Port and Energy Management Challenges

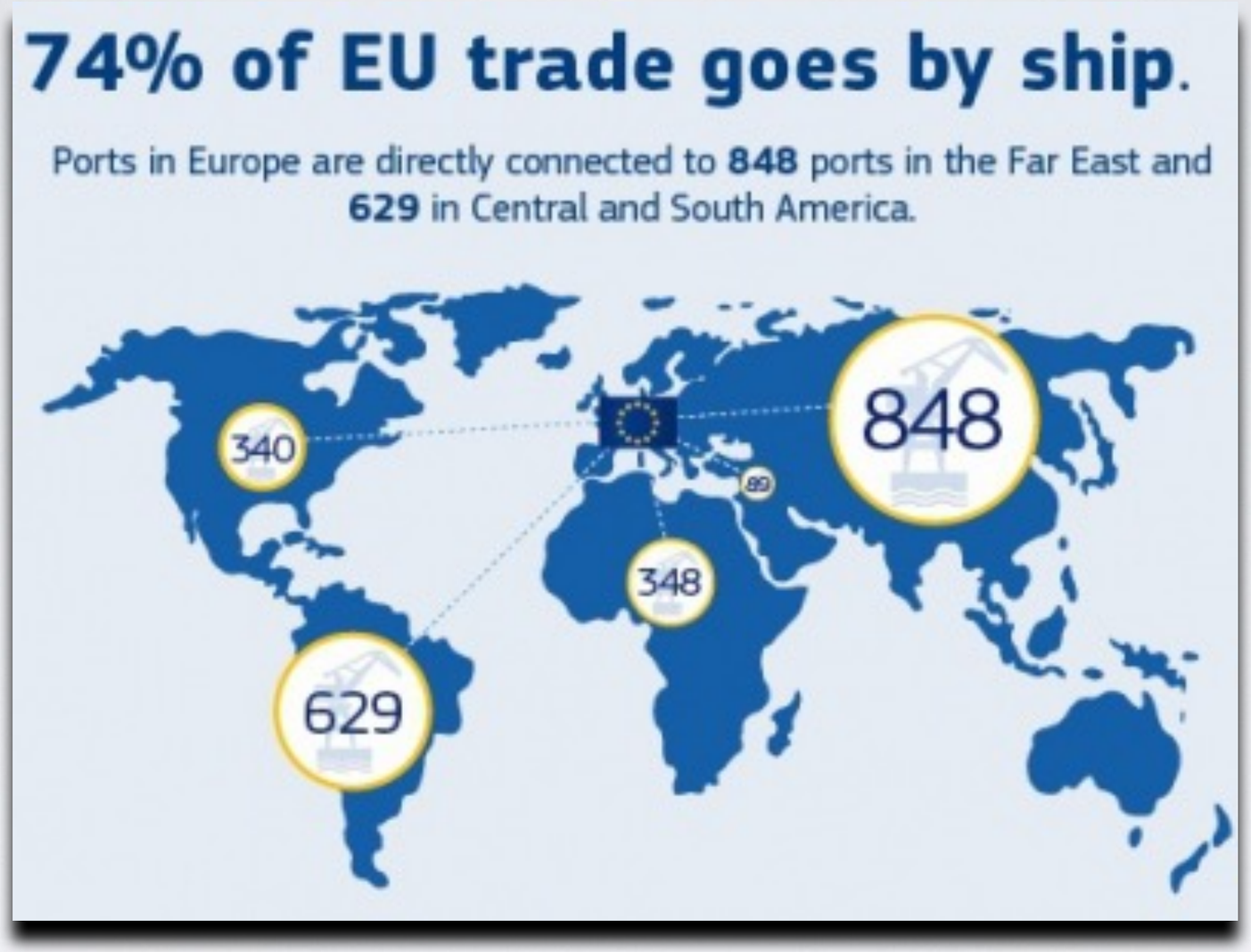
Fabio Ballini Lecturer Maritime Energy Management

WORLD MARITIME UNIVERSITY

CONTENT

- 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

Improving energy efficiency

Reducing Energy Use

Reducing the costs

Managemen t Strategy

ENERGY OBJECTIVES

Monitoring

The primary objective of Energy Management is to maximise profits or minimise the cost

Reducing GHG

Maximise the profit

Reporting

WHY IS PORT ENERGY MANAGEMENT IMPORTANT?

