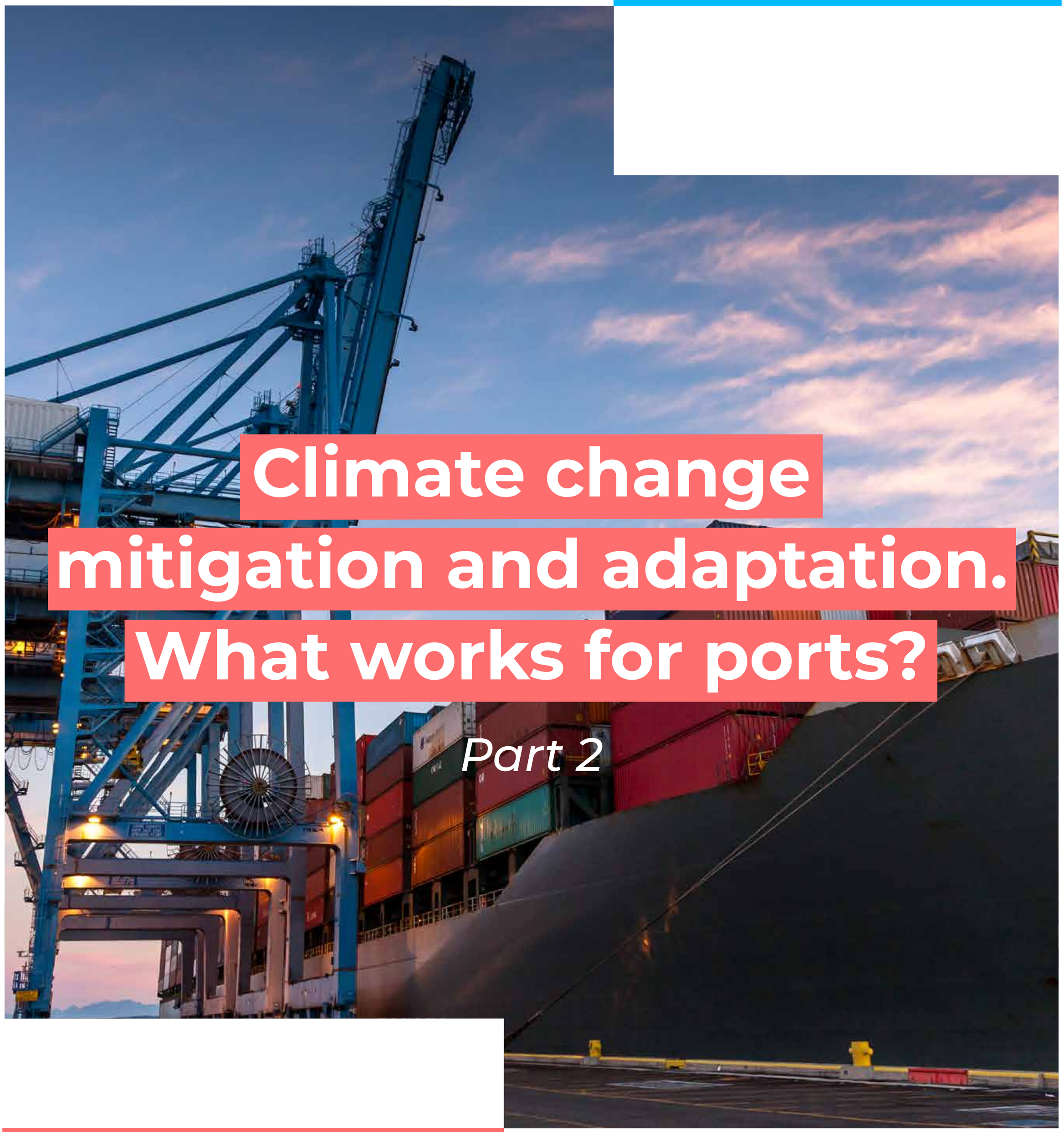
EDHEC
BUSINESS SCHOOL



Climate change mitigation and adaptation. What works for ports?

Part 2

EDHEC BUSINESS SCHOOL

ClimaTech is the largest global database on technologies and strategies to...

Mitigate climate change

Identify the most effective solutions to decarbonise infrastructure.

3 scopes of emissions:

1. **Scope 1** → direct emissions from the infrastructure
2. **Scope 2** → emissions linked to energy consumption
3. **Scope 3** → all other indirect emissions (transport, procurement, waste, etc.)

