



Decarbonization in ports and shipping

Trans Middle East Conference

January 25, 2023

As a leading strategy firm, we successfully operate in all major international markets with a strong footprint in the Middle East

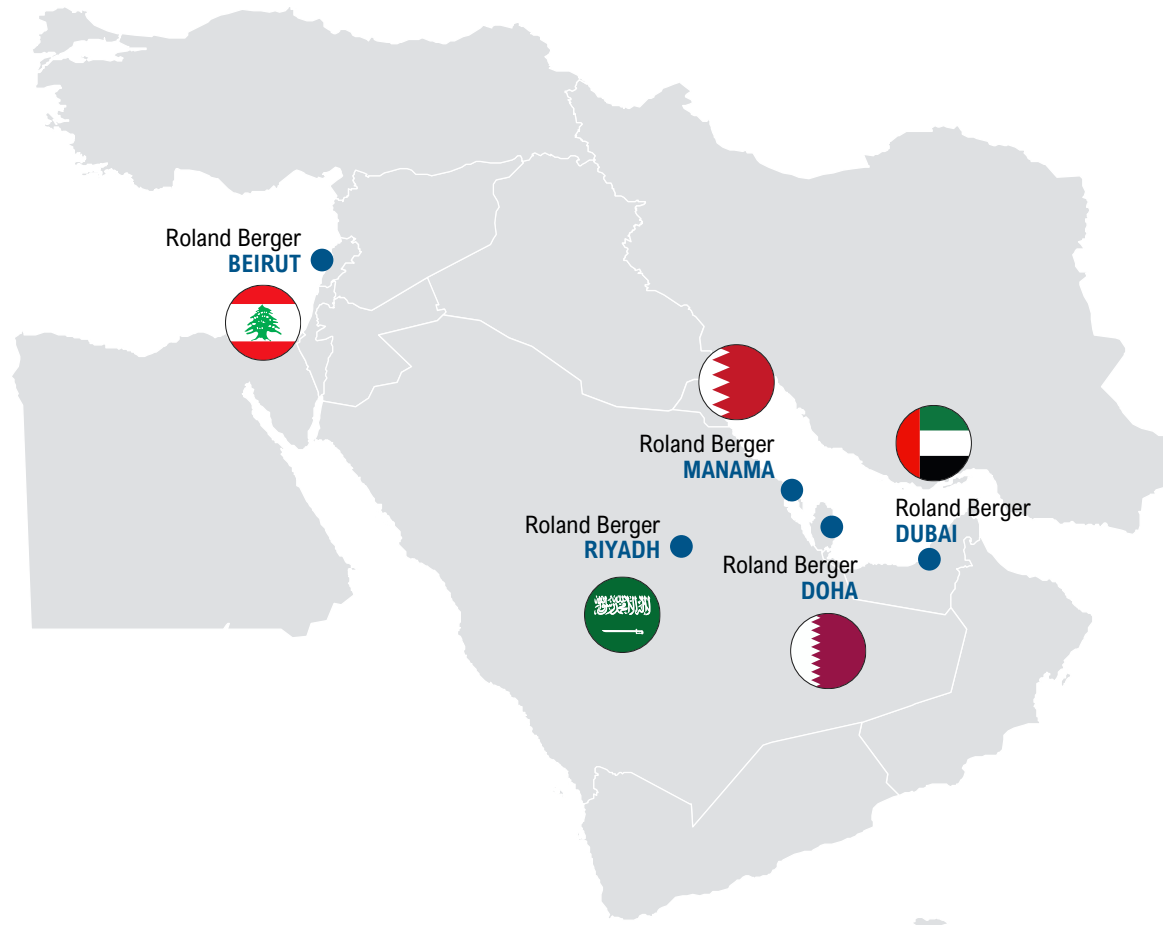
Roland Berger globally and in the Middle East

Founded in **1967** in Germany by Prof. Roland Berger

50+ offices in **35** countries, with approx. **3,000** employees

Over **300** partners with specific expertise organized in **8** global platforms

