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NEXT Black Sea Basin

## ODESA NATIONAL MARITIME UNIVERSITY

# From Recovery to Leadership: Digital Ports and Green Corridors as Ukraine's 2050 Catalyst

*Workshop "Blue Economy and Partnership for  
Sustainable Development of Ukraine's Maritime  
Sector"*

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Odesa, 12 November 2025

# The Challenge That Becomes Opportunity

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## Where We Stood

- ✓ **14 ports** handled 130M tons annually
- ✓ **45M tons** of agricultural exports
- ✓ **Leading** Black Sea port region by activity
- ✓ Year-round warm-water access to Mediterranean & Atlantic

## What Happened

- ✓ **USD 850 million** in port infrastructure damage
- ✓ Traditional maritime routes disrupted
- ✓ Export capacity significantly impacted

**Strategic Opportunity:** Post-war port reconstruction allows implementation of cutting-edge digital solutions from a "clean slate" without legacy system constraints

## Odesa Commercial Sea Port, 23 may 2025



# The Global Smart Port Revolution

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## Technology Trends Defining 2050

### AI & Machine Learning

Cargo optimization, delay prediction, autonomous operations

### Blockchain

Transparent documentation, smart contracts, supply chain tracking

### IoT & 5G Connectivity

Real-time port monitoring, predictive maintenance, sensor networks

### Digital Twin

3D port logistics modeling, simulation, optimization

## European Leaders Setting the Standard

- ✓ **Rotterdam (Netherlands)** – Global leader in port digitalization, fully integrated digital twin
- ✓ **Constanța (Romania)** – Implementing digital twin technology and Port Community Systems
- ✓ **Varna (Bulgaria)** – Developing smart port infrastructure with EU support
- ✓ **Antwerp & Hamburg** – Advanced automation and AI-driven operations

# Smart Digital Ports of the Future



# Why Ukraine Can Lead the Region

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## Competitive Advantages

<b>Infrastructure</b>	Clean slate – implementation without legacy system constraints
<b>Human Capital</b>	Strong IT sector, maritime education tradition (ONMU)
<b>European Integration</b>	Access to EU funding, EU Maritime Single Window standards alignment
<b>Strategic Partnerships</b>	Estonia (e-governance leader), EU Digital Deal, maritime recovery coalition
<b>Geography</b>	Year-round warm-water ports, gateway to Mediterranean & Atlantic

**Key Insight:** Ukraine can leapfrog stages of digital evolution and implement state-of-the-art solutions immediately

# Port Digitalization Roadmap 2025-2050

## Phase 1: Foundation (2025-2030)

- ✓ National Maritime Single Window
- ✓ Port Community Systems (Odesa, Chornomorsk, Pivdennyi)
- ✓ Fiber optics, 5G, data centers
- ✓ Digital skills training

## Phase 2: Integration (2030-2040)

- ✓ Black Sea Digital Port Network
- ✓ AI cargo prediction systems
- ✓ 100% blockchain documentation
- ✓ Digital twin of entire system

## Phase 3: Leadership (2040-2050)

- ✓ Regional Smart Port Hub
- ✓ Autonomous vessel readiness
- ✓ Export Ukrainian IT solutions
- ✓ International Research Center



# Green Shipping Corridors: How They Work

## Definition & Current Status

**Green Corridor** = Zero or near-zero emission maritime routes between aligned ports with supporting infrastructure, fuel supply, and regulatory frameworks

- ✓ 44 initiatives globally, but **none operational in Black Sea (2024)**
- ✓ Examples: Singapore-Rotterdam, California Green Shipping
- ✓ Driven by IMO targets & EU regulations

## European Regulations

- ✓ **EU ETS** – Emissions Trading System for shipping
- ✓ **FuelEU Maritime** – Mandatory green fuel adoption
- ✓ **Alternative Fuels Directive** – Infrastructure requirements

