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Promotion of Port Communities SMEs role in Energy Efficiency
and
GREEN Technologies for BERTHing Operations

Priority- Objective 1-1

Axe 1: Strengthening innovation capacities
Objective 1.1: Dissemination of innovative technologies and know-how

WP3.2 Energy Plans Design Index

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WHY DEVELOPING AN ENERGY PLAN?

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1) To disclose the port operation's emissions of greenhouse gases;
2) To identify areas in which improvements can be made;
3) To provide economic benefit as well as environmental benefit;
4) To enable our port to provide environmental sustainable services to port community.

Saving energy means making money:
energy costs are rising and are not likely to drop.

Energy efficiency remains the easiest
And single most cost-effective
way to cut energy use.

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ENERGY SAVING MEASURES

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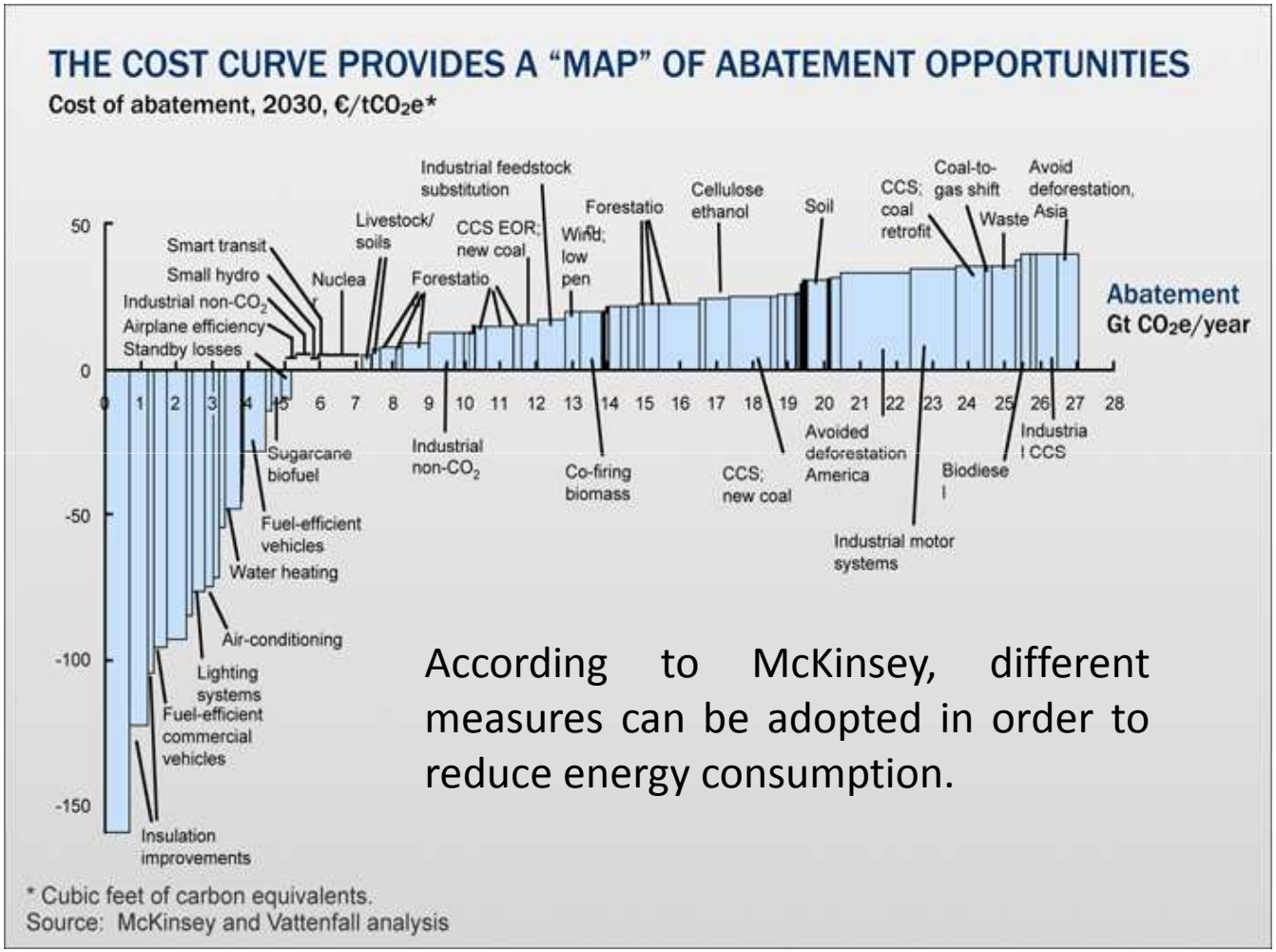

According to McKinsey, different measures can be adopted in order to reduce energy consumption.

