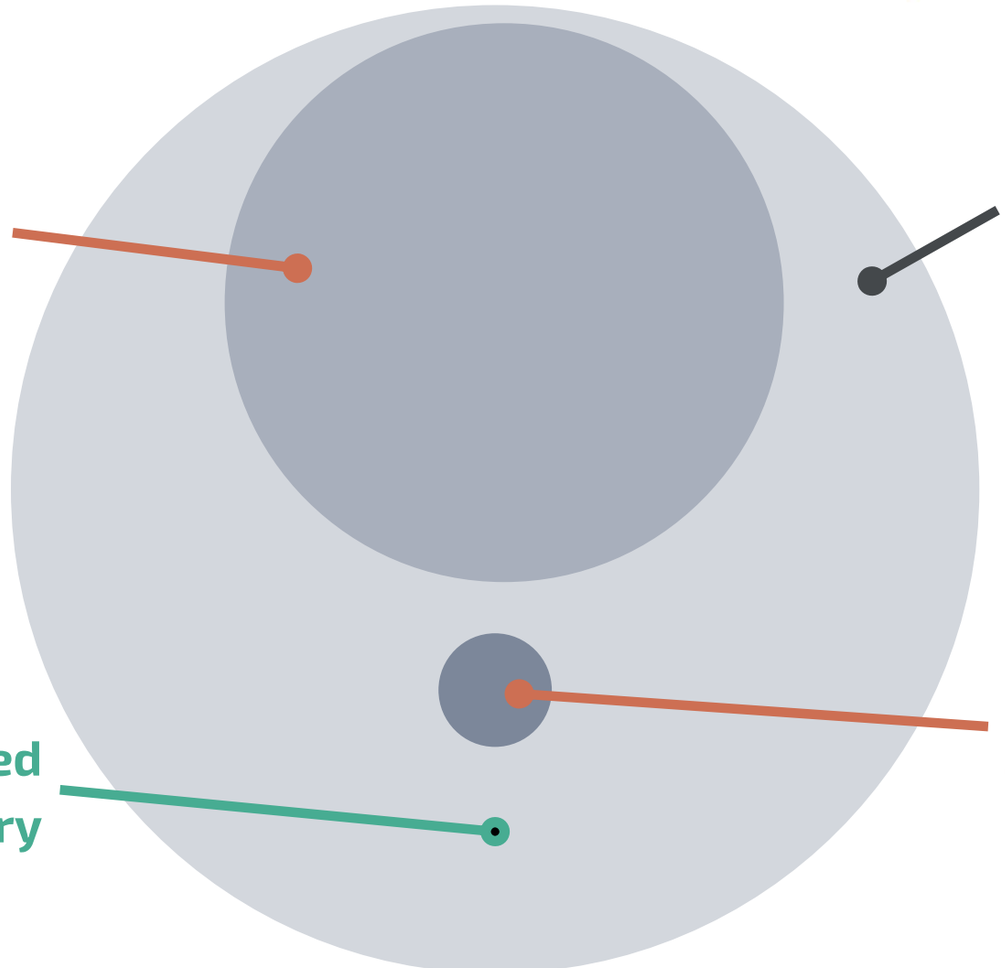
Myth: **Captured CO_2 will be valuable**



Over 1,000 Bt of CO_2 came from human activity

3,000 Bt of CO_2 in atmosphere

+35-41 Bt of CO_2 added annually by humans

0.23 Bt of CO_2 consumed annually by industry

Source: Michael Barnard Bt = Billion Tons

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+35-41 Bt of CO_2 added annually by humans

- 0.23 Bt of CO_2 consumed annually by industry

Conclusion:

There isn't much of a market for captured CO_2

It is WASTE, not resource

Source: Michael Barnard Bt = Billion Tons

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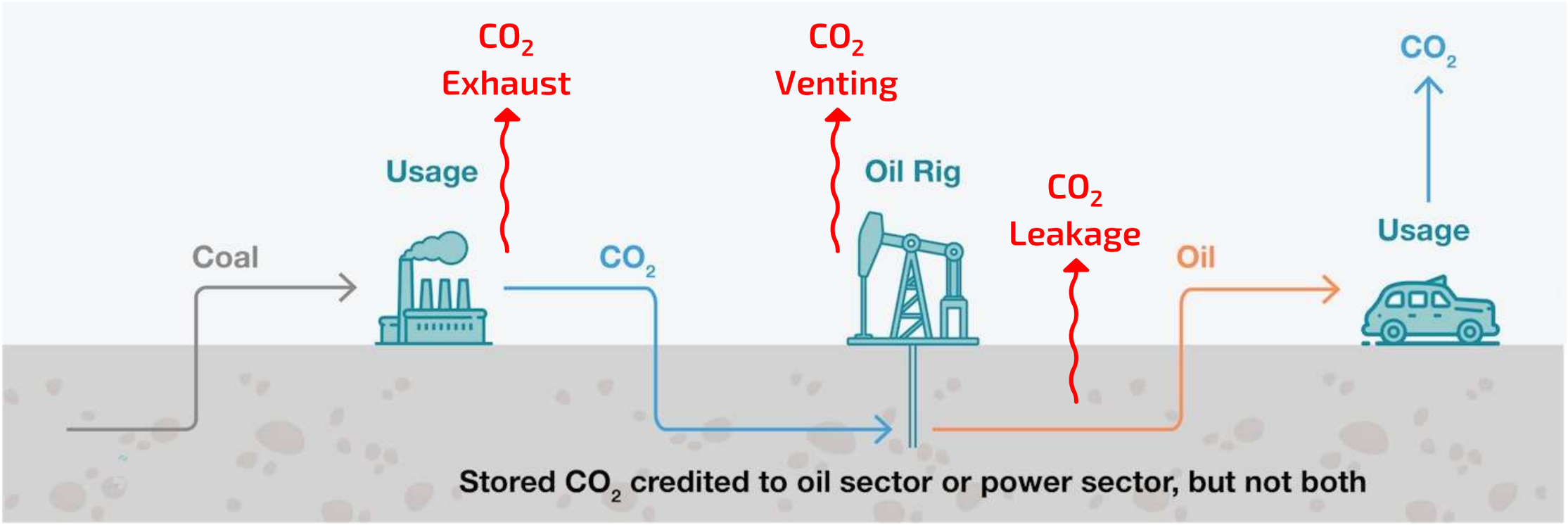
Myth: **CO_2 can be safely stored**