**Global Targets (IMO)**

**-40% CO<sub>2</sub>**

**by 2030**

**Net- Zero**

**by 2050**

## Black Sea Green Corridor System: Three Key Routes

### Corridor 1: Odesa → Constanța → Bosphorus

**Cargo:** Grain, oilseeds, fertilizers (agricultural exports)

**Distance:** 600 nautical miles

**Target:** 100% green fuel by 2040

### Corridor 2: Danube River ↔ Black Sea Integration

**Focus:** Multi-modal green transport

**Connection:** Central Europe → Black Sea ports

**Target:** Zero-emission river-sea vessels by 2045

### Corridor 3: Odesa ↔ Rotterdam (First Trans-European)

**Significance:** Main Ukraine-EU trade artery

**Route:** Through Bosphorus, Mediterranean, Atlantic

**Target:** First 100% green corridor by 2042

## Required Infrastructure Investment (2025-2050)

### Port-Side Investments

#### Marine Renewable Energy

400+ MW offshore wind/solar Western  
Black Sea capacity

#### Cold Ironing

Shore power connections for vessels at  
berth

#### Green Fuel Bunkering

Hydrogen, ammonia, bio-LNG facilities  
in 18 major ports

#### Carbon Capture

Port-based CO<sub>2</sub> capture and storage  
facilities

### Fleet Modernization Timeline

**2025-2035:** Retrofit existing vessels with dual-fuel systems

**2030-2050:** New-build zero-emission vessels enter service

**2040-2050:** Autonomous vessel readiness achieved

# Ukraine 2050: Portrait of a Regional Leader

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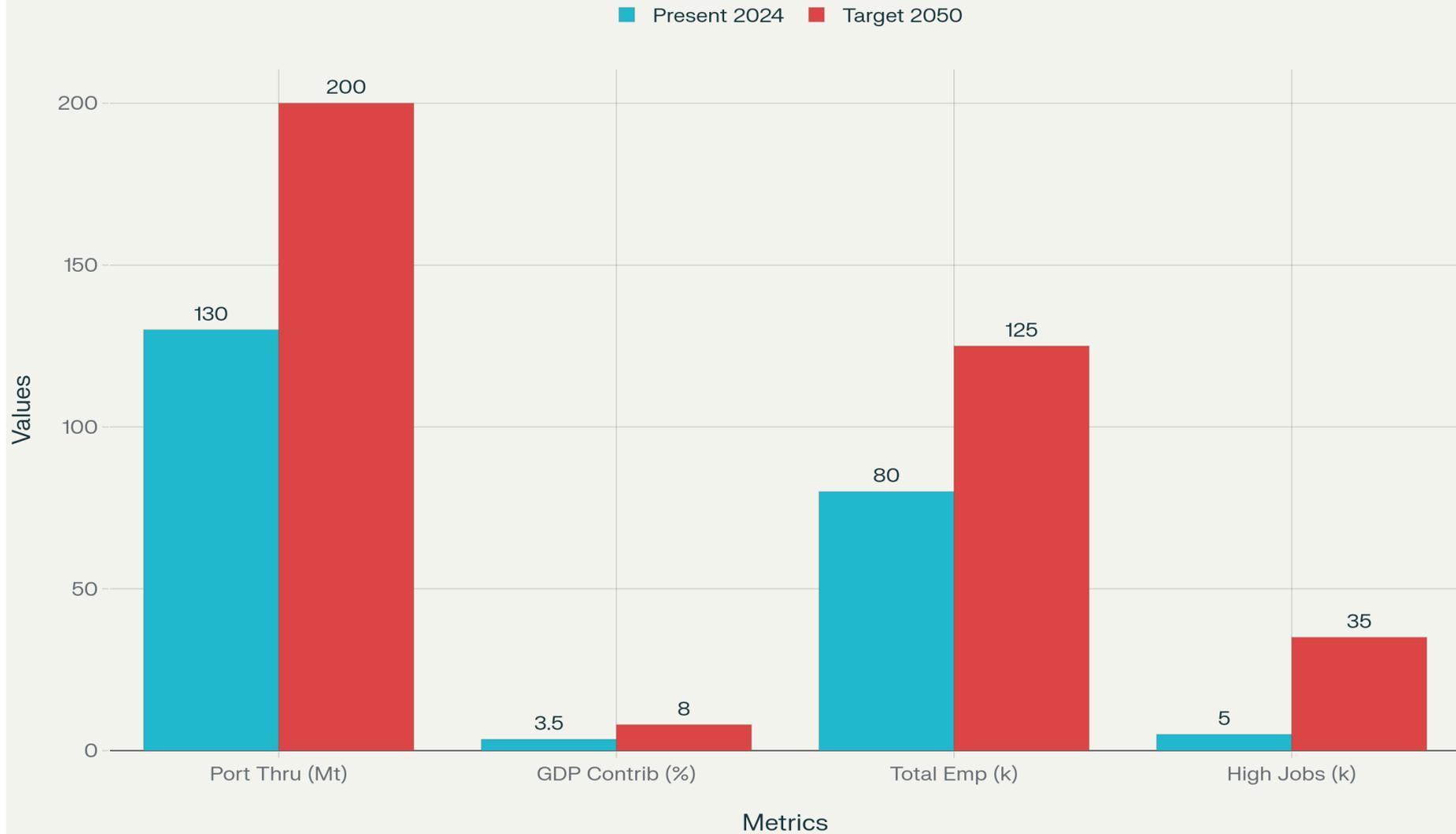
## Economic Impact

