TRANSPORT & ENVIRONMENT

ZERO EMISSION SHIPPING

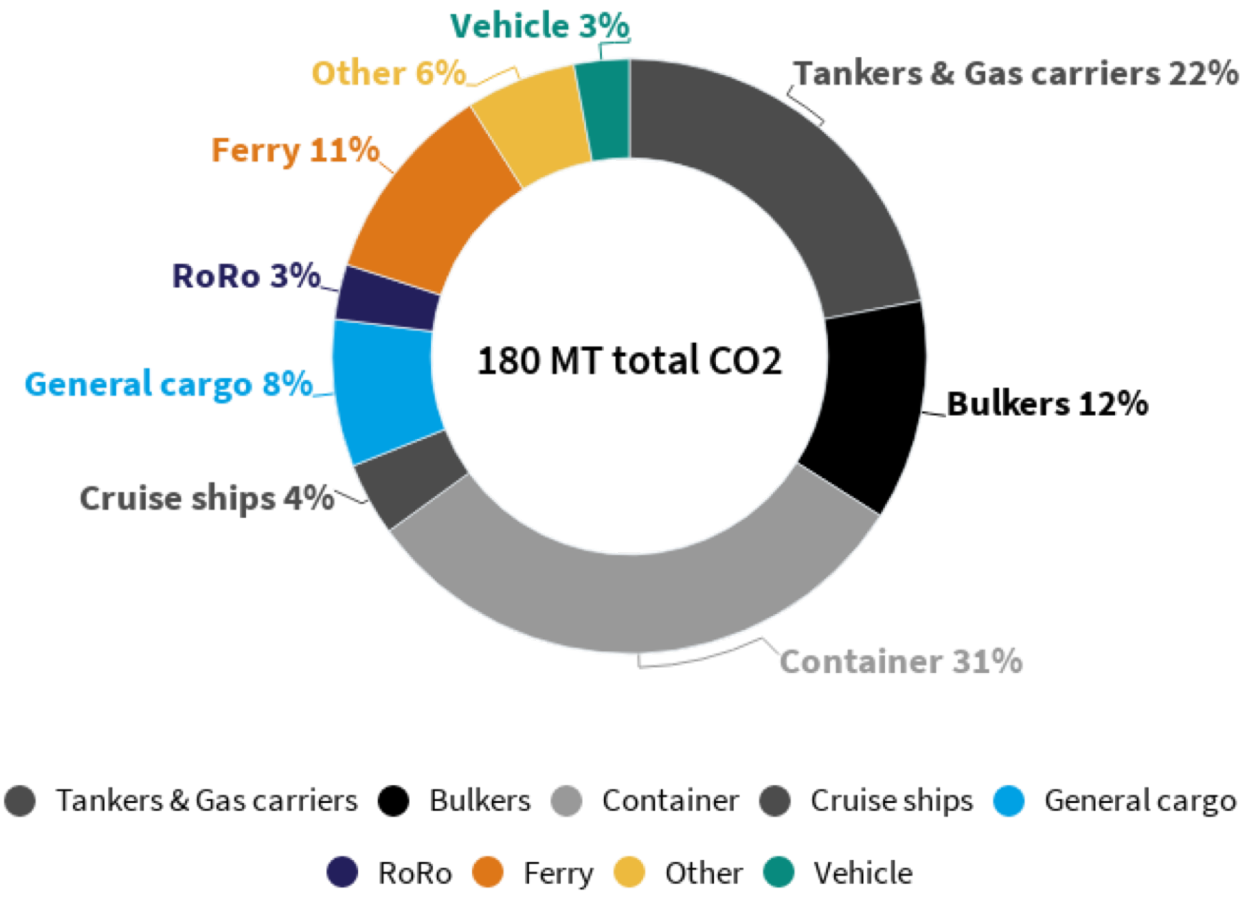
Role of Bottom-up actions

2018 | COP24 Katowice

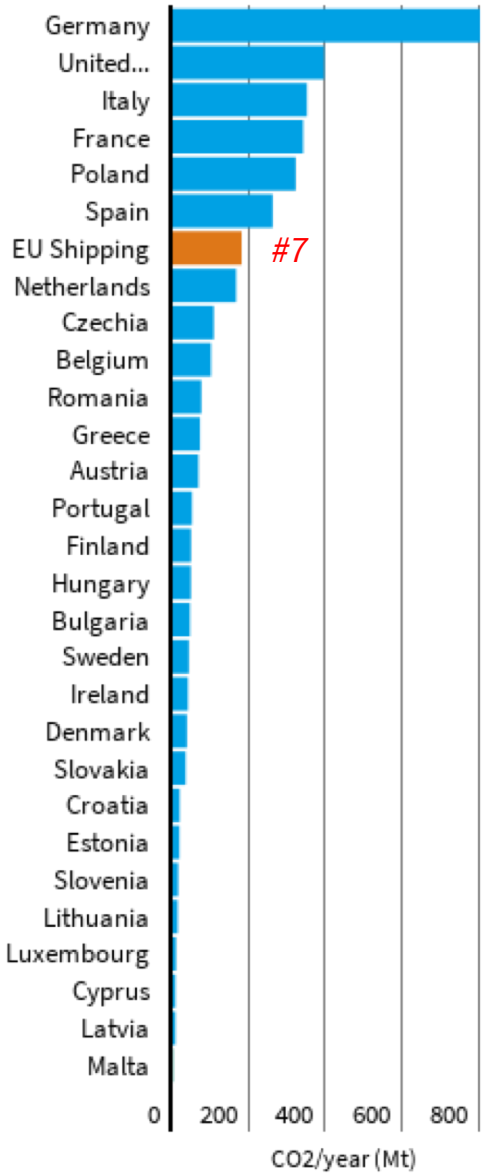
Faig G. Abbasov

How big a problem?

EU shipping CO_2



EU CO_2



Source: Ricardo-AEA, 2013 for the EU MRV impact assessment scope; Eurostat, 2018

Myth: Cars are main culprit. Shipping is part of the solution.

TRANSPARENCY & DATA

Journey:
Calais-Dover

Ship:
PoB (~1420 pax, 530 cars)

