



Prototypes and Pilot Plans at the Port of Koper

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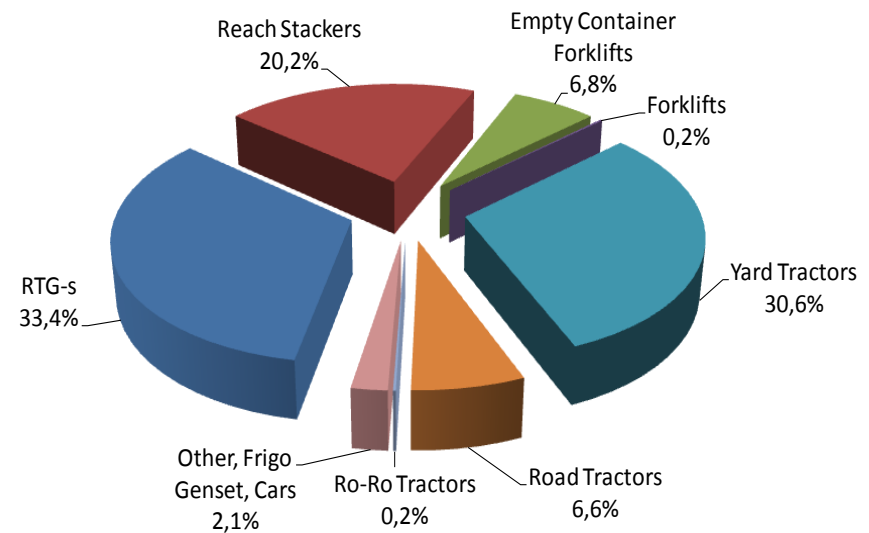
VI Port Cluster Innovation Congress & GreenCranes Intermediate Information Days,
Session: Assessment of Energy Efficiency Alternatives at Port Container Terminals

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Case study: flywheel technology

- RTG cranes – main consumers of diesel fuel and major contributor of diesel emissions at the Port of Koper

- Cost benefit analysis:
 - Without genset change - not commercially justifiable
 - With genset downsizing – payback period 7 – 10 years



The fuel consumption distribution per type of machinery used on the Container Terminal of the Port of Koper (year 2011)

- **integrate energy management into** the business structures to save energy, costs, improve the energy, environmental and business performance;
- systematic process for **continuous improvement** in energy performance
- Basic framework: documents that define energy management system
- EN 16001 ⇒ ISO 50001 ⇒ SIST EN ISO 50001
- energy efficiency, decrease costs, introduction of Energy Performance indicators (EnPI)

Establish an **Energy Management System**:

- Adopt energy policy
- Identify energy use
- Set objectives, targets
- Implement an action plan
- Check, correct
- Review, improve



Energy efficiency as a **key actions**:

- Achieve energy supply security
- Decrease emissions
- Achieve more cost-effective operations

- energy management as part of the environmental management system
- not specified energy targets for the container terminal
- need for a realistic assessment of the situation
- **GREENCRANES** pilot: arrive to a precise information about energy consumption to be able to monitor the situation and react



Evaluation of the Container Terminal's Energy Management System

		unaproprate	less suitable	average	suitable	BAT
awareness about energy efficiency management	top management					
	management					
	employees					
energy information system						
energy efficiency performance indicators EnPI						
energy monitoring & targeting system						
energy review (EN ISO 50001)						
energy efficiency measures implementation system	organisational measures					
	investment measures					
energy action plan implementation						
energy management improvement cycle (PDCA circle)						

