Best Environmental Practices for the development of Green Ports

Rafael Company
Project Manager
Port of Valencia

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     - ✓ *CLIMEPORT*
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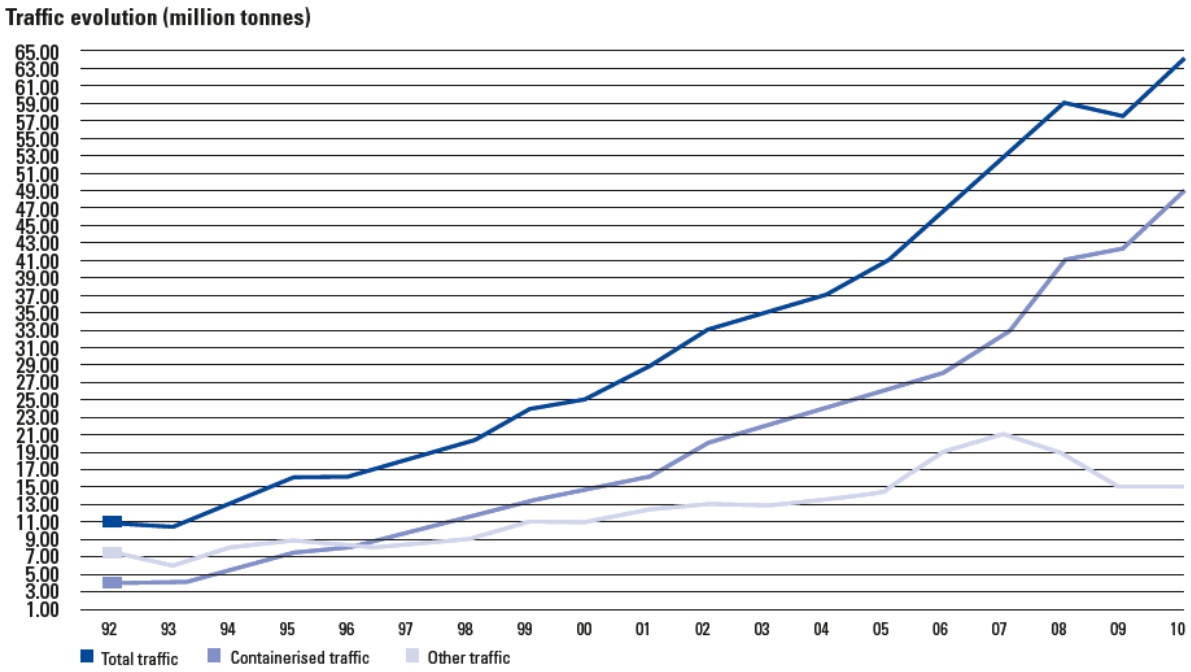
Big figures: Port of Valencia



- VPA manages 3 ports:
  - ✓ Sagunto
  - ✓ Valencia
  - ✓ Gandia
- Tons moved in 2010 (difference with 2009)
  - ✓ 64.028.786 tons (+10,81%)
- Container traffic in 2010 (difference with 2009)
  - ✓ 4.206.937 TEUs (+15,14%)
- Vessels: 7.043 (+3,48%)
- Container vessels: 3.147 (+5,43%)

Rnkg	PORT	2009
1	ROTTERDAM	10,8
2	HAMBURG	9,7
3	ANTWERP	8,66
4	BREMEN	5,6
5	**VALENCIA**	**3,6**
6	GIOIA TAURO	3,47
7	ALGECIRAS	3,32
8	FELIXTOWE	3,2
9	BARCELONA	2,57
10	LE HAVRE	2,5

I ON TECHNOLOGICAL INNOVATI
E DEVELOPMENT OF PORT SYST

Valenciaport Mission

“To favour the competitiveness abroad of the economic and social fabric of its area of influence by means of a **competitive offer** in terms of price and quality and maritime, intermodal, logistic and **port infrastructures and services**, in line with European transport policy and **social demands”**.

Port cities must become integrated into their environments to try and ensure that sustainable development takes places in harmony with the economy prosperity and the social development generated by port activities.

Strategic Plan

Objectives:

- **To consolidate Valenciaport** as the major **transoceanic** gateway of the Iberian Peninsula.
- To convert the port into the regional distributing hub and the **leading intermodal logistics platform on the Western Mediterranean**.
- **To have capacity** -in terms of resources, infrastructures and services- to successfully tackle a traffic movement of 90 million tons and 6 million TEU in 2015.
- Linked to these strategic objectives, the Port Authority of Valencia focuses its **priorities on:**
  - Consolidating and strengthening the deep sea status of its ports
  - Developing its intermodal logistics platform nature
  - Expanding the services it provides to the key traffics in the Valencian Region and Iberian Peninsula and,
  - **Ensuring the sustainable development model of its ports.**

Environmental background

Year	Environmental Certifications	
2000	Environmental Policy approved on 12 April 2000 and revised by the Board of Directors of AVP on12 January 2006.	
2003	APV is the first Spanish Port to obtain the certificate in the Port Environmental Review System (PERS)	ECOPORTS PERS CERTIFIED
2006	APV achieved certification of the EN ISO 14001-2004 Standard on Eco-management in response to commitments acquired in its Environmental Policy	
2007	APV received **EMAS II** Validation and Verification (A Community Eco-management and Audit. Scheme). In this way, the Valencia Port Authority now possesses the ideal tools for achieving its environmental objectives and goals as stipulated in the Environmental Policy	EMAS VERIFIED ENVIRONMENTAL MANAGEMENT
2000-2011	**Environmental Projects & Initiatives**	

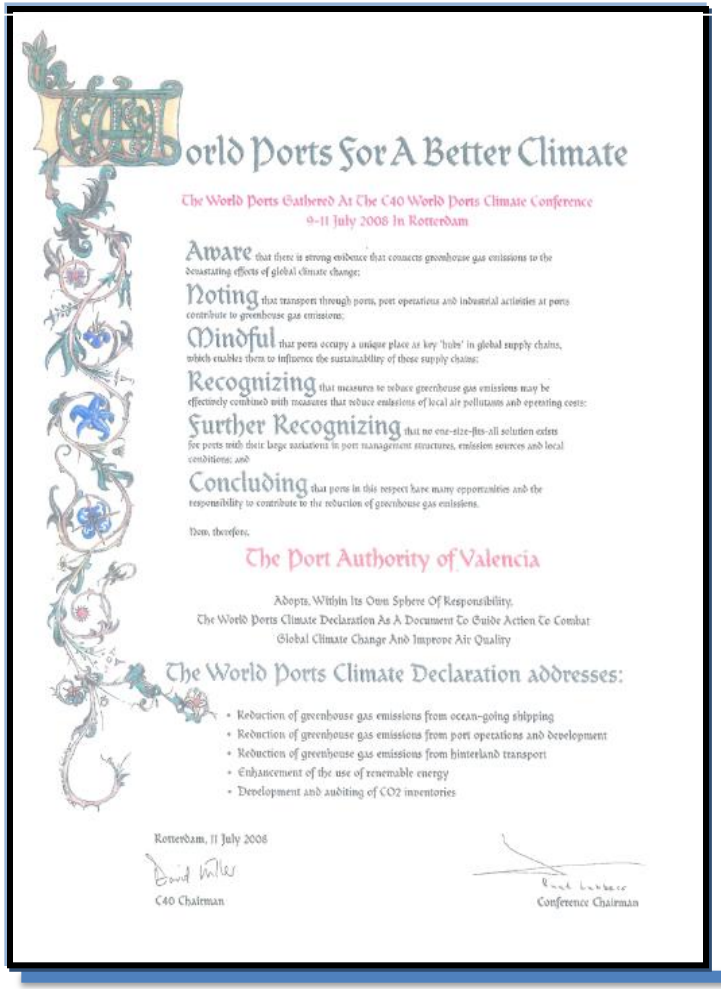
ECOPORT (LIFE), ECOPORTS(FP5) , HADA (LIFE), INDAPORT (National), SIMPYC (LIFE), NOMEPORTS (LIFE), ELEFSINA BAY 2020 (LIFE), MADAMA (Interreg), EFICONT (National), ECOLOGISTYPORT (National), CLIMEPORT(MED),…..

Networks : AIR QUALITY, NOISE MONITORING, WATER QUALITY CONTROL, ECOPORT LEX

Promotion and Dissemination: Environmental Good Practices guides, Guide for the Implementation of Eco-management Systems in Ports (I and II (by levels)), Newsletters, Brochures, Conferences, Workshops, ….

Environmental background

Ports declaration for a better climate
In Rotterdam



World Ports For A Better Climate

The World Ports Gathered At The C40 World Ports Climate Conference
9-11 July 2008 In Rotterdam

Aware that there is strong evidence that connects greenhouse gas emissions to the devastating effects of global climate change;

Noting that transport through ports, port operations and industrial activities at ports contribute to greenhouse gas emissions;

Mindful that ports occupy a unique place as key 'hubs' in global supply chains, which enables them to influence the sustainability of these supply chains;

Recognizing that measures to reduce greenhouse gas emissions may be effectively combined with measures that reduce emissions of local air pollutants and operating costs;

Further Recognizing that no one-size-fits-all solution exists for ports with their large variations in port management structures, emission sources and local conditions; and

Concluding that ports in this respect have many opportunities and the responsibility to contribute to the reduction of greenhouse gas emissions.

Now, therefore,

The Port Authority of Valencia

Adopts, Within Its Own Sphere Of Responsibility,
The World Ports Climate Declaration As A Document To Guide Action To Combat
Global Climate Change And Improve Air Quality

The World Ports Climate Declaration addresses:

- Reduction of greenhouse gas emissions from ocean-going shipping
- Reduction of greenhouse gas emissions from port operations and development
- Reduction of greenhouse gas emissions from hinterland transport
- Enhancement of the use of renewable energy
- Development and auditing of CO2 inventories

Rotterdam, 11 July 2008

C40 Chairman

Conference Chairman

Voluntarily commitments

Charter for Sustainable Development of
Port Cities -AIVP

We, members of the International Association Cities and Ports, have gathered in Sydney for the 10th International Conference Cities and Ports. We hereby mutually undertake to respect and promote the…

Charter for Sustainable Development of Port Cities

PREAMBLE

Steadily growing international trade in goods and services plays a major role in shaping the economic and social face of the world. The strategies of alliance and competition among countries, regions or cities to turn economic flows to profit are increasingly determined and complex. Decision-makers, whose job it is to formulate policies capable, in the medium or long run, of satisfying collective needs, have more and more difficultly understanding and anticipating those strategies.

