SEPTEMBER 10, 2025

PORTS OF TOMORROW – TODAY: TACKLING THE CHALLENGES OF ELECTRIFICATION AND INNOVATION

AAPA Webinar Series with ABB Marine and Ports / E-Mobility

ENGINEERED TO OUTRUN

INTRODUCTIONS

ABB / Marine & Ports / E-Mobility / Presenters

ABB Purpose

We enable a more sustainable and resource-efficient future with our technology leadership in electrification and automation

- Creating success
- Addressing world's energy challenges
- Transforming industries
- Embedding sustainability
- Leading with technology

ABB at a Glance

ABB is a global technology leader in electrification and automation, enabling a more sustainable and resource-efficient future.

By connecting its engineering and digitalization expertise, ABB helps industries run at high performance, while becoming more efficient, productive and sustainable so they outperform. At ABB, we call this ‘Engineered to Outrun’.

~110,000
Employee globally

174
Nationalities

$33.7 bn
Order intake

$32.9 bn
Revenues

18.1%
Operational EBITA margin

>170
Manufacturing sites globally

$1.5 bn
R&D investment

~22k
Granted patents

21.3%
Women in senior management positions

78%
Reduction of scope 1 and 2 GHG emissions since 2019

ABB IN THE UNITED STATES

Investment & Growth

Country headquarters
Cary, North Carolina

About ~17,000
people in the U.S.

ABB's
largest market
$96+ billion

U.S. is approximately
27% of
ABB revenue

Entered U.S. in 1925
when BBC formed ABBEC (American Brown Boveri Electric Corp.)

$14 billion invested
15 acquisitions &
CAPEX since 2010

Nearly 40
facilities including
manufacturing, distribution and operations

Including **10+**
R&D, service and other
major locations

~14,000
U.S. customers
in all 50 States

100% renewable electricity used in all manufacturing operations

9,000+ distributor
locations

More than $30 million
in charitable contributions to U.S. communities since 2016

Business Areas and Divisions

Business Area	Electrification	Motion	Process Automation	Robotics & Discrete Automation
Division	• Distribution Solutions • Smart Power • Smart Buildings • Installation Products • Service • E-mobility[1]	• Drive Products • Motion High Power • Motion Services • NEMA Motors • IEC LV Motors • Traction	• Energy Industries • Process Industries • Marine & Ports • Measurement & Analytics	• Robotics • Machine Automation

1. The E-mobility division, formerly part of the Electrification business area, has been an independent business and separate operating segment since January 2023. It is reported in “Corporate and Other”

ENGINEERED TO OUTRUN

Industries are the beating heart of the modern world. From energy, power and mining to building, transport, manufacturing, and more – they need to meet the global demand, be more sustainable, efficient, and manage transitions. To them, “running” is no longer enough – they need to outperform.

With our leading technologies in electrification and automation, we help all industries run at high performance and become more productive, efficient and sustainable to outperform.

At ABB, we call this ‘Engineered to Outrun’.

ENGINEERED
TO OUTRUN

ABB Marine and Ports at a Glance

ABB Marine & Ports drives the decarbonization of the maritime industry through safer, smarter and more sustainable operations for ships and ports.

Global Footprint

26 countries, 40 locations

Employees
~2300

Countries
>26

50+ years
experience

Five business lines:

- Marine Systems
- Marine Propulsion
- Coast Guard and Navy
- Ports
- Service

Overview of ABB solutions for maritime




Marine systems

- Electric solutions
- Modular power system
- Shaft generators
- Control systems and automation
- Integration of batteries and fuel cells
- Shore power solutions and charging solutions (vessel side)

Propulsion solutions

- Azipod® propulsion
- ABB Dynafin™

Digital solutions

- Smart asset management
- Ship advisory
- Fleet intelligence
- Cyber Security
- Intelligent shipping
- OVERSEA fleet management

Port solutions

- Terminal electrification
- Energy management solutions
- Shore Power and charging solutions (land side)
- Integration of batteries and fuel cells
- Crane controls & automation
- Remote crane operation solutions
- OCR and container information systems for cranes, gates and rail

Services

- Decarbonization services
  - Integration of batteries and fuel cells
  - Shore power and charging solutions
  - Shaft generators
- Lifecycle services (revamp / retrofits / upgrades)
- Spare Parts

ABB E-mobility: The Global Provider of High-Power EV Charging Infrastructure

1,400+
Employees

10.5K+
Sites Worldwide
Electrified

69K+
DC Chargers
Deployed

>109
Countries
Present in

1 TWh
Electricity
Delivered

3.27 Mt
CO2 Avoided

Charge Point Operator
1000 chargers deployed across nationwide network

Public Transit Depot
200+ charge points operating since 2018

Charge Point Operator
122 charge points >20.000 customers monthly

Depot Aggregator
One of the largest commercial charging depots in the world

Retail
+500 sites equipped partner since 2016

Public Transit Depot
478 Charge Points
Largest electric bus depot in the world (Guinness World Record)