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ENERGY MANAGEMENT GOALS

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The main aim of an Energy management plan are:

- Environmental policy implementation;
- Obtaining local community consensus;
- Implement in the Decision Making Processes “energy saving aspects” as an significant item in order to save money;
- More accessibility to EU community Funding Resources;
- Implement Strategic Energy Management Practices in:
  - Purchasing/Procurement Procedures and Specifications
  - Enhanced Design & Port Construction Practices
  - Enhanced Facility Port Operating Practices
  - Cost-Effective Facility Upgrades
  - Active Commodity Management.

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PORT ENERGY NEEDS: TYPE OF PORT DEFINITION

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In terms of ownership and responsibility, ports can be considered as one of two general types:

Landlord Ports – These ports own the land or are given responsibility for managing the land on which the port is located, and in most cases develop the port facilities such as marine terminals, but lease the land and/or facilities to terminal operators who are responsible for the equipment used on the terminals.

Operating Ports – These ports develop, own, and operate the marine terminal facilities and the equipment used on the terminals.

Different types of ports could act in a different way in emissions activity depending on the responsibility the port actually has on the activity.

it is always important to identify and engage stakeholders at the beginning of the process for the construction of Carbon foot printing inventory.

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PORT ENERGY NEEDS: EMISSIONS ACTIVITY DEFINITION

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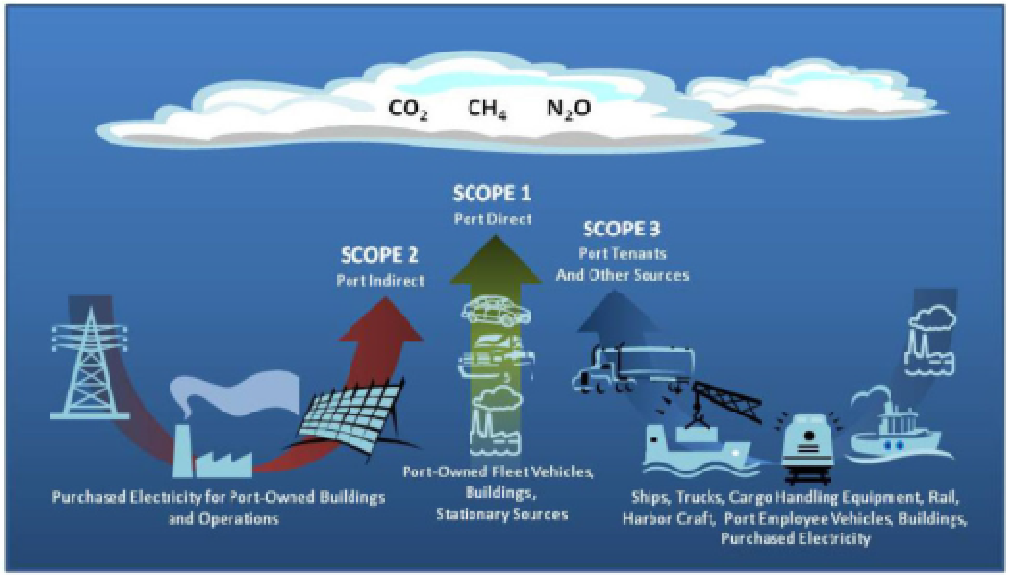
Port Direct Sources: These sources are directly under the control and operation of the port administration entity (fleet vehicles, buildings, port owned and operated cargo handling equipment and any other emissions sources that are owned and operated by the port administrative authority).



Port Indirect Sources: These sources include port purchased electricity for port operations and mobile sources (ships, trucks, cargo handling equipment, rail locomotives, harbor craft).

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PORT ENERGY NEEDS: BOUNDARY DEFINITION

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An important consideration in developing any emissions inventory is the physical and operational area or domain that encompasses the activities to be considered in the energy plan. The boundary definition helps answer the questions of

"exactly which activities am I going to include in my energy plan and where am I going to start counting?"

For example, a port energy plan may include locomotive activity related to port operations over a wide area; the area may go beyond port boundaries and include other locomotive activity that is not related to port operations and, therefore not included in the port inventory.

In this case, the inventory domain is operational as well as geographical, and the geographical extent of the port rail inventory would not include all rail activity within that area.

