Port and Energy Management Challenges

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Rationale for Energy Management in Ports

Port Energy Management Planning

Port of Genova study case.

Summary and Conclusions
EU AND SEAPORTS

✓ The EU is highly dependent on seaports
✓ 74% of goods imported from and exported to the rest of the world
✓ 37% of intra-EU trade transits through seaports
✓ Seaborne traffic of EU ports accounts for over 3 billion tonnes per year
The primary objective of Energy Management is to maximise profits or minimise the cost.
WHY IS PORT ENERGY MANAGEMENT IMPORTANT?

2. Increase Efficiency and Port Performance
3. Cost and Energy Savings
4. Indirect Costs and Externalities
EU AND UN POLICIES AND REGULATIONS

Energy Security Strategy (EC) UN 2030 Sustainable Development

Long-term measures

❖ Increasing energy efficiency and reaching the proposed 2030 energy and climate goals.
❖ Increasing energy production in the EU (including renewables) and diversifying supplier countries and routes.
❖ Speaking with one voice in external energy policy;

Targets for 2030

❖ 40% cut in greenhouse gas emissions compared to 1990 levels
❖ at least a 27% share of renewable energy consumption
❖ at least 27% energy savings compared with the business-as-usual scenario

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

❖ By 2030, ensure universal access to affordable, reliable and modern energy services
❖ By 2030, increase substantially the share of renewable energy in the global energy mix
❖ By 2030, double the global rate of improvement in energy efficiency
❖ By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
❖ By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries and developed countries,

Goal 13: Take urgent action to combat climate change and its impacts

❖ Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
❖ Integrate climate change measures into national policies, strategies and planning
❖ Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
❖ Promote mechanisms for raising capacity for effective climate change-related planning and management
# EU PORTS' ENVIRONMENTAL PRIORITIES

## EVOLUTION OF PORTS' ENVIRONMENTAL PRIORITIES OVER TIME (1996-2016)

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<tbody>
<tr>
<td>1</td>
<td>Port Development (water)</td>
<td>Garbage / Port waste</td>
<td>Noise</td>
<td>Air quality</td>
<td>Air quality</td>
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<td>2</td>
<td>Water quality</td>
<td>Dredging: operations</td>
<td>Air quality</td>
<td>Garbage/ Port waste</td>
<td>Energy Consumption</td>
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<td>3</td>
<td>Dredging disposal</td>
<td>Dredging disposal</td>
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<td>4</td>
<td>Dredging: operations</td>
<td>Dust</td>
<td>Dredging: operations</td>
<td>Noise</td>
<td>Relationship with local community</td>
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<td>5</td>
<td>Dust</td>
<td>Noise</td>
<td>Dredging: disposal</td>
<td>Ship waste</td>
<td>Garbage and Port waste</td>
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<td>6</td>
<td>Port Development (land)</td>
<td>Air quality</td>
<td>Relationship with local community</td>
<td>Relationship with local community</td>
<td>Ship waste</td>
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<td>7</td>
<td>Contaminated land</td>
<td>Hazardous cargo</td>
<td>Energy consumption</td>
<td>Dredging: operations</td>
<td>Port development (land)</td>
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<td>8</td>
<td>Habitat loss / degradation</td>
<td>Bunkering</td>
<td>Dust</td>
<td>Dust</td>
<td>Water quality</td>
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<td>9</td>
<td>Traffic volume</td>
<td>Port Development (land)</td>
<td>Port Development (water)</td>
<td>Port development (land)</td>
<td>Dust</td>
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Source: European Sea Port Organisation (ESPO), 2016.
PORT ENERGY MANAGEMENT OBJECTIVES

**Resilience**: ability to sustain business continuity during a power outage and resume operations after a catastrophic event

**Availability**: access to energy sources that are required in order to meet present and future power demand of port operations through energy generation, transmission and distribution

**Reliability**: availability of high quality and consistent energy able to meet predicted peaks in demand

**Efficiency**: reductions in energy demand through management practices and technologies that maximise operational productivity and cost-effectiveness

**Sustainability**: integration of energy management practices and renewable power generation to minimise the depletion of natural resources thus providing economical, social and environmental benefits
PROCESS FOR DEVELOPING A PORT ENERGY MANAGEMENT PLAN