3 Distinct Lines of DC Charging Products to Enable Port Electrification

Compact

Ubiquity of Power

Charge vehicles anywhere

50 kW

C50

All-in-One

Highest Power Density

Most powerful to charge a single vehicle

200-400 kW

A200/300/400

Split-System

Scalable and Flexible Ultra-High-Power

Most effective system solution

1.2 MW

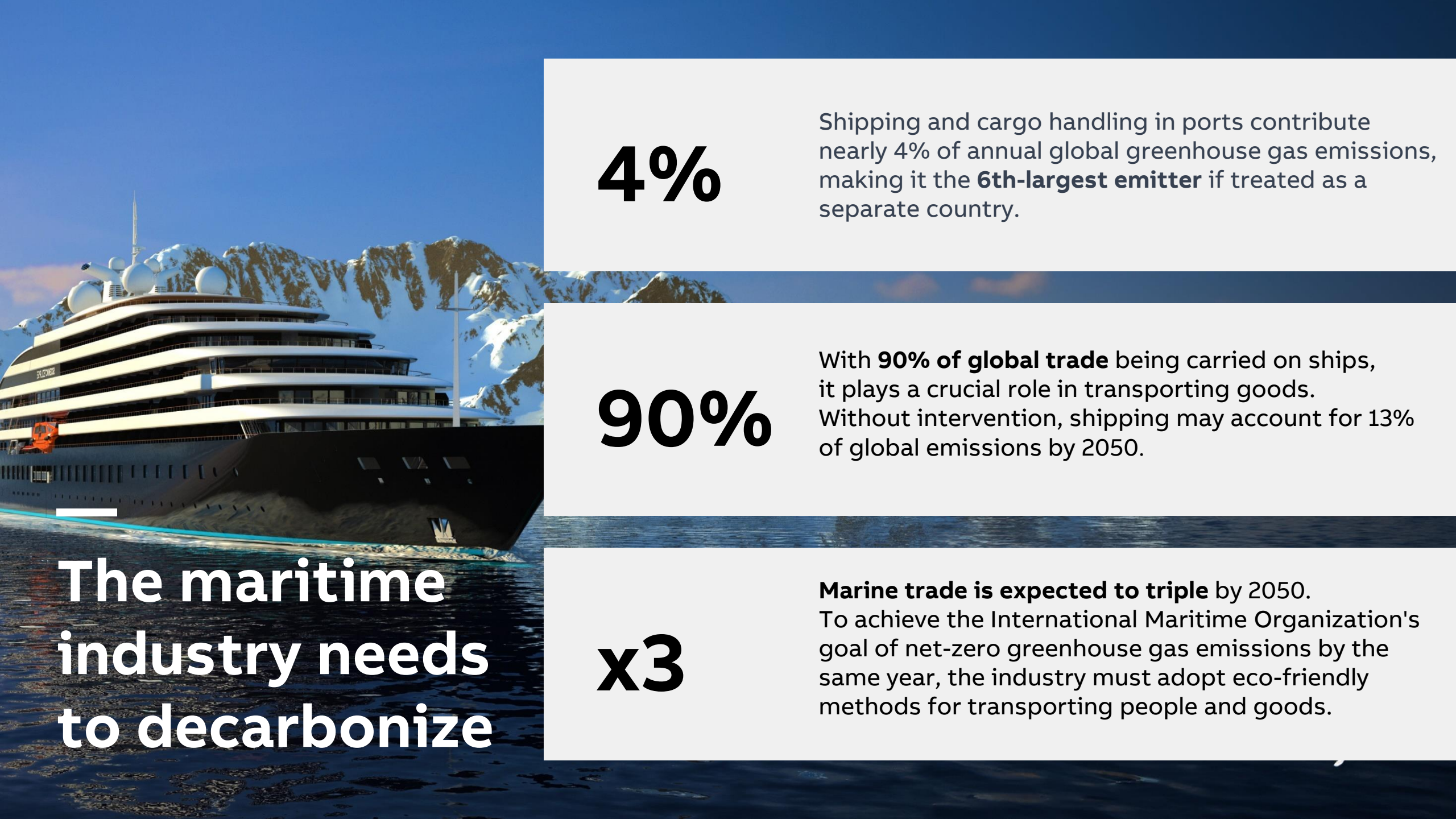
MCS1200

360+ kW

HVC360 + Chargedock

02

SETTING THE STAGE: PORT ELECTRIFICATION & ENERGY MANAGEMENT



The maritime industry needs to decarbonize

4%

Shipping and cargo handling in ports contribute nearly 4% of annual global greenhouse gas emissions, making it the **6th-largest emitter** if treated as a separate country.

90%

With **90% of global trade** being carried on ships, it plays a crucial role in transporting goods. Without intervention, shipping may account for 13% of global emissions by 2050.