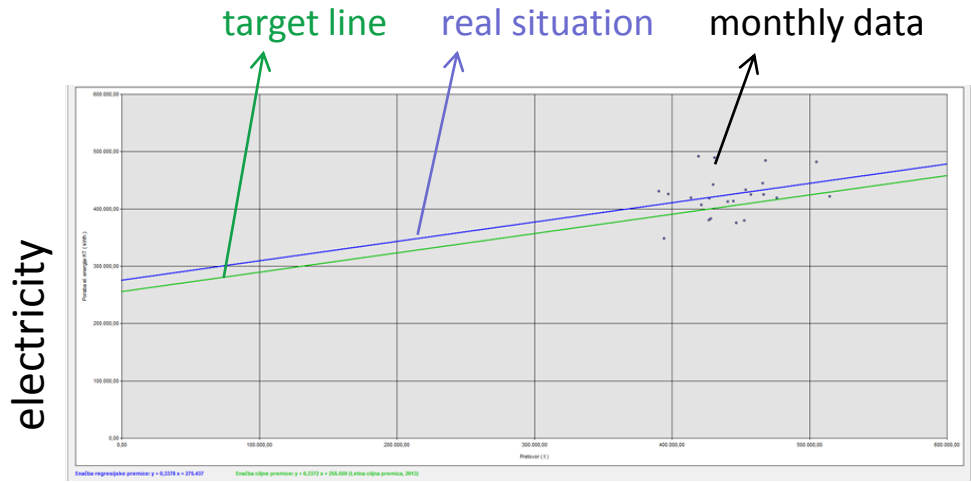
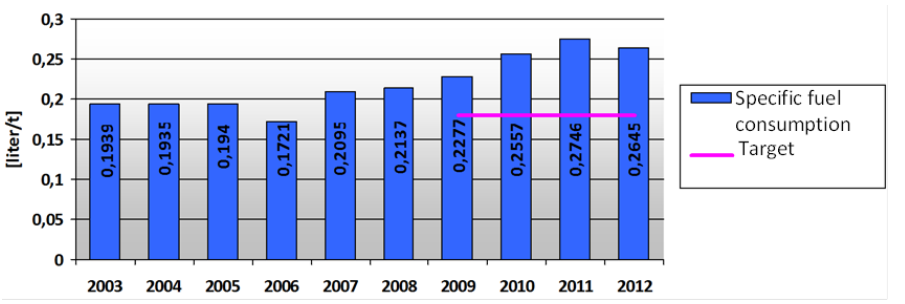
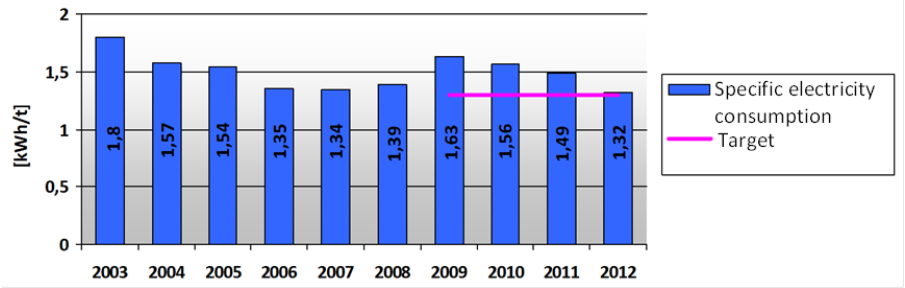


- **Goal**: pass from the monthly monitoring of energy consumption to a 15-minutes level for electricity and daily overview for fuel for every machine
- **Purpose**: almost on-line possibility to discover anomalies in the process and react immediately.
- **Necessary steps**:
 - System modernization to gather data from RTG to monitor in the **Monitoring & Targeting Information System**
 - Installation of fuel counters on each machine (terminal tractors, reach stackers) and remote transmission in the targeted system
 - Setting up of new KPI on the bases of measurements and findings

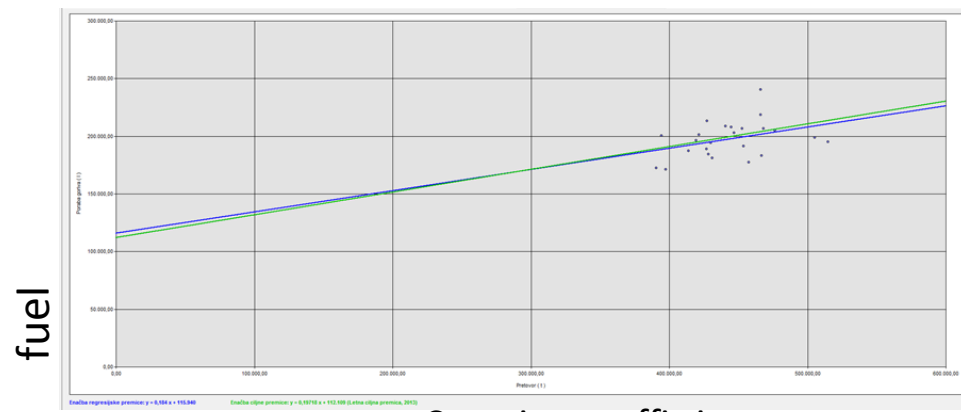
For the efficient implementation of a monitoring and targeting system at Container terminal, a scalable approach is needed as follows:

