



becker marine systems

Emission Optimized Power Supply in Ports



SHIP EFFICIENCY 2015

by STG

5th International Conference

Hamburg, 28 – 29 September 2015



Becker Marine Systems

Innovative engineering for environmentally-friendly products!

- 248 Employees
- 140 in Hamburg
- 6 Locations worldwide
- 20 Products

Reduction of CO²
1.743.847 t (619 Ships)



Energy-Saving Devices



Manoeuvring Equipment



LNG HYBRID



LNG HYBRID Portofolio

LNG HYBRID
Barge



2014

LNG HYBRID
PowerPac



2015 /
2016

LNG HYBRID
Ferries



2016 /
2017

The Regulators Are Driving Uptake

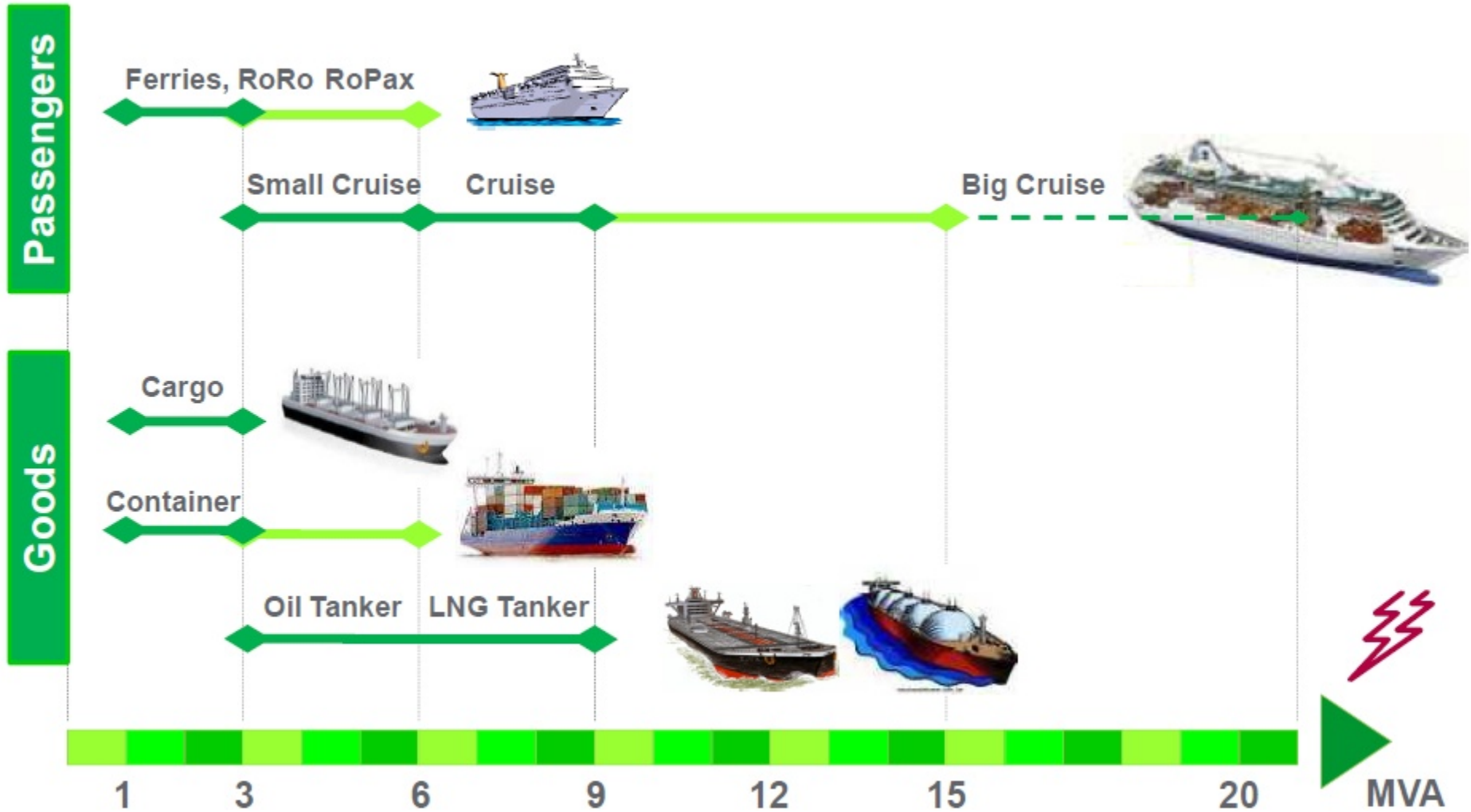
Today's Problems

- Air and noise pollution in port from ships
- Stronger public awareness
- Ship operators are in danger to **loose image**



- MARPOL Annex VI
- EU Sulphur Directive
- Directive On The Deployment Of Alternative Fuel Infrastructure

Vessels Power Demand at Berth

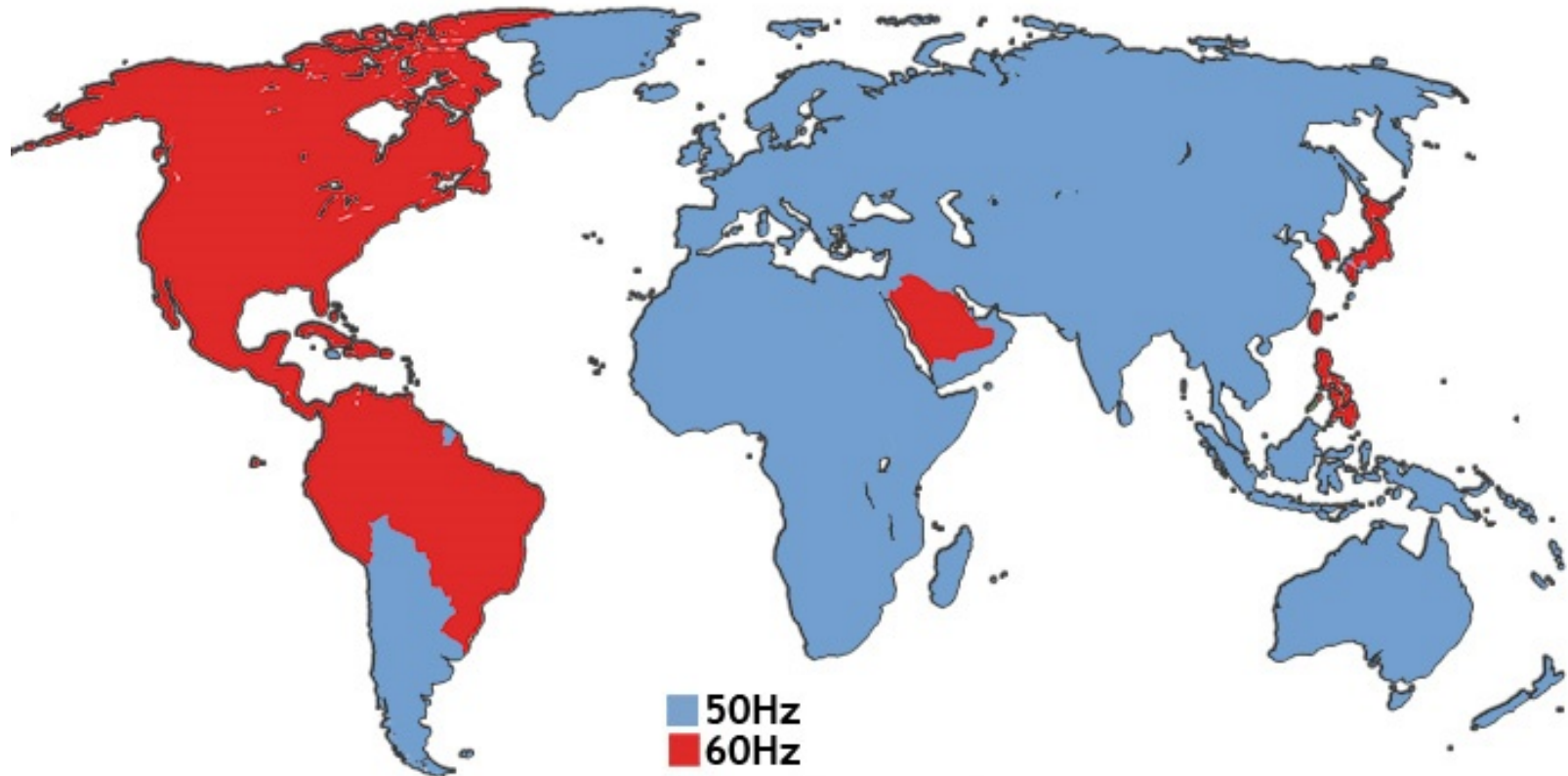


Schneider Electric - PWB – Energy Management Solutions



Power Grid Frequency

IEC/ISO/IEEE 80005-1, Frequency shall match



Regulations

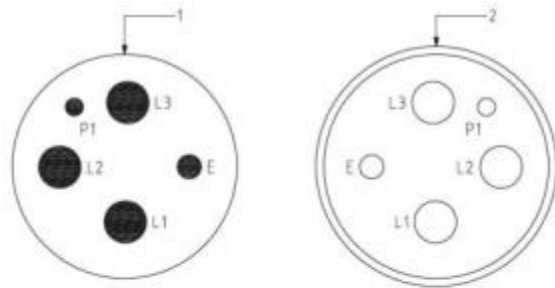
Rules

Bureau Veritas NR 557

High-Voltage Shore Connection System

IEC/ISO/IEEE 80005-1

Utility connections in port - Part 1
High Voltage Shore Connection (HVSC) Systems
General requirements



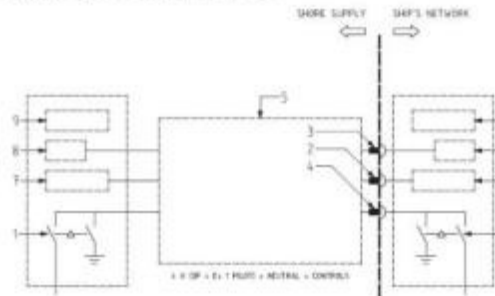
KEY

- 1. POWER PLUG FACE (SHORE SIDE PLUG)
- 2. SOCKET OUTLET FACE (SHIP SIDE SOCKET)
- E. EARTH
- P1. PILOT LINE 1 (USED FOR GROUND CHECK)
- L1. PHASE A - PHASE R
- L2. PHASE B - PHASE S
- L3. PHASE C - PHASE T

Figure C.4 - Shore power connector pin assignment

C.4.1 System description

The general system layout is shown in Figure C.1.



KEY

- 1. 4V-SHORE SUPPLY SYSTEM
- 2. 4V-PLUG
- 3. SHIP'S HV-SOCKET
- 4. PILOT WIRES INTEGRATED IN PLUG AND SOCKET
- 5. CABLE MANAGEMENT SYSTEM
- 6. SHORE CONNECTOR SWITCHBOARD
- 7. INTERLOCKS WITH PILOT WIRE
- 8. COMMUNICATION FOR CONTROL AND MONITORING
- 9. PROTECTIVE RELAYING

Figure C.1 - General system layout

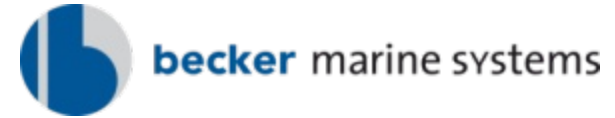


Conversion of
AIDAsol finished
2013



Clean Energy for Cruise Ships

The Environment



project partners:



Guaranteed
Supply

Economic
Feasibility

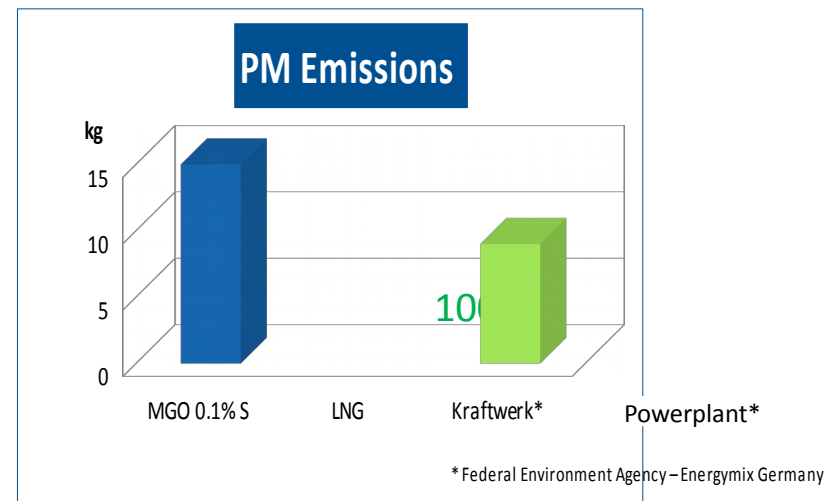
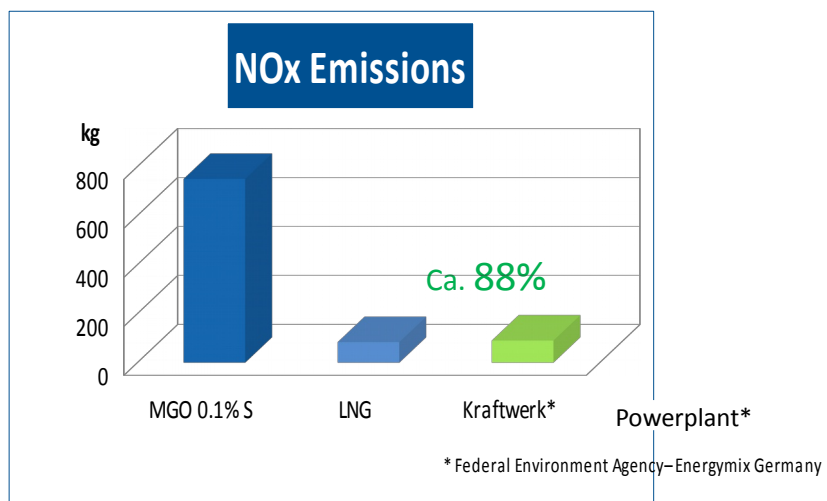
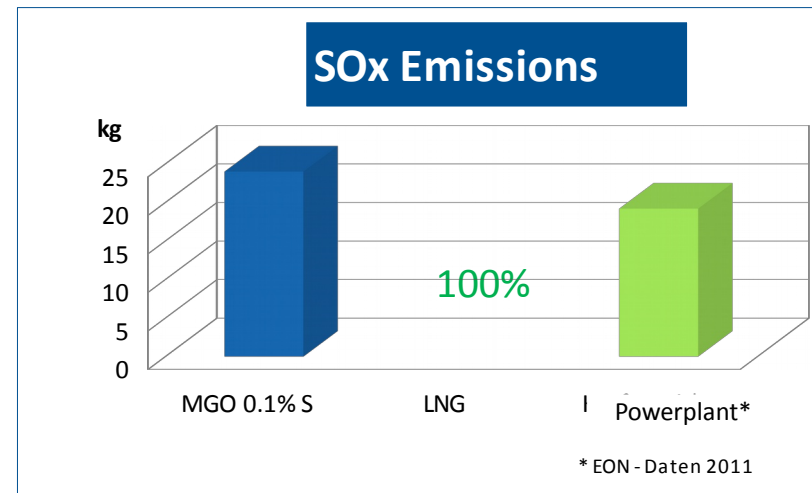
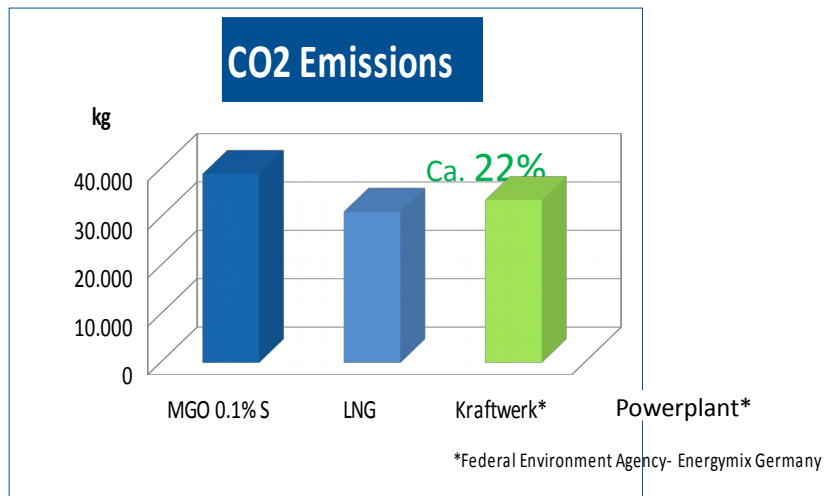


GASNOR
A Shell Subsidiary



LNG HYBRID

LNG – a clean energy!



(6MW average load; 10 hours /data based on the electrical power)



Our Solution

LNG HYBRID BARGE

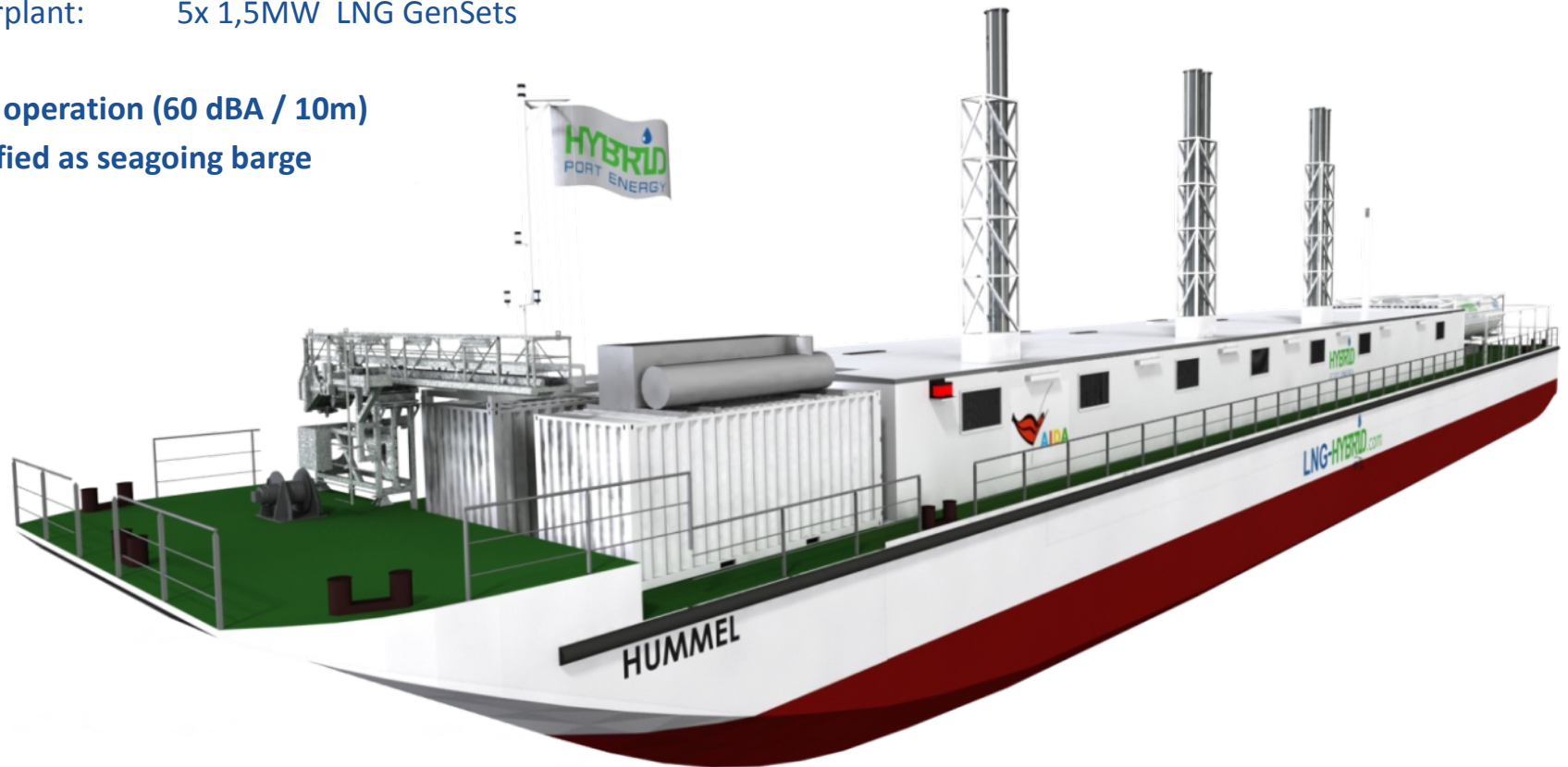
Barge Dimensions: 76 x 11,4 x 2,5 m

Capacity: 2 x 15 t LNG Container

Powerplant: 5x 1,5MW LNG GenSets

Silent operation (60 dBA / 10m)

Classified as seagoing barge



LNG HYBRID Barge



Standard

5 x 1.500 kW **7.500 kW**
11 kV Barge/Ship
60 Hz

5x ~1.500 kW **~7.500 kW**
10 kV Barge/Shore
50 Hz

Thermal Capacity: **~9.200 kW**

Option

7 x 1.500 kW **10.500 kW**
11 kV Barge/Ship
60 Hz

7x ~1.500 kW **10.500 kW**
10 kV Barge/Shore
50 Hz

Thermal Capacity: **~12.000 kW**

High efficiency: + power efficiency 39,7 %

+ heat efficiency 45,4%

Handling LNG