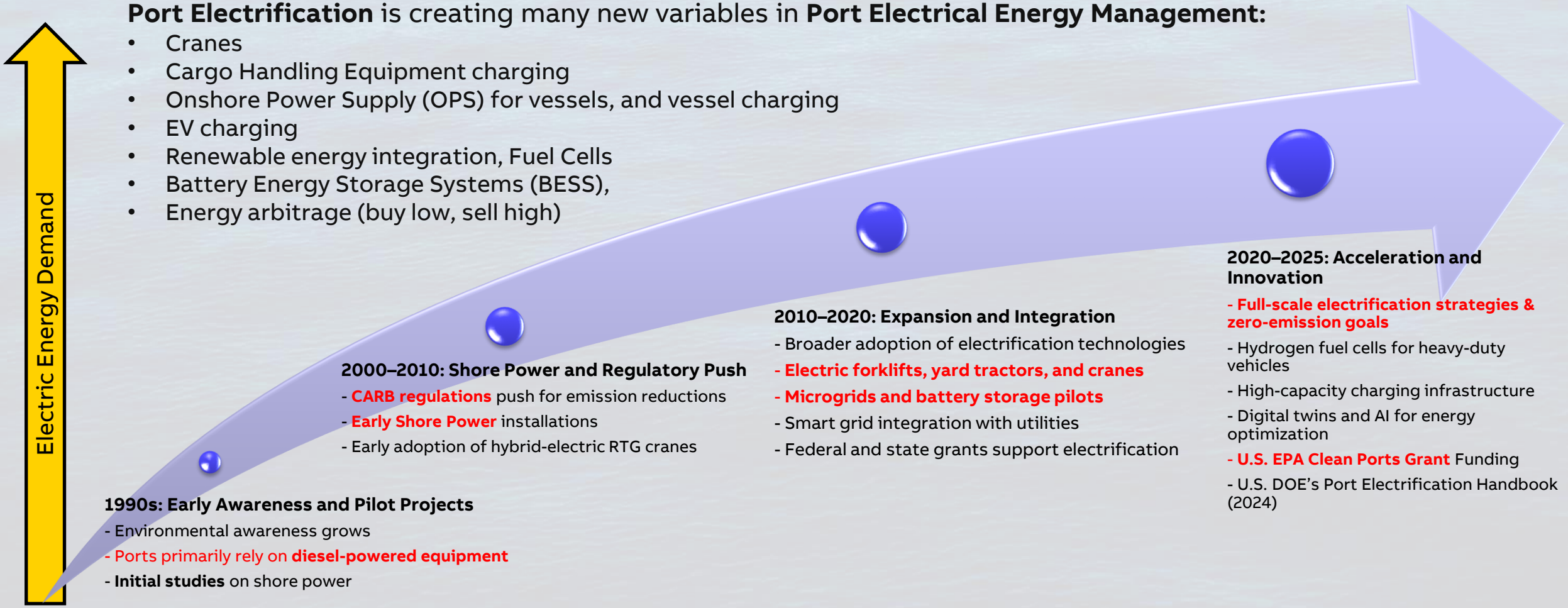
x3

Marine trade is expected to triple by 2050. To achieve the International Maritime Organization's goal of net-zero greenhouse gas emissions by the same year, the industry must adopt eco-friendly methods for transporting people and goods.

Port Electrification & Port Electrical Energy Management

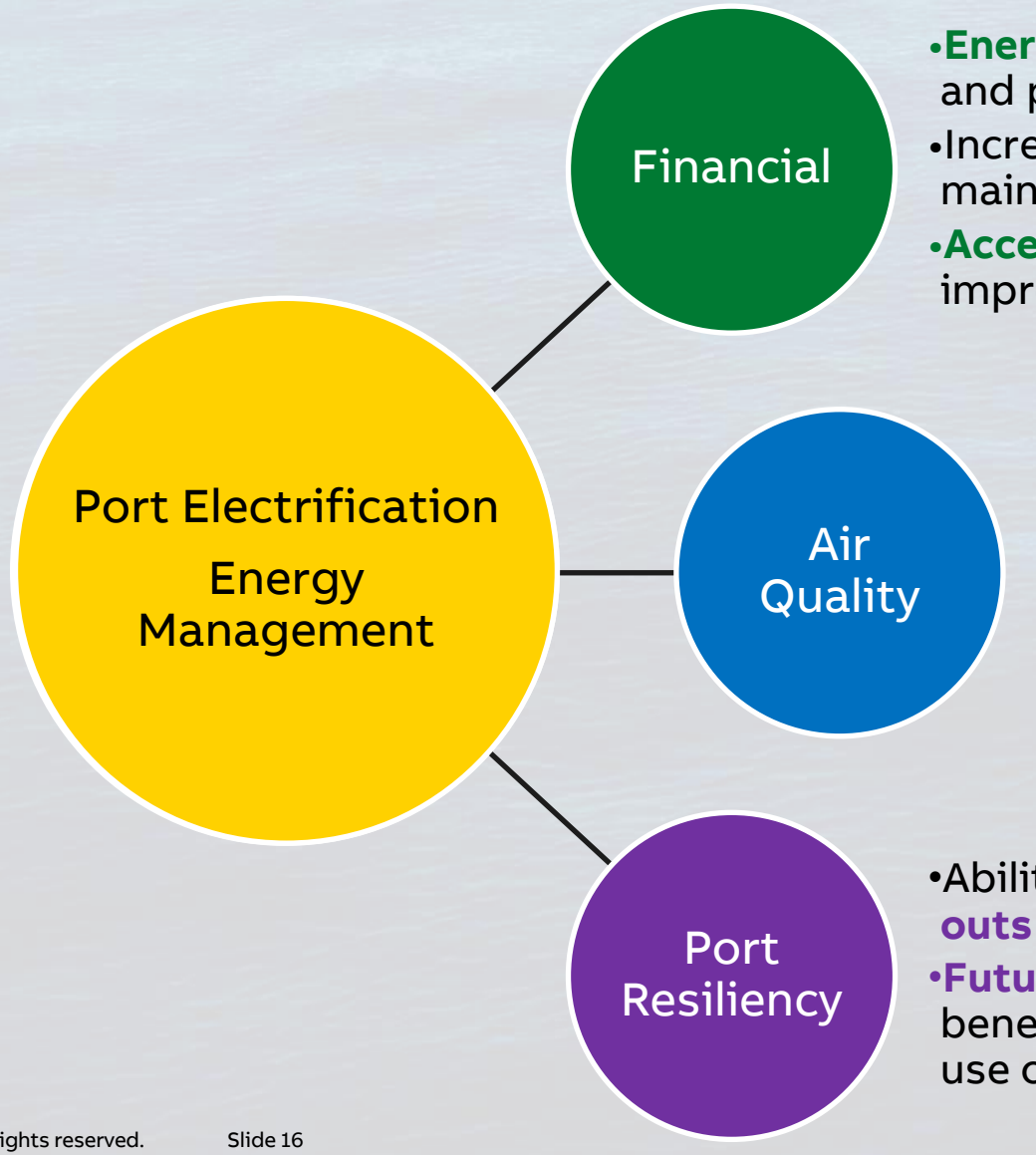
Port Electrification is creating many new variables in **Port Electrical Energy Management:**

- Cranes
- Cargo Handling Equipment charging
- Onshore Power Supply (OPS) for vessels, and vessel charging
- EV charging
- Renewable energy integration, Fuel Cells
- Battery Energy Storage Systems (BESS),
- Energy arbitrage (buy low, sell high)



Timeline of Technological and Policy Evolution

Why Port Electrification / Energy Management?