Most CO_2 consumed by industry today is used for Enhanced Oil Recovery (EOR), it pumps the CO_2 underground to release more oil, and often doesn't stay there.



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Myth: **Renewable diesel can save us alone**

But the biomass it is made from is in high demand everywhere!

So, prices will **stay high** (about 3x fossil diesel).

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Myth: **Batteries are bad**

They catch fire easily!

Rarely, and easily managed and prepared for.
(and becoming safer)

Electricity and water don't mix!

Marine battery systems are designed for that environment.
(and IP67 rated, etc.)

They are too expensive!

Cost more than a diesel system but are much cheaper to run.
(and getting cheaper)

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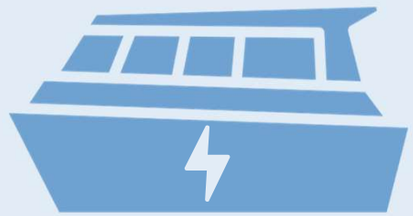
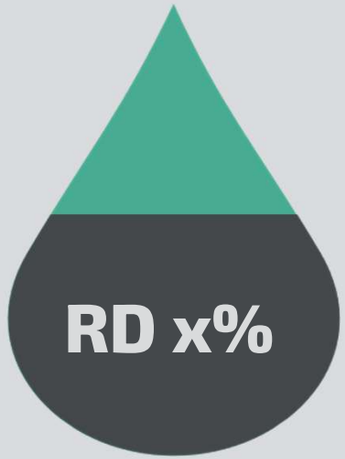
Pragmatic actions we can take now

Energy Efficiency Measures

Greater Use of Battery Electric



Renewable Diesel Blending



Using Green Bio-Methanol

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What changes with electrification?

Things we are used to having:

- Efficiency second to features
- Overpowered propulsion
- Excess range
- Extra fuel as ballast

Things we need to have in the future:

- Super-efficient vessel designs
- Higher torque at lower power
- Accurate ability to predict range
- Differentiation (early mover)

Things we can do without:

- Rising fuel bills
- Noisy, shuddering, smoky engines
- Maintenance headaches

Things we will get:

- Lower operating costs
- Quiet, steady, clean motors
- Batteries as permanent ballast

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This means standard designs rule

Things we need to have in the future:

- Super-efficient vessel designs
- Higher torque at lower power
- Accurate ability to predict range
- Differentiation (early mover)

Things we will get:

- Lower operating costs
- Quiet, steady, clean motors
- Batteries as permanent ballast

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You need the right players on your team