Many decision-makers feel a profound unease, compounded by their growing realisation that our natural resources are mismanaged, limited and subject to natural regulatory mechanisms whose complexity we are only just beginning to grasp.

They are at once aware of the global challenges involved in development and the protection of environmental resources and powerless before individual and collective self-interests; the solution is to join forces to better manage our resources and needs. As part of that effort to improve resource management, we must seek new social equilibriums capable of bringing everyone a better quality of life and of creating jobs. This entails adopting international standards and setting up effective organizations that can make themselves heard and exert influence on the global players.

Port cities are the advanced posts of globalisation. Worldwide economic movements transit through those cities, alternately benefiting and destabilising them. They are beginning to organise, both individually and jointly, in local, national or international networks so that they can more effectively and durably manage the impacts of the global economic players' strategies on their communities and on their economic and social development.

Though no doubt witnesses, port cities are also responsible stakeholders in globalisation and obviously have a particularly legitimate right to make their voice heard and to weigh on collective decision-making. Conscious of their place in regional development strategies and in economic circuits, stakeholders in port cities – the cities, the ports and all their economic and institutional partners – firmly intend to:

- work together to find solutions for the sustainable development of each and of all;
- cooperate with the national and international organisations seeking to devise rules to protect the earth's natural resources and at the same time improve its populations' quality of life;
- become initiators of proposals to promote a new political, economic, social and environmental approach to global economic trade and to the management of port cities, growing at an ever faster pace.
- establish a privileged relationship with global maritime operators competing in the race for ever huger ships.

Best Practices in Energy

Energy Efficiency **(EE)** encompasses all changes that result in a reduction in the energy used for a given energy service or level of activity. This reduction in the energy consumption is not necessarily associated to technical changes, since it can also result from a better organization and management or improved economic efficiency in the port sector

-World Energy Council (WEC)-

TECHNOLOGICAL INNOVATIVE MANAGEMENT SOLUTIONS → **ENVIRONMENTAL IMPACT REDUCTION OF VESSELS AND PORT MACHINERY** → **A BETTER QUALITY OF LIFE AND PORT-CITY RELATIONSHIP** → **GLOBAL IMPACT**

Projects focus on Energy Efficiency:

- ❑ *EFICONT*
- ❑ *CLIMEPORT*

Driving Energy EFFiciency in CONTainer Terminals

EFICONT (Energy Efficiency in Container Port Terminals) project is a relevant research proposal of which the main mission consists in integrating a set of significant improvement measures in terms of energy efficiency in ports, especially in container port terminals (CPTs).

EFICONT is a project within the framework of the “National subprogram for sustainable mobility and modal split in transport” of the “Energy and Climate Change Strategic Action” of the “National Plan of R&D 2008-2011” and, in particular, within the thematic “Improvement of the operative and energy efficiency of transport terminals”

Energy Efficiency in Equipment

Methods to improve the Energetic Efficiency:

- Technological improvements focused on the modernization and improvement of ancient equipments
- New Technologies in new equipments

OBJECTIVES

- *Reduction of operative costs*
- *Fuel Consumption Reduction*
- *Emission Reduction*
- *Noise Reduction*

Energy Efficiency applied to Container Terminals:

Logical-operative aspect:

Improve the port productivity

Equipments aspect:

Upgrades made to the machinery efficiency

Reduction of the energy consumption

Reduction of the operational cost

Increase competitiveness

Main Principles of ecological port equipment development

- To reduce diesel emissions and NOx and PM
  - Emission legislation drives development

  → Use of alternative fuels like gas (LPG, CNG and LNG) or various biofuels

- To reduce fuel consumption and CO2
  - Take benefit of the specific cyclic mode of operation
  - Run diesel engine only when needed
  - Use of various types of energy storages
  - Automation

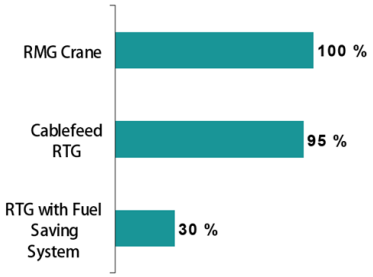
  → Hybrid vehicles

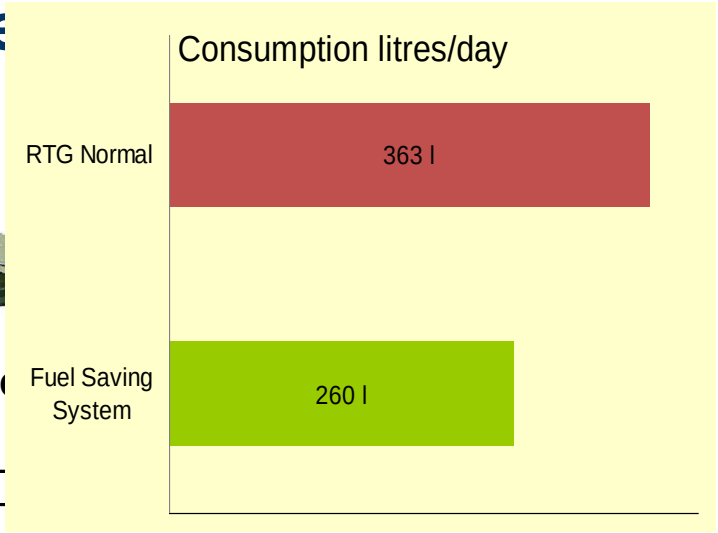
  → Automated hybrid vehicles

- Equipment with AC-supply
  - Zero emission vehicles

  → Direct or plug-in battery AC-supply

Energy Output in Yard Equipme





- Hydraulics: Varying between 22 and 30 l/h
- Fully Electric: Varying between 22 and 14,5 l/h

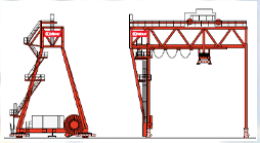
Reach Stackers: App. 15 l/h

Tuck Master: From 4,8 to 8,5 l/h

Conclusions:

Elimination of Diesel machinery, noisy and pollutant

Use of renewable energies

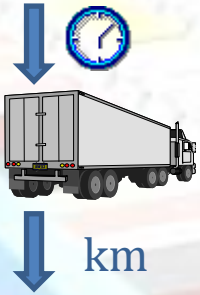


Use of electrical RMGs

Reduction of soil pollution due to spills or accidents

$$max(min)f(x)$$
$$x \in \Omega \subseteq \mathbb{R}^n$$

Movement optimization and traffic reduction



Waiting time minimization

Reduction of truck's displacements

Reduction of CO2 emissions

Projet cofinancé par le Fonds Européen de Développement Régional

Project cofinanced by the European Regional Development Fund

MEditerranean PORTs' Contribution to CLImate Change Mitigation

Objectives

✓ Evaluate the environmental impact of Mediterranean Ports to Climate Change

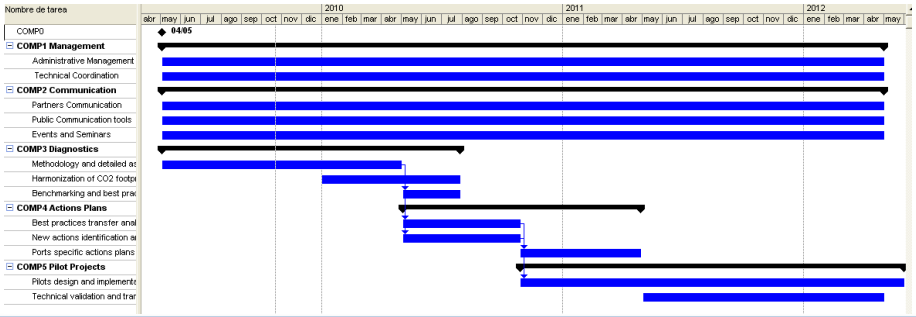
✓ Define the possibilities of alignment of European and national policies and measures concerning with port strategies to combat Climate Change

✓ Design action plans focused on the critic activities which affect environment and society

✓ Assess the costs and benefits arisen from the action plans adopted

✓ Study the state of the art technologies and developing pilot initiatives based on efficient energy systems

Start: 4-05-2009
End: 30-04-2012
Budget: 1.610.454 €
Funding: 1.239.221 €



Consortium

European Mediterranean Ports

Autoridad Portuaria de Valencia

Puerto Bahía de Algeciras

LUKA KOPER
Port of Koper

Morseille Fos

Piraeus

Autorità portuale Livorno

Energy Experts

ITE
INSTITUTO TECNOLÓGICO DE LA ENERGÍA

aven
Agencia Valenciana de la Energía

GOLEA

Technological Components

C3. CURRENT SITUATION OF PORTS ACCORDING TO GHG EMISSIONS

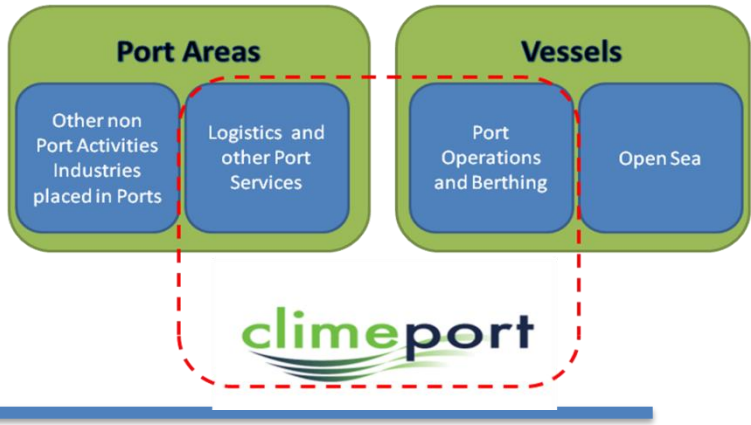
3.1 Methodology and Detailed Assessment
3.2 Harmonization of CO_2 Footprint Evaluation
3.3 Benchmarking and Best Practices Identification

