CX Collaborative Decarbonization in Transport and Logistics Systems

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REthinking and FOstering Competence and skills for sUstainable transport, Shipping, and logistics



# Shore Power Decarbonization Game

# Instructions

First define which player(s) will represent which of the roles below. Then, follow the instructions for each round (year till 2030).

# Role #1: Shipping Company Goal:

- Max. earnings
- 100% shore power port calls by 2030

### Role #2: Terminal/Grid Operator Goal:

- Max. earnings
- 100% shore power port calls by 2030

Role #3: EU Goal:

- Min. budget use
- 100% shore power port calls by 2030





Extra-EU voyage	2023	14 500
	2024	
	LOLI	32 500
NY - Antwerp - NY 17	2025	50 500
	2026	72 500
Intra-EU voyage	2023	12 000
, , , , , , , , , , , , , , , , , , , ,	2024	27 000
Le Havre - Riga- 700	<b>)</b> 2025	42 000
Amsterdam	2026	60 000



# Decarb Game: Roles and Objective (Years 2025-2029)

## **Role #1: Shipping Company** Goal:

- Max. earnings
- 100% shore power port calls by 2030

## Facts:

- 800 vessels
- Earnings 1 Billion per year
- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity add to the grid (in %)?

# Role #2: Terminal/Grid Operator

Goal:

- Max. earnings
- 100% shore power port calls by 2030

#### Facts:

- 200 berths •
- Earnings 800 million per year
- Cost for shore power onshore 4 Million per berth
- Microgrid expansion costs of 2,5 Billion

#### Decisions each year:

- How many berths (in %) to • equip with shore power?
- How much capacity add to the grid (in %)?

## Role #3: EU

Goal:

- Min. budget use
- 100% shore power port calls by 2030

- How many vessels and berths (in %) to subsidize with shore power?
- How high to set the interest rate for shore power projects (in %)?







Carbon cost of maritime emissions in the ETS Extra-EU voyage and intra-EU voyage example			
	Tonnes of CO <sub>2</sub> emitted	Year	Carbon cost in USD*
Extra-EU voyage		2023	14 500
	1700	2024	
NY - Antwerp - NY		2025	50 500
		2026	72 500
Intra-EU voyage		2023	
		2024	
Le Havre - Riga-	700	2025	
Amsterdam	,00	2026	60 000
"The CO <sub>2</sub> cost per tonne cargo is based on th spot European Emission Allowances ( EUR 7)	e last settlement price of the 2,90). 1 EUR = 1.12 USD.		
			Sig)ar



Role #1: Shipping Company Facts:

- 800 vessels
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- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity
  add to the grid (in %)?

Updated Earnings = earnings – (invests - EU subsidies)

# Role #2: Terminal/Grid Operator

Facts:

- 200 berths
- Earnings 800 million per year
- Cost for shore power onshore 4 Million per berth
- Microgrid expansion costs of 2,5 Billion

Decisions each year:

- How many berths (in %) to equip with shore power?
- How much capacity add to the grid (in %)?

Updated Earnings = earnings – (invests - EU subsidies)

# Role #3: EU

#### <u>Goal:</u>

- Min. budget use
- 100% shore power port calls by 2030

## Facts:

- 10 Billion budget
- Decisions each year:
- How many vessels and berths (in %) to subsidize with shore power?
- How high to set the interest rate for shore power projects (in %)?





	Tonnes of CO <sub>2</sub> emitted	Year	Carbon cost in USD*
Extra-EU voyage		2023	14 500
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1700	2024	
NY - Antwerp - NY		2025	50 500
		2026	72 500
Intra-EU voyage		2023	12 000
		2024	
Le Havre - Riga-	700	2025	
Amsterdam	100	2026	

# Decarb Game: Roles and Objective (Year 2026)

## Role #1: Shipping Company Goal:

- Max. earnings
- 100% shore power port calls by 2030

## Facts:

- 800 vessels
- Earnings 1 Billion per year
- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity
  add to the grid (in %)?

# Role #2: Terminal/Grid Operator

<u>Goal:</u>

- Max. earnings
- 100% shore power port calls by 2030

### Facts:

- 200 berths
- Earnings 800 million per year
- Cost for shore power onshore 4 Million per berth
- Microgrid expansion costs of 2,5 Billion

#### Decisions each year:

- How many berths (in %) to equip with shore power?
- How much capacity add to the grid (in %)?

