Title: Ports and Terminals in the view of emissions
Presenter: Dipl.-Logist. Reiner Buhl, Fraunhofer CML
Date: November 7th 2014
Content

• Maritime economy and environmental policy
• GREEN EFFORTS
  – Terminal energy consumption
  – Goals and consortium
  – Escalating saving strategy
  – Recommendations
  – Information material
• Conclusion
Maritime economy and environmental policy

Most important drivers for environmental actions in the maritime economy are¹:

• Image
• Legislation
• Cost: 65% increase of electricity price for the European economy (between 1995 and 2010)²

Question:

How can we design and realize a greener future for ports and terminals?

¹) Jahn, Bosse, Schwientek (2011) Seeschifffahrt 2020
²) Bundesministerium für Wirtschaft und Technologie (2012) Internationaler Preisvergleich Energie
GREEN EFFORTS

Terminal energy consumption

Container terminal 1,6 m TEU/a

Consumption of electric energy:
\[ \Sigma \approx 12 \text{ mwh/a} \]

Consumption of combustibles (Diesel):
\[ \Sigma \approx 3 \text{ m liters/a} \]

- Storage reefer containers: 36%
- Facility management: 11%
- Yard Lighting: 3%
- Ship-to-shore cranes: 50%

- Reachstackers etc.: 10%
- RTGs: 42%
- Terminal Tractors: 48%
GREEN EFFORTS
Goals and consortium

• Reduction of the carbon footprint (and other emissions)
• Reduction of the energy consumption
• Improvement of the energy mix

Co-funded by the European Union
GREEN EFFORTS

Escalating saving strategy

1. Training investment:
   Changing attitude of staff and management by raising awareness and motivation to use energy thoughtfully

2. Organizational investment:
   Modifying operations to increase productivity per energy consumption

3. Technical modification investment:
   Modifying equipment and systems to reduce consumption/ increase productivity

4. Technical purchase investment:
   Put new equipment/systems into operation

Co-funded by the European Union
GREEN EFFORTS

Organizational investment

- Implementation of dual cycling for equipment (STS, yard equipment)
- Reducing travel distance and number of handling operations per box by applying a TOS using optimization algorithms
- Reducing standby consumption

Co-funded by the European Union
GREEN EFFORTS

Technical investments

• Measuring energy consumption
• Checking possibilities for own energy production (e.g. wind and photovoltaic)
• Downsizing of drives
• Using LED lighting
• Implementing power management using smart grid technology

Co-funded by the European Union
GREEN EFFORTS
Information material

• White papers on energy production, efficiency, storage and emissions
  – Wind energy
  – Photovoltaics
  – Biogas
  – Biomass
  – Geothermal energy
  – LED und LEP lighting
  – Hybrid drive
  – Hydrogen
  – Cogeneration of heat and electricity
  – Particulate matter emissions
  – Cool roofs and pavement
  – Energy storage

• Video

http://www.green-efforts.eu
GREEN EFFORTS

Video

Co-funded by the European Union
Conclusion

• Improved insight
• Raised awareness
• Next steps: Industry implementation and international standardization

Dipl.-Logist. Reiner Buhl
Fraunhofer-Center für Maritime Logistik und Dienstleistungen
Schwarzenbergstraße 95 D
21073 Hamburg
Tel.: +49 40 / 42878 6115
Fax: +49 40 / 42878 4452
E-Mail: reiner.buhl@cml.fraunhofer.de
Internet: www.cml.fraunhofer.de

Prof. Jens Froese (Projektkoordinator)
Kieserling-Foundation Distinguished Professor and Head of Workgroup
Workgroup Maritime Logistics
School of Engineering and Science
Jacobs University Bremen gGmbH
Campus Ring 1 | 28759 Bremen | Germany
Phone: +49 421 200 3137
E-Mail: j.froese@jacobs-university.de

http://www.green-efforts.eu
Supporting Entities

- **Ports & Terminals (Europe)**
  - Port of Antwerp
  - Port of Hamburg
  - Bremen Ports
  - SBO/Riesa
  - Port of Trelleborg
  - MSC Valencia
  - Kleipeda Smelte
  - Eurogate Hamburg
  - ECT Rotterdam
  - MSC Antwerp
  - HHLA Hamburg
  - NTB Bremerhaven

- **Ports & Terminals (worldwide)**
  - Port of Singapore
  - Port of LA
  - PSA HQ Singapore
  - Exolgan Buenos Aires (PSA)
  - BACTSSA Buenos Aires (Hutchinson)
  - APM Buenos Aires Terminal
  - DP World (Terminales Rio de la Plata)
  - Terminal Zarate (Murchinson Group)
  - Katoen Natie Montevideo
  - TERPORT - San Antonio, Paraguay

- European Bank for Restructuring and Development (EBRD), London
- World Bank, Washington
- UN CEPAL, Santiago de Chile