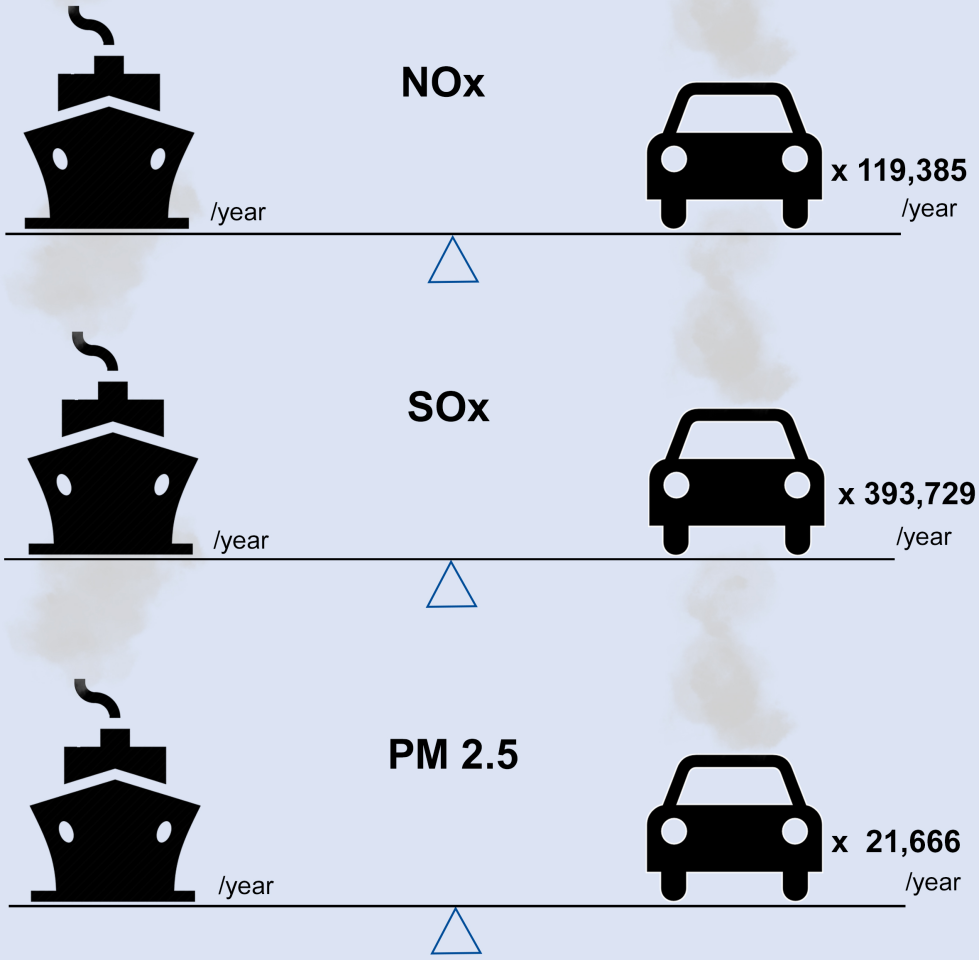
Distance:
21 n-miles

Operational profile:
209 days/year, 6 journeys/day

Fuel:
MGO, 1000ppm S
Road diesel, 10ppm S

Air pollution: a single ferry between Calais-Dover

MS Pride of Burgundy



Source: T&E analysis based on real ship technical specifications

Current IMO process

Targets

- Reduction of carbon intensity by **at least 40% by 2030** compared to 2008
- Reduction of carbon intensity by **at least 70% by 2050** compared to 2008
- Reduction of absolute emissions by **at least 50% by 2050** compared to 2008 while **aiming for full decarbonisation** in line with Paris Agreement

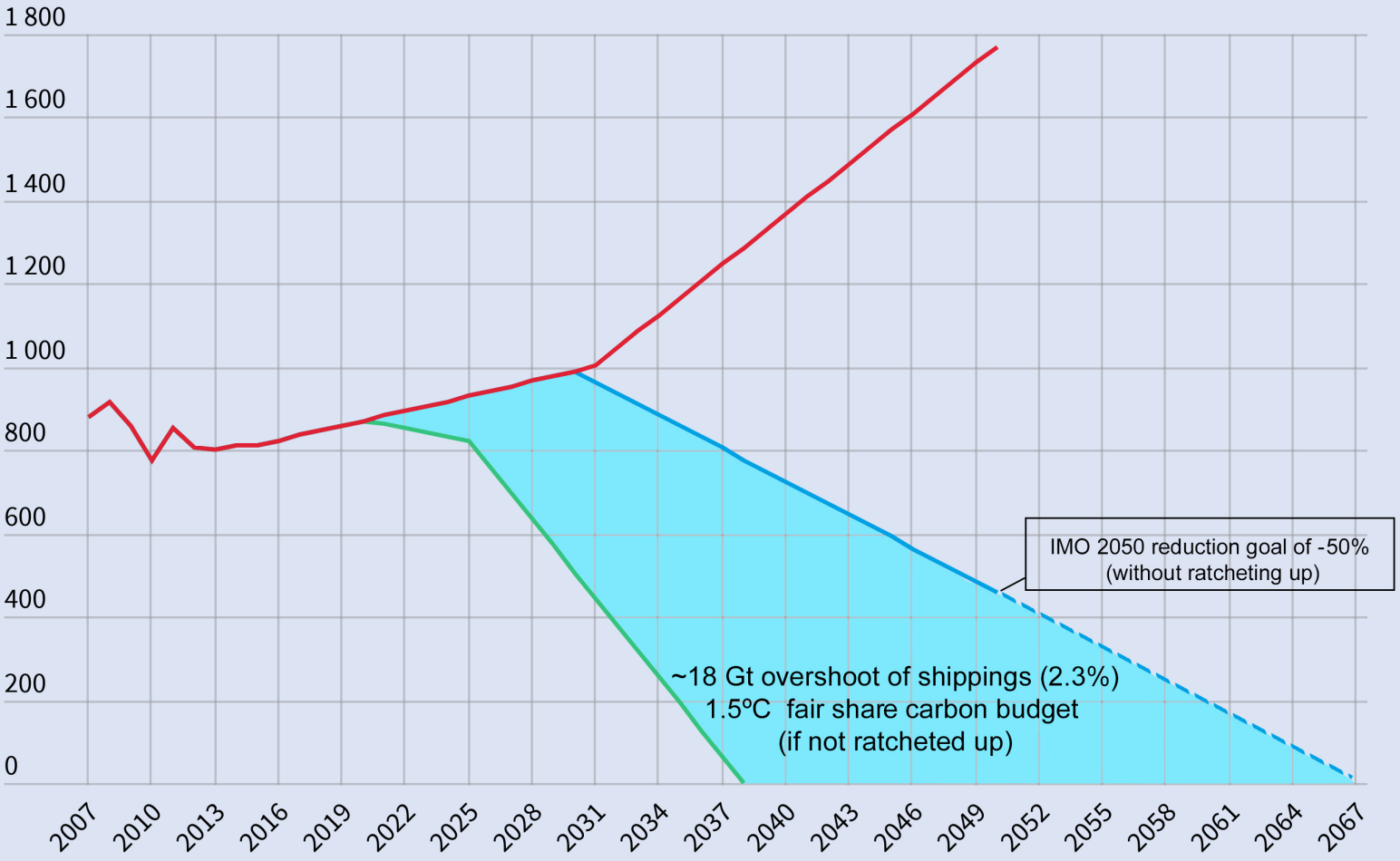
Short-term measures

- Design efficiency (EEDI)
- Operational efficiency (slow steaming, operational efficiency, etc.)