1. Policies and Regulations (EU Directive 2012/27; MARPOL Annex VI; Clean Power Transport Directive 2014/94/EU)

2. Increase Efficiency and Port Performance

3. Cost and Energy Savings

4. Indirect Costs and Externalities

EU AND UN POLICIES AND REGULATIONS

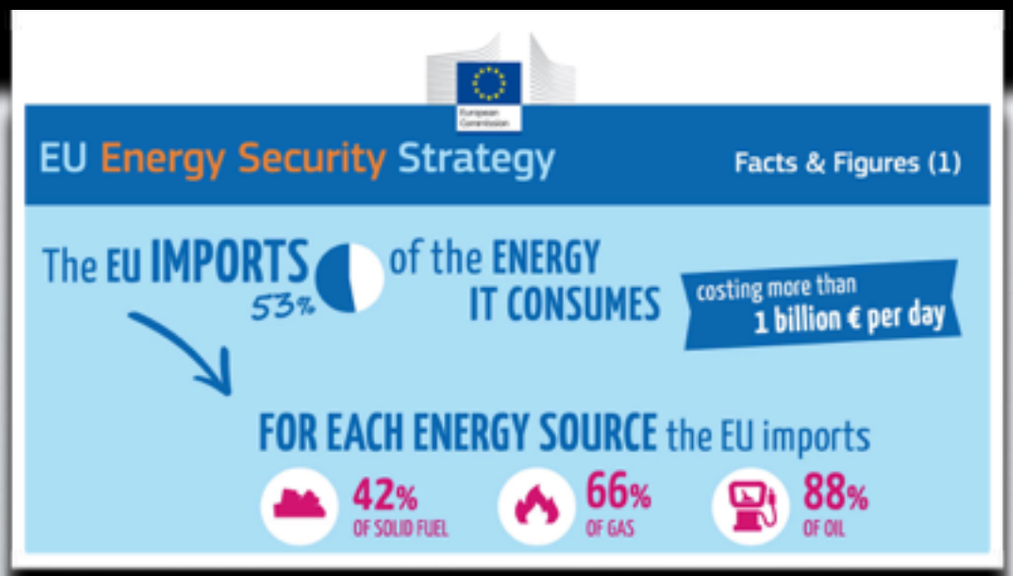
Energy Security Strategy (EC)

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



UN 2030 Sustainable Development

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)