Adapt to its consequences

Understand the physical risks each type of infrastructure faces and assess the best resilience measures.

4 types of risk:

- **Flood**
- **Storm**
- **Heat**
- **Wildfire**

We can use ports to understand what ClimaTech can do.

Source : ClimaTech

EDHEC BUSINESS SCHOOL

Decarbonisation (1/3)

Type of Infrastructure

Container Port

Category

1 Decarbonisation S1

Strategy

Using low-carbon fuels for vehicles that cannot be currently converted to electric vehicles, such as heavy maintenance vehicles, cranes and other lifting equipment

Key Technologies

- Biodiesel
- Renewable diesel for lifting equipment
- Renewable diesel for service fleets

Effectiveness

Low

34 %

Source : ClimaTech

Decarbonisation (2/3)

Type of Infrastructure

Tool Port

Category

2 Decarbonisation S2

Strategy

Purchasing renewable energy from an external energy company to reduce reliance on the electrical grid, which is largely dependent on fossil fuels

Key Technologies

- Power purchase agreements (PPAs)
- Wind-generated electricity
- Solar-generated electricity
- Hydro-generated electricity
- Blockchain-based energy tracking systems
- Digital marketplaces for renewable energy credits (RECs)

Effectiveness

Very High

100 %

Source : ClimaTech

EDHEC BUSINESS SCHOOL

Decarbonisation (3/3)

Type of Infrastructure

Container Port

Category

3 Decarbonisation S3

Strategy

Upgrading port infrastructure with facilities to power docked ships with an electrified link from the shore as opposed to burning fossil fuels in ship engines

Key Technologies

- High-voltage shore power systems
- Smart grid integration
- Energy storage technologies

Effectiveness

High

87 %

Source : ClimaTech

EDHEC BUSINESS SCHOOL

Physical risk (1/4)

Type of Infrastructure	 **Bulk Goods Port**
Physical Risk	**Flood**
Strategy	**Upgrading existing drainage systems** to enable them to cope with larger predicted floods
Key Technologies	• Enlarging drainage pipes • Additional pumping stations • Integrating smart drainage • High-capacity stormwater drains • Backflow prevention valves
Level of Typical Protection (Flood Return Period)	**Medium**
Risk Reduction Effectiveness	**Low** 19 %

Source : ClimaTech

EDHEC BUSINESS SCHOOL

Physical risk (2/4)

Type of Infrastructure	 **Tool Port**
Physical Risk	**Storm**
Strategy	**Large structures** such as causeways, breakwaters and moles, either offshore or onshore, **that protect assets from strong winds** and associated wave action
Key Technologies	• Reinforced concrete • Corrosion-resistant alloys • Energy-absorbing composites • AI-driven structural monitoring
Level of Typical Protection (Storm Return Period)	**High**
Risk Reduction Effectiveness	**Medium** 50 %

Source : ClimaTech

Physical risk (3/4)

Type of Infrastructure	 **Tool Port**
Physical Risk	**Heat**
Strategy	**Specialised coatings applied to surfaces** to reduce heat absorption and minimise temperature build-up. These coatings typically contain reflective pigments or additives that reflect sunlight and infrared radiation
Key Technologies	• High-albedo coatings • Reflective pigment additives • Infrared-reflective coatings • Cool roof coatings
Level of Typical Protection (Temperature Threshold)	**High**
Risk Reduction Effectiveness	**Medium** 60 %

Source : ClimaTech

EDHEC BUSINESS SCHOOL

Physical risk (4/4)

Type of Infrastructure

Container Port

Physical Risk

Wildfire

Strategy

Regularly remove dry brush, dead trees, and flammable debris near the asset. This reduces the fuel available for wildfires

Key Technologies

- Automated land-clearing equipment
- Remote-controlled mulchers
- High-efficiency forestry masticators
- Drone-assisted surveying
- AI-driven terrain analysis
- GPS-guided excavation

Risk Reduction Effectiveness

High

70 %

Source : ClimaTech

EDHEC BUSINESS SCHOOL

EDHEC Climate Institute

This independent research center combines scientific expertise, economic analysis, and advanced climate risk modelling. The EDHEC Climate Institute relies on 200+ academic papers, technical documents, and government reports, a team of specialised researchers and engineers, and years of applied research serving sustainable finance.