Serving over **1,000** international clients

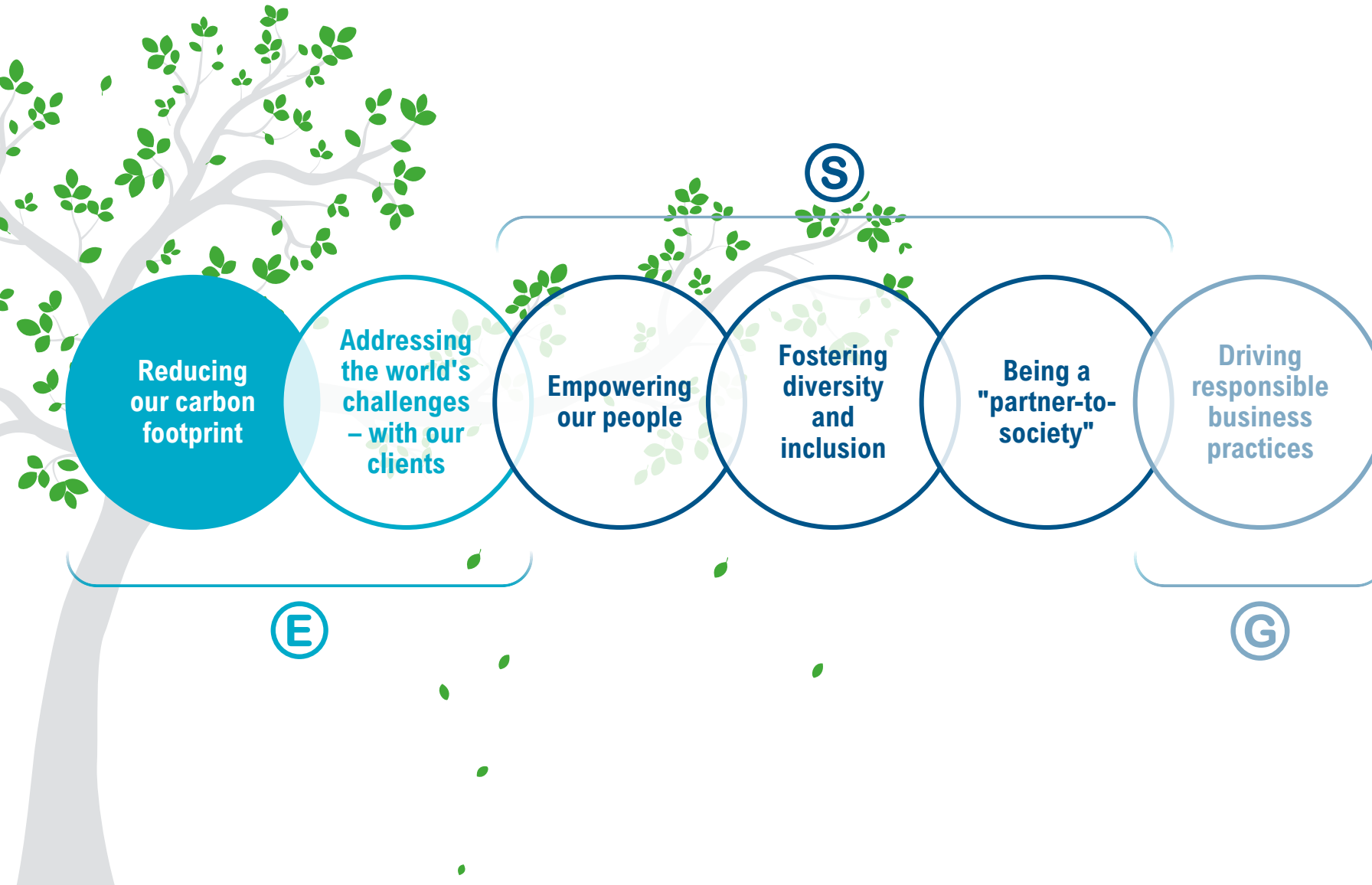


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We have set ourself the most ambitious climate action targets in the consulting industry



Our climate action ambition

Carbon neutral as of 2019

Net zero in 2028 – incl. reduction of emissions in line with Paris Agreement

Carbon negative – compensation of historical emissions

+ Roland Berger forest/solar

2028+

Carbon negative

As countries struggle to reach net-zero pathway, regulatory pressure is likely to be reinforced – Current business models are at risk

“

The EU plans to reduce GHG³⁾ emissions by at least 55% by 2030. This level of ambition for the next decade will put the EU on a balanced pathway to reaching climate neutrality by 2050.

– Ursula von der Leyen

We aim to have CO₂ emissions peak before 2030 and achieve carbon neutrality before 2060.