The geographical boundary could be different depending on source category.

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EMISSION EVALUATION

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Emissions are generally estimated using the following equation:

Emissions = Energy or Fuel Consumption x Emission Factor

The fuel consumption from Port Machinery and shipping may be calculated using two types of methodologies:

- TOP-DOWN: knowing fuel sales data;
- BOTTOM-UP: knowing the fuel consumption and taking into account technical and operating conditions for each engine. It is more exactly and its results better to get the System Efficiency. The consumption of fuel by the vessel fleet is generally modeled using general equation or similar formulas calculating the delivered engine power and resulting fuel consumption of main and auxiliary ship engines and/or Port Machinery.

Represents the emission producing characteristics, varying by source types per unit of energy consumption.

As an example:

For Ships, Emission Factor may be calculated using EMEP/EEA emission inventory guidebook 2009, updated march 2011 (Trozzi - De Laurentis methodology)

http://eea.europa.eu/emep-eea-guidebook

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GUIDING PRINCIPLES FOR ENERGY MANAGEMENT: EMISSION SOURCES

For each of the processes analyzed in WP3.1 it must be determined potential for improvement and specific elements that may be improved.

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GUIDING PRINCIPLES FOR ENERGY MANAGEMENT: EXAMPLE

For different typologies of emission sources there are different calculation methods…and different ways to get energy improvements

Example 1: TOWBOATS

The simplest method to calculate the Fuel Consumption (FC) is to multiply the Specific Fuel Consumption (SFC) with the installed power ($P_{inst,eng.}$) with a load factor (LF) and the time (T) for each activity.

LF = Engine load factor represents the load applied to an engine or the percent of rated engine power that is applied during the engine's operation

HOW TO GET ENERGY IMPROVEMENTS?

- installation of engine retrofits;
- replacement of older boats with newer ones;
- optimization of tow boat - to vessel assignment;
- relocation of the tow boat basis, etc…

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CRITERIA FOR SELECTING ENERGY IMPROVING MEASURES AND INVOLVING SMES

Some measures may be preferred by the port, terminal operators or the port stakeholders in general.

In addition, some of the measures may be more along the line with port policies, than others….

Other considerations for selecting the proper measure(s) could be, for example:

- Local agreement with stakeholders;
- Quantity of energy saving and emissions reduction, related with relative investments;
- Feasible works in the immediate future;
- Payback investment time.

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CRITERIA FOR SELECTING ENERGY IMPROVING MEASURES AND INVOLVING SMES

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As it has been done for APICE project, we suggest an *Actions Evaluation*.

CO2 EMISSIONS REDUCTION POTENTIAL

MEASUREABLE RESULTS

IMPLEMENTABILITY

CRITERIA
(to be evaluated by port and stakeholders)

TIMEFRAME

.....

COSTS

TECHNICAL FEASIBILITY

COST-EFFECTIVENESS

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ACTIONS EVALUATION MATRIX

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ACTIVITY/SOURCE	ACTION (title)	C1	C2	C3	C4	.....
Vessel at berth	Shore power (hotelling)					
	Retrofitting technologies					
	more					
Cargo handling equipment	Fleet turnover					
	Idle reduction programs					
	Electric powered equipment use					
	(more)					
Rail traffic emissions	Accelerated fleet turnover					
	Retrofitting technologies					
	Track electrification					
	Alternatives to diesel locomotives					
	Increase rail ratio through economic incentives					
	Improvement of rail system Optimization of timing and paths (access, avoid congestion)					
	(more)					
Diesel road vehicles	Idle reduction programs					
	Environmental excellence certification for trucks					
	Accelerated fleet turnover					
	Retrofit technologies					
	Improvement of road system Optimization of timing and paths (access, avoid congestion)					
	(more)					
Ship services (tugs)	Engine retrofit					
	Fleet turnover					
	Relocation of tow boats basis					
	Optimization of timing and paths					
	(more)					
Stationary sources (reefer, lighting, tenants building)	Creating a dedicated area in each container terminals equipped with reefer plugs served with green energy					
	New technologies for reefer engines					
	Changing in lighting technologies (i.e. implementing led use)					
	Tenant bulding climatization system optimization/retrofitting					
	Building isolation					

ACTIONS EVALUATION
MATRIX OUTPUT: ENERGY PLAN

Analysis with local community can help in select the energy plan measures (and pilot to be chosen!?).

Timing to improve actions, way to monitor, track & Improve performance must be described in the energy plan

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THANK YOU FOR THE ATTENTION!

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