- More detailed analyses of the terminal's energy flows, along with analyses of existing and potential measuring equipment;
- installation of additional measuring equipment;
- analyses of existing energy and production supervising systems;
- definition of the characteristic parameters of production;
- monitoring and targeting database implementation;
- installation of monitoring and targeting software;
- implementation of the basic structure of the monitoring and targeting system;
- definition of the energy indicators and target values and
- upgrading of the energy management system.

- With the introduction of the energy management and targeted monitoring we pass from specific consumption to a characteristic consumption.



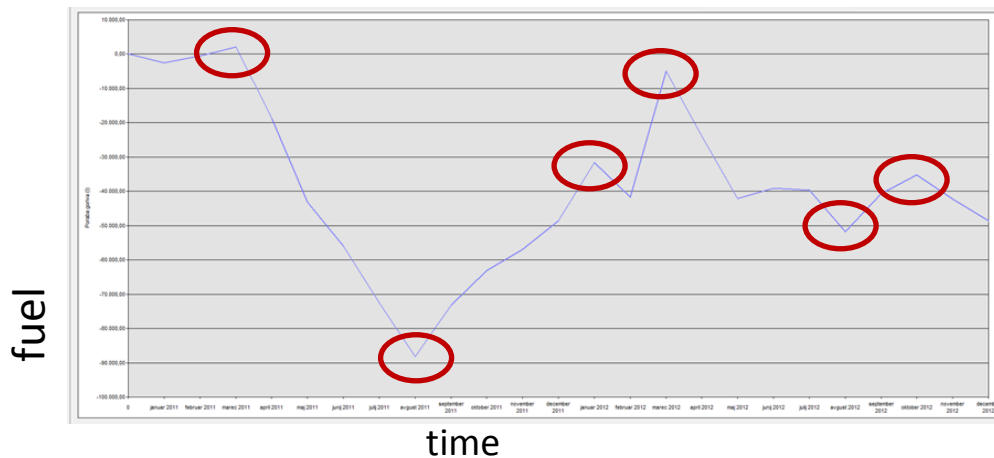
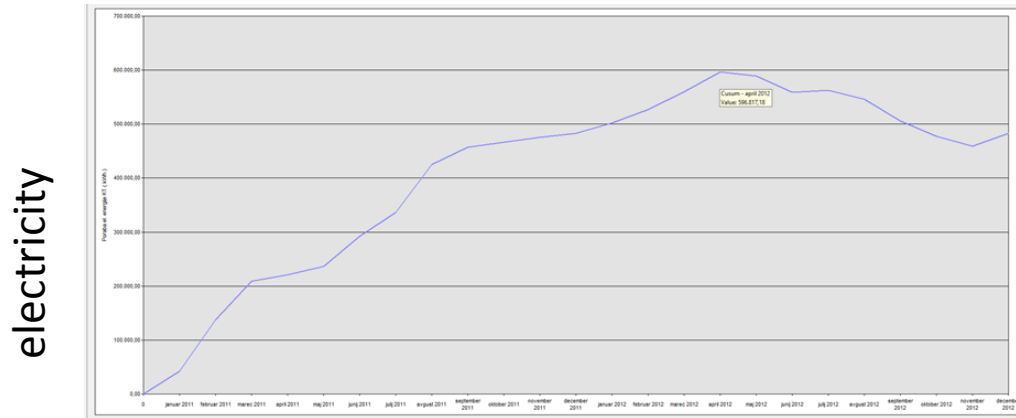
Container traffic in t