C4. ACTION PLANS

4.1 Best Practices Transfer and Implementation Barrier Analysis
4.2 New Actions Identification and Common Implementation Plan
4.3 Port Specific Action Plans

C.5 PILOT PROJECTS

5.1 Pilot Design and Implementation
5.2 Technical Validation and Transferability



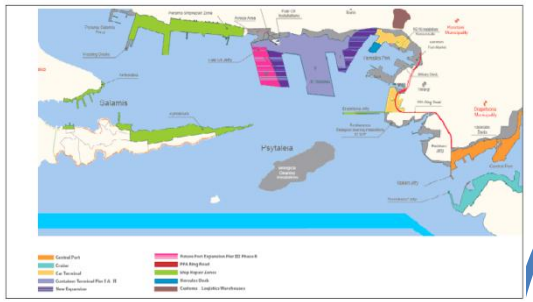
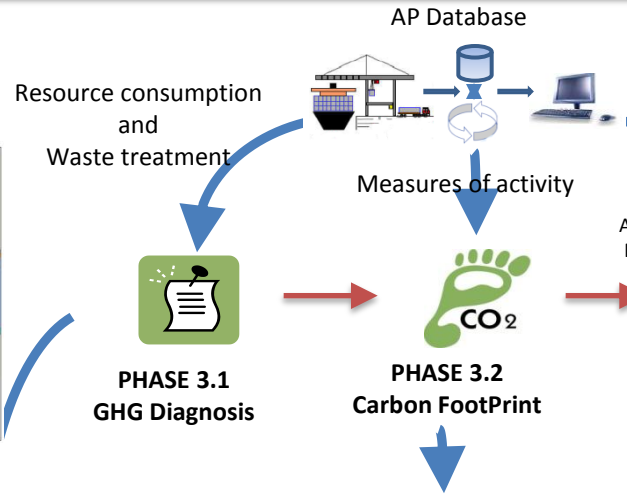
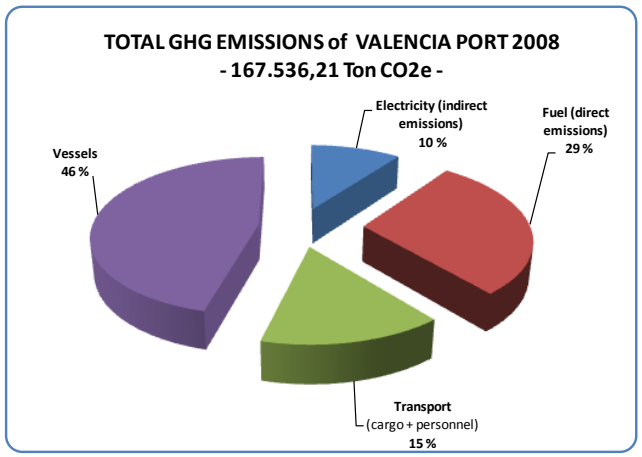


Figure 1: Piraeus Port map





Calculation of the real Carbon Footprint . About 90% of total traffic	GHG Emissions Ratio
1.- Activities (known data)	1,09
2.- Services (Public and private)	0,10
3.- Rest of activities	0,01
4.- Mobility	0,48
5.- Vessels	1,48
TOTAL (KgCo2e)/Total traffic (Ton)	**3,17**

Calculation of the real Carbon Footprint to Containers Terminals	GHG Emissions Ratio
1.- Activities (known data)	1,17
2.- Services (Public and private)	0,10
3.- Rest of activities	0,01
4.- Mobility	0,48
5.- Vessels	1,14
TOTAL (KgCo2e)/Total traffic (Ton)	**2,91**

Action area	Actions	Impact	Nº Best Practice
Improvement in the consumption of exterior lighting of roads, yards and docks.	Flow reductions in night time. Promotion the incorporation or replacement of equipment of high efficiency	Indirect emissions: Electrical consumption	1
Reduction of machinery fuel consumption.	Automatic shutdown in case of stand-by Management and control of fuel consumption per employee-machine.	Direct emissions: Fuel consumption	2
Promotion the management of electric demand	Analysis of quarter hours, alarms overruns, load test. Establishment of consumption patterns	Indirect emissions: Electrical consumption	3
Improvements in facilities maintenance processes	Fixed: verification of losses in electrical wiring for overloaded lines (reactive compensation)	Indirect emissions: Electrical consumption	4
Improvements in facilities maintenance processes	Review of maintenance plans (Eg: reducing leaks in compressors, optimal performance of a/conditioning)	Indirect emissions: Electrical consumption	5
Improvements in energy management of the concessionary companies	Promotion implementation of energy management systems.	Direct and indirect emissions	6
Reduction of emissions in park of vehicles	Industrial hybrid vehicles.	Mobility	7

IMPACT

ACTION S PLAN DEFINITION

✓ **Level 1: The Port as a whole.** It allows to measure and evaluate the global influence that the action plans, and the impact of the ports in the environment, as well as compare it with other human activities.

✓ **Level 2: Port Activities.** The port activities will have different responsible and different final objectives as economic activities. Consider the distinction among port services like passengers transport, goods transport and so on. Allows comparison between different size ports

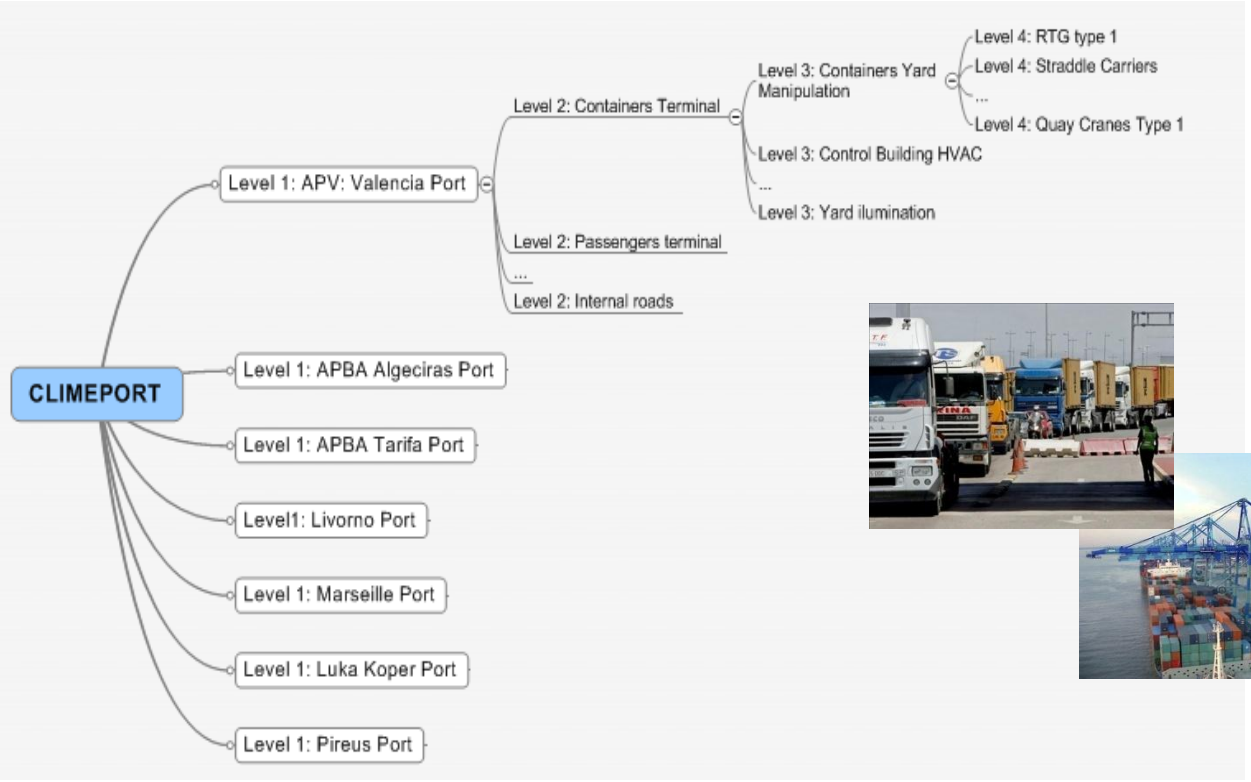
Note that the level 2 is equivalent to the installation division described at ISO 14064-1: 2006: Greenhouse gases -- Part 1.

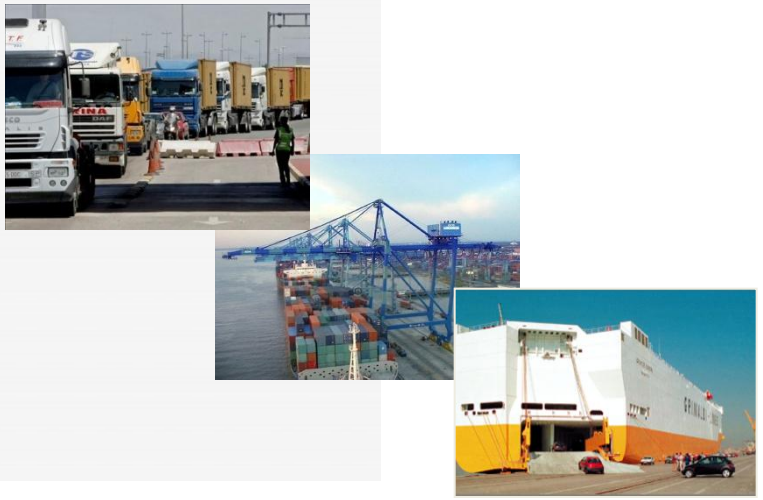
✓**Level 3: Services and processes.** To carry on the activities, several processes with specific equipment and standard units (energy distribution, buildings, passenger vehicles, etc.). Identical division inside the same activity in different ports. Focus the actions plans in services with higher improvement potential

✓ **Level 4: Equipment**. The elements used to produce the different services. This division will allow checking the performance of the different possible manufacturer/type of equipment for the same service, vehicle, crane, HVAC equipment, etc, in order to change or specify the more efficient or suitable.

Note that level 3 and 4 means a systematic way, specific for ports classification of GHG sources and sinks that appear in ISO documents.