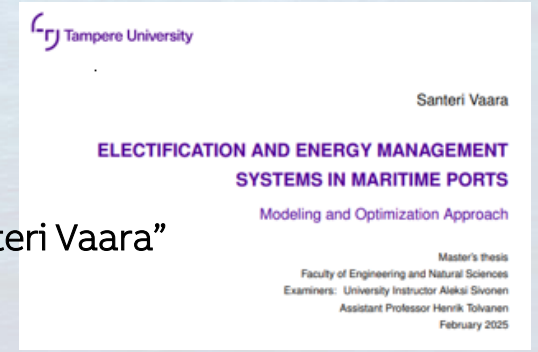
- **Energy Cost Savings** – Optimization of energy demand cycles and peak utility rates
- Increased **Operational Efficiency** – Reduced equipment maintenance costs, increased equipment uptime
- **Access to grants** for port modernization / infrastructure improvements

- Improved **quality of life / health** in surrounding community for port employees
- **Global initiative** in all industries
- **Regulations**: CARB, IMO

- Ability to operate during **weather events** / utility **brown & black outs**
- **Future proof** - Port Electrification investments will sustain their benefit regardless of utility energy production source, facilitate the use of Renewables (Wind / Solar / Hydro), fuel cells, batteries, etc.

Port Energy Management Study – Inputs / Conclusions

"Electrification and Energy Management Systems in Maritime Ports: Modeling and Optimization Approach" by Santeri Vaara"



Inputs / Considerations

Power Procurement Options:

1. Baseline - Buy all power
2. Forecast Based Power Procurement (FPP)
3. Optimal Port Energy Scheduling (OPT)

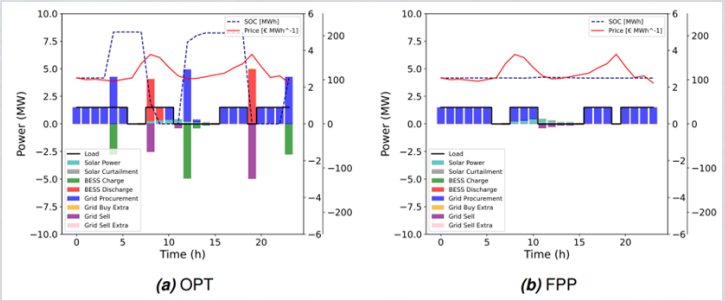
Port Energy Demand & Production:

1. Cranes / CHE / Vessel Shore Power & Charging / EV charging / HVAC / Refrigeration / etc.
2. Utility – Renewable / Rates / Reliability
3. Renewables – Solar / Wind / Hydrogen
4. BESS – Capacity / Usage

Modeling & Analysis

Port Microgrids and Energy Management: Optimization of Energy Flows.

1. Forecasting (demand, production, pricing).
2. Demand-side management (load shifting, peak shaving).
3. Energy arbitrage (buy low, sell high).
4. Berth allocation optimization and just-in-time ship arrivals.



Outputs / Conclusions

Overall:

1. Energy Management Systems **(EMS) improves cost efficiency, energy utilization, and emissions reduction.**
2. Microgrids can **reduce dependency on fossil fuels and facilitate the integration of renewable energy**

Sensitivities:

1. OPT - **Reduced operational costs by 6.4–12.2%**
2. OPT - Increased solar and battery utilization
3. OPT – Increased benefits with Price volatility and misaligned solar/load patterns
4. Solar and BESS capacity positively impact cost savings.
5. Higher demand reduces benefits of smart scheduling.
6. Correct sizing of components is crucial for financial viability.

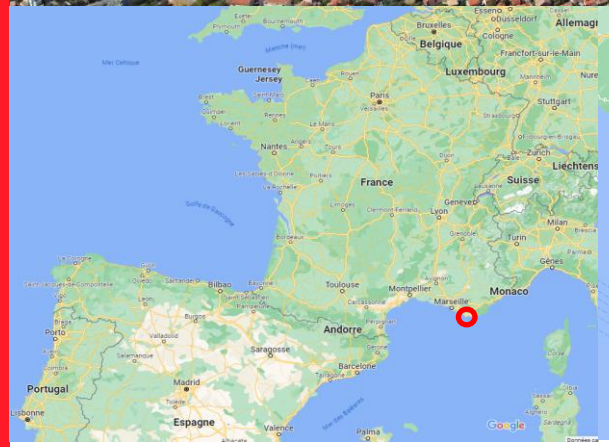
03

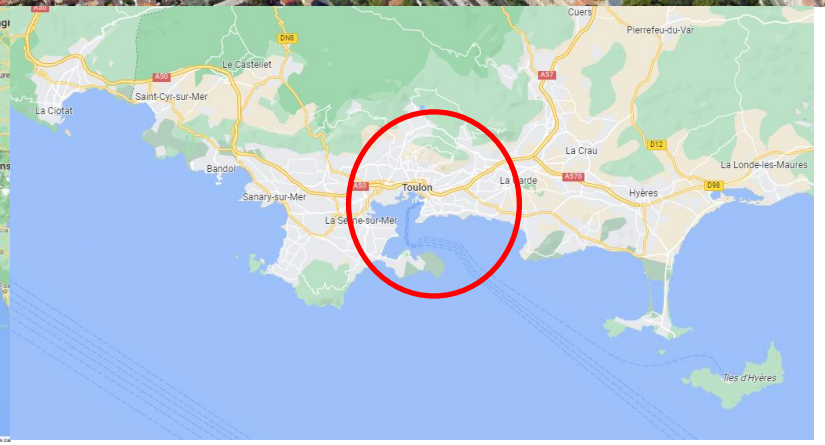
REFERENCE CASES

Ports of the Future – Today:

