

Electric Power Supply Vessel, EPS for the Port of Bergen

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HMMS AS ?

Hordaland Maritime Miljøselvskap AS shall develop and commercialise environmentally good solutions for the maritime industry





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Eierselskap:

| | | |
|------------------------|-------|---|
| Sparebanken Vest | 7,43 | % |
| Eidesvik Offshore ASA | 91,08 | % |
| Grieg International AS | 0,74 | % |
| Coast Center Base AS | 0,74 | % |

PROSJEKTER

NFR prosjekt

Bergen Havn prosjekt



Bakgrunn og Veien videre



Utvikling, verifisering og testing av hybridssystemer

2009 2010 2011 2011 2011 2011 2011

Fellowship II

Kvalifisering MCFC
Kvalifisering av kraft
elektronikk

Testing av nedskalert MCFC
integret i elektrisk
hovudsistem
om bord i skip

Fellowship III - Hybrid

NFR støtte

M/V Viking Lady

Hybrid system utvikling og nedskalert testing
med MCFC med energilagring og
energi gjenvinningsystemer i eksisterende
Fellowship infrastruktur

Bruk av LNG som brennstoff
med samme skips
infrastruktur – den beste
måten å fremskaffe effektive
forretningskonsepter.

EPS-Skip hybrid – Utvikling

NFR støtte ansøkt -
EPS-Skip

Full skala utvikling av elektrisk system for hybridsystem
med verifisering og testing i et hybrid skip -
fullskala EPS-Skip demonstrasjon

Støtte fra EU vil bli ansøkt



FellowSHIP III - Deliverables

A low emission total hybrid energy system with energy storage.



”Port of Bergen project”

The main goal for the study is to find optimal capacity and functionality, size and form of an Electric Power Supply Vessel, EPS, suitable for the Port of Bergen.

HMMS Hordaland Maritime
Miljøsekskap AS

- Sparebanken Vest AS
- Grieg International AS
- Eidesvik Offshore ASA
- Coast Center Base AS

Supported by:

- Norwegian Research Council
- Port of Bergen
- City of Bergen
- Hordaland County Council



”Port of Bergen project”

- Business model and practical implementation
- Cost estimates for building and operation of EPS
- Basic technical developments
- Further markets for EPS
- Political and administrative relations

”Port of Bergen project”

- EPS features

- Deliver «mobile shore power» to visiting vessels that do not have access to ordinary shore power.
- Simultaneous delivery of different voltages and frequencies.
- Deliver surplus power to the city net.
- Be a mobile emergency power source in case of net problems.
- Providing «as-clean-as-possible» mobile power.

”Port of Bergen project”

- EPS challenges

- Taking responsibility for power supply to other vessels, Class and regulation issues.
- Flexibility in deliveries, i.e. 50/60 Hz and voltages.
- Safety issues with simultaneous operations close to traffic areas: Delivery of power, refuelling diesel, refuelling LNG, loading and discharging.
- Variable loads when switching from one client vessel to another.



Proposed
arrangements at
Skoltegrunnskaian
in the Port of
Bergen.

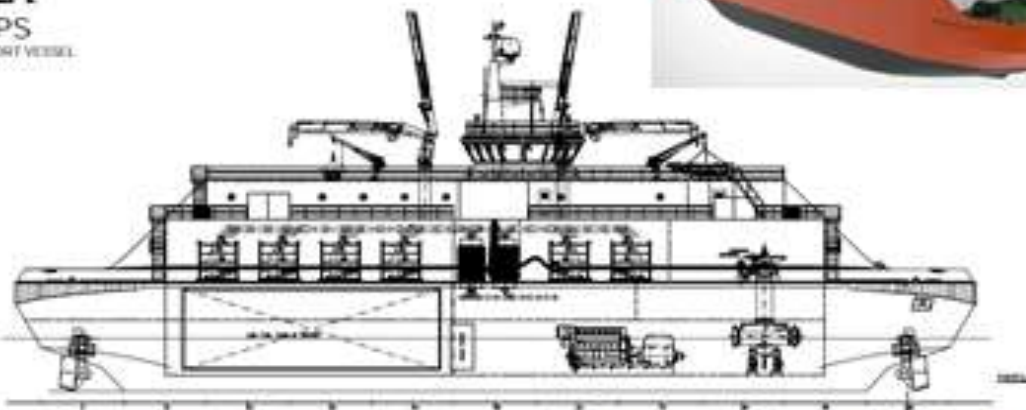


HMMS



Electric Power Supply Ship - EPS


WÄRTSILÄ
VS303 EPS
ELECTRIC POWER SUPPORT VESSEL



Power Station based on Fuel Cells, Steam Turbines, Gas Engines and Battery Pack in a hybrid configuration.