C3.1 Methodological Approach. GHG Diagnosis and Inventory



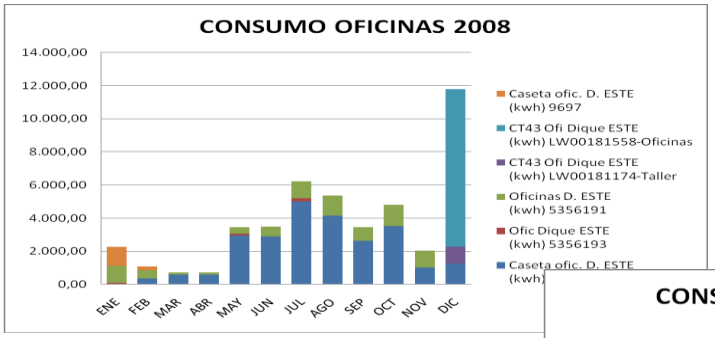


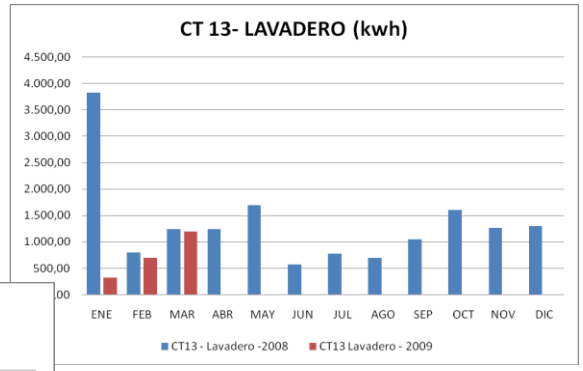
C3.1 Methodological Approach. GHG Diagnosis and Inventory

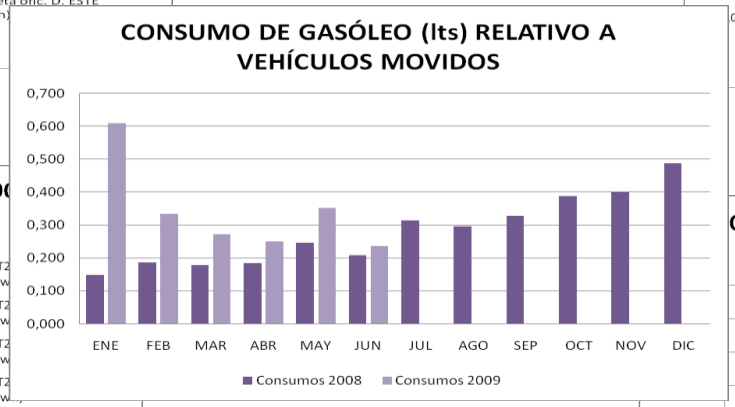
LEVEL 2

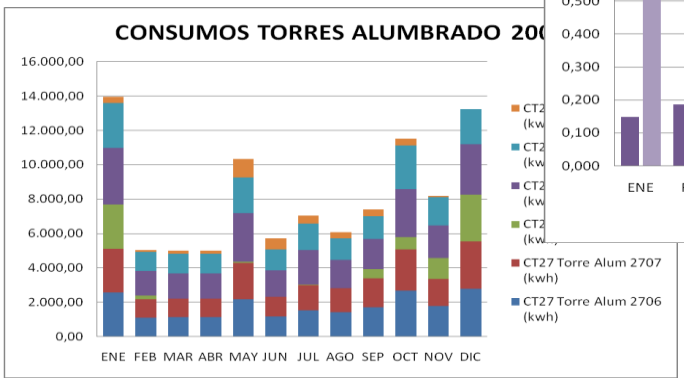
C3.1 Methodological Approach. GHG Diagnosis and Inventory

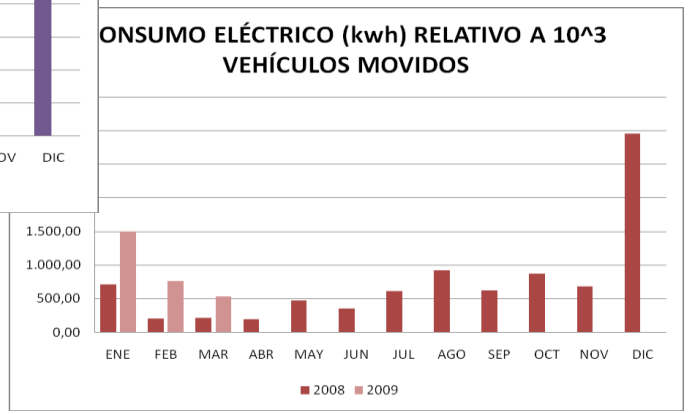
LEVEL 3











C3.1 Methodological Approach. GHG Diagnosis and Inventory

LEVEL 4

Energy Maps:

- Total Consumption
- Energy Intensity : consumption by unit of cargo (ton)
- Consumption graphics

		CONSUMO AGUA (unidades)	ELECTRICIDAD INSTALAC. FIJAS (kwh)	ELECTRICIDAD INST. MÓVILES (kwh)	ELECTRICIDAD TOTAL (kwh)	CONSUMO GASOLEO (litros)	TONELADAS DE MERCANCÍA MOVIDAS EN LA TERMINAL	DESGLOSE DE MAQUINARIA
2008	ENERO	144	80.100	3.241	83.341	57.913	222.427	4 grúas + 7 palas + 2 carretillas
	FEBRERO	170	72.990	654	73.644	45.172	155.913	4 grúas + 7 palas + 2 carretillas
	MARZO	232	87.390	1.277	88.667	38.802	96.396	4 grúas + 9 palas + 2 carretillas
	ABRIL	403	87.390	976	88.366	27.915	127.703	4 grúas + 9 palas + 2 carretillas
	MAYO	401	137.790	325	138.115	17.886	128.917	4 grúas + 9 palas + 2 carretillas
	JUNIO	511	127.350	525	127.875	16.000	176.629	2 grúas + 9 palas + 2 carretillas
	JULIO	670	116.820	0	116.820	58.180	154.984	2 grúas + 9 palas + 2 carretillas
	AGOSTO	601	151.740	0	151.740	51.173	255.582	3 grúas + 9 palas + 2 carretillas
	SEPTIEMBRE	690	119.880	732	120.612	26.651	131.982	3 grúas + 9 palas + 2 carretillas
	OCTUBRE	754	128.700	0	128.700	47.003	166.421	3 grúas + 10 palas + 2 carretillas
	NOVIEMBRE	636	59.490	0	59.490	22.492	73.952	3 grúas + 10 palas + 2 carretillas
	DICIEMBRE	841	108.360	0	108.360	21.007	95.251	3 grúas + 10 palas + 2 carretillas
	TOTAL	6.053	1.278.000	7.730	1.285.730	430.194	1.786.157	
	PROMEDIO	504	106.500	644	107.144	35.850	148.846	
2009	ENERO	656	69.030	0	69.030	27.622	148.463	3 grúas + 10 palas + 2 carretillas
	FEBRERO	121	88.020	125	88.145	32.933	103.869	3 grúas + 10 palas + 2 carretillas
	MARZO	110	42.217	600	42.817	31.333	110.642	3 grúas + 10 palas + 2 carretillas
	ABRIL	88	80.957	0	80.957	35.187	125.295	3 grúas + 10 palas + 2 carretillas
	MAYO	134	91.977	0	91.977	27.855	113.262	
	JUNIO							
	JULIO							
	AGOSTO							
	SEPTIEMBRE							
	OCTUBRE							
	NOVIEMBRE							
	DICIEMBRE							
	TOTAL	1.109	372.201	725	372.926	154.930	601.531	
	PROMEDIO	222	74.440	145	74.585	30.986	120.306	

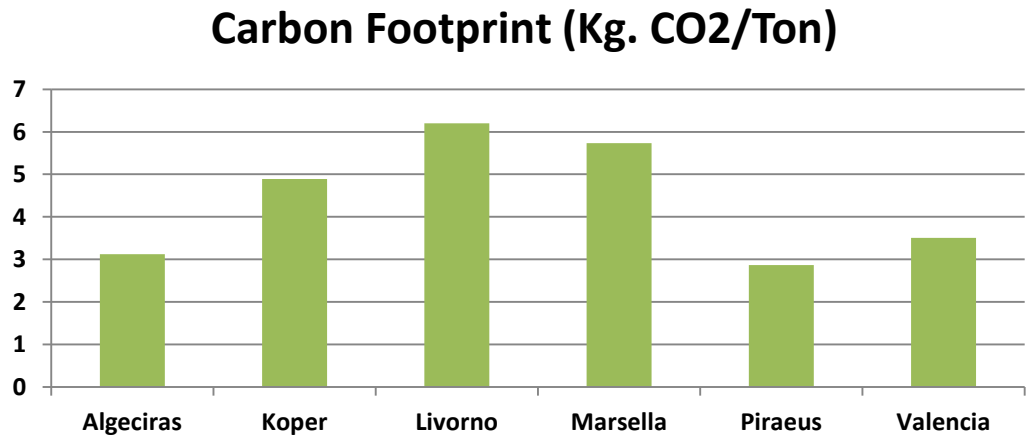
C3.2 Methodological Approach. CO_2 FootPrint Evaluation

Description:

This phase will provide the actions to harmonize the information and data collected in the previous phase. The objective is to obtain a group of indicators which allow specific and quantitative measures of the aspects related to GHG emissions in the ports.

