Integrated Port Community System and Energy Efficiency in Ports
Valenciaport Foundation (Vincent Ernoux)
Integrated Port Community Systems opened to the world

Paper based on the development and results of an integrated Port Community System in Valenciaport with the support of Valenciaport Foundation
From an isolated port to a port community connected to the world: stages

Stage 1: The isolated port
Objective:
- Automate internal processes
- Internal information systems
Technology:
- Voice services
- Image services
- Data services

Stage 2: The connected port
Objective:
- Connect with port agents for critical business processes
  - Cargo Manifest
  - Customs Declaration
  - Berthing Management
  - Hazardous Materials
Technology:
- EDI

Stage 3: The port community
Objective:
- Build communities both into the land side with land carriers, and into the sea side with shipping companies
  - Community Information System
  - Development of Infoportals
  - Seal of Quality Guarantee
Technology:
- Community portal
- Integration with web technology/RFID

Stage 4: A port community connected to the world
Objective:
- Increase efficiency by automating operations in a paperless, error-free process
- Modernize logistics management
- Increase connectivity by full integration with external agents
- Foster integration by connecting Sea-Port-Land operations, improving the cooperation of the Port Community
- Reinforce bonds with partner ports
Technology:
- Microsoft .NET solutions
- Web services/RFID
- XML

The Port Community System increases its coverage at the same time that the port is growing
Final stage:

The PCS is fully integrated with land, maritime and port actors.

The PCS is connected to the world through the ocean shipping’s leading e-marketplaces.

Full Integration of the PCS turns the Port into a totally paperless environment.

SUBSTANTIAL REDUCTIONS OF TIME AND COSTS ARE ACHIEVED
SERVICES TO INCLUDE IN A FULLY INTEGRATED PORT COMMUNITY SYSTEM

**Mar / Sea**
- salidas y llegadas
  - schedules
- reservas de carga
  - bookings
- instrucciones de embarque
  - shipping instructions

**Puerto / Port**
- escalas
  - stopovers
- mercancías peligrosas
  - dangerous goods
- declaración mercancía
  - goods declarations
- información aduanas
  - customs informations
- instrucciones a terminales
  - instructions to terminals

**Tierra / Land**
- transporte terrestre
  - inland transport
- ferrocarril
  - railway

Land and Sea stakeholders all use the same PCS and have access to a full range of services.

No more paper in between them.
Main added-values of integrating the PCS

Easy access to all integrated logistics information
Better service quality and improved customer service
More efficient transactions
A single gateway that unifies the communication with carriers
Reduction of errors inherent to manual systems
Information and Communication are more secure
Substantial Time and cost reduction
# Time Reduction in Customs Procedures

<table>
<thead>
<tr>
<th>Process</th>
<th>Agent involved</th>
<th>Previous situation (minutes/consignment)</th>
<th>Current situation (minutes/consignment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare Customs Documentation</td>
<td>Shipping Agency</td>
<td>5.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Check Customs Documentation</td>
<td>Customs’ Police</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Prepare Customs Documentation</td>
<td>NVOCC</td>
<td>6.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Solving Errors</td>
<td>All agents</td>
<td>30</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9.4 to 46.2</td>
<td>0.9 to 1.1</td>
</tr>
</tbody>
</table>
### Time Reduction of Trucks at Gateways

<table>
<thead>
<tr>
<th>Process</th>
<th>Previous situation Manuel Lane Minutes/Truck</th>
<th>Current situation Manuel Lane Pick Hours Minutes/Truck</th>
<th>Current situation Automatic Lane Minutes/Truck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete necessary processes to leave the <strong>terminal gate</strong></td>
<td>2</td>
<td>15</td>
<td>0.4</td>
</tr>
<tr>
<td>Complete necessary processes to leave the <strong>port gate</strong></td>
<td>2</td>
<td>15</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>30</td>
<td>1.10</td>
</tr>
</tbody>
</table>
VALENCIAPORT FOUNDATION: A MAIN INNOVATION AND TRAINING CENTER OF THE PORT INDUSTRY
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MAIN FIELDS OF KNOWLEDGE:
• PORT PLANNING AND MANAGEMENT
• LOGISTIC CHAIN AND INTERMODALITY
• PORT SERVICES AND INFRASTRUCTURES
• ENERGY EFFICIENCY
• SECURITY AND CYBER-SECURITY
• ICT IN PORTS
• FINANCIAL FEASABILITY
• PORT HIGHER EDUCATION TRAINING
• PORT VOCATIONAL TRAINING
• Etc.

OUR CLIENTS:
• EUROPEAN UNION
• WORLD BANK
• INTERNATIONAL DONORS
• MINISTRIES
• PORT AUTHORITIES
• PORT TERMINALS
• Etc.