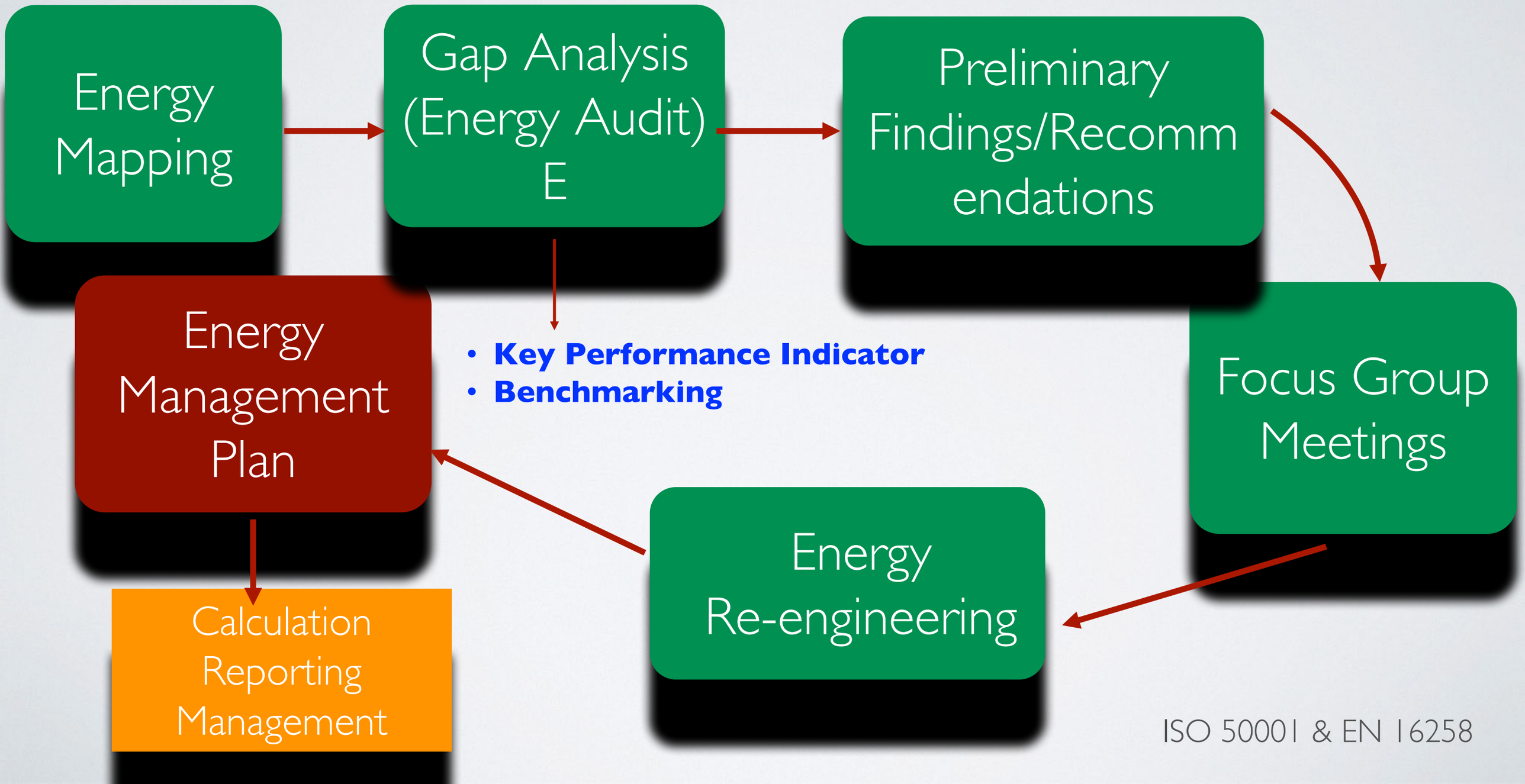
	1996	2004	2009	2013	2016
1	Port Development (water)	Garbage / Port waste	Noise	Air quality	Air quality
2	Water quality	Dredging: operations	Air quality	Garbage/ Port waste	Energy Consumption
3	Dredging disposal	Dredging disposal	Garbage / Port waste	Energy Consumption	Noise
4	Dredging: operations	Dust	Dredging: operations	Noise	Relationship with local community
5	Dust	Noise	Dredging: disposal	Ship waste	Garbage and Port waste
6	Port Development (land)	Air quality	Relationship with local community	Relationship with local community	Ship waste
7	Contaminated land	Hazardous cargo	Energy consumption	Dredging: operations	Port development (land)
8	Habitat loss / degradation	Bunkering	Dust	Dust	Water quality
9	Traffic volume	Port Development (land)	Port Development (water)	Port development (land)	Dust

So

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



STUDY CASES:

