# BATTERY STORAGE AND SMART MANAGEMENT OF GREEN ENERGY IN TERMINAL OPERATIONS

## Scope

**Battery Energy Storage System (BESS**) with smart **Energy Management Systems integration** at Antwerp Euroterminal, combining renewable energy sources with battery storage for terminal optimization.

## Goal

Validate port energy independence potential while **supporting decarbonization through intelligent energy flow orchestration** between renewable generation, storage, and operations.

## Benefits

- **Environmental**: Maximized renewable energy self-consumption and reduced grid dependency
- **Operational**: Predictive, cloud-based energy management with real-time optimization
- **Technical**: 2.1 MWh capacity, 1 MW power output with modular lithium-ion architecture
- **Economic**: Improved energy cost predictability and enhanced energy security

## Results

- ✅ ~50% reduction in grid energy consumption (from 24-30% to ~11-13%)
- ✅ Operational since November 2023 with full system commissioning
- ✅ System CAPEX: ~€1.6 million over 10 years
- ❌ ROI currently negative

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## Upscaling

- **Transfer Activities**: Active knowledge exchange with Barcelona (~92MW solar plans), Constanta (9MW PV park), Venlo (Smart Energy Hub with 9 companies)
- **Commercial**: Provides environmental and operational benefits despite economic headwinds
- **Target Groups**: Major European terminal operators (APM Terminals, PSA, Hutchison Ports, DP World, TiL-MSC) and port authorities
- **Strategic**: Demonstrates technical approach for port energy independence initiatives

## Lessons Learned

- DSO approval processes involve **complex technical requirements** and extended timelines
- **Comprehensive site evaluation essential** during planning to prevent budget overruns
- Battery system compatibility requires **standard communication protocol** support
- **Collaborative stakeholder workshops** essential for successful project execution

PIONEERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement 101037564.