Shore-to-ship power
The ABB way to green cruise terminals

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Shore-to-ship power
The ABB way to green cruise terminals
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Agenda

Smart Ports towards decarbonisation: balancing demand and supply

Shore-to-ship power solutions for cruise terminals

Conclusions
Smart Ports towards decarbonisation
Ports decarbonisation and green vision

Port infrastructure is a small contributor to GHG versus the whole maritime industry
- BUT…

Ports do not exist in isolation:
- Coordination amongst all stakeholders to enable port sustainability
- Need of optimal combination of incentives, regulation and tools for maritime sector

Ports are the entry point for goods and people into a nation/region
- Ensure positive impact/green image
- Minimizing impact on city air quality
Smart Ports towards decarbonisation
Ports decarbonisation and green vision

Climate change is (unfortunately) not for free
- Look for measures that minimize costs and maximize benefits is key
- New business models: «thinking out of the box»

The technical way
- Enhance Renewable penetration in ports
- Promote shore-to-ship power solutions
- Electrify handling equipment and vehicles

The strategical way
- Partnerships: collaboration to share best practices, costs and benefits
- Incentives plans: reducing carbon demand/intensity
Smart Ports towards decarbonisation

Balancing Demand and Supply

E-mobility market (E-vehicles and E-buses) is growing extremely fast

Renewables integration launch ports toward a green era

A state-of-the-art Port Electrification infrastructure can simultaneously supply shore power to vessels and to e-mobility recharging solution

Demand

Supply

Shore-to-ship power, hybrid and full electrical ferries are now reality

Producing electricity on-shore is more efficient than on-board generation
Agenda

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Why ABB?

- **60 years+**
  Electrification experience

- **Sustainability**
  Comprehensive portfolio for green ports

- **Safety**
  Design to the highest HSE standard

- **Global Footprint**
  Ensuring worldwide coverage

- **360° approach**
  From preliminary design to service

- **Technology**
  State-of-the-art shore-to-ship power solutions
Optimizing Capital Expenditures in Shore-to-ship power systems

Customization is key for CAPEX – OPEX optimization

**Needs assessment**
Clarify your needs together with ABB experts:
- Power @ HV S/S
- Average power per vessel (utilization)
- No. of vessels (contemporaneity)

**Project inception phase**
ABB supports customers in:
- Consulting for OPEX-CAPEX optimization
- Developing a tailored engineering solution

**Project execution**
ABB performs:
- Turnkey implementation
- Engineered package supply According to customer requirements

**Service**
ABB grants:
- Reliable system operation
- Structured maintenance planning
- System lifecycle extension

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Defining a custom solution according to any port needs!
Shore-to-ship power: a step forward for a greener port

Specific requirement for each vessel segment

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>RORO/Ferry</th>
<th>Container</th>
<th>Cruise</th>
<th>LNG / Tanker FSU / FPSO</th>
<th>Shipyards / Navy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>11 kV or low voltage</td>
<td>6,6 kV</td>
<td>6,6 &amp; 11 kV</td>
<td>6,6 kV</td>
<td>6,6 kV, 11 kV or low voltage</td>
</tr>
<tr>
<td>Max Power consumption</td>
<td>6.5 MVA</td>
<td>7.5 MVA</td>
<td>16/20 MVA</td>
<td>Approx. 10 MVA</td>
<td>Case by Case</td>
</tr>
<tr>
<td>Frequency</td>
<td>60 &amp; 50 Hz</td>
<td>60 mainly</td>
<td>60 mainly</td>
<td>60 Hz</td>
<td>50 &amp; 60 Hz</td>
</tr>
<tr>
<td>Plugs/cables (per connection)</td>
<td>1 onboard</td>
<td>2 onshore</td>
<td>4+1 onshore</td>
<td>2/3</td>
<td>Case by case</td>
</tr>
<tr>
<td>Transformer</td>
<td>Not critical</td>
<td>critical</td>
<td>critical</td>
<td>onshore</td>
<td>Case by case</td>
</tr>
<tr>
<td>Layout</td>
<td>Partially controlled</td>
<td>Partially controlled</td>
<td>Flat profile</td>
<td>critical</td>
<td>Not critical</td>
</tr>
<tr>
<td>Load profile</td>
<td>critical</td>
<td>Not critical (if P=7.5 MVA)</td>
<td>critical</td>
<td>Case by case</td>
<td>Case by case</td>
</tr>
<tr>
<td>Protect selectivity</td>
<td>critical</td>
<td>Case by case</td>
<td>Case by case</td>
<td>Case by case</td>
<td>Case by case</td>
</tr>
<tr>
<td>Cable management system</td>
<td>mid cost</td>
<td>low cost</td>
<td>high cost</td>
<td>Mid cost</td>
<td>Case by case</td>
</tr>
</tbody>
</table>
Shore-to-ship power: a step forward for a greener port

Custom solutions for each vessel segment

Cruise vessels

Container vessels

Ro/ro – Ferry Navy
Optimizing Capital Expenditures in Shore-to-ship power systems

Developing specific solutions for Shore-to-ship power

High power conversion platforms enters into the S2SP market: delivering power up to 24 MVA!
Innovative solutions for Shore-to-ship power
One-to-one converter for cruise terminals

One single converter can supply a cruise vessel ensuring full compliance with IEC/ISO/IEE 80005-1

- Incoming MV supply
- 20MVA Static Frequency Conversion System (ACS6000 SFC) to supply No.1 cruise vessel
- Harmonic filters
- Cable Management System
- On-board vessel retrofit: S2SP switchgear and PMS upgrade
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From shore-to-ship power to smart ports

Conclusion

Optimized cost/benefit ratio is key for sustainable development in ports

Specific assessment needs ensures CAPEX / OPEX optimization through customized solution design (one size does not fit all)

Technology providers play a key role in removing barriers towards the large-scale implementation of shore-to-ship power