Mid/Long-term measures

- Carbon pricing/MBMs

IMO 2050 target vs. 1.5°C compatible trajectory



Source: 3rd IMO GHG Study (2014), UMAS (2016), CE Delft (2017), ICCT (2017)

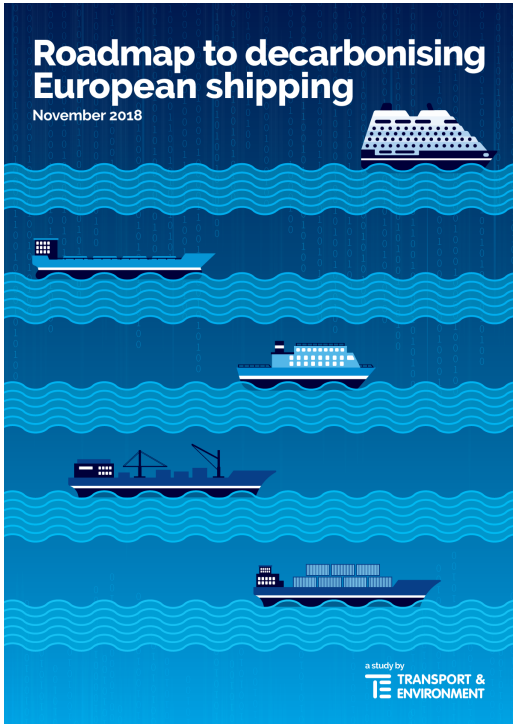
1. **Climate & industry policy disconnect:** *Global measures, local investment*

2. **Think globally, act locally**: *role bottom-up measures*

Climate & industry policy disconnect

How much renewable energy?

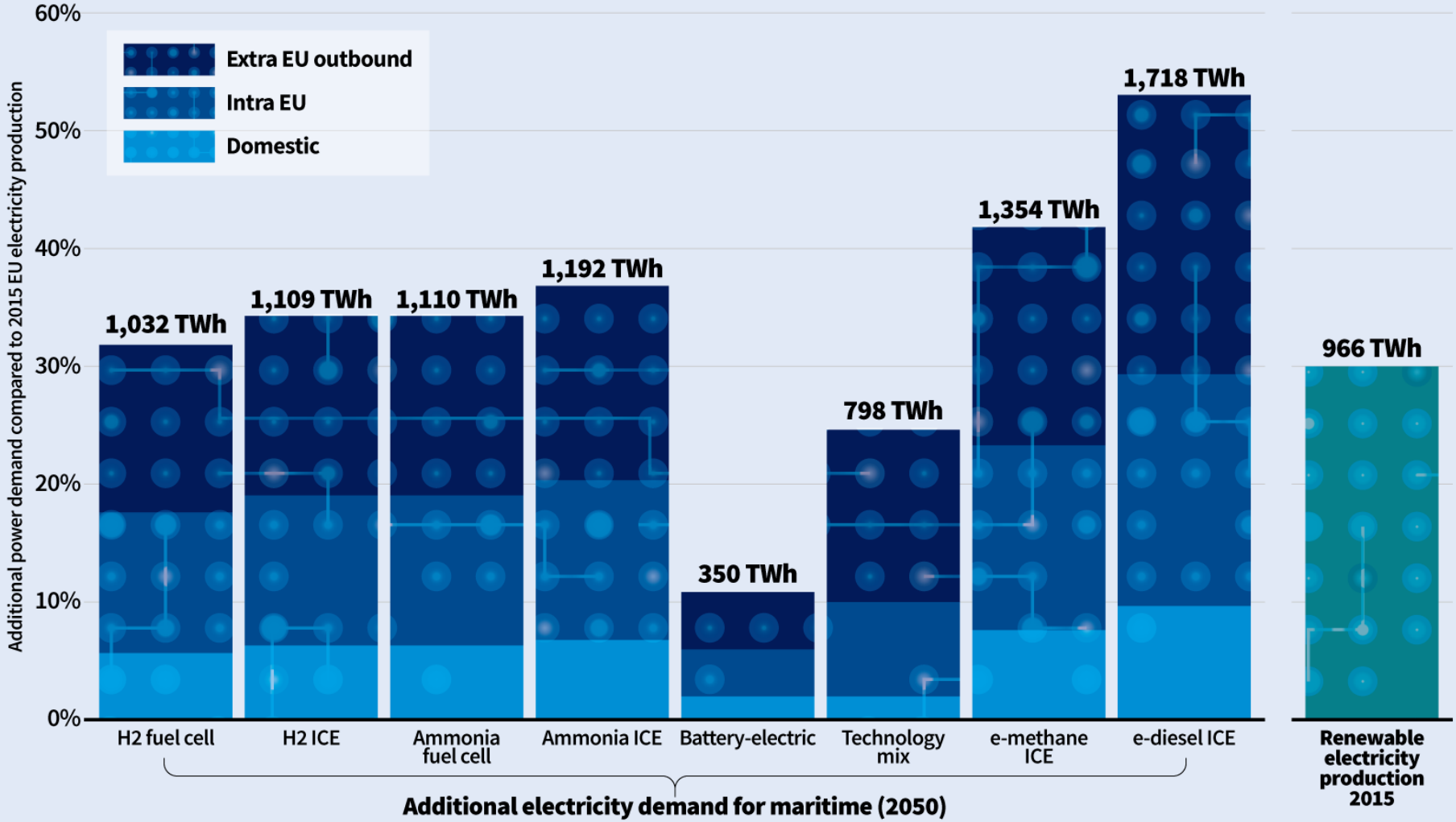
Global measures, local investment



Technology pathways analysed

Technology	Propulsion	Energy storage
Battery ships	Electric motor	Batteries
Hydrogen fuel-cells	Electric motor	Liquid H_2
Hydrogen ICE	Internal combustion engine (ICE)	Liquid H_2
Ammonia fuel-cells	Electric motor	Liquid ammonia
Ammonia ICE	ICE	Liquid ammonia
Electro-methane	ICE	Synthetic methane from electricity
Electro-diesel ICE	ICE	Synthetic diesel from electricity
Technology mix	Battery-electric, H2 fuel cell & Ammonia fuel cell	

Shipping's additional electricity demand under different technology pathways in 2050



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Source: Transport & Environment (2018)

How much renewable energy?