C3.2 Methodological Approach. CO_2 FootPrint Evaluation

	Electrical Consumption KWh	Fuel Consumption (Litres)	Carbon Footprint (Kg. C02)
Algeciras	65.396.051	12.807.927	3,12
Koper	23.195.436	3.928.329	4,89
Livorno	136.578.400	8.370.850	6,2
Marsella	43.216.774	11.763.550	5,73
Pireaus	28.063.000	2.291.396	2,87
Valencia	41.843.337	14.333.394	3,17

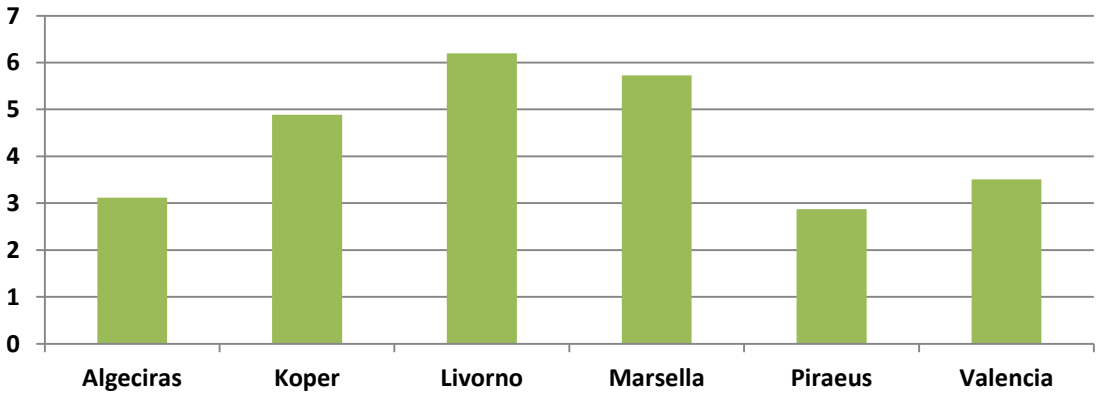


C3.2 Methodological Approach. CO_2 FootPrint Evaluation

WHAT IS A CARBON FOOTPRINT?

A carbon footprint is a measure of the impact our activities have on the environment, and in particular climate change. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels for electricity, heating , transportation etc.

Carbon Footprint (Kg. CO2/Ton)



Carbon footprint of **the total goods traffic**

Example of an specific activity :

Calculation of the real Carbon Footprint to Containers Terminals	GHG Emissions Ratio	
1.- Activities (known data)	1,17	
2.- Services (Public and private)	0,10	
3.- Rest of activities	0,01	
4.- Mobility	0,48	
5.- Vessels	1,14	
TOTAL	**2,91**	**(KgCo2e)/Total traffic (Ton)**

✓ Real carbon footprint of the Port of Valencia to **containers terminals** is 2,91kgCO_2e/Ton.

C3.3 Benchmarking and Best Practices Identification

Description

Finally in order to study a common set of transferible experiences among participant and interested ports. The porjact has established a common methodology to identify and evaluate the known impact through the use of a common set of indicators.

Algeciras

Koper

Livorno

Marseille-Fos

Piraeus

Valencia

	Section	Indication of the content
1	Title of the practice	
2	Precise theme/issue tackled by the practice	
3	Objectives of the practice	
4	Location	- Country/Region/Port
5	Detailed description of the practice	- Origin - Timescale - Bodies involved/implementation - Process and detailed content of the practice - Legal framework - Financial framework
6	Evaluation	- Possible demonstrated results (e.g. through indicators - Possible success factors - Difficulties encountered
7	Lessons learnt from the practice	
8	Contact information	
9	Other possible interesting information	- Website - Various documents (reports, presentations)

1. Energy Efficiency and Savings
2. CO2 Reduction
3. Renewable Resources Integration
4. Mobility/ Logistic Improvement
5. Waste Reduction
6. CO2 compensation / CO2 sinks
7. Other

C3.3 Benchmarking and Best Practices Identification

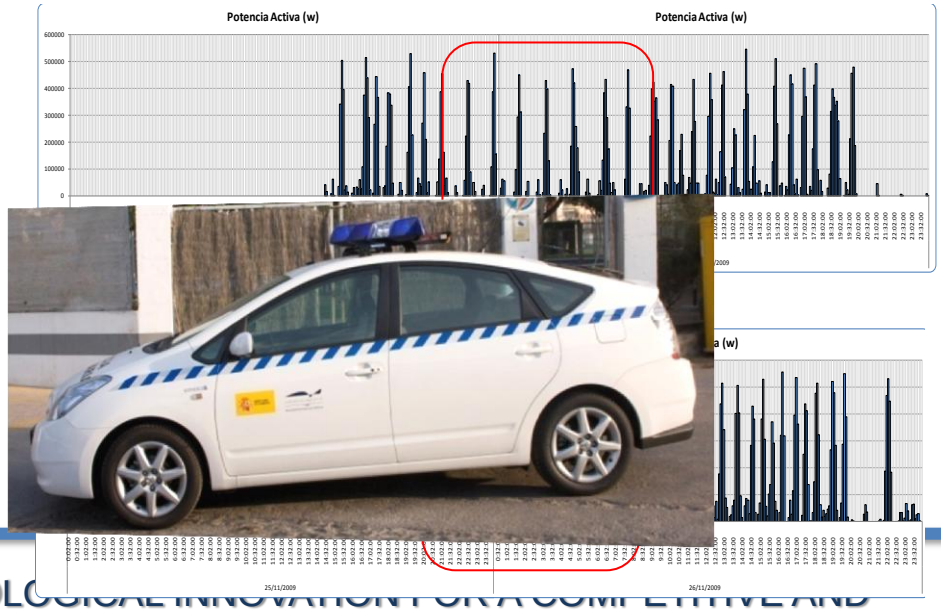
ID Nº.	NAME DESCRIPTION	SCOPE LEVEL	PORTS IMPLEMENTED IN	TOPICs
1	**Improvement in the consumption of exterior lighting of roads, yards and docks**	This good practice provides savings in fuel consumption and emissions reductions in outside lighting by installing flow reducers and energy efficient equipment. Lowering light pollution of the port (adaptation of lighting the proportion of luminous flux). Reduction of energy consumption (replacement of existing bulbs with energy-saving using High Pressure Sodium lamps, using motion sensors at specific areas of the port parking), etc.	Valencia Koper	1,2
7	**Emission reductions in fleet vehicles in Port Authority.**	Incorporation of hybrid cars in the fleet.	Valencia, Algeciras, Livorno	2,3
27	**Improvement of the energy efficiency of buildings.**	Implementation of green roof project. This good practice allows partial capture of CO_2 emissions, limitation of energy losses of the building and improvement of thermal insulation of the building.	Piraeus	1, 6, 7 (better view of the port, noise absorption…)
29	**Recycling of Hydrocarbon Residues.**	Get back the hydrocarbon fraction of the waters of oil dumping of tankers to recover it in fuel	Marseille	5
n	…	…	…	…

30 BPs Identified

1. *Improvement in the consumption of exterior lighting of roads, yards and docks.*
2. *Reduction of machinery fuel consumption.*
3. *Use of the thermal inertia in industrial cooling facilities.*
4. *Improvements in the quality of consumption.*
5. *Improvements in the consumption of air conditioners by energetic classification change.*
6. *Improvements in energy management of concessionaries companies*
7. *Emission reductions in fleet vehicles in Valencia Port Authority.*
8. *Installation of transformers in accordance with the standard HD 428.1 S1.*
9. *Optimisation of indoor lighting systems in buildings*
10. *Introduction of insulation in sanitary hot water pipes.*
11. *Installation of wind energy in port facilities.*
12. *Installation of photovoltaic energy in administrative buildings*
13. *Installation of solar thermal energy in the building of the Port Police*
14. *Establishment of a model of gardening for the optimisation of the capture and sequestration of CO_2 in the Green System.*
15. *Port Waste Management Centre.*
16. *Economy software for optimised fuel consumption for harbour mobile cranes.*
17. *Using NH_3 for cooling system instead of CFCs.*
18. *Vessel speed reduction entering in the port*
19. *Clean fuels usage for port mechanisation*
20. *Active Front End technology (AFE) for port cranes*
21. *Onshore Power Supply (OPS*
22. *Movement of employees with bikes and with an organised port bus network*
23. *Energy production by renewable production in port.*
24. *Environmental R&D in port*
25. *Port community involvement*
26. *Reduction of the emissions from diesel engine equipment*
27. *Improvement of the energy efficiency of buildings.*
28. *Limitation of waste disposal in landfill*
29. *Recycling of Hydrocarbon Residues.*
30. *Electric Consumptions Monitoring*

Action area	Actions	Impact	Nº Best Practice
Improvement in the consumption of exterior lighting of roads, yards and docks.	Flow reductions in night time. Promotion the incorporation or replacement of equipment of high efficiency	Indirect emissions: Electrical consumption	1
Reduction of machinery fuel consumption.	Automatic shutdown in case of stand-by Management and control of fuel consumption per employee-machine.	Direct emissions: Fuel consumption	2
Promotion the management of electric demand	Analysis of quarter hours, alarms overruns, load test. Establishment of consumption patterns	Indirect emissions: Electrical consumption	3
Improvements in facilities maintenance processes	Fixed: verification of losses in electrical wiring for overloaded lines (reactive compensation)	Indirect emissions: Electrical consumption	4
Improvements in facilities maintenance processes	Review of maintenance plans (Eg: reducing leaks in compressors, optimal performance of a/conditioning)	Indirect emissions: Electrical consumption	5
Improvements in energy management of the concessionary companies	Promotion implementation of energy management systems.	Direct and indirect emissions	6
Reduction of emissions in park of vehicles	Industrial hybrid vehicles.	Mobility	7

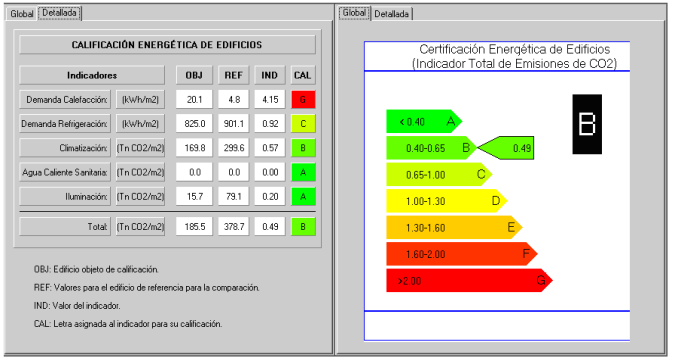
BEFORE BEST PRACTICE



C4. ACTION PLANS

C4.1 Best Practices Transfer and Implementation

- ✓ Environmental normative and procedures
- ✓ Improvement of processes
- ✓ Use of new technologies
- ✓ Reduction of energy consumption
- ✓ Energy efficiency



C4.2 Common Implantation

- ✓ Balance and harmonize the actions in the whole group of ports
- ✓ Reach an equal final status starting from different degrees of development

C4.3 Port Specific Action Plans

- ✓ Take advantage of particular conditions: location, climate conditions, etc.