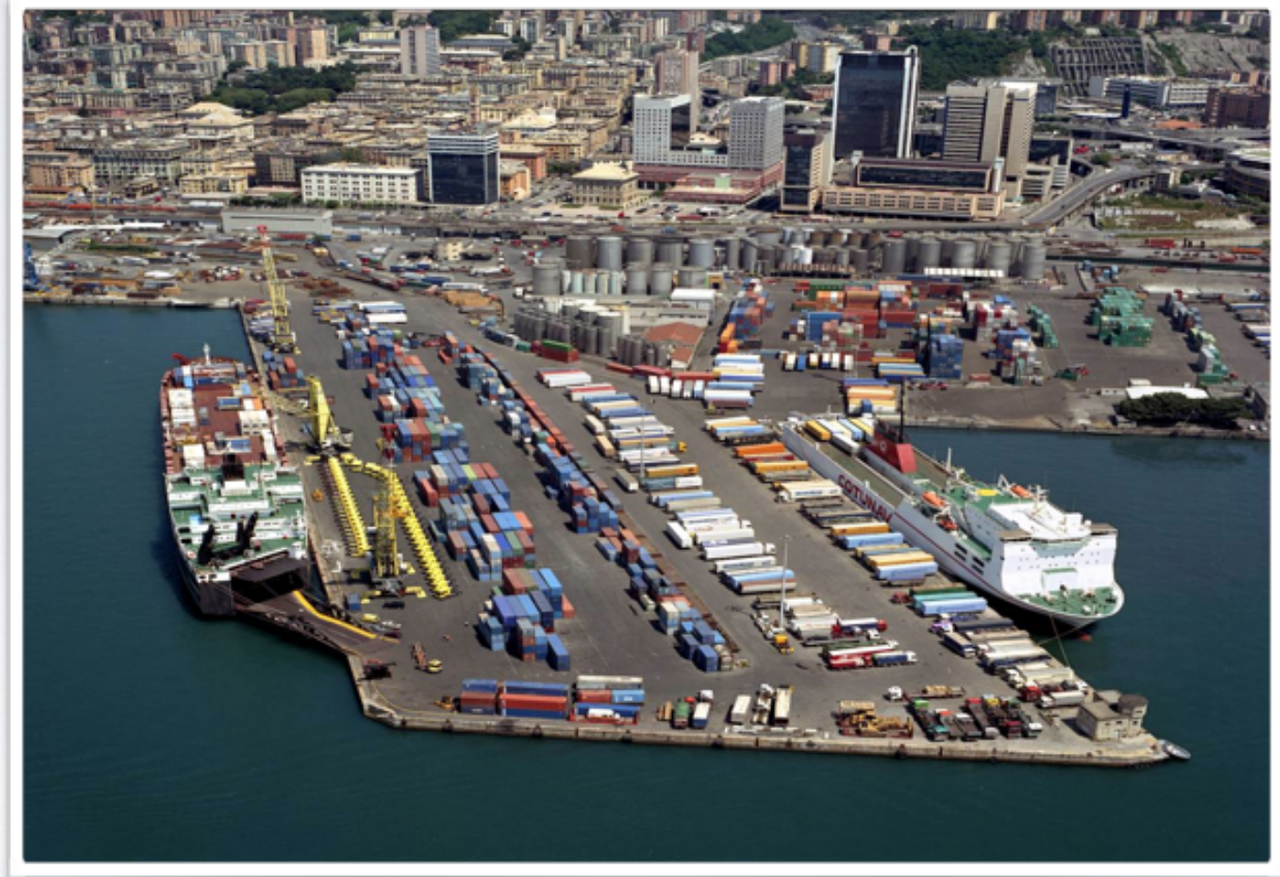
PORT OF GENOVA

PORT ENVIRONMENTAL ENERGY PLAN (PEAP)

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 enphasis to sources renewable energy and a reduction of the impact of the activities carried out in the port area.

PORT ENVIRONMENTAL ENERGY PLAN (PEAP)

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.



PORT ENVIRONMENTAL ENERGY PLAN (PEAP)

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)

Port Environmental Energy Plan (PEAP)

EOLIC		Power [kW]	Producibility electric [kWh/a]	Cost [€]	CO2 [t/a]	TDRS [year]
Facility on the Diga Foranea:	39 torri da 199 kW	7.800	12.000.000	20.110.000	5.966	10,5
TOTAL				**20.110.000**	**5.966**	

SOLAR	Rated power[kW]	producibility electric [kWh/a]	Cost [€]	CO2 [t/a]	TDRS [year]
Distributed systems on the roofs port buildings	5.589	6.111.751	24.427.422	1.222	9,05
TOTAL		**18.111.751**	**24.427.422**	**3.622**	

SOLAR PANEL	n. panel	Producibility thermal [kWh/a]	Cost [€]	CO2 [t/a]	TDRS [year]
Petrolig	14	33.355	63.000	7,57	7
Mariotti	100	247.780	180.000	56,25	7
Centro Servizi Derna	90	191.267	162.000	43,42	7
TOTAL		**472.402**	**405.000**	**107**	

DOCS ELECTRIFICATION	Electricity Delivered [kWh/a]	Power - Preparation [MW]	Cost [€]	CO2 [t/a]	
naval reparation areas	50.000.000	10 - 20	13.000.000	9986,4	
TOTAL		**0**	**13.000.000**	**9986,4**	

TOTAL OPERATIONS			Cost [€]	CO2 [t/a]	
TOTAL			57.942.422	19.682	

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(VoltriTerminal 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 24.4million 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


umesc
Diolch
Kiitos
Sheun
Kasih
Todah
Mamnoon
Shnorhakalutiun
Shokriya
Spaas
Mul
Ačі
Gamsahapnida
Ngiyabonga
Dankie
Shokrun
Xie
Dank
Takk
Cam
Gra
Kop
Salamat
Merci
Dhanyavad
Khopjai
Kruthagnathalu
kun
Arigatou
krap
ThankYou
Tack
Dhonnobaad
Shukriya
Asante
Gomapsupnida
Grazzi
raibh
Gracias
Nandree
Blagodariya
Fyrir
Terima
Enkosi
Danke
dank
Euxaristo
Kun
Hain
Dhan
daa
SUSTAINABLE DEVELOPMENT GOALS