- ✓ 100% of ports carbon-neutral by 2050
- ✓ Regional leader in green corridor adoption
- ✓ Center for maritime renewable energy research

## Innovation Ecosystem

- ✓ **200+ startups** in maritime technology sector
- ✓ **International Smart Port Research Center** in Odesa
- ✓ **Annual Black Sea Maritime Innovation Summit**
- ✓ **5 maritime technology accelerators**

### Ukraine Maritime Sector: Present vs 2050 Vision



## Environmental Leadership

# SeaBridge Digital Corridor: The Problem

## Why Current Port Documentation is Inefficient

### ✗ Current Problems:

- ✓ Paper documentation = 2-3 day delays
- ✓ Fragmented systems across ports
- ✓ No real-time cargo visibility
- ✓ High coordination costs
- ✓ No green corridor integration
- ✓ Manual carbon accounting

### ✓ SeaBridge Solution:

- ✓ Documentation in 3 HOURS (not days)
- ✓ Unified platform for all ports
- ✓ Real-time cargo monitoring  
AI route optimization
- ✓ Integrated green corridors
- ✓ Automated carbon credit trading

## Market Scale

**18**

**Major Black Sea Ports**

**5,000+**

**Vessels Transiting**

**500+**

**Logistics Companies**

# SeaBridge: How It Works

## Technical Architecture (5 Layers)

- 1. Blockchain Layer** – Smart contracts for bills of lading, customs declarations, certificates
- 2. AI Engine** – Machine learning for route optimization (cost + carbon), predictive arrivals
- 3. IoT Integration** – Real-time monitoring of ports, vessels, weather, fuel availability
- 4. Digital Twin Interface** – 3D visualization of port operations and vessel positions
- 5. Carbon Accounting Module** – Emissions calculation, credit tracking, ESG reporting

## Business Model (5 Revenue Streams)

Revenue Stream	Model	Pricing
Transaction Fees	Per document/shipment	0.5% of cargo value
SaaS Subscriptions	Port operators, shipping companies	€500–5,000/month
Carbon Marketplace	Commission on credit trades	2% of transaction
Data Analytics	Premium insights for planners	€5,000–50,000/year
API Access	Third-party integrations	€10,000–50,000/year

# SeaBridge: Financial Projections (2026-2030)

## Investment Required

- ✓ **€8M EUR** (Seed)
- ✓ Technology development: €3.5M
- ✓ Pilot implementation (3 ports): €2M
- ✓ Team & talent: €1.5M
- ✓ Marketing & partnerships: €1M