– Xi Jinping

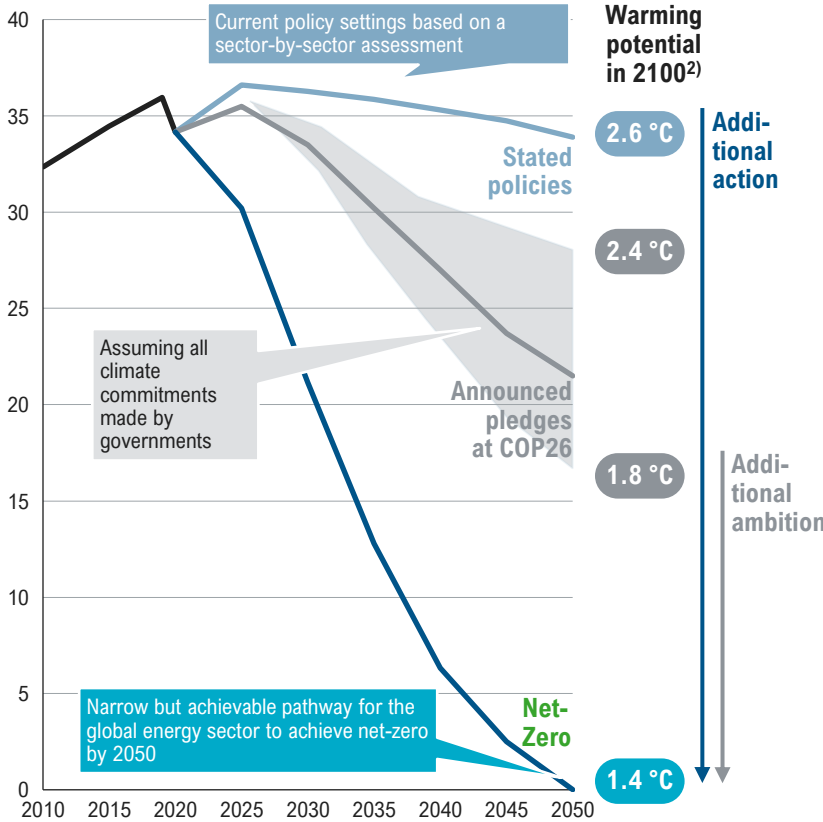
We target a reduction of 50-52% from 2005 levels in economy-wide net GHG³⁾ pollution in 2030 and having the country achieve net zero emissions no later than 2050.

– Joe Biden

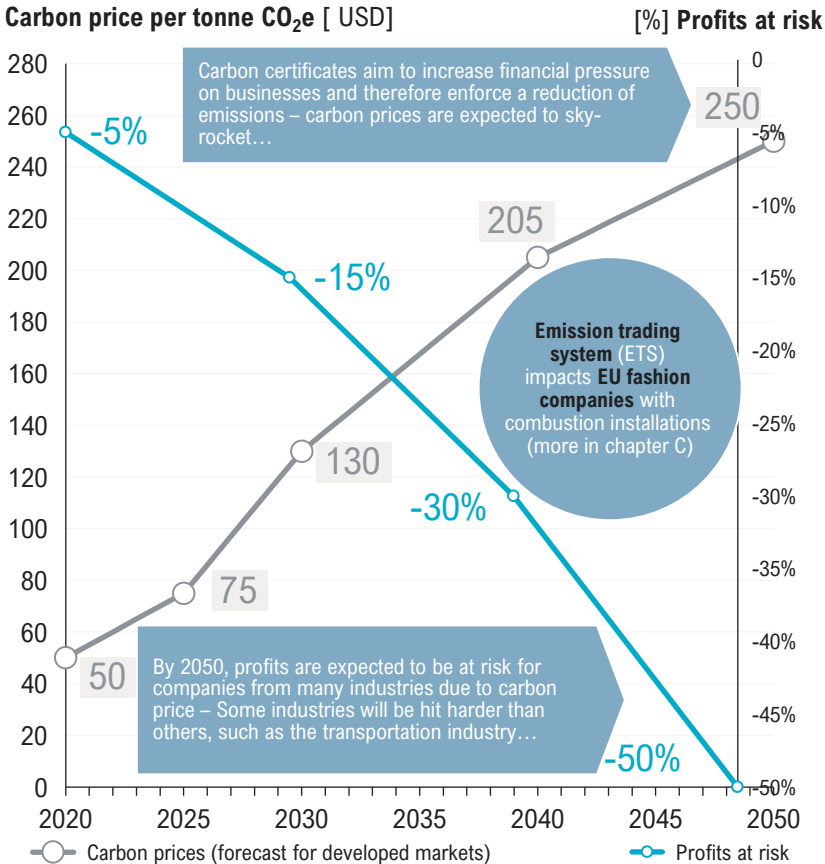
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Global GHG emissions trajectories and corresponding global warming [Gt CO₂e]