Worked Example
The Port of Toulon

Mediterranean port with 180,000 people living in close proximity





Toulon

Marina, Naval base and Commercial harbor, all within the same area

Toulon in numbers

A leading port for island connection

Ferries

1200 calls / year = 1,7M Pax*

RO-RO & Cargo

250 calls / year = 75,000 Trucks*

Cruise

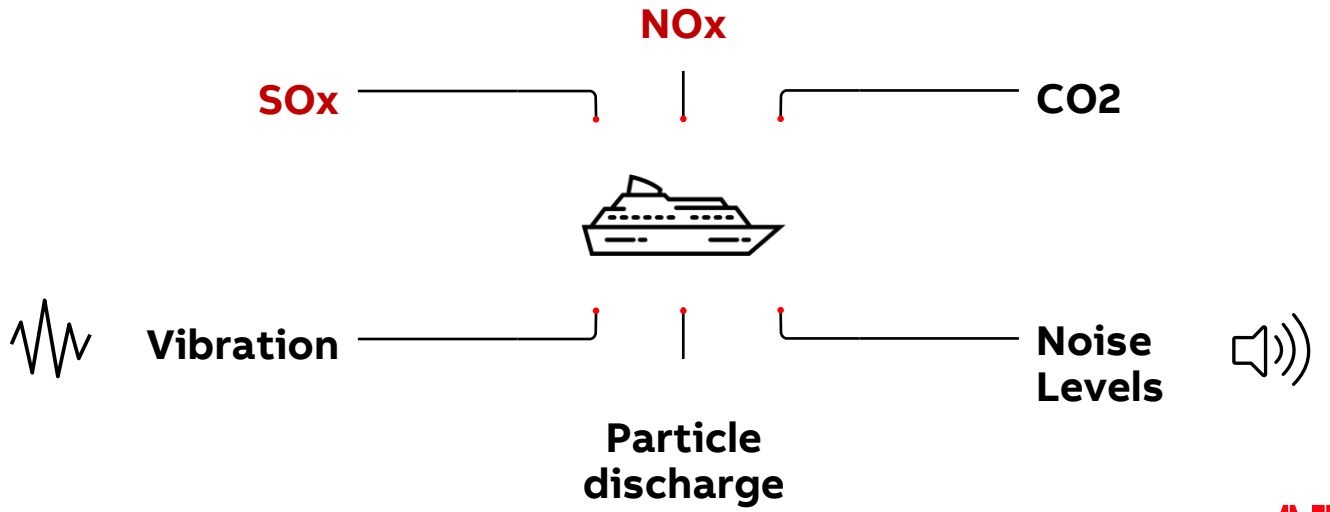
80-100 calls / year = 200,000 Pax*

Total

1500 calls / year average*

**Port operator figures 2021*

Studies show that :
Vessels stopping more than **2½h** were responsible for **80%** of the emissions.
Meaning that a shore power system would reduce port emissions by 80%, plus additional benefits!