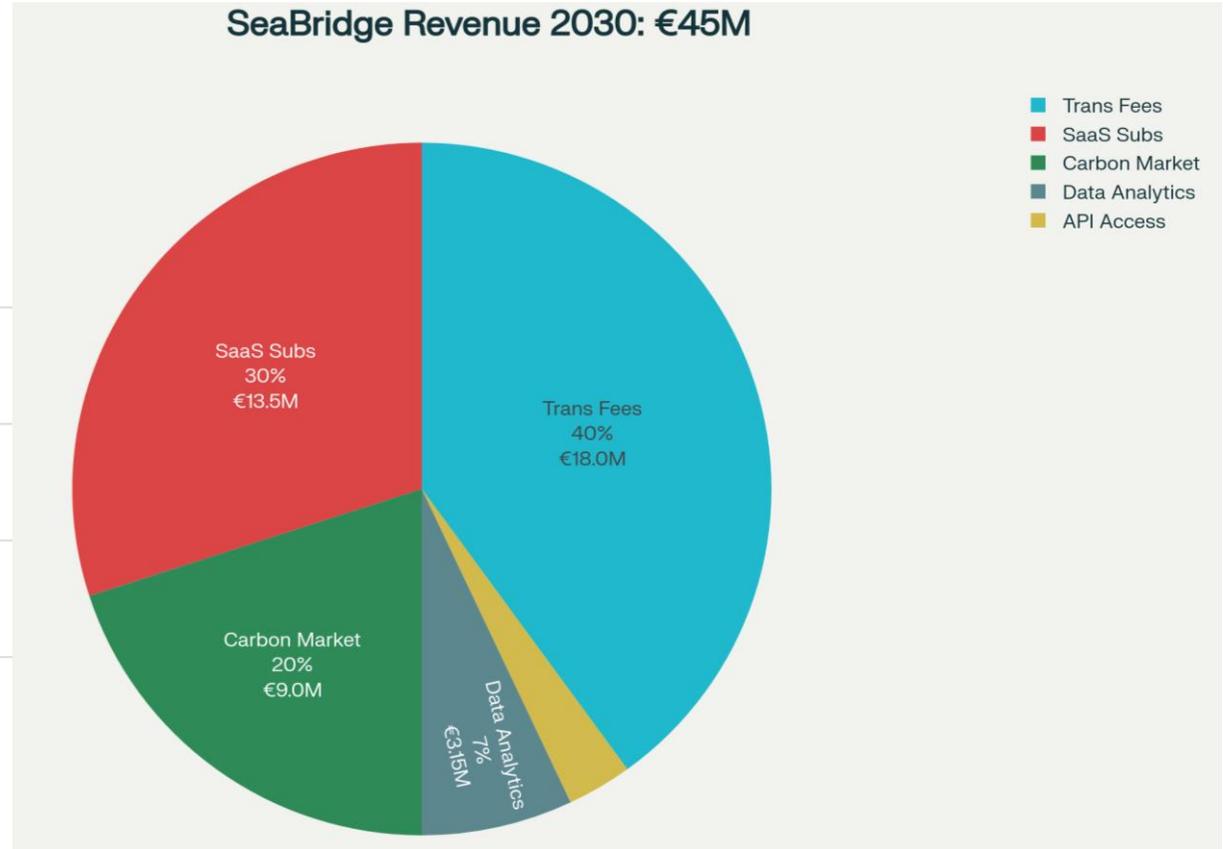
SeaBridge Revenue Projection 2026-2030



# SeaBridge: Financial Projections (2026-2030)

## 5-Year Revenue Forecast

Year	Revenue	Ports
2026	€0.5M	3
2027	€3.2M	8
2028	€12M	18
2029	€28M	25+
2030	€45M	30+



## Exit Strategy

Acquisition by major port operator (APM Terminals, DP World) or maritime tech company (Wärtsilä, Kongsberg) at **8-10x revenue multiple = €360-450M valuation**

# SeaBridge: Partnerships & Risk Management

## Identified Partners (Already Engaged)

- ✓ **Ukrainian Sea Ports Authority (USPA)** – MOU for pilot program
- ✓ **Port of Constanța (Romania)** – Interest in digital twin integration
- ✓ **Estonian Maritime Cluster** – Technical advisory partnership
- ✓ **EU DataPorts Project** – Technology transfer opportunities
- ✓ **BRIDGE-BS / DOORS Accelerators** – Black Sea innovation funding

## Risk Mitigation Strategy

Risk Type	Probability	Mitigation Strategy
<b>Geopolitical</b>	Medium	Multi-country deployment, EU guarantees, regional diversification
<b>Technology Adoption</b>	Low	Pilot program with early adopters, success-based pricing, free trial period
<b>Technical</b>	Low	Proven technology stack (Hyperledger, Azure), Ukrainian IT expertise
<b>Regulatory</b>	Very Low	Built-in EU Maritime Single Window compliance, harmonization framework

## SeaBridge: Impact & SRIA Alignment

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### Impact Metrics (5-Year Horizon)

**2M**  
**tonnes**  
**CO<sub>2</sub> reduced**  
**annually**

**300+**  
**Direct**  
**jobs**  
**created**

**18**  
**Major**  
**ports**  
**connected**

**5,000+**  
**Vessels**  
**served**

### Alignment with Black Sea SRIA Implementation Plan

- ✓ **Theme 1: Digital Twin of Black Sea** – SeaBridge provides the infrastructure platform
- ✓ **Theme 8: Marine Renewable Energy** – Enables green corridor coordination and monitoring
- ✓ **Theme 9: Innovative Observing Systems** – Real-time data platform for regional cooperation
- ✓ **Theme 11: Science-Policy-Industry Bridge** – Neutral platform connecting stakeholders

## Integrated Implementation Timeline

Period	Digital Ports	Green Corridors	SeaBridge Platform
<b>2025-2027</b>	Maritime Single Window, PCS deployment	Corridor planning, regulatory framework	Pilot launch (3 ports), product-market fit
<b>2028-2030</b>	5G networks, blockchain documentation	Bunkering infrastructure, first green routes	Black Sea expansion (18 ports), profitability
<b>2031-2035</b>	AI optimization, digital twin deployment	Fleet retrofitting, 50% green fuel adoption	Regional standard, Eastern Mediterranean expansion
<b>2036-2040</b>	Black Sea Digital Port Network complete	100% green corridors operational	International scaling, M&A opportunities
<b>2041-2050</b>	Autonomous vessel readiness, export leadership	Net-zero emissions achieved, carbon neutral	Industry standard, technology licensing

# From Vision to Action: Four Strategic Imperatives

## 1 Digitalize

From Day One

Leverage reconstruction  
as competitive advantage

## 2 Lead on Green

Corridors

Position Ukraine at forefront  
of decarbonization

## 3 Foster

Innovation

Transform Odesa into  
maritime Silicon Valley

## 4 Cooperate

Regionally

Build bridges, not barriers



Thanks!