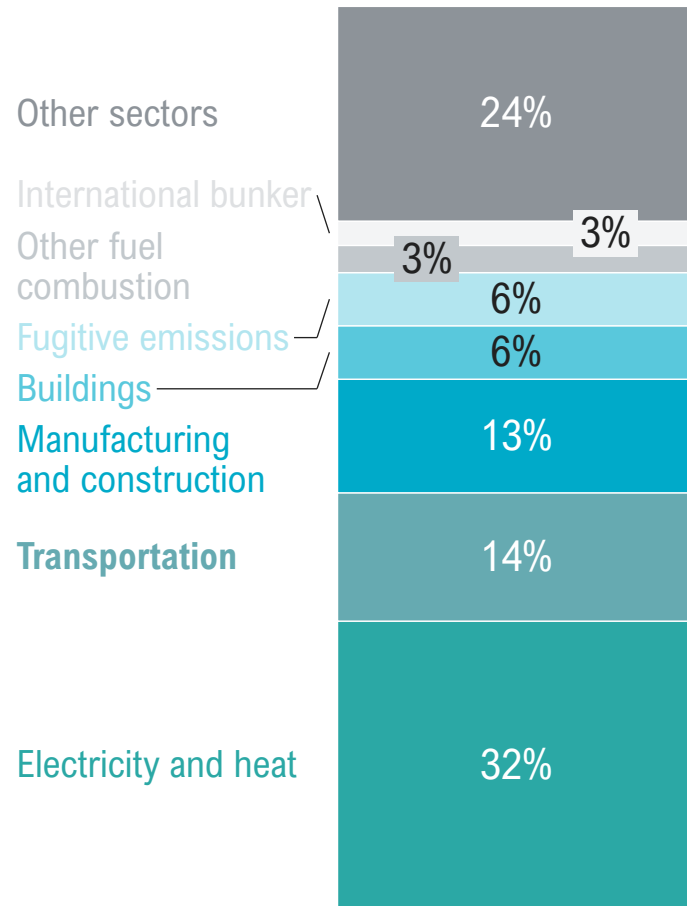
Politicians are planning to enforce emission reductions, bringing businesses and their profits into troubles



1) Total CO₂ includes carbon dioxide emissions from the combustion of fossil fuels and non-renewable wastes, from industrial and fuel transformation processes (process emissions) as well as CO₂ removals; 2) Temperature increases displayed reflect the 50% confidence level, IEA = International Energy Agency, Announced pledges scenario is updated to reflect pledges made until 3rd November 2021; 3) Greenhouse gas

Thus, decarbonization becomes a necessity for companies that want to flourish – Energy decarbonization is in focus now

World Greenhouse Gas Emissions - Overview



E
N
E
R
G
Y



~76%

of world **GHG emissions** come from **energy generation and consumption** sectors