Tech & Solution Providers

- Systems Integrators
- Manufacturers
- Marine Service Providers
- Boat Builders

Critical Stakeholders

- Utilities
- Ports, Harbours & Marinas
- Fuel Co's

Key Enablers

- Banks
- Insurers
- Government Org's

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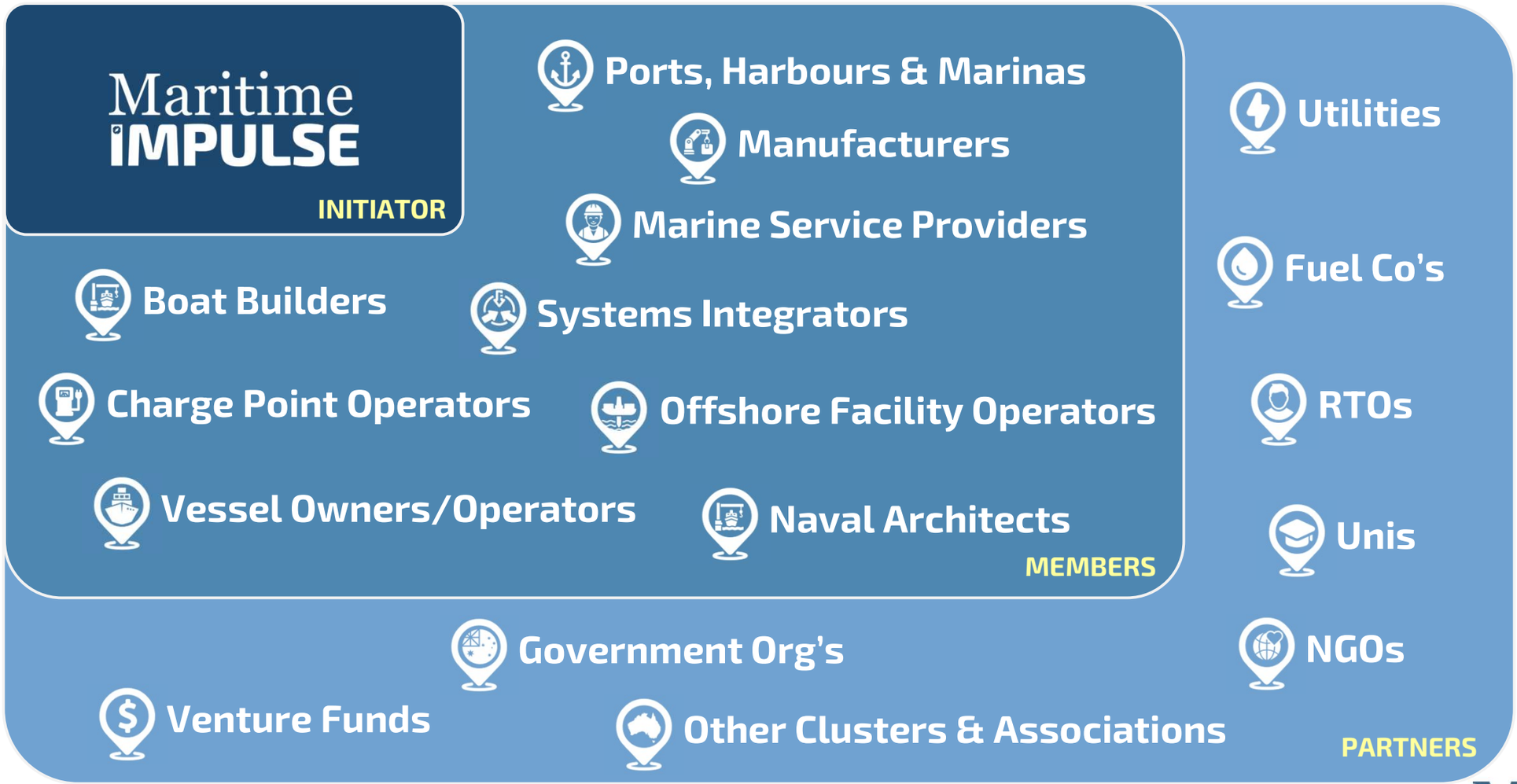
MERC brings the right players together



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MERC Steering Committee

MERC was founded in February 2024, with two seats for Maritime Impulse:

Angus McDonald
CEO & Co-Founder, MERC Chair
Maritime Impulse
https://www.linkedin.com/in/angusmcdonald/

Christine McDonald
Director & Co-Founder
Maritime Impulse
https://www.linkedin.com/in/christinekolamcdonald/

Three Member representatives were elected to the Steering Committee in July 2024:

Lynelle Johnson
Managing Director
Eclass Outboards
https://www.linkedin.com/in/lynellejohnson/

Dr Steve Mitchell
Engineering Manager
Ampcontrol
https://www.linkedin.com/in/steven-d-mitchell/

Brendan Cooley
Managing Director
IMS
https://www.linkedin.com/in/brendancooley/

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MERC Founding Members

MARINE LIFESTYLES

3ME TECHNOLOGY

fibre™

AMPCONTROL®

REFUELLING SOLUTIONS®

hullbot

EClass MARINE

EV MARITIME

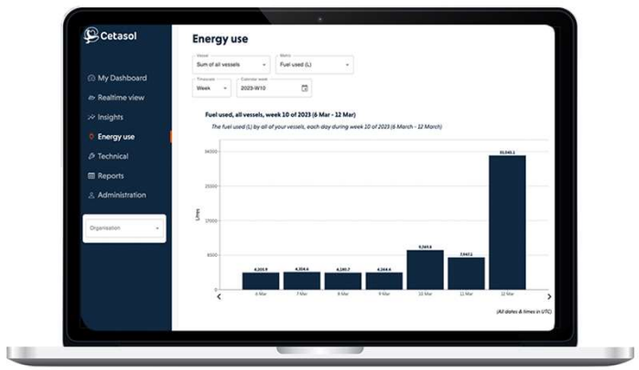
IMS. Always delivering.

STEBER INTERNATIONAL
STEBERCRAFT PTY. LTD.

GOBOAT

Get Energy Smart

Digitise and get the data you need to help you navigate the future.



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https://maritimeimpulse.org

Join MERC

Want to help accelerate the industry's decarbonisation journey? Find out more.

Maritime EMISSIONS REDUCTION Coalition

https://www.merc.blue/

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