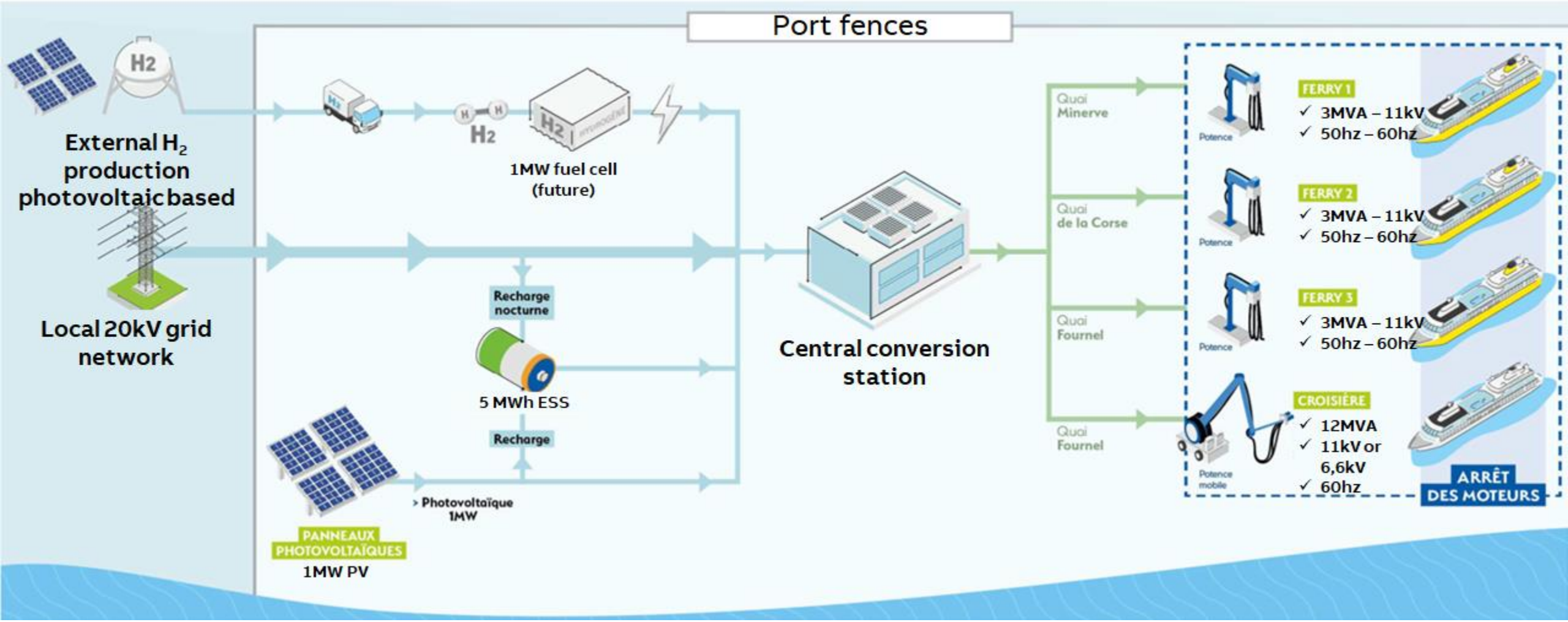
Customer Objectives

Project constrains and specifications

- ✓ Possibility to connect 3 Ferries at one time, or 2 Ferries plus 1 Cruise vessel
- ✓ 50hz and 60hz up to 3 MVA for ferries
- ✓ 11kV and 6,6kV up to 12MVA for cruises
- ✓ Very limited available space for the project
- ✓ 3MVA Peak shaving (9->6MVA) with 3 ferries connected
- ✓ Power Factor >0,92 at grid side
- ✓ Integration of 1 MW photovoltaic power
- ✓ System ready for 1MW Fuel-cell connection

Energy Hub design

The overall solution



Purpose Built Substation

Main Electrical Building

Dimensions: **36m x 11m x 6m**
Total Footprint: **400m²**

- 4 technical rooms
- 1 complete roof top for HVAC

Purpose Built Substation

Cruise berth switchgear (12MVA) and Stepdown transformers (dry type)

Purpose Built Substation

Ferry berth switchgear and battery energy storage

Cable Management System

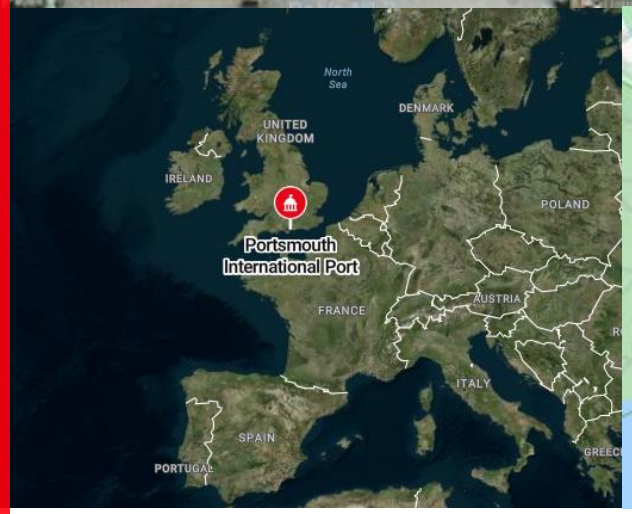
Cruise cable management system and connection boxes

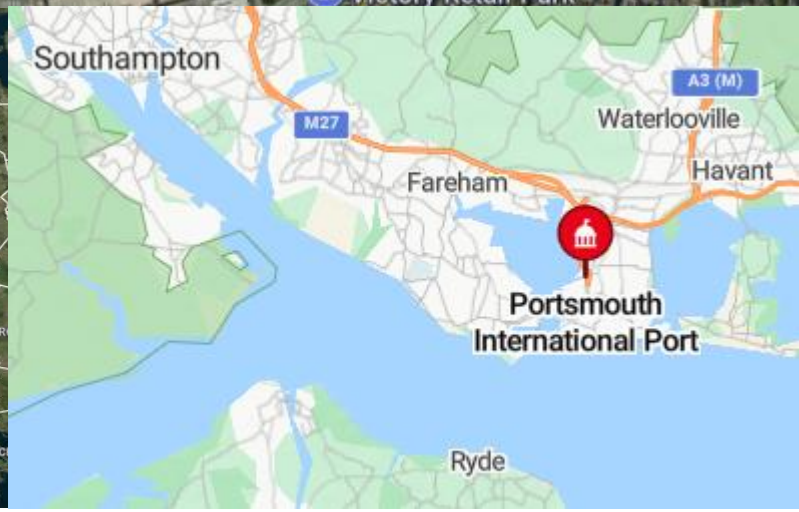
How to integrate PV with limited space

Photovoltaic shades for waiting traffic

Worked Example Portsmouth International Port

Portsmouth International Port, also known as Portsmouth Continental Ferry Port, is the harbour authority for the city of Portsmouth, Hampshire, located on the south coast of Great Britain





Shore Connection

Portsmouth International Port

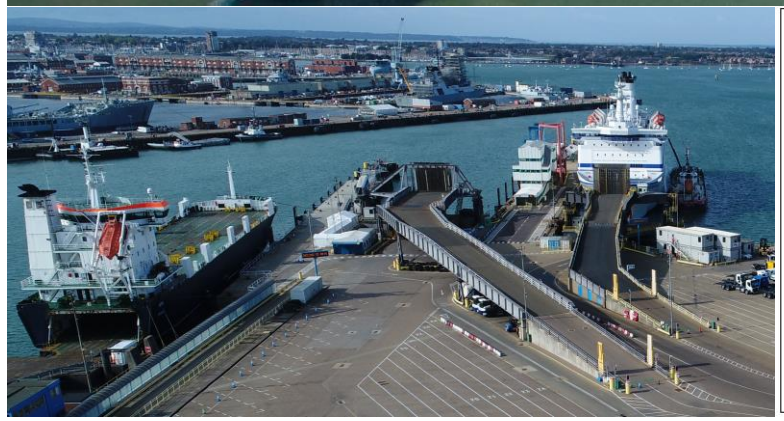
This ZEVI Sea Change project is funded by the UK Government. It is estimated that the system will save over 20,000 tonnes of CO2e per annum from 2027