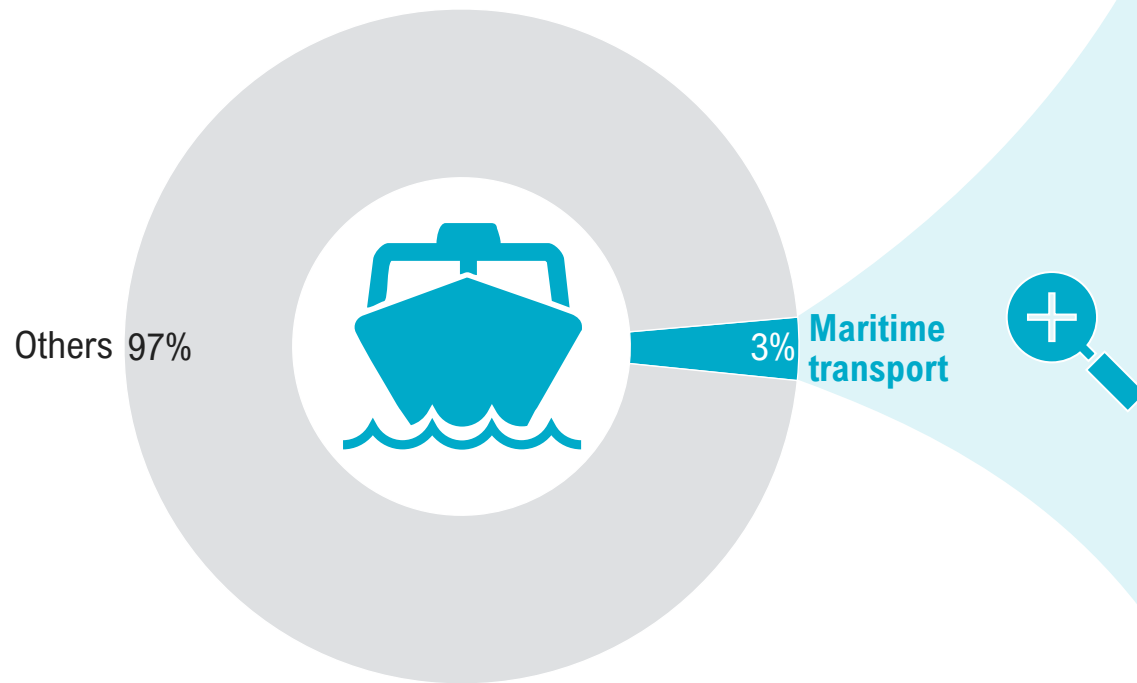
Key activities/end-uses

- Residential buildings
- Commercial buildings
- Fuel combustion
- Mineral resources
- **Transportation**
- Chemicals

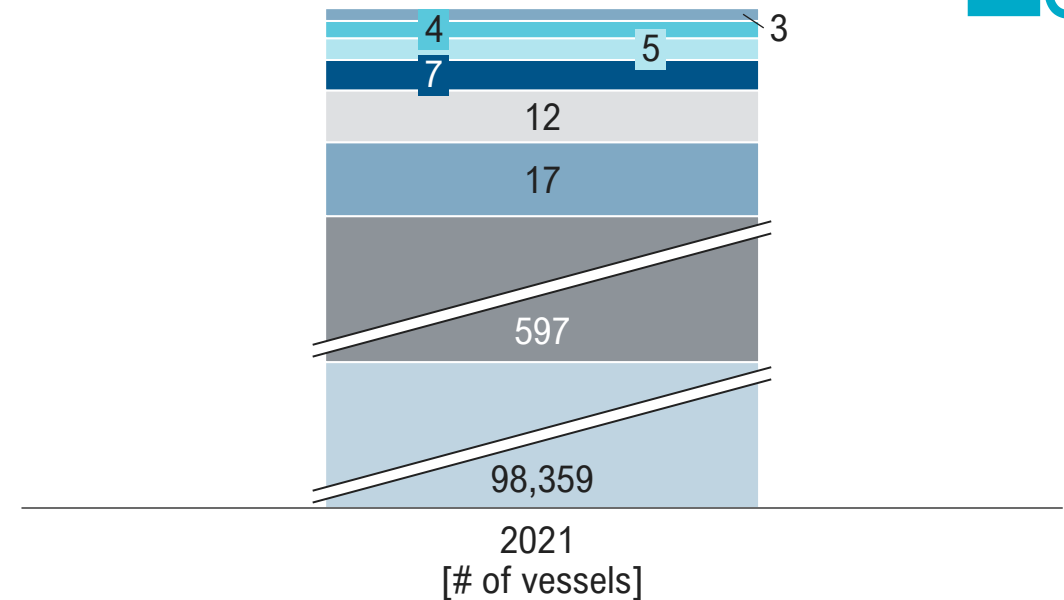
The global maritime industry today accounts for ~3% of GHG emissions, with 99% of vessels leveraging conventional fuel types

GHG emissions from shipping, 2020

Global greenhouse gas emissions by sector



Type of fuel [# of vessels]



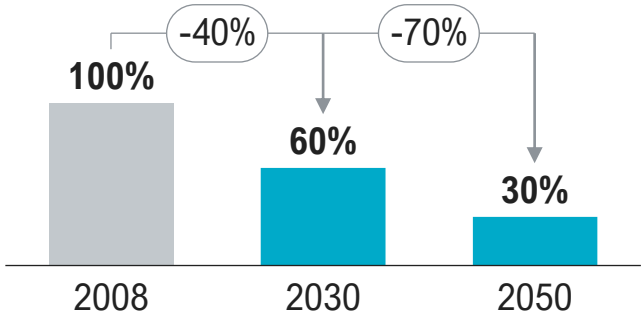
■ Conventional
 ■ LNG
 ■ Biofuel
 ■ Methanol
 ■ Nuclear
 ■ Ethane
 ■ LPG
 ■ Other

In the maritime industry, a combination of more stringent regulation and end-consumer demand for lower emissions is driving the need to decarbonize