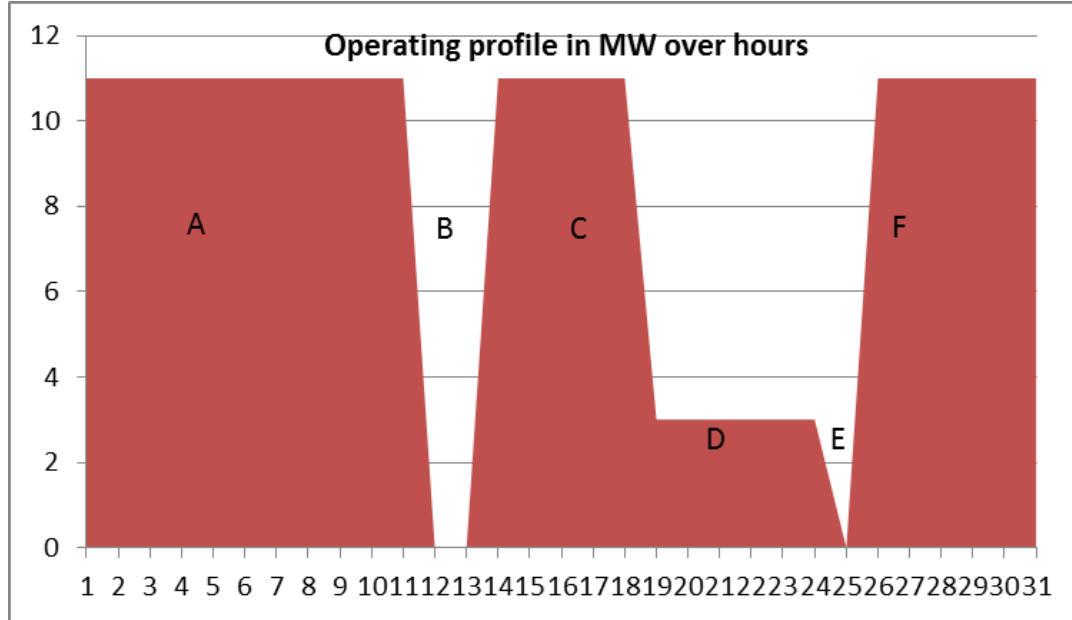
Power : 13 MW el-power delivery, 50/60 Hz, different voltages

Fuel: Natural gas (LNG).