PARTNER / PORT	Selected GP (Id. Number)	Category	Ports Implemented
ALGECIRAS	1,5,15,21,26	1,2,4,5	Valencia Koper Livorno Piraeus
LIVORNO	2, 6, 9, 17,20	1,2	Valencia Algeciras Koper
KOPER	3, 7,14,26,29	1,2,3,4,5,6,7	Valencia Algeciras Livorno Piraeus Marseille
MARSEILLE	1,13,14,18,23		Algeciras Piraeus
PIRAEUS	4,8,10,11,19		
VALENCIA	12,14,16,21,30		

Evaluation of assigned BP by each partner taking as a reference the information provided in the reports available in the project extranet (C3.3 Reports). Each group of BP is assigned taking into account the variety of categories (type of BP) and ports which are already using them.

BEST PRACTICES EVALUATION QUESTIONNAIRE

Name of the Best Practice:	Identification of the Best Practice
	BP- XX

Please, evaluate your degree of agreement with the following statements	Evaluation	
1.- The associated information of the BP is appropriate	1	Totally Disagree
2.- The degree of complexity of the required resources for the BP implementation is appropriated/affordable		Indifferent
3.- The degree of complexity of the required knowledge for the BP implantation is appropriate/affordable		Indifferent
4.- The level of monitoring, control and maintenance of the BP is suitable		Agree
5.- The BP reduces significantly the CO2 emissions		Totally Agree
6.- The BP respects the port environment		Disagree
7.- The cost/benefit relationship of the BP is appropriate	3	Indifferent
8.- The BP can be implemented within different port scenarios/activities	3	Indifferent
9.- The BP can be extended to the logistic chain	3	Indifferent

Evaluation
5.- Totally Agree
4.- Agree
3.- Indifferent
2.- Disagree
1.- Totally Disagree

Evaluator Name:

Entity / Company:

Specific and Common Plans

Order	Code	Best practice description	C4.2 Global evaluation	Valencia Port	Algeciras Bay Port	Marseille Port	Livorno Port	Luka Koper	Pireus Port			Responsible for Common Action Description
9	BP-24	Environmental R&D in Port	3,74	2	2	1	2	2	2	30	CA	Pireus
1	BP-07	Emission reductions in fleet vehicles in Port Authorities	4,22	2	2	0	2	1	0	28		
4	BP-01	Improving in the consumption ofexterior lighting ofroads, yards and docks	4,11	2	1	1	1	2	1	29	CA	Valencia
14	BP-12	Installation of Photovoltaic Energy in administrative buildings of APBA	3,50	1	2	2	1	2	2	28	CA	Algeciras
2	BP-30	Electric Consumptions Monitoring	4,21	1	1	2	1	0	1	27	CA	Marseille
10	BP-14	Establishment of a gardening model for the optimization of the capture and sequestration of CO2 in the Green System of the Port of algeciras Bay	3,67	1	2	0	1	1	2	25		
15	BP-21	On shore power supply (OPS)	3,32	1	1	2	2	2	1	26	CA	Livorno
3	BP-18	Vessels Speed reduction entering in the port	4,13	0	0	1	0	2	0	24		
5	BP-09	Optimisation of indoor lighting systems in buildings	4,06	0	2	0	0	0	1	23		
6	BP-10+13	Energy Efficiency Renewable in Sanitary Water Production	4,04	0	2	1	0	0	0	23		
7	BP-06	Improvements in energy management of concessionaries companies.	4,02	2	0	0	1	0	0	23		
13	BP-11	Installation of Wind Energy in port facilities	3,59	0	2	2	0	0	0	22		
8	BP-02	Reduction of machinery fuel consumption	3,92	2	0	0	0	0	0	22		
11	BP-19	Clean Fuels usage for Port Mechanisation	3,64	0	0	1	0	2	0	21		
12	BP-08	Installation of transformers in accordance with the standard HD 428.1 S1.	3,63	0	2	0	0	0	0	20		
17	BP-03	Use the thermal inertia in industrial cooling facilities	3,21	2	0	0	0	1	0	19		
16	BP-16	Economy Software for optimised fuel compsuption for Harbour Mobile Crane	3,28	0	0	0	0	2	0	18		

Action implemented

Action interesting

Pilot Project: Design and Implementation

1. **Definition of climate change requirements criteria for the selection of port tenants, contractors and suppliers**

   ✓ Port of Piraeus / Koper

1. **Greenhouse gas emissions monitoring and estimation tool to be managed within port areas**

   ✓ Port of Livorno / Marseille

3. **Implementation of an Energy Efficiency System in 4 port facilities (UNE EN 16001 / ISO 50001**)

   ✓ Port of Valencia / Algeciras

Implementation of the energy efficiency system in 4 port facilities (UNE EN 16001 / ISO 50001)

Port of Valencia

- to enable companies and their workers to implement an Energy Management System to combat the Climate Change in accordance with the provisions of the relevant national standards and / or Europe in order to systematize the process of saving energy and reducing greenhouse gases.

Title action plan	**Improvements in energy management of Port Tenants**
Precise Theme	Implementation of energy management systems according to ISO 50001 in port facilities.
Expected savings	Reduction between 2% and 8% for both economic and Greenhouse Gas emissions.
Objetives	Energy management systems certification participating companies
Project Duration	Start: June 2011 / End: January 2012

Index

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Methodology for Climate Change Mitigation in Ports

1 -Introduction

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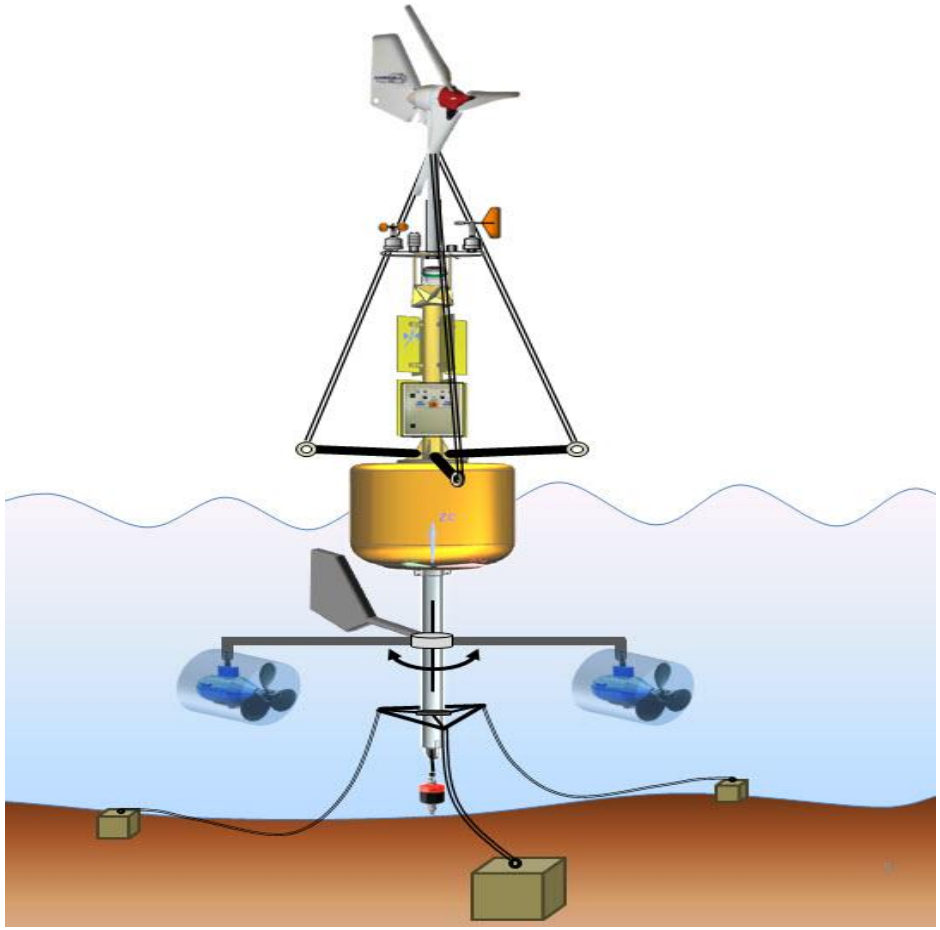
Methodological Approach Handbook

www.climeport.com

INTERNATIONAL FORUM ON TECHNOLOGICAL INNOVATION FOR A COMPETITIVE AND SUSTAINABLE DEVELOPMENT OF PORT SYSTEM AND SHIPPING

Hydro-Wind Power Offshore systems



UNIVERSIDAD POLITECNICA DE VALENCIA

ai2 INSTITUTO DE AUTOMÁTICA E INFORMÁTICA INDUSTRIAL

Al Servicio de Sistemas de Ayudas a la Navegación (SAN) de la Autoridad Portuaria de Valencia.

Mediante la presente carta, confirmamos la colaboración tecnológica entre el Grupo de Supervisión y Diagnóstico de Fallos AI2-UPV y la Autoridad Portuaria de Valencia para la realización de un estudio sobre los recursos de generación de energía eléctrica renovable de tipo eólico y por corrientes marinas existentes en el litoral valenciano, así como estudios del comportamiento dinámico de nuevos sistemas integrados offshore de generación eléctrica tanto del tipo eólico como a través de las corrientes marinas. Para la consecución de los citados estudios se procederá a la instalación de una boya de observación marina multiparamétrica (oleaje, corrientes y condiciones de viento) con capacidad para la generación eléctrica a partir del potencial hidro-eólico de la zona.

En este sentido, adjuntamos siguiendo sus instrucciones, la carta náutica con las coordenadas de la ubicación de la boya SADO (Sistema de Adquisición de Datos Oceanográficos) que creemos más convenientes para el proyecto con el fin de que evalúen la viabilidad del emplazamiento y la futura inclusión de la boya dentro de la red SAN.