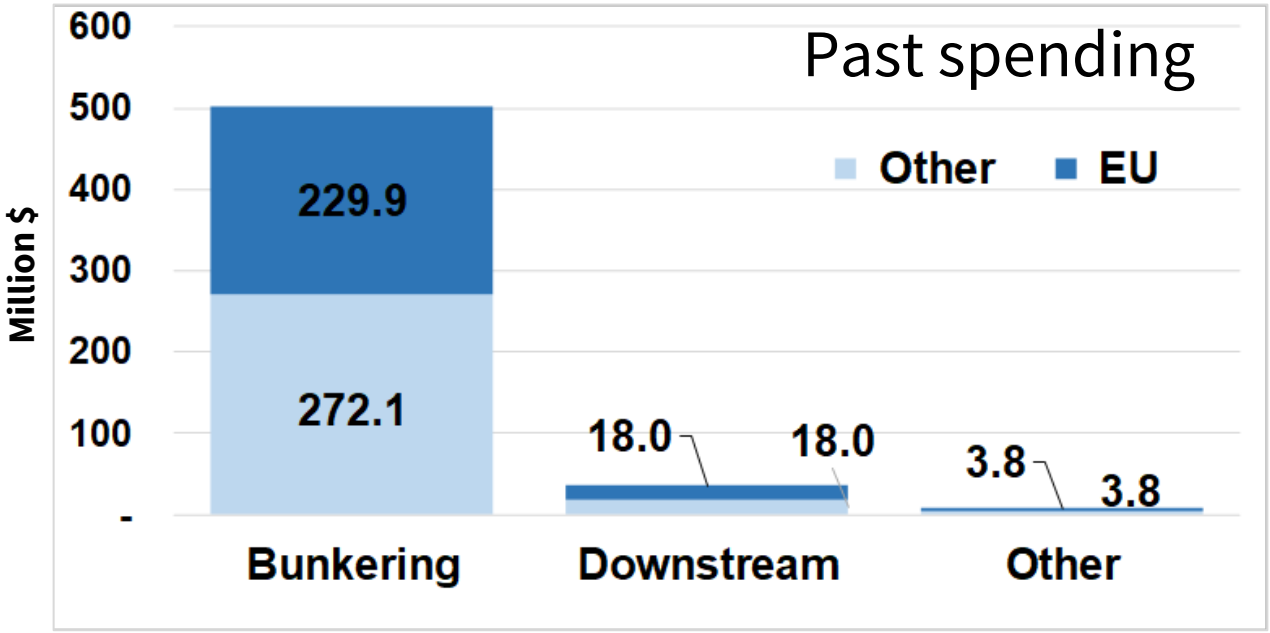
+11-53%

Additional renewable electricity over total 2015 electricity production

+11%	Battery-electric	*difficult*
+25%	**Tech. mix: battery, liquid H2 & NH3**	***more likely***
+32-34%	H_2 (FC & ICE)	*possible*
+34-37%	Ammonia (FC & ICE)	*possible*
+42%	Synthetic methane	*dangerous*
+53%	Synthetic diesel	*dangerous*

Disconnect?

European LNG subsidies



Funding:	"BAU"	"High Gas"	"Transition"	"Limited Gas"
Private funding:	4,296	11,055	2,002	957
EU-2050:	4,763	9,992	2,486	1,028
EU-2025/30:	1,525	1,158	1,036	952
Total:	**10,584**	**22,205**	**5,524**	**2,937**

Source: Domagoj et al., UMAS, 2018

EU Mandate on Port LNG infrastructure

DIRECTIVES

DIRECTIVE 2014/94/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 22 October 2014

on the deployment of alternative fuels infrastructure

(Text with EEA relevance)

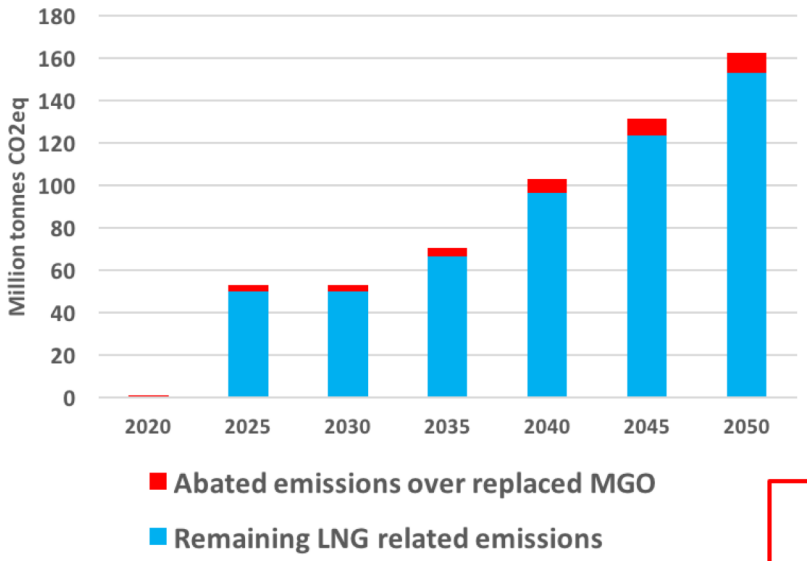
Article 6

Natural gas supply for transport

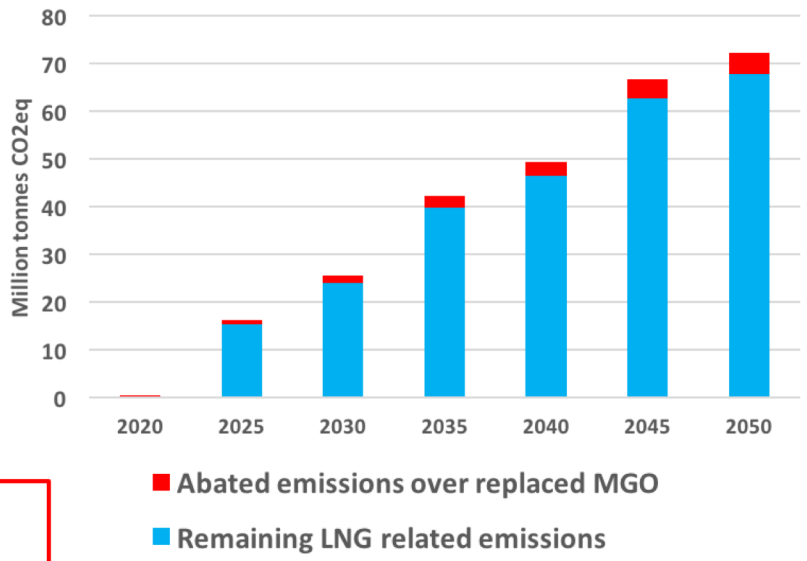
1. Member States shall ensure, by means of their national policy frameworks, that an appropriate number of refuelling points for LNG are put in place at maritime ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network by 31 December 2025. Member States shall cooperate with neighbouring Member States where necessary to ensure adequate coverage of the TEN-T Core Network.

2. Member States shall ensure, by means of their national policy frameworks, that an appropriate number of refuelling points for LNG are put in place at inland ports, to enable LNG inland waterway vessels or seagoing ships to circulate throughout the TEN-T Core Network by 31 December 2030. Member States shall cooperate with neighbouring Member States where necessary to ensure adequate coverage of the TEN-T Core Network.