Your Partner in Shipping

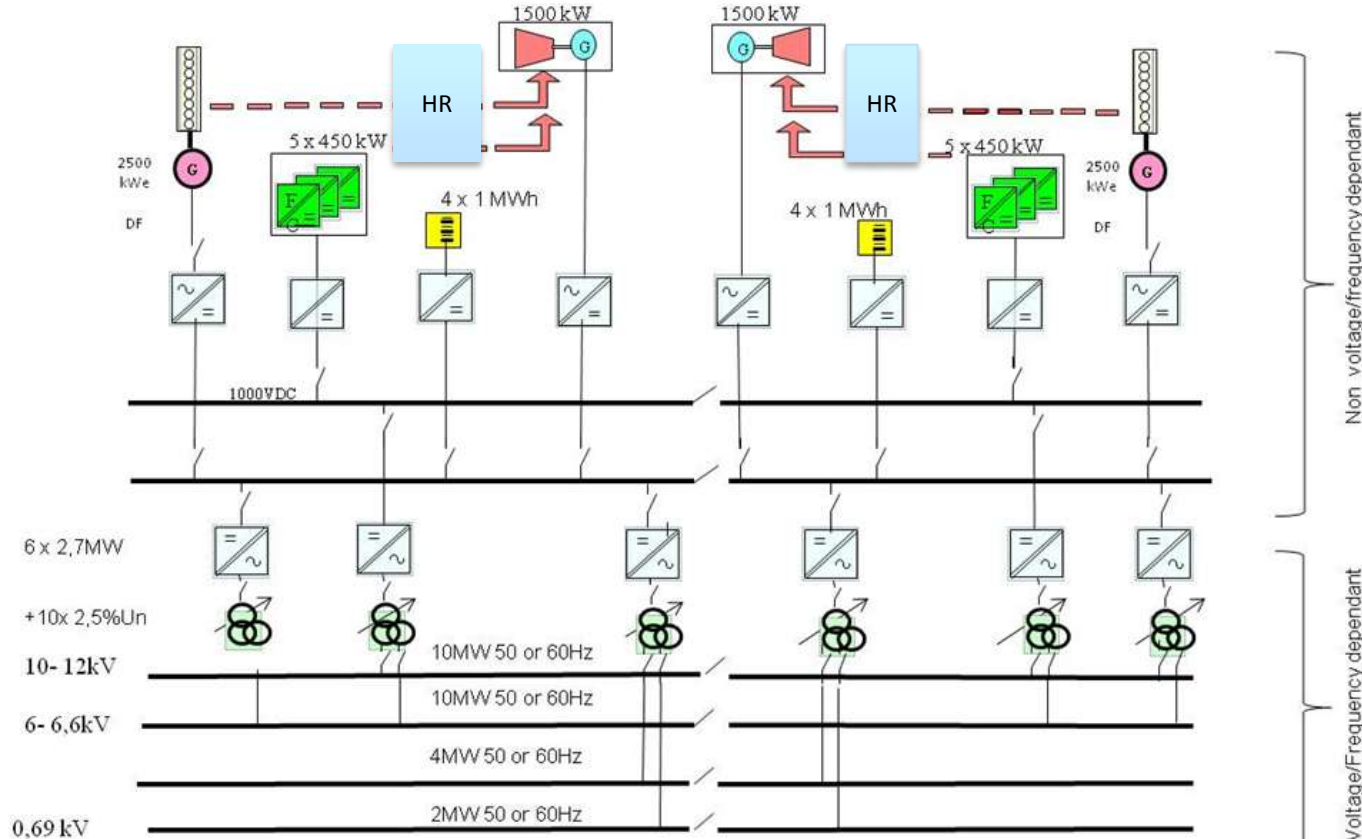


Operating profile for design

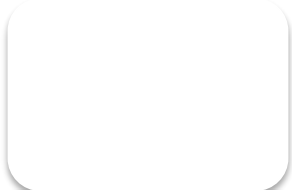
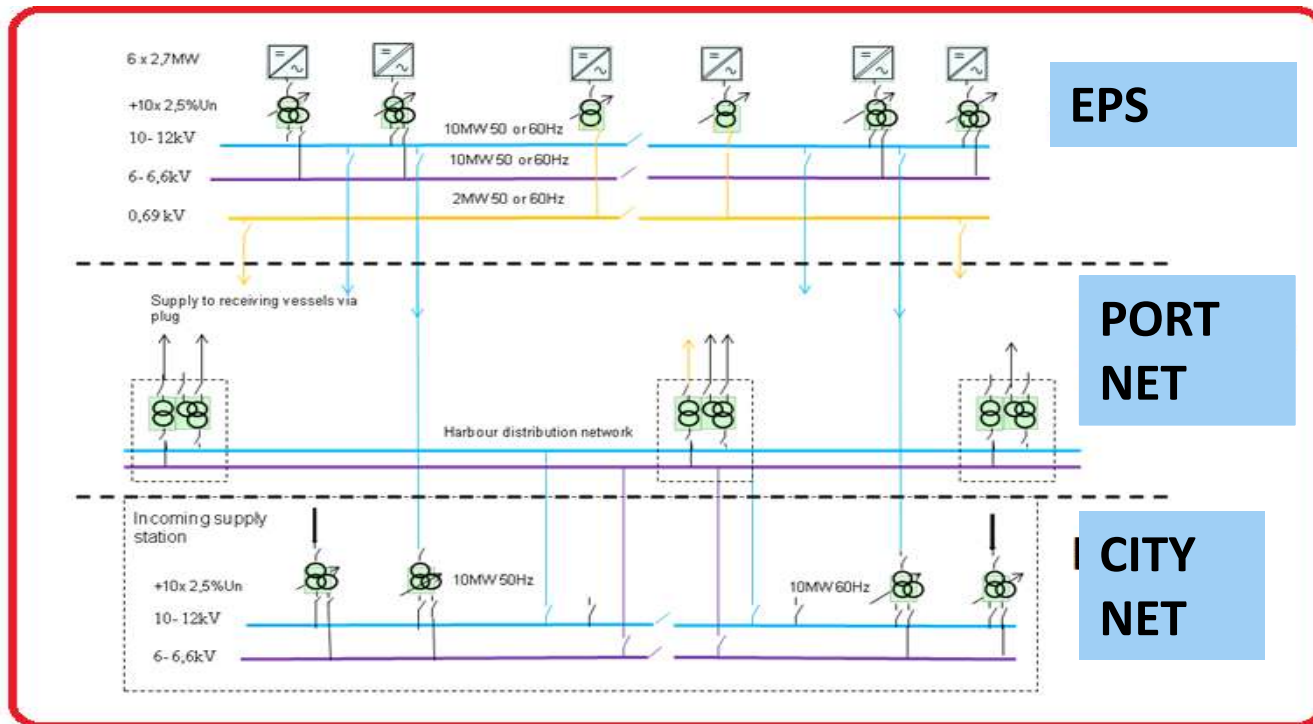


- A – Large cruise vessel connected in 10 hours
- B – Disconnection for 2 hours
- C – New connection of two vessels in 5 hours
- D – Disconnection of one vessel, remaining in operation for 5 hours
- E – Disconnection of vessels in 1 hour
- F – Large cruise vessel connected

Power plant concept for EPS



Network Connections



Estimated profile of emissions and consumption for the EPS - hybrid

| UTSLIPP | | EPS -hybrid | DF - LNG | DF - MGO |
|--------------------|-------|--------------------|-----------------|-----------------|
| NOx | g/kWh | < 0,68 | 1,7 | 7 - 8 |
| SOx | g/kWh | < 0,01 | 0,02 | 2 |
| CH4 | g/kWh | < 0,8 | 20 | - |
| CO2 | g/kWh | < 420 | 507 | 660 |
| Partikler | | 0 | Ca 0 | Urenset |
| | | | | |
| Brennstoff forbruk | g/kWh | < 140 | 186 | 210 |



Thank you for the attention

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