MAIN TOOLS AND METHODS:
• AUTOMATIZATION MODELS
• TRAFFIC FORECASTS
• EVALUATION OF ALTERNATIVES
• FINANCIAL FEASIBILITY STUDIES
• MARKET RESEARCH
• MICROSIMULATIONS
• PROCESS REENGINEERING
• DATA ENVOLVEMENT ANALYSIS
• CO2 EMISSIONS ESTIMATIONS
• GEOGRAPHIC INFORMATION SYSTEMS
• TRANSPORT MODELISATION
• HINTERLAND SIMULATION
• ENERGY EFFICIENCY AUDITS
• SAMPLING METHODS
• and many more.
VALENCIAPORT FOUNDATION: A MAIN INNOVATION AND TRAINING CENTER OF THE PORT INDUSTRY

SOME OF OUR MOST RECENT PROJECTS:

✓ ANALYSIS OF THE CAPACITY OF THE SOUTH BERTH IN CALLAO TERMINAL (PERU)

✓ DRAFTING OF THE DEVELOPMENT STRATEGY OF THE NATIONAL PORT SYSTEM

✓ MEDITERRANEAN NETWORK FOR CUSTOMS PROCEDURES AND SIMPLIFICATION OF CLEARANCE IN PORTS

✓ FUTUREMED - FREIGHT AND PASSENGER SUPPORTING INFOMOBILITY SYSTEMS FOR A SUSTAINABLE IMPROVEMENT OF THE COMPETITIVENESS OF PORT-HINTERLAND SYSTEMS OF THE MED AREA

✓ COSTA - CO2 & SHIP TRANSPORT EMISSIONS ABATEMENT BY LNG

✓ GREENCRANES – GREEN TECHNOLOGIES AND ECO-EFFICIENT ALTERNATIVES FOR CRANES AND OPERATIONS AT PORT CONTAINER TERMINALS

✓ SEATERMINALS – SMART, ENERGY EFFICIENT AND ADAPTIVE PORT TERMINALS

✓ CONTAIN - CONTAINER SECURITY ADVANCED INFORMATION NETWORKING

✓ BUSINESS TO MOTORWAYS OF THE SEA

✓ SUSPORTS – DELIVERY SUSTAINABLE ENERGY SOLUTIONS TO PORTS
Valenciaport Foundation is developing innovation actions related to Energy Efficiency.

With the final aim of:

- Cost
- Security
- CO2

**ENERGY EFFICIENCY IN PORTS**

- Energy consumption analysis
- Use of LNG and other alternative fuels
- Electrification
- Energy Storage
- Downsizing Engines
- Retrofitting
ENERGY EFFICIENCY IN PORTS

Energy Consumption Analysis

We map the port container terminals Energy Profiles

ELECTRICITY
- Reefers
- Ship to Cranes, e-RTGs
- Lights
- Buildings

FUEL
- d-RTGs
- Terminal Tractors
- Reach Stackers

+ Carbon Footprint
+ Carbon Footprint
ENERGY EFFICIENCY IN PORTS

Electricity

- Refers: 43
- STS cranes: 37
- Lights: 15
- Buildings: 5

Total Consumption > 30 GWh

Fuel

- RTG Cranes: 58
- TTs: 32
- Reach Stackers: 9
- Others: 1

Total Consumption > 7 Millions Liters
ENERGY EFFICIENCY IN PORTS: LNG

THE CASE OF NEW LNG TERMINAL TRUCKS

We assess the potential use of LNG in Port Machinery:

- Terminal Trucks
- Reach Stackers
- RTGs

LNG Terminal Truck

Similar performance

Financially viable with a Payback Time stable at 9 years from 19 Units and an IRR around 20%

Less CO2 Emissions

Renew the fleet of Trucks can help maximise the profitability of in container terminals

The optimum number of Trucks to be replaced will depend on fuel prices in each country
ENERGY EFFICIENCY IN PORTS: ELECTRIFICATION OF RTGs

We assess whether electrification of d-RTGs is convenient or not.

Technical Feasibility
Financial Feasibility
Environmental aspects

Viability depends on:
- Oil prices
- Electricity prices
- Cost of Electric Systems
- Fuel consumption of current RTGs
- Cost of investments in the terminal
- Number of container moves by meter

Electrification will be more profitable in terminals with higher number of container moves by meter.
We assess how much energy can be saved in terminal operations and reused.

Between 50% to 65% of Energy can potentially be recovered in Gantry Cranes.
The Innovation and Knowledge Center of the cluster of the Leading Port in the Mediterranean

www.fundacion.valenciaport.com