Business as usual

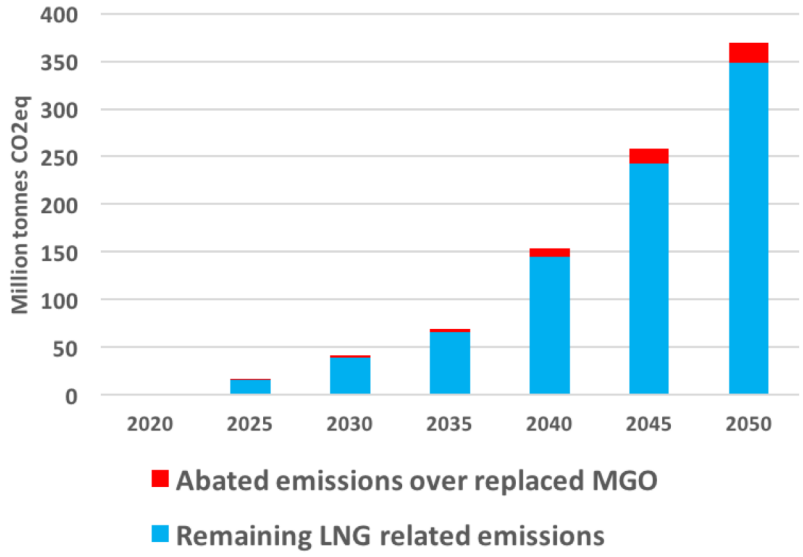


Transition scenario

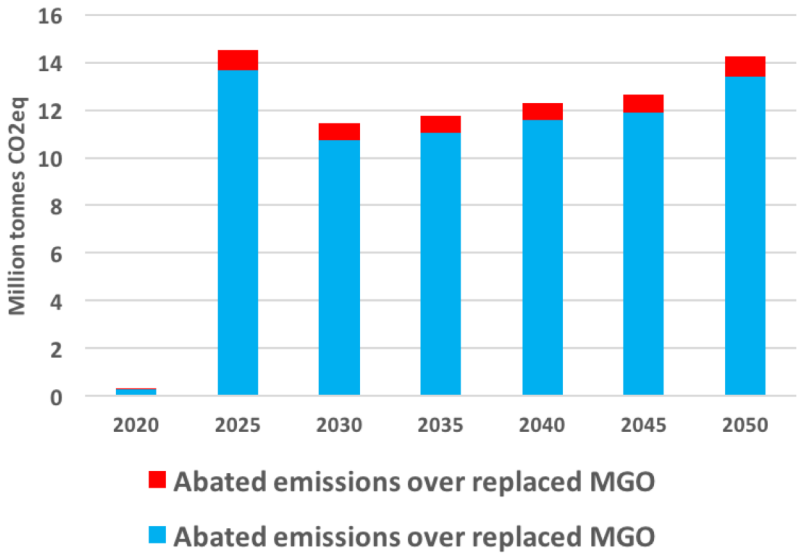


-6% GHG savings compared to replaced MGO

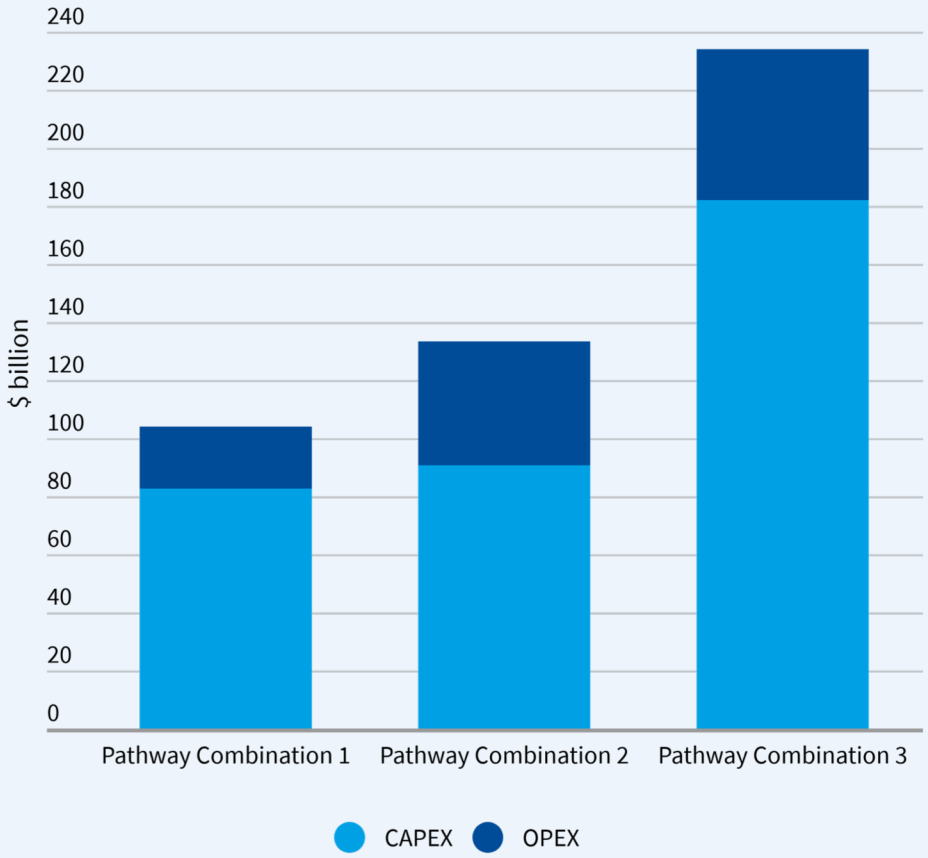
High LNG scenario



Limited LNG scenario



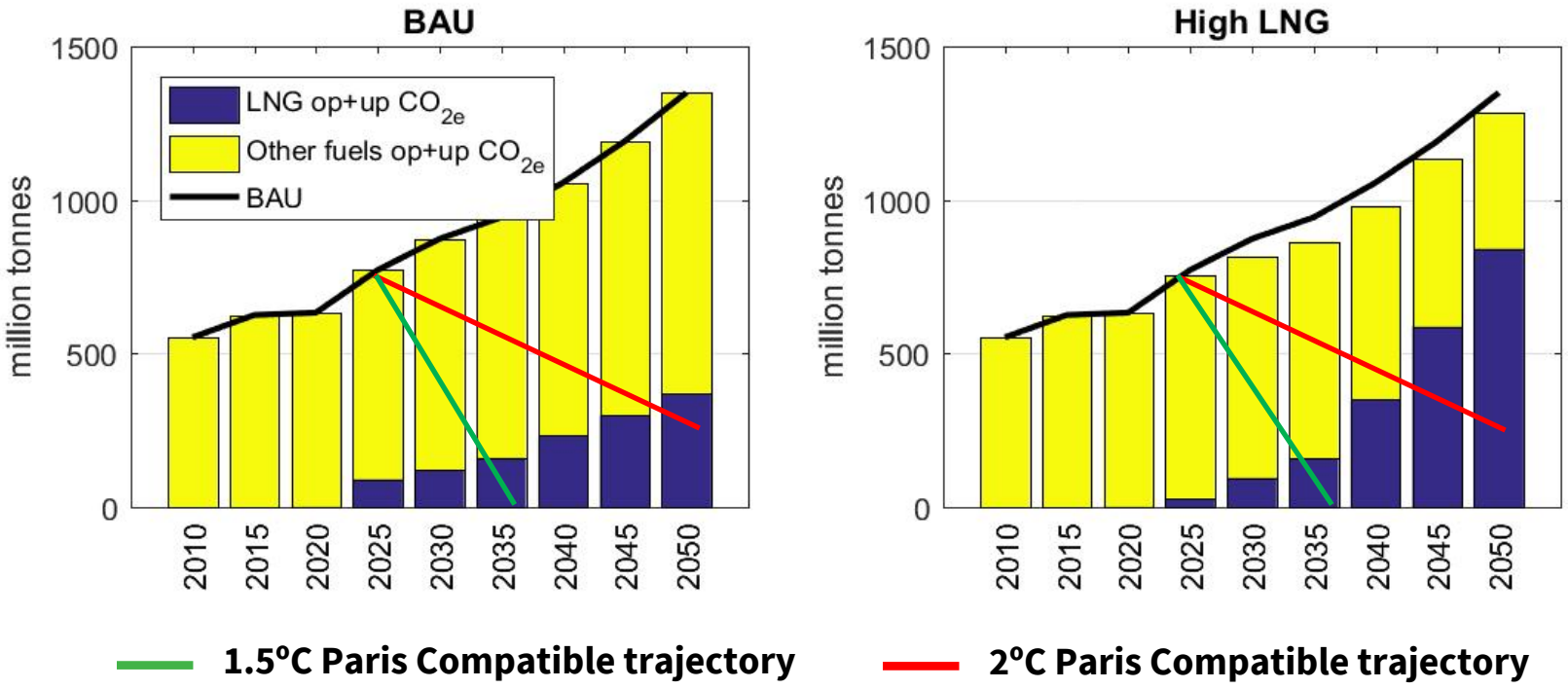
Ship LNG bunkering infrastructure costs



	Combination 1	Combination 2	Combination 3
Direct bunkering	10%	5%	27%
LNG feeder vessel	80%	45%	27%
LNG storage tanks	5%	45%	27%
LNG barge	5%	5%	20%

Source: forthcoming research UCL/UMAS (2018)
Note: estimations assume 3-61% market share increase of LNG from 2025 to 2050

GHG benefits of LNG vs. BAU



- Shifting 60% of global fleet to LNG will deliver only **4.6%** GHG reduction from ships on well-to-wheel (well-to-wake) basis compared to business-as-usual (BAU).
- Cumulative emissions (well-to-wake) from 2010-2050
  - **BAU - 35.22 billion tonnes**
  - **High LNG scenario - 33.61 billion tonnes**

Source: Forthcoming research, UCL/UMAS (2018)

Think globally, act locally

What role for bottom-up measures?

How to bridge global ambition gap?

How do get to ZEVs fast?

Local/Regional measures

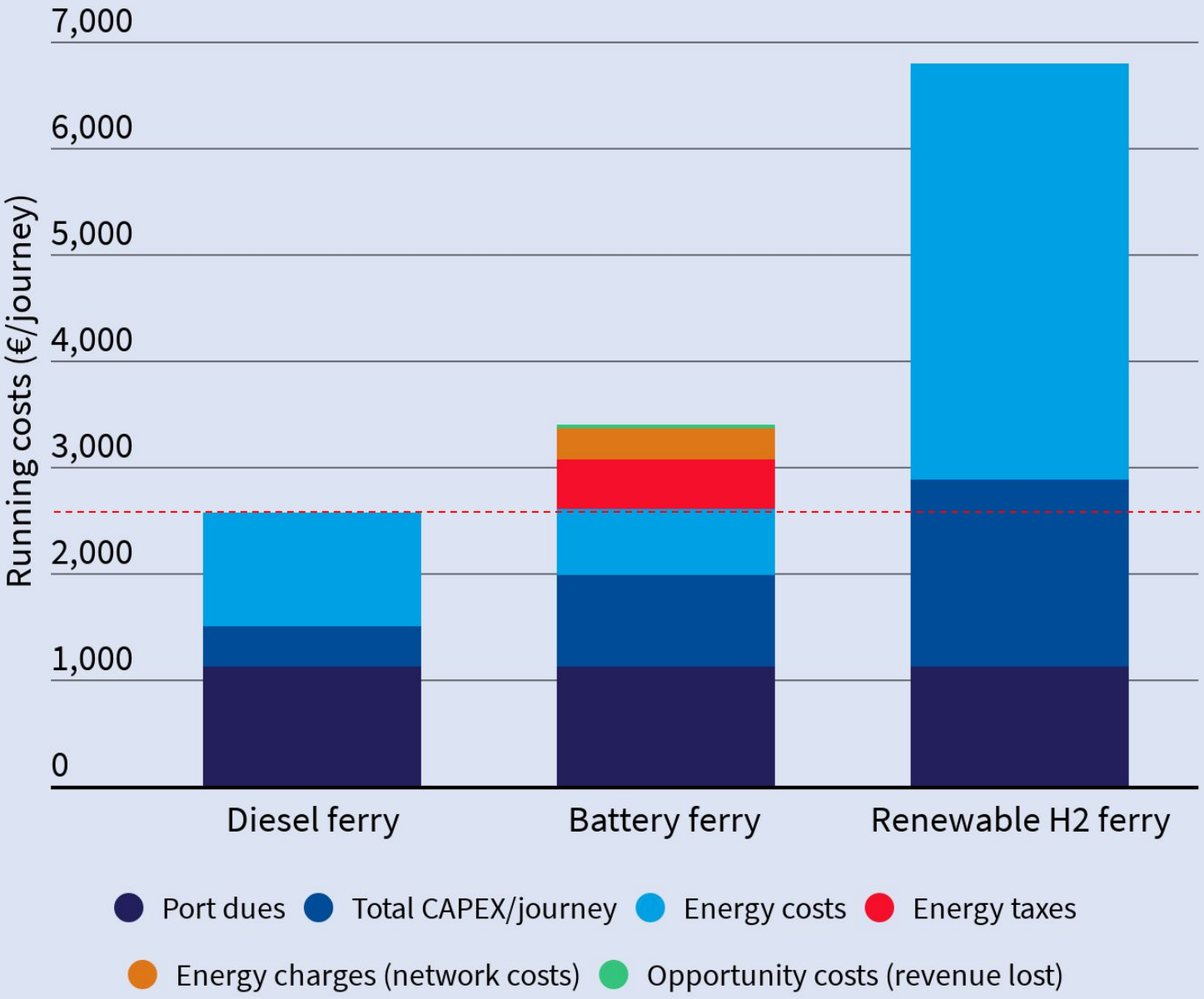
Beyond IMO scope

- ❑ Taxes on shore-side electricity
- ❑ Green port discounts
- ❑ Routes with public service obligations (PSO)
- ❑ ZEVs/infrastructure subsidies/co-financing

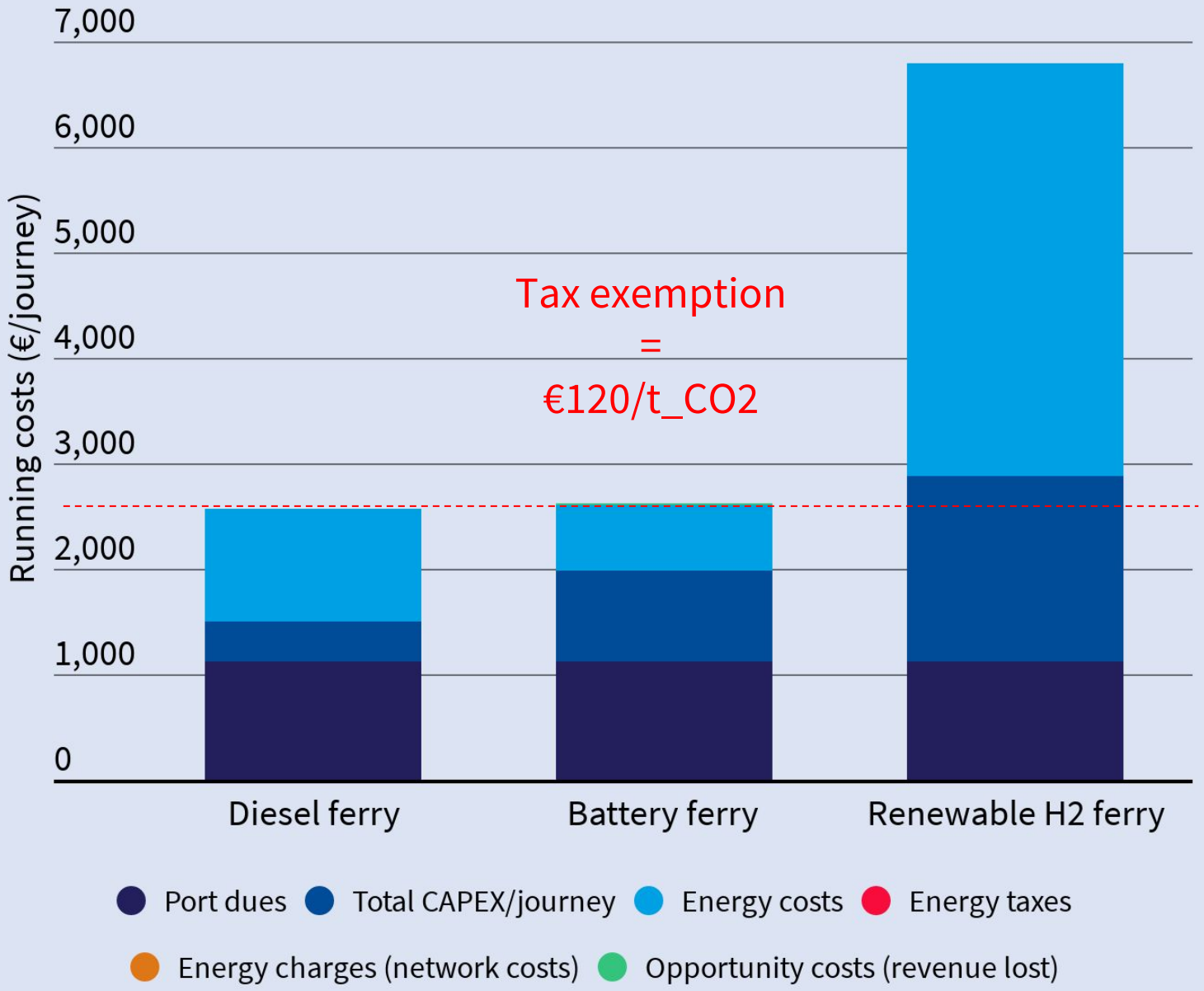
Complementary to IMO scope

- ❑ Green lanes
- ❑ ZEV mandates – CO2 emission control areas
- ❑ Tighter air pollution standards
- ❑ Maritime Climate Fund

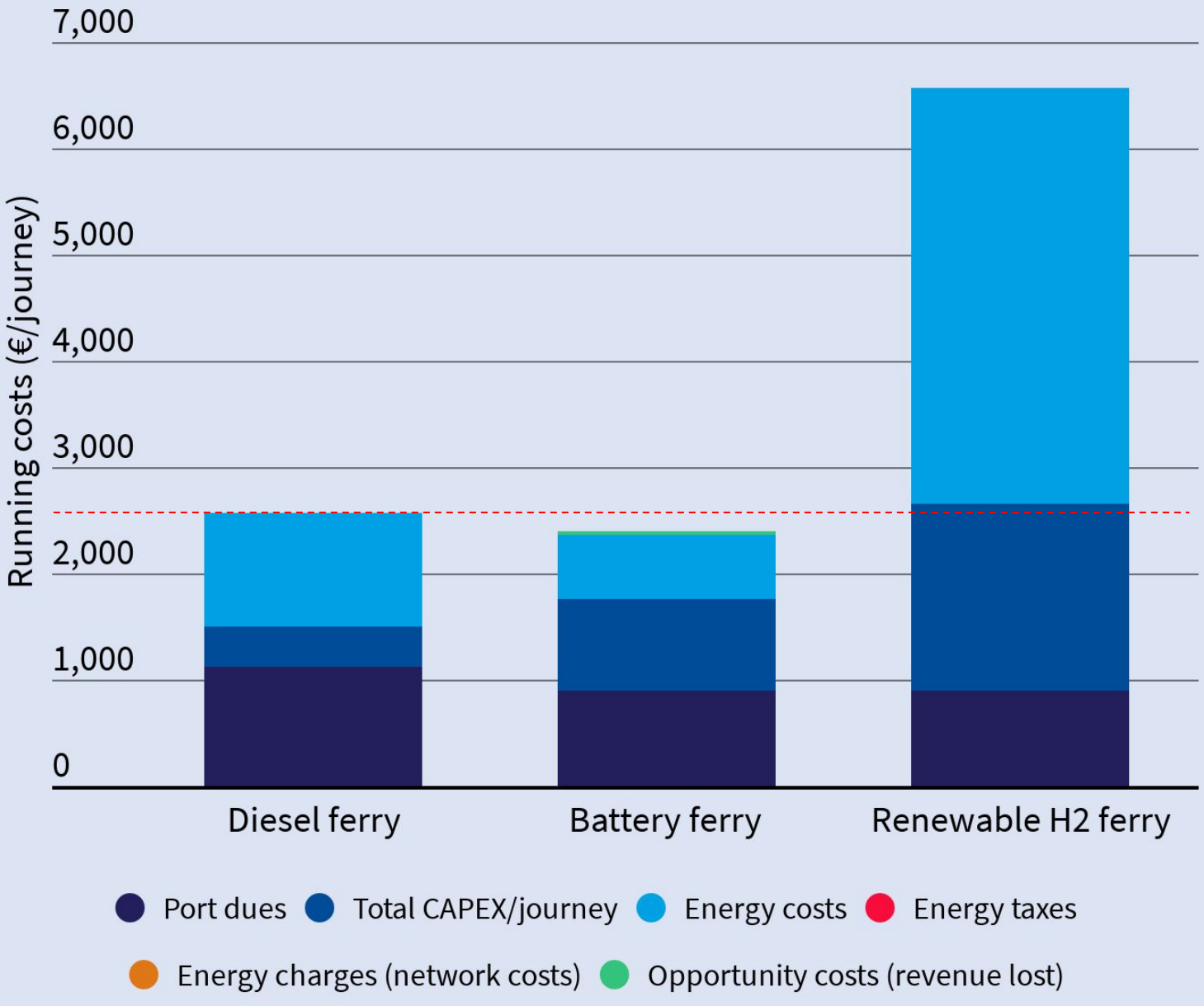
Zero Emission Channel Ferry (today)



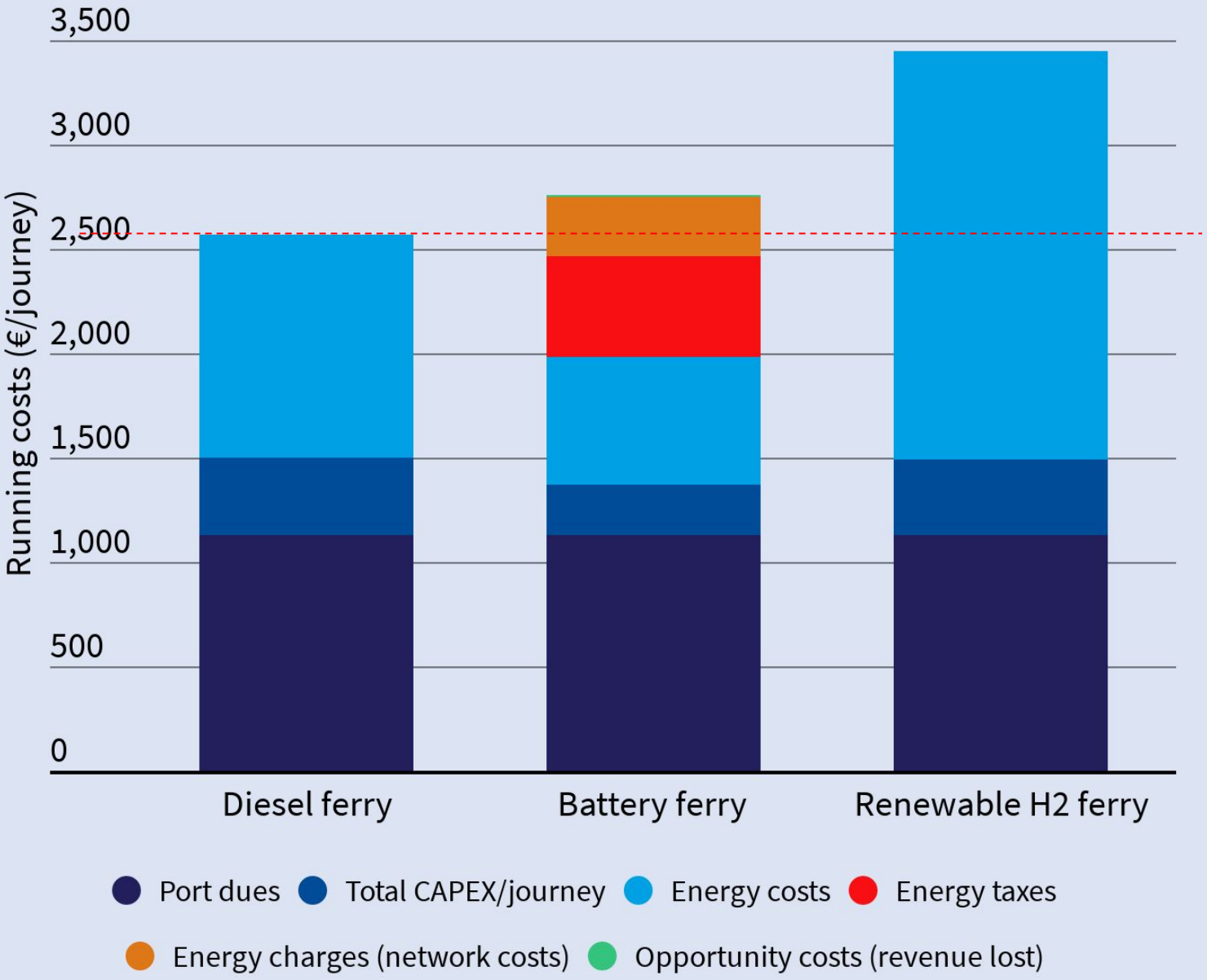
Zero Emission Channel Ferry (policy: tax)



Zero Emission Channel Ferry (policy: tax, port discount)



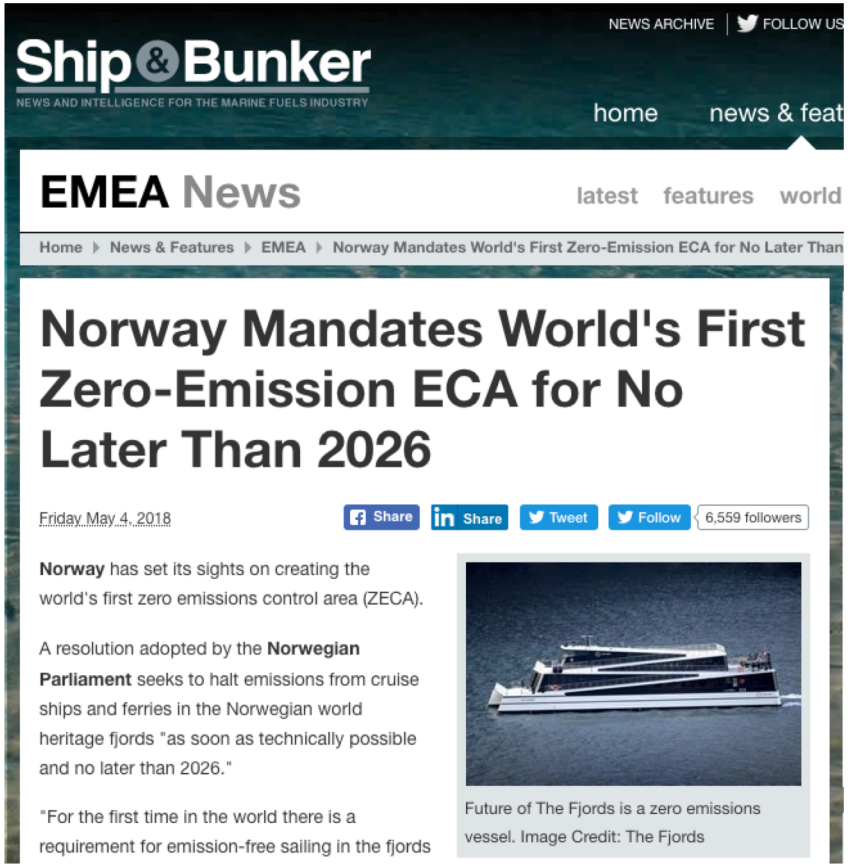
Zero Emission Channel Ferry (future technology)



Key takeaway

- Align PA temp goals with domestic industrial policies
- Stop wasting taxpayers money on LNG
- Allocate available sustainable biofuels to aviation (more difficult sector than shipping)
- Invest in battery/hydrogen production and shore-side charging/hydrogen bunkering infrastructure
- Implement bottom-up measures: tax optimisation for OPS, green port discounts for ZEVs

[EXTRAs] – Mandate ZEVs



Ship & Bunker

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Norway Mandates World's First Zero-Emission ECA for No Later Than 2026

Friday May 4, 2018

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Norway has set its sights on creating the world's first zero emissions control area (ZECA).

A resolution adopted by the **Norwegian Parliament** seeks to halt emissions from cruise ships and ferries in the Norwegian world heritage fjords "as soon as technically possible and no later than 2026."

"For the first time in the world there is a requirement for emission-free sailing in the fjords

Future of The Fjords is a zero emissions vessel. Image Credit: The Fjords

- ❑ Green lanes *(bilateral ports?)*
- ❑ Zero-Emission ECAs *(national/regional?)*
- ❑ Routes under public service obligations (PSO) *(already subsidies why not green?)*
- ❑ Tighter air pollution standards *(berth & territorial waters/EEZ)*

[EXTRAs] – (Co-)Financing

Port of Bergen – Will build Europe's largest onshore power supply in Norway's largest cruise port

24/09/2018

"We are building a shore power facility that will supply three cruise vessels with power simultaneously. The aim is for the facility to be ready at the beginning of the cruise season in 2020. Furthermore, with the support of the municipality of Bergen, a more limited facility that will serve one cruise vessel at a time will be ready by 2019" as explained by the Port Director Johnny Breivik.

Applying for funding from Enova

A shore power facility that can supply three cruise vessels at the same time is estimated to cost around 120 million NOK. Port of Bergen is applying for funding for about 50 million NOK from Enova, a state owned grant scheme, as investment support. The remaining cost of the investment will be paid for by Port of Bergen and BKK. However over time the industry itself, the owners of the vessels that dock at Port of Bergen, will ultimately pay for the cost of establishing shore power.

- Strict climate criteria *(zero emission)*
- Lending, structured financing, guarantees, project bonds…*(EIB, EBRD, etc)*
- Partial/Full grants (HORIZON2020, INTERREG, etc.)
- EU Maritime Climate Fund

Merci!

TRANSPORT & ENVIRONMENT

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