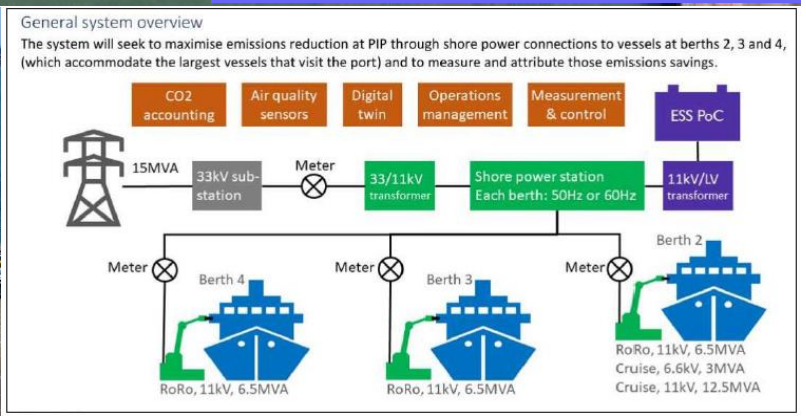
Customer Requirements:

- ✓ Possibility to connect 3 Ferries at one time, or 2 Ferries plus 1 Cruise vessel
- ✓ 50hz and 60hz up to 6.5 MVA for ferries
- ✓ 11kV and 6,6kV up to 12.5MVA for cruises
- ✓ Integration of existing ESS (1.3MWh)
- ✓ Complex CMS solution to allow 13 different ferries vessels plus cruise to use the berths

ABB Solution:

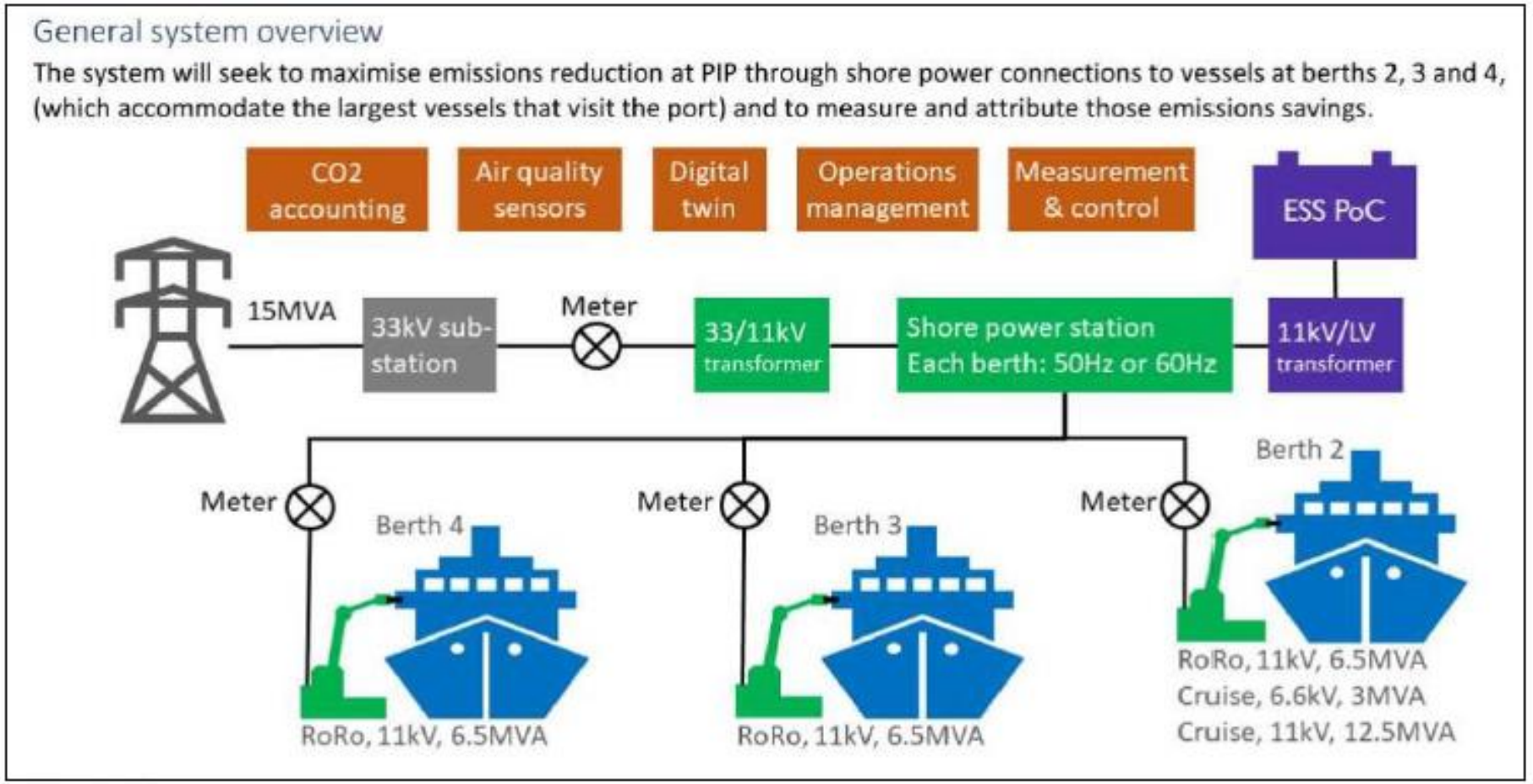
- ✓ Fully containerised OPS System with centralised MV SFC and separate 50Hz distribution system providing the most efficient solution
- ✓ Full power available at 50 or 60Hz, or any combination
- ✓ Full automation system
- ✓ Service Contract including Remote support





Project Overview

Project Scope



Portsmouth Shore Supply

Portsmouth International Port

Site Layout Photo

Portsmouth - Seachange

2,600 panels installed, including above the car lanes. 1.2 MWp system providing 35% of the site's electricity.
1MW lithium-ion battery energy storage systems (BESS) installed for storing renewable energy from the solar arrays.