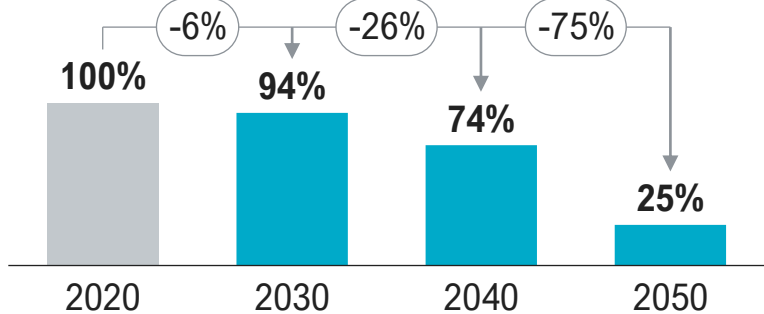
Drivers for decarbonization in maritime

 **Regulatory push for increasing decarbonization in shipping, incl. reduction targets**

 **IMO carbon intensity targets for shipping** [in %, compared to 2008]



 **EU GHG emission reduction targets for shipping, FuelEU Maritime** [in %, compared to 2020]



 **Also, demand for "green" transport options to reduce scope 3 emissions and achieve targets**

P&G



Coca-Cola



PEPSICO



Nestlé



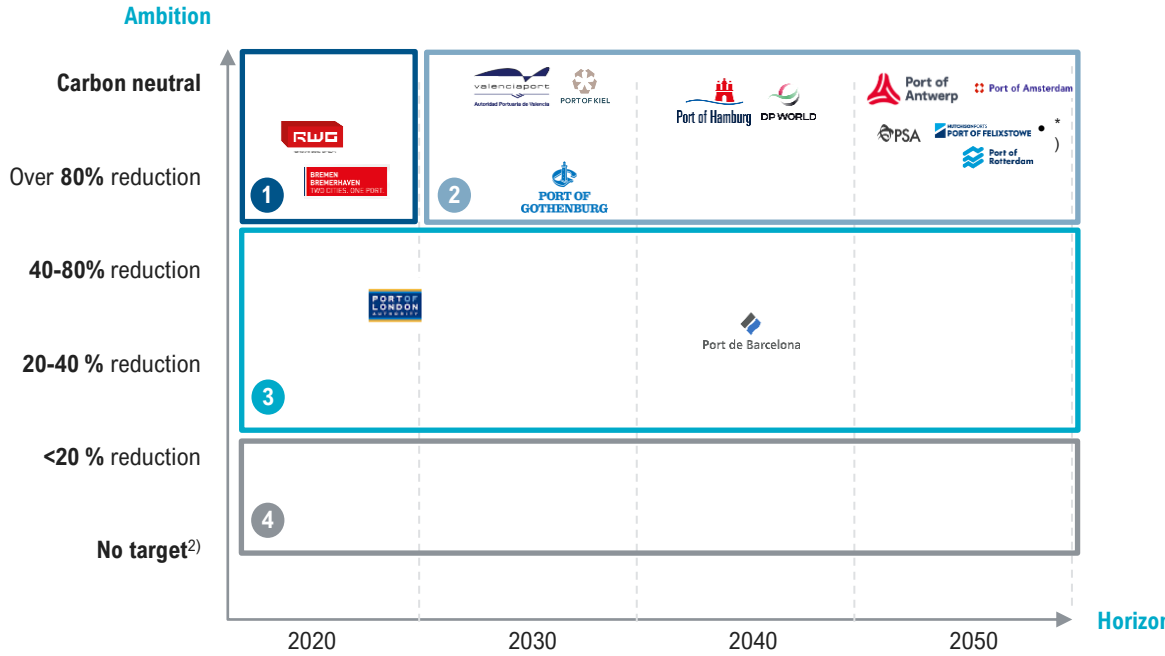
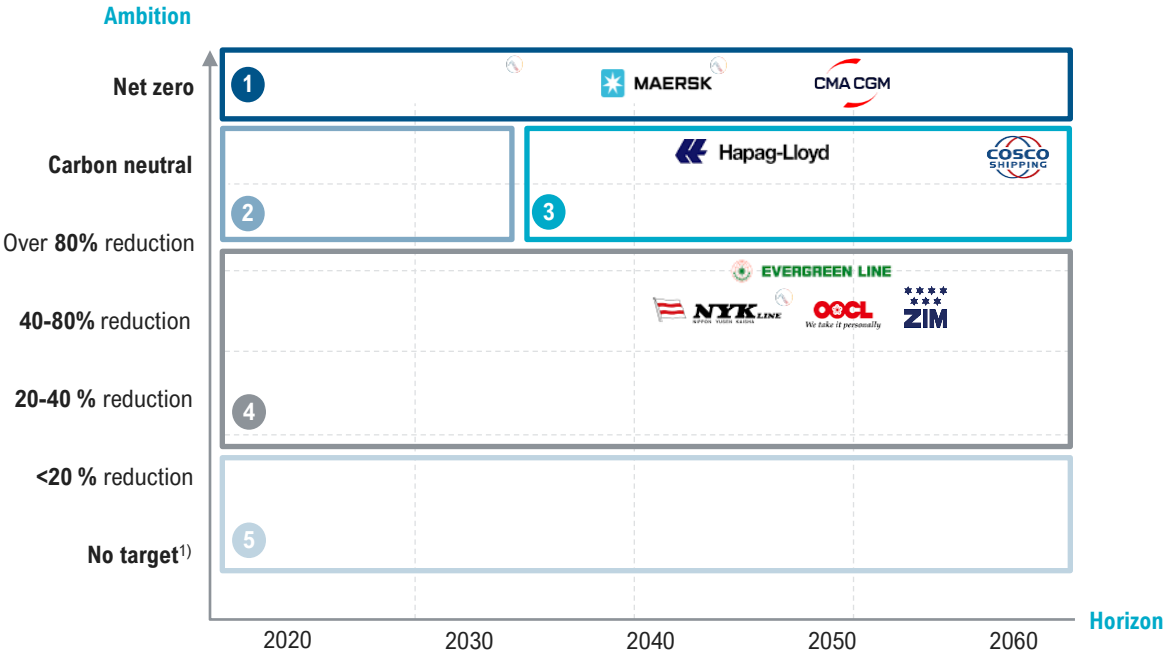
1) Reduction target refers to CO₂ emissions only