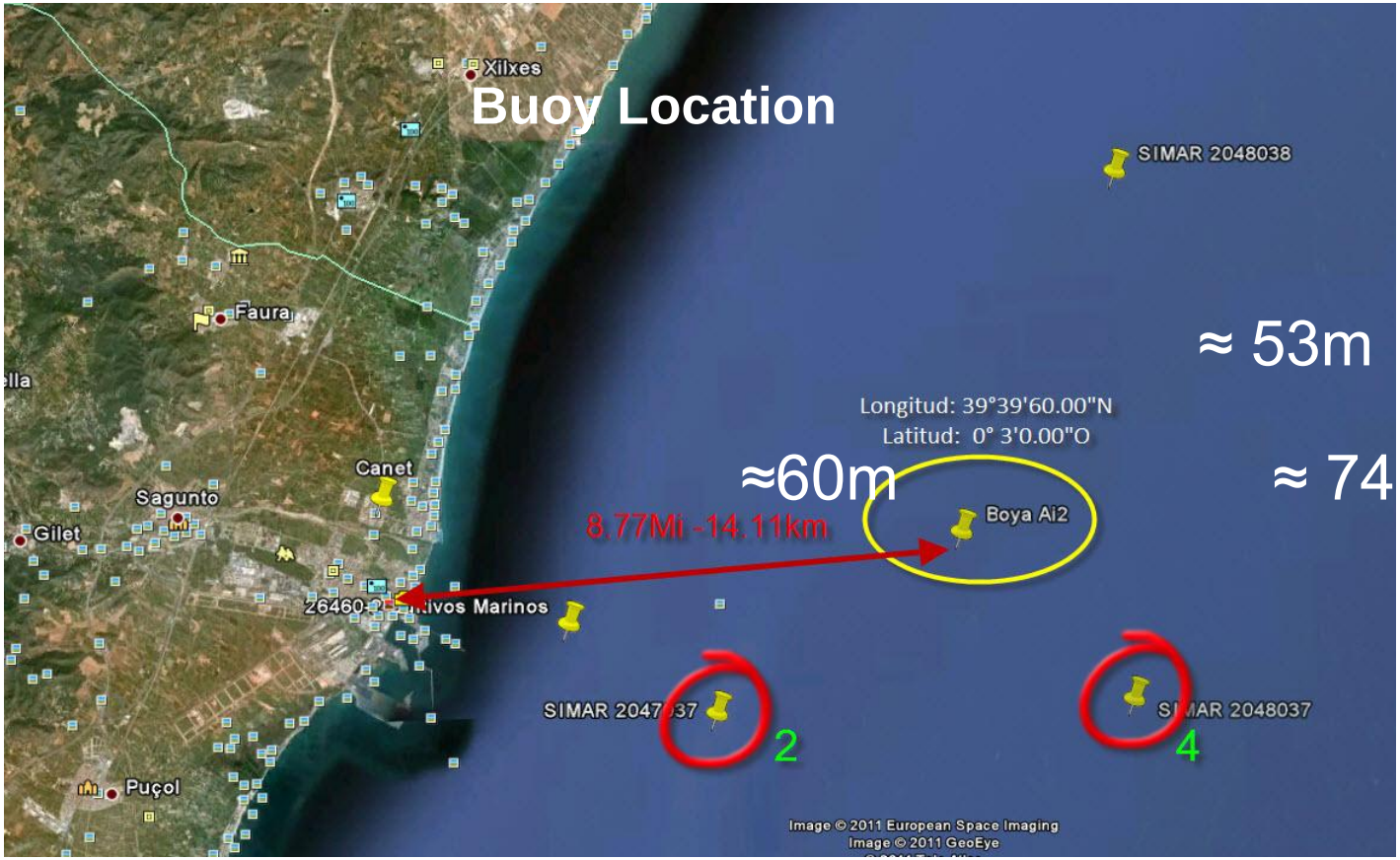
Atentamente:

Dr. Emilio García Moreno
Director del Grupo de Supervisión
y diagnóstico de Fallos.

UNIVERSIDAD POLITECNICA DE VALENCIA

Edificio 8k • Despacho 20• Planta baja • Cº de Vera s/n • 46022 Valencia
Tfno.: +34 963877000 ext. 73504 • Fax: +34 963877359
www.ai2.upv.es • instituto@ai2.upv.es

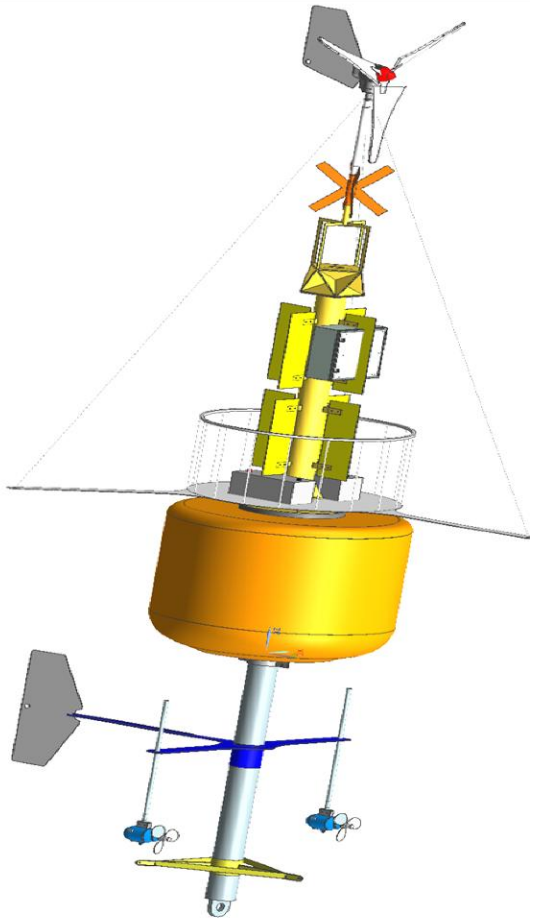
Renewable Energies



Length: 39º39’60.00”
Latitude: 0º3’0.00”

Distance from the port: 14.11Km
Depth: 60m

Details.

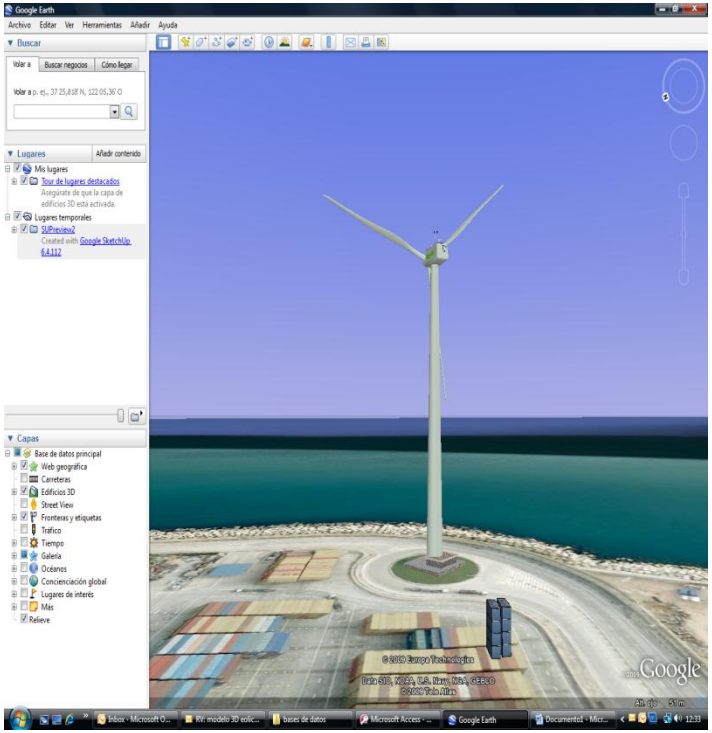


- Aerogenerador 600W (Ampair).
- Barandilla de sujeción y tirantes de acero.
- Sensor de Altura de OLA. (AANDERAA)
- Anemómetro ultrasonidos (Airmar PB200)
- Baliza luminosa.
- Controlador PLC- ACE3600
- Regulador de carga Tristar
- Baterias 140Ah
- GPS
- Sensor de colisión

- 2 Turbinas de 100W (Ampair). Una dextrógira y otra levógira.
- Timón para el autodireccionado de las turbinas.
- Pieza triangular para el anclaje mediante tres catenarias a 120º. Limitación giro boya.
- Amarre al fondo mediante tres catenarias y tres muertos.
- Anclaje de los correntímetros.

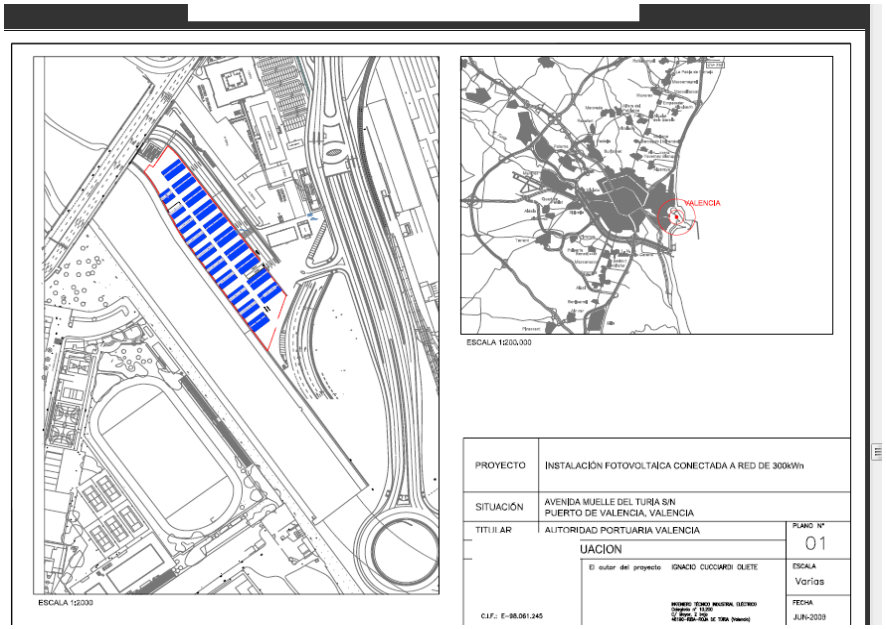
Wind Power Systems

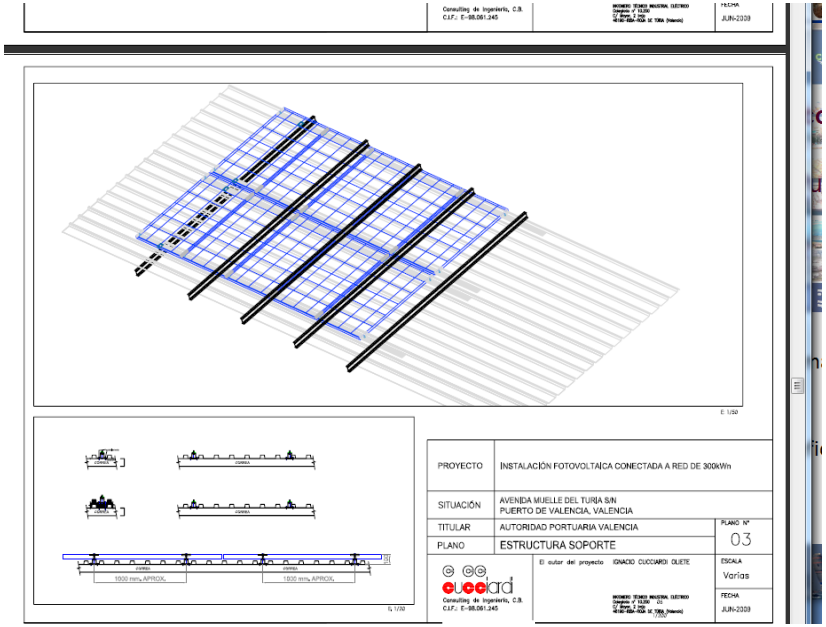
- Colaboration with companies in order to evaluate the implementation of eolic power generators in line with visual impacts.