Solar power slashes Portsmouth Port costs

29/07/2025

Portsmouth International Port has saved nearly GB£140,000 in electricity costs over the past year thanks to its cutting-edge solar power system.

The port reports that since switching on its solar array in late 2023, it has harnessed solar technology to deliver major savings and progress its ambitious port electrification strategy.

Worked Examples
Port EV Charging

ABB E-mobility & Port Electrification

APPLICATION
High-power DC fast and depot chargers for ports across the globe

COUNTRY / SITE
Port Authority of New York & New Jersey, Port of Helsingborg, Port of Long Beach, Port of Rotterdam

CUSTOMER NEEDS
Charging for drayage trucks/onroad vehicles and cargo handling equipment

SOLUTION
- ABB E-mobility has provided ports with DC fast charging systems ranging from 180 kW to 400 kW. Speeds up to 1.2 MW are also now available.
- All charging systems are equipped with integrated connected services to maximize charging success rates. Service level agreements specific to the harsh conditions often present at ports.
- Charging solutions that comply with EPA Clean Ports Program requirements
  - Build America, Buy America compliant
  - OCPP 2.0.1
  - CCS1, CCS2 or NACS connector
  - ISO 15118 Ready

Port Authority Opens Electric Truck Charging Station at Port Newark, Welcoming Greener New Era for Trucking at East Coast's Busiest Port

The Port Authority of New York & New Jersey
80,593 followers

July 8, 2025

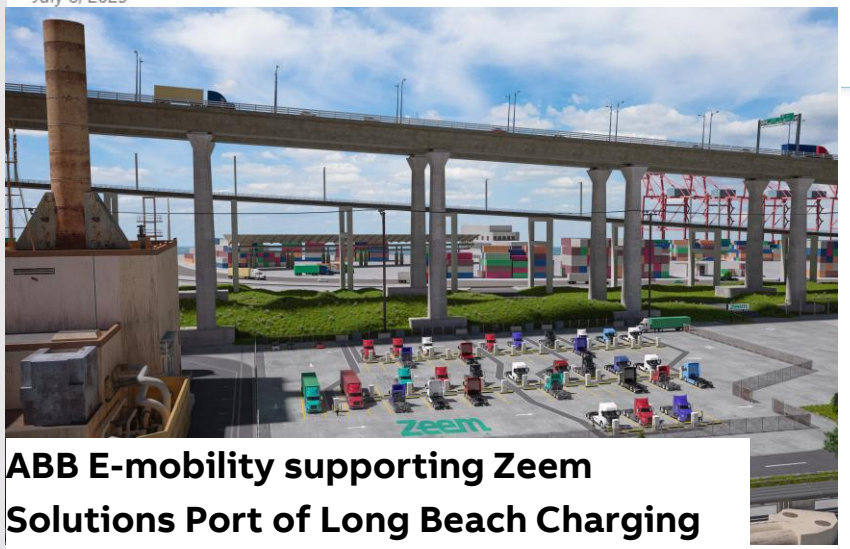


ABB E-mobility supporting Zeem Solutions Port of Long Beach Charging Depot with A400s

ABB charges the Port of Helsingborg's sustainability goals

First port in Sweden to use electrical terminal tractors, powered by ABB's DC high power chargers.

PORT TECHNOLOGY INTERNATIONAL

Home About News Journal Technical Papers Events Webinars Supplier Directory

Port of Rotterdam unveils first electric truck charging station

January 26, 2024

By Dom Magli

TWITTER FACEBOOK LINKEDIN EMAIL

ABB E-mobility

Lessons Learned – Best Practices

Port Electrification / Shore Power / BESS / EV Charging Projects

Project Planning / Scope

- Clear attainable goals
- Clearly defined scope of work
- Clearly defined division of work from vendors if not single sourced

Communication

- Ensure adequate PM Resources (internal / vendor)
- Ensure engagement of key stakeholders throughout project (steering committee)

Partners

- With track record of capability / capacity for large scale projects
- With the right competencies throughout project execution and after:
  - Technical solutions
  - PM & Execution Resources
  - Commissioning and field service support

Let ABB help you become "ENGINEERED TO OUTRUN"

Port Solutions

- Terminal electrification
- Energy management
- Shore Power / charging
- Batteries and fuel cells
- Crane controls & automation
- Remote crane operation
- OCR and container information systems

EV Charging Solutions

- Compact: C50
- All-in-One:
  - A200/300/400
  - T184
- Split-System:
  - MCS1200, HVC360 + Chargedock

ABB …

Joe Labbe
Market Development Manager
ABB Marine and Ports
Miramar, FL
Joseph.Labbe@us.abb.com
+1-754-736-0537

Thank you for your time and attention!

See you in Quebec City at the AAPA Annual Convention and Expo – Oct 6-8, 2025 (Booth #120)

Alex Ehrett
Business Development & Public Policy Lead, NAM
ABB E-Mobility
Salt Lake City, UT
Alex.Ehrett@us.abb.com
+1-216-965-3910


ABB