## Role #3: EU

<u>Goal:</u>

- Min. budget use
- 100% shore power port calls by 2030

- How many vessels and berths (in %) to subsidize with shore power?
- How high to set the interest rate for shore power projects (in %)?







	Tonnes of CO <sub>2</sub> emitted	Year	Carbon cost in USD*
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,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		2024	32 500
NY - Antwerp - NY	1700	2025	50 500
		2026	72 500
Intra-EU vovage		2023	12 000
, , , , , , , , , , , , , , , , , , , ,		2024	27 000
Le Havre - Riga-	700	2025	
Amsterdam	100	2026	

### Role #1: Shipping Company Facts:

- 800 vessels
- Earnings 1 Billion per year
- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity
  add to the grid (in %)?

Updated Earnings = earnings – (invests - EU subsidies) + 2% increased earnings shore power port calls

# Role #2: Terminal/Grid Operator

Facts:

- 200 berths
- Earnings 800 million per year
- Cost for shore power onshore 4 Million per berth
- Microgrid expansion costs of 2,5 Billion

Decisions each year:

- How many berths (in %) to equip with shore power?
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# Role #3: EU

### <u>Goal:</u>

- Min. budget use
- 100% shore power port calls by 2030

## Facts:

- 10 Billion budget
- Decisions each year:
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Intra-EU voyage		2023	12 000
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Le Havre - Riga-	700	2025	42 000
Amsterdam	100	2026	



# Decarb Game: Roles and Objective (Year 2027)

## **Role #1: Shipping Company** Goal:

- Max. earnings
- 100% shore power port calls by 2030

## Facts:

- 800 vessels
- Earnings 1 Billion per year
- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity add to the grid (in %)?

# Role #2: Terminal/Grid Operator

Goal:

- Max. earnings
- 100% shore power port calls by 2030

### Facts:

- 200 berths •
- Earnings 800 million per year
- Cost for shore power onshore 4 Million per berth
- Microgrid expansion costs of 2,5 Billion

#### Decisions each year:

- How many berths (in %) to • equip with shore power?
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## Role #3: EU

Goal:

- Min. budget use
- 100% shore power port calls by 2030

### Decisions each year:

- How many vessels and berths (in %) to subsidize with shore power?
- How high to set the interest rate for shore power projects (in %)?







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Extra-EU voyage		2023	14 500
	1700	2024	32 500
NY - Antwerp - NY		2025	50 500
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Intra-EU voyage		2023	12 000
, ,		2024	27 000
Le Havre - Riga-	700	2025	42 000
Amsterdam	700	2026	60 000

#### Funded by the European Union

Role #1: Shipping Company Facts:

- 800 vessels
- Earnings 1 Billion per year
- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity
  add to the grid (in %)?

Updated Earnings = earnings – (invests - EU subsidies) + 2% increased earnings shore power port calls

# Role #2: Terminal/Grid Operator

Facts:

- 200 berths
- Earnings 800 million per year
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Decisions each year:

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# Decarb Game: Roles and Objective (Years 2028)

## **Role #1: Shipping Company** Goal:

- Max. earnings
- 100% shore power port calls by 2030

## Facts:

- 800 vessels
- Earnings 1 Billion per year
- Cost for shore power onboard 1 Million per vessel
- Microgrid expansion costs of 2,5 Billion

## Decisions each year:

- How many vessels (in %) to equip with shore power?
- How much support capacity add to the grid (in %)?

# Role #2: Terminal/Grid Operator

Goal:

- Max. earnings
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### Facts:

- 200 berths •
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#### Decisions each year:

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# Role #3: EU

Goal:

- Min. budget use
- 100% shore power port calls by 2030

- How many vessels and berths (in %) to subsidize with shore power?
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## Role #1: Shipping Company Facts:

- 800 vessels
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# Decisions each year:

- How many vessels (in %) to equip with shore power?
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Updated Earnings = earnings – (invests - EU subsidies) + 2% increased earnings shore power port calls

# Role #2: Terminal/Grid Operator

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# Decarb Game: Roles and Objective (Year 2029)

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Amsterdam	100	2026	60 000



# Calculations – Year 2029 $\rightarrow$ 2030 goal achieved?

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Updated Earnings = earnings – (invests - EU subsidies) + 2% increased earnings shore power port calls

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Le Havre - Riga-	700	2025	42 000
Amsterdam	100	2026	



# THANK YOU FOR YOUR ATTENTION



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