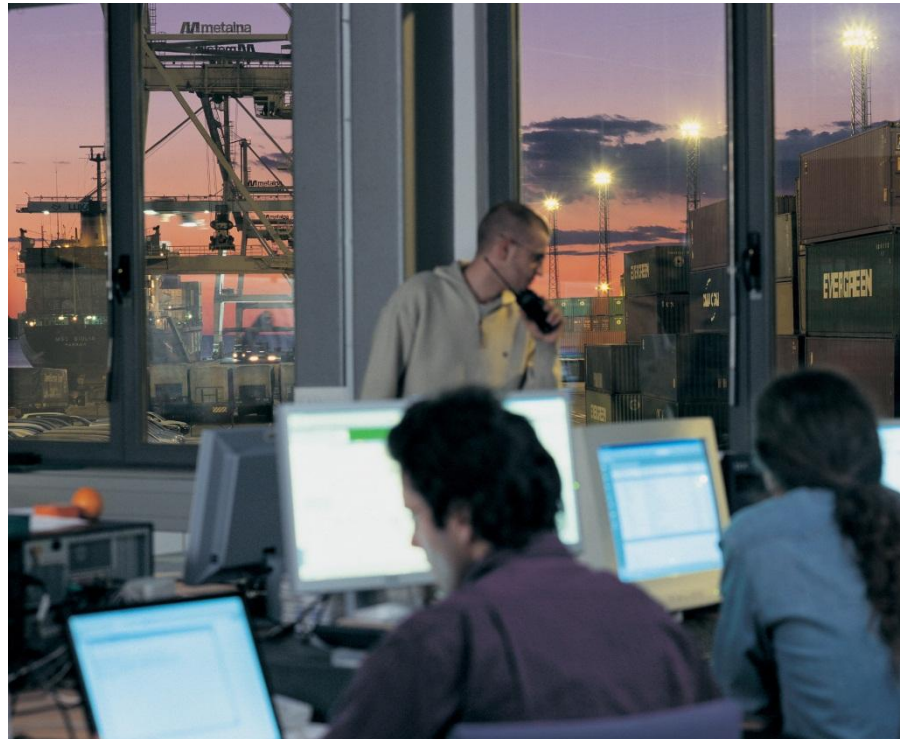
Container traffic in t



- Monitoring the deviation from the target line in the CUSUM diagram



- **Responsible person** on the Container terminal has to monitor through the targeted system and comment each deviation. That will enable an active reaction and the possibility to introduce corrections in the process to reach the lowest possible consumption.



Implementation of Monitoring & Targeting Information System will upgrade existing energy management system. Main advantages will be:

- Setting of hierarchical energy performance indicators system (up to 10 main energy performance indicators, based on more than 50 supporting indicators).
- Reporting system on energy efficiency based on monthly comparison.
- Setting of energy targets based on characteristic energy consumption (M&T principle) instead of specific energy usage evaluation.
- Detailed analyse on characteristic energy consumption for all main activities.
- Implementing professional energy information system that allows upgrading.
- Building on responsibility system for energy performance indicators.
- Setting the basis for SIST EN ISO 50001 Energy Management Systems standard implementation.

Implementation of Monitoring & Targeting Information System at Luka Koper will allow periodical comparison on energy performance indicators according to set target lines. Introduction of responsibility system will encourage activities on energy efficiency improvement. It is assumed that fully developed energy Monitoring & Targeting Information System will allow from 1 to 3 % of energy efficiency increase per year.

■ Environmental Aspects

Energy	Energy consumption	Energy Savings (according to the year 2012)	CO ₂ savings
Electricity	4.804.756,1 kWh	48.532,9 kWh	26.693,1 kg
Fuel	2.365.796,1 l	23.896,9 l	61.893,1 kg

■ Cost-Benefit Aspects:

- Estimated yearly savings on the Container Terminal with introduction of EMS approx. 0,5% of energy consumption – 15.000 €
- Payback period for the implementation of the EMS Information System at Container terminal: 1 year
- Encourage implementation of other measures
- Based on a national scheme: savings of 5% for electricity, 7% for fuels
- Target: yearly savings of 1.500 MWh / 140.000 €



Questions?
Thank you for your attention

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