Decarbonization targets have been established across maritime logistics, with ports already achieving operational net zero status

Carbon reduction ambitions of shipping and ports players

In order for the shipping industry to deliver on planned reductions, **targets have been established for the post-2040 horizon**

Similarly, ports across the world have established individual carbon targets, albeit **ports are focusing on achieving targets sooner**



Source: Desk research, Company websites, Roland Berger

Shipping is a late adopter of decarbonization solutions – But the opportunities and pressure to move ahead have increased

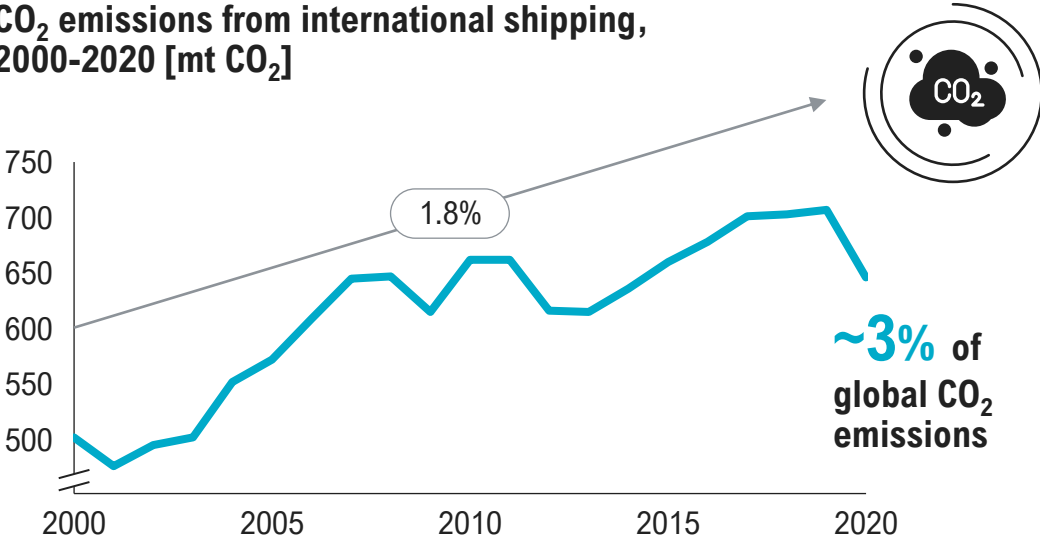
Global shipping emissions and context



Shipping has been a late decarbonization adopter of alternative fuels & new technologies due to ...

- Small historical margins
- Lower maturity of decarbonization options (e.g. vs road)
- Until recently, relatively limited regulatory, customer push

CO₂ emissions from international shipping, 2000-2020 [mt CO₂]



CAGR 2000-2019

Source: IEA, Market research, Roland Berger

... but faces intensifying pressure to decarbonize ...

