Hamburg’s Onshore Power Supply Strategy
Our Port – in the middle of the city – has its special challenges

Source: www.mediaserver.hamburg.de/C.O.Bruch
Clean Air Action Plan 2017 - Inventory of air emissions

**NOx emissions**

- Ship traffic: 39%
- Road traffic: 29%
- Industry: 16%
- Domestic heating: 5%
- Terminal equipment: 4%
- Offroad traffic: 3%
- Flight traffic: 2%
- Rail traffic: 2%

**NOx immissions**

- Regionale Hintergrundbelastung
- Städtische Zusatzbelastung
- Lokaale Zusatzbelastung Kfz-Verkehr

- Schifffahrt
- Pkw
- Kräne
- leichte Nfz
- schwere Nfz
- Flughafen
- mobile Maschinen
- Industrie
- Hafeninfrastruktur
Inventory of air emissions

**NOx emissions of ship traffic**

- Container ships: 69.4%
- Dry bulk: 2.1%
- Inland ship: 3.3%
- Multi-purpose ship: 7.2%
- Gas-, oil-, chemical tanker: 8.5%
- Gas, oil, chemical tanker: 8.5%
- Multi-purpose ship: 7.2%
- Inland ship: 3.3%
- Cruise ship: 2.4%
- Others: 0.1%

**Inner port traffic:**
- Tug boats: 3.9%
- Pilot boats: 0.3%
- Water police: 0.2%
- Dredgers: 0.4%

**NOx emissions allocation of shipping**

- Sailing: 14%
- Maneuvering: 10%
- Berth: 76%
Ship Traffic - Initial Level of Pollution

We detected hot spots at the large container terminal facilities!
Port Fee System: Graduation of port fees according to Tier-Level (start in 2018)

General Terms and Conditions: Environmental module

- Tier 0 +15%
- Tier 1 +10%
- Tier 2 Standard
- Tier 3 -30%

Additional NOx related discount opportunities

- Eco-friendly port power discount on the berth operation portion
- Environmental discount incentive "ESI" (environmental and climate friendliness)
- Environmental discount incentive "solely powered by LNG"

Revenue neutral

Revenue negativ
Forecast and Impact of Regulation

NOx t/a

Total

Port calls

Based on ISL potential prognosis, May 2015
Clean Air Action Plan 2017: Installation of external energy supply at large scale

Source: Anika Beiersdorf/HPA
Overview IPP and distribution Grid „Microgrid“ to the the quayside
Overview Fixed Shore Connection
Overview IPP - HPC Power plant, Fuel Cell and Battery

- BHKW 2.5 MW$_{el}$
- BHKW 3.6 MW$_{el}$
- BZ 1.4 MW$_{el}$
- Batterie 5 MWh$_{el}$
Overview IPP, HPC Power Plant, Fuel Cell, Wind Power, Battery
PowerPac, flexible solution
Existing Solutions in Hamburg

LNG PowerPacs

LNG Hybrid Barge
Lacking of business case

Table 1-1. Business case analysis for establishing OPS with a shore to grid solution and a LNG-power-barge solution with a sales electricity price of EUR 115 per MWh

<table>
<thead>
<tr>
<th>2017 prices, MEUR</th>
<th>Bergen</th>
<th>Hamburg</th>
<th>Rostock</th>
<th>Tallinn</th>
<th>Helsinki</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grid</td>
<td>LGN-barge</td>
<td>Grid</td>
<td>LGN-barge</td>
<td>Grid</td>
</tr>
<tr>
<td>Annual utilization of OPS infrastructure</td>
<td>1,730 hrs</td>
<td>570 hrs</td>
<td>1,040 hrs</td>
<td>1,530 hrs</td>
<td>510 hrs</td>
</tr>
<tr>
<td>Interest and loan repayments</td>
<td>-11.2</td>
<td>-16.2</td>
<td>-11.0</td>
<td>-16.2</td>
<td>-25.6</td>
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<tr>
<td>Operation &amp; maintenance</td>
<td>-1.6</td>
<td>-1.6</td>
<td>-0.5</td>
<td>-0.5</td>
<td>-1.0</td>
</tr>
<tr>
<td>Purchase of electricity/LNG</td>
<td>-14.9</td>
<td>-14.6</td>
<td>-15.1</td>
<td>-4.7</td>
<td>-19.5</td>
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<tr>
<td>Sale of electricity</td>
<td>21.8</td>
<td>21.8</td>
<td>7.2</td>
<td>7.2</td>
<td>13.1</td>
</tr>
<tr>
<td>Total</td>
<td>-5.9</td>
<td>-10.6</td>
<td>-19.4</td>
<td>-14.3</td>
<td>-33.1</td>
</tr>
<tr>
<td>Min. investment support</td>
<td>5.9</td>
<td>10.6</td>
<td>19.4</td>
<td>14.3</td>
<td>33.1</td>
</tr>
</tbody>
</table>

1) Port of Bergen has today a capacity fee reduction of 90 percent. The business case assumes a capacity fee reduction of 50 percent throughout the calculation period.

Source: DNV GL
Ship-owner view

- Environmental performance is no main business criteria
- Use of environmental friendly technology has to be economicly
- Use of OPS only if cheaper than on board production of electricity
- Use of OPS if equal price or more expensive only when mandatory
Challenges

• Political pressure
  - Clean Air Action Plan City of Hamburg
  - EU Directive 2014/94/EU deployment of alternative fuels infrastructure

• Regulation only to offer of infrastructure not for mandatory use

• High investments without return necessary

• Onshore Power is no business case!

• No chicken – egg problem!
How to overcome challenges?

• Premisses: Level-Playing-Field

• Regulatory approach:
  - Mandatory specific technic e.g. California regulation
  - Emissions limit, technic open (different level of ambition possible)
    - Tier 3 at berth (assistance policy for NECA like Sulphur regulation for SECA)
    - Zero Emission at berth/ports (assistance policy for Paris agreement)

• Business approach:
  - Raise costs for fuel consumption e.g. CO2 levy
  - Reduce costs for electricity e.g. exemption on EEG reallocation charge
  - Reduce costs for grid use e.g. exemption on fixed grid fee

• Reason of state approach
  - Subsidies for OPS investments (grid and infrastructure)
Thank you!

**Hamburger Port Authority**

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