Onshore power supply
Case study – Port of Helsinki
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Onshore power supply in Port of Helsinki

• One connection in Katajanokka Harbour
  • Operation started in October 2012
  • OPS for ferries operating from Helsinki to Stockholm (Viking Line M/S Gabriella and M/S Mariella)
  • 4 MW, 400 V / 50Hz, 12 cables
  • Automatically moving system (radio controller)
  • Port of Helsinki has built the onshore side, Viking Line was responsible of changes in the vessels

• Small scale onshore power supply at 9 berths for catamarans, military vessels etc.
Experiences of Katajanokka Onshore Power (2013)

• In 2012 and 2013 M/S Gabriella and M/S Mariella stayed the harbour over 7 hours/day
• Big investment for the Port (1,25 M€), challenging place to build
• OPS reduced air emissions and noise close to the harbour (Katajanokka residential area)
• However reduction of emissions not significant related to total emissions of the area
• With recent fuel and electricity prices economically feasible for the vessels
• Equipment is designed and built especially for the two Viking Line ferries and their quay space
Use of electricity kWh/d (summer/autumn 2013)
Price comparison (2013)

- Onshore power was over 25% less expensive for shipping company than use of auxiliary engines (MDO price 660 €/mt, electricity cost 0.115 €/kWh)
Enviromental aspects – Emissions and noise

• **OPS reduced emissions.** Emissions when using OPS ranged from 1,3% to 15,6% of auxiliary engine emissions (2012)

• Impact especially on nitrogen emissions

• OPS has had impact on air quality mainly in the vicinity of the vessels

• However emissions from auxiliary engines have been marginal compared to other emission sources in the area

• Note that heating (boilers) also produces emissions

• Auxiliary engines are only partly responsible of vessel noise. Most of the noise comes from handling of cargo or from air conditioning

• Low frequency noise (resonance) can be disturbing → less is better!

• Complaints regarding noise have decreased since the use of OPS in Katajanokka
Onshore power supply – Port view

• OPS is useful but not an ”easy-fix”
  → Routes, time-schedules and berths change – services need to be agile
  → Summer 2014 M/S Gabriella and M/S Mariella changed routes → less use for OPS
  → OPS is expensive and ”rigid” establishment
  → Not technically possible to build in every harbour (for example transformer capacity)
  → Note that OPS is not emission free, emissions are just located differently (energy production facility)

• Regulating noise and emissions in Port of Helsinki mandatory through environmental / operational permits
  → targets have been met regardless of OPS

• Sulphur directive has also reduced emissions
Onshore power supply – Port view and details

- Onshore power systems of vessels must become standardized
  - Voltage 6,6 / 11 kV; frequency 50 / 60 Hz
- Standardized OPS is cheaper to build
  - Vs. 4 MW power with 12 cables 400V or 1 cable 6,6 kV
  - Cost of the cable handling device was 400,000 €
- Electricians of the ship connect and disconnect OPS, they have also radio-control device to drive the cable handling system near the ship
- Ferries need 4 MW power and cruisers 10 – 20 MW, size of OPS is very different
- To get investment pay back time of 6-8 years port of Hki must charge 2,5 c/kWh, but electric power has to be cheaper than fuel to maintain win-win situation
- OPS is useful if a ship stays ≥ 4 hours at quay