- Energy Mapping
- Gap Analysis (Energy Audit)
  - Preliminary Findings/Recommendations
  - Energy Re-engineering
  - Focus Group Meetings
  - Calculation Reporting Management

- Energy Management Plan
  - Key Performance Indicator
  - Benchmarking

ISO 50001 & EN 16258
STUDY CASES:
PORT OF GENOVA
The study of PEAP Port Environmental Energy Plan aims to better plan the energy-environment in the port area and indicate potential directions of development in order to achieve a more efficient use of energy, with particular emphasis to sources renewable energy and a reduction of the impact of the activities carried out in the port area.
The Port of Genoa is spread over an area of about 700 hectares of land plus 500 hectares of sea along a narrow coastal strip that extends for a length of about 22 km, protected from the open sea by a system of breakwaters.
The PEAP is composed of the following tasks:

**Assessment and planning**

a) Regulatory framework (European, national and regional level)
b) correlations with other planning tools within the port
c) environmental framework
d) condition of the buildings
e) development of guidelines for works
f) strategic environmental assessment
g) planning methods and choices
PORT ENVIRONMENTAL ENERGY PLAN (PEAP)

The PEAP guidelines provide for the following technologies:

1. On shore wind energy
2. Solar, thermal and photovoltaic energy
3. Biomass energy
4. Geothermal and hydrothermal energy
5. Wave power
6. Improvement of energy efficiency of buildings
7. Improvement of energy efficiency of public lightning
8. Improvement of efficiency of cargo transport
### Port Environmental Energy Plan (PEAP)

<table>
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<tr>
<th>EOLIC</th>
<th>Power [kW]</th>
<th>Productivity electric [kWh/a]</th>
<th>Cost [€]</th>
<th>CO2 [t/a]</th>
<th>TDRS [year]</th>
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<tr>
<td>Facility on the Diga Foranes:</td>
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<td>199 kW</td>
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<tr>
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<th>CO2 [t/a]</th>
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<td>6.111.751</td>
<td>24.427.422</td>
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<th>Productivity thermal [kWh/a]</th>
<th>Cost [€]</th>
<th>CO2 [t/a]</th>
<th>TDRS [year]</th>
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<td>Mariotti</td>
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<tr>
<th>DOCS ELECTRIFICATION</th>
<th>Electricity Delivered [kWh/a]</th>
<th>Power - Preparation [MW]</th>
<th>Cost [€]</th>
<th>CO2 [t/a]</th>
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<td>Naval repair areas</td>
<td>50,000,000</td>
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<th>TOTAL OPERATIONS</th>
<th>Cost [€]</th>
<th>CO2 [t/a]</th>
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<tr>
<td><strong>TOTAL</strong></td>
<td>57,942,422</td>
<td>19,682</td>
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PORT ENVIRONMENTAL ENERGY PLAN (PEAP)

✓ This strategy will allow to save almost 10,000 t of CO2 annually with the introduction of 12 plug positions of cold ironing in the naval reparations area. The ferry terminal and a container terminal (Voltri Terminal Europa) with an investment of 13 million euros.

✓ Save 6000 CO2 (t/y) thanks to the wind system with an investment of 20.1 million euros.

✓ Save 3600 CO2 (t/y) thanks consequence of the installation of 29 photo-voltaic structures with an over all investment of 24.4 million euros.

✓ Save 100 CO2 (t/y) thanks to the installation of three solar power stations in port buildings with an investment of 400,000 euros.
ENVIRONMENTAL AND ENERGY PORT CHALLENGES

1. **Exemplifying**: setting a good example for the wider port community by demonstrating excellence in managing the energy and environmental performance of their own operations, equipment and assets

2. **Enabling**: providing the operational and infrastructure conditions within the port area in order to facilitate port users, thus contributing towards enhancing the energy and environmental performance in the port area

3. **Encouraging**: providing incentives to the port users encouraging a change of behavior, inducing continuous improvement of their energy and environmental performance

4. **Engaging**: with port users and stakeholders (e.g. SMEs) as well as competent authorities for sharing knowledge, means and skills towards joint projects targeting energy and environmental improvement in the port area and the whole logistics chain

5. **Enforcing**: making use of mechanisms that enforce good environmental practice