Photovoltaic Energy

- Implementation Study: **Photovoltaic** Pilot plant of 3**00kw** in the Valencia Port Authority parking.





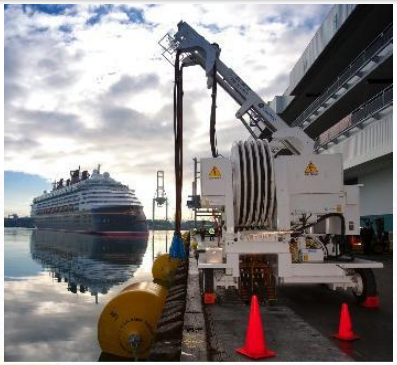
Land-based Power Supply to Ships
Alternative Maritime Power (AMP)

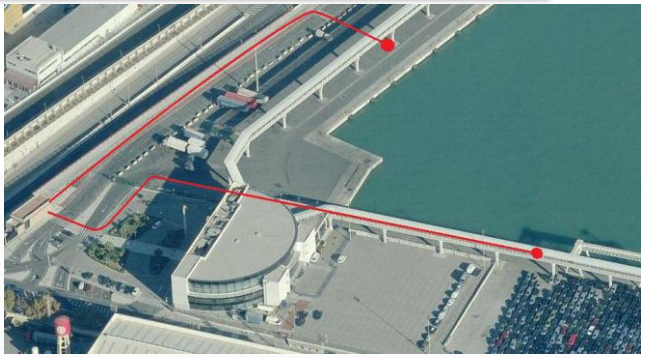
Ships can use required power while docking without operating its own generator.

- The port provides ships with necessary power.
- ↓ Oil Cost & CO2 emission

Source: Cavotec

Cold Ironing



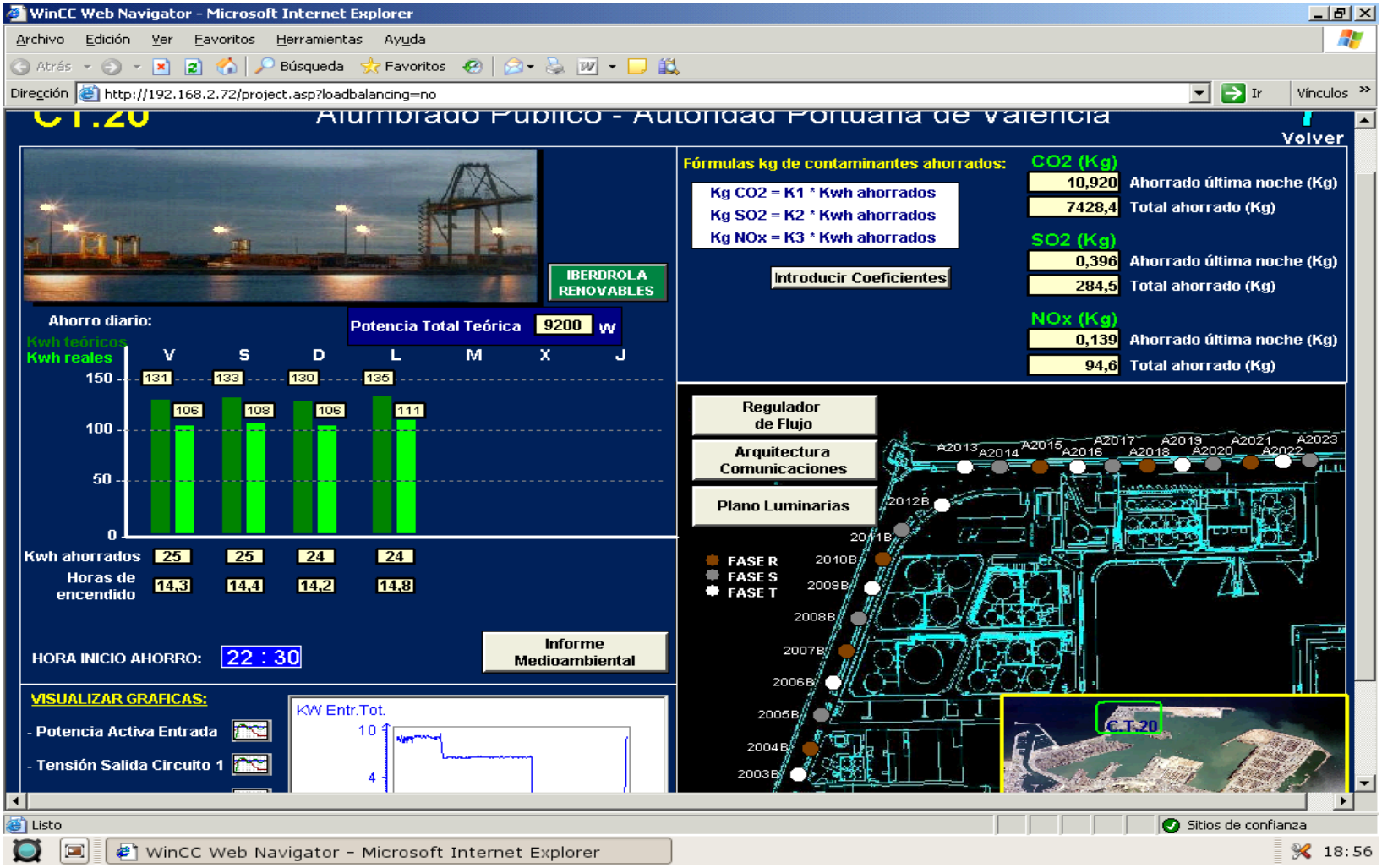


Cold Ironing

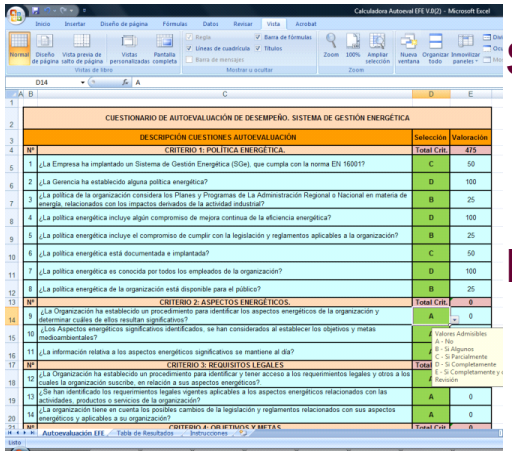
Characteristics:

- Most ships operate on low voltage 440V, while large container and cruise operate on high voltages of 6.6 to 11 KV.
- Frequency requirements vary depending on the place of construction of the ship
- Power convertors are required either on board or at the terminal
- Power load requirements vary from 1 to 4 MW for a container ship to 5 to 10 MW for a cruise ship

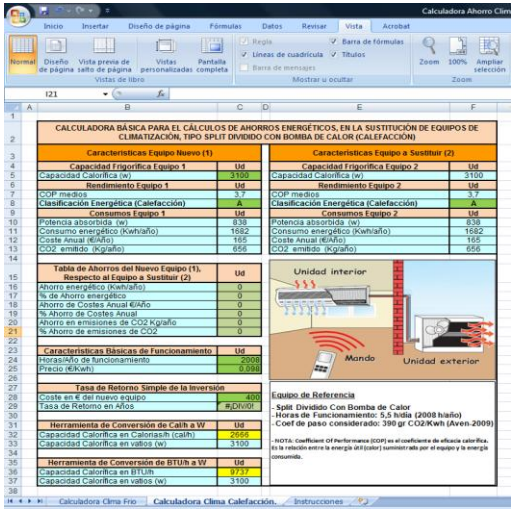
Energy Efficiency Diagnosis: Lighting of Public Areas



Energy Efficiency Evaluation of the VPA Buildings.

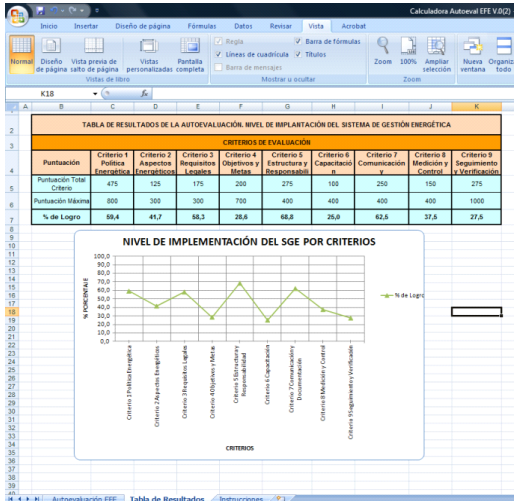


Started in 2009 and finished in May 2010



It was diagnosed the follow issues:

- ✓ Electricity Energy Consumption
- ✓ Material Consumption
- ✓ Renewable Energies
- ✓ Waste Generation
- ✓ Areas used Sustainable mobility
- ✓ Energy Efficiency of the port tenants
- ✓ C02 emissions



Thank you very much for your attention!!

Grazie mille!!