- #### Increasingly stringent regulations

 - IMO and the EU enforcing concrete targets
 - Carbon pricing schemes with extending scope and rising price
- #### Growing customer requirements

 - Customers (both forwarders and BCOs) want to decarbonize their logistics operations
- #### Peers are offering green products

 - Most European shipping companies are offering a green product

... while new enablers emerge

- #### Favorable financials following a profitable COVID period

 - Record profits for many shipping companies in 2020/21
 - Fleet upgrades & acquisitions along the value chain envisaged
- #### Increased availability of alternative fuels




 - Introduction of bio-/e- variants for existing fuels (e.g., bio-LNG)
 - Early developments of zero-emission options (e.g., green H₂)
- #### Emergence of new technologies & increased efficiency

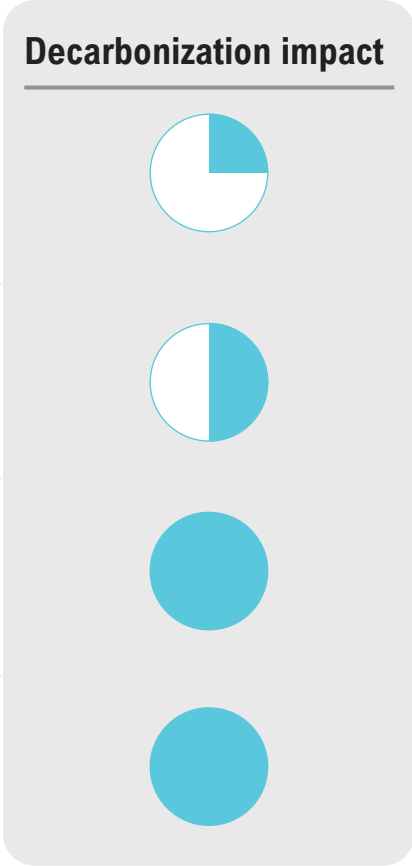
 - Engine technology improvements (e.g., waste heat recovery)
 - Power assistance and vessel design & alternative propulsion

Different applications for hydrogen, ranging from use in ports to serving as a bunkering hub, are available and need to be considered further









Hydrogen applications to consider

Possible hydrogen applications

H₂ use in port 	Port logistics Port equipment such as forklifts and trucks can be powered by H₂ or derived fuels (e.g., e-diesel)
	Electricity generation Electrical energy to power the port operations can be generated on site using H₂
H₂ use in shipping 	Bunkering Ports can develop infrastructure required to provide alternative bunker fuels such as ammonia and methanol
H₂ use in trade 	Import/Export Port serves as export (or import) hub , acting as a key gateway for the wider production value chain



Examples

Port of LA plans to use 7 machines powered by H₂ , incl. crane, unloading machines	 
Duisburg port to use H₂ fuel cells and engines for power generation in container terminal	 
MPA of Singapore initiated a pilot program to develop ammonia bunkering ecosystem	 
Plans for ammonia plant to be connected to Khalifa Port , to server as an export hub	 

● High decarbonization impact ○ Low decarbonization impact

Roland Berger brings the expertise and experience required to realize real impact for you – We make sustainability and climate action work in practice

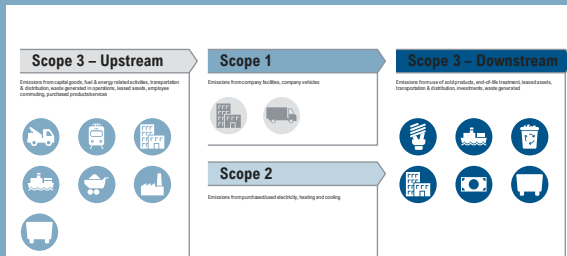
The Roland Berger sustainability and climate action (SCA) expertise and experience

We help to achieve real impact



With net zero in 2028, our RB targets are the most ambitious in the consulting industry

Functional expertise
We drive sustainability and climate action along the entire value chain



Proprietary tools and approaches
Operationalize sustainability with software solutions and concepts



Broad partner network
We engage our partner network selectively and as their deep expertise is needed



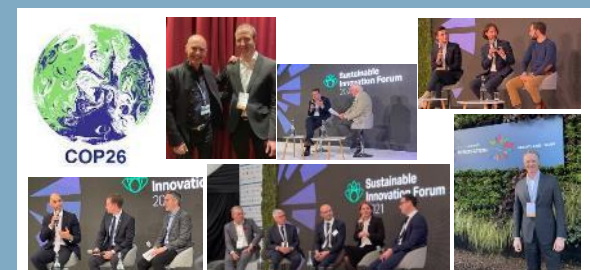
Sustainability across industries
We serve a wide range of industries globally



Thought leadership
We regularly publish thought leadership



Global dialogue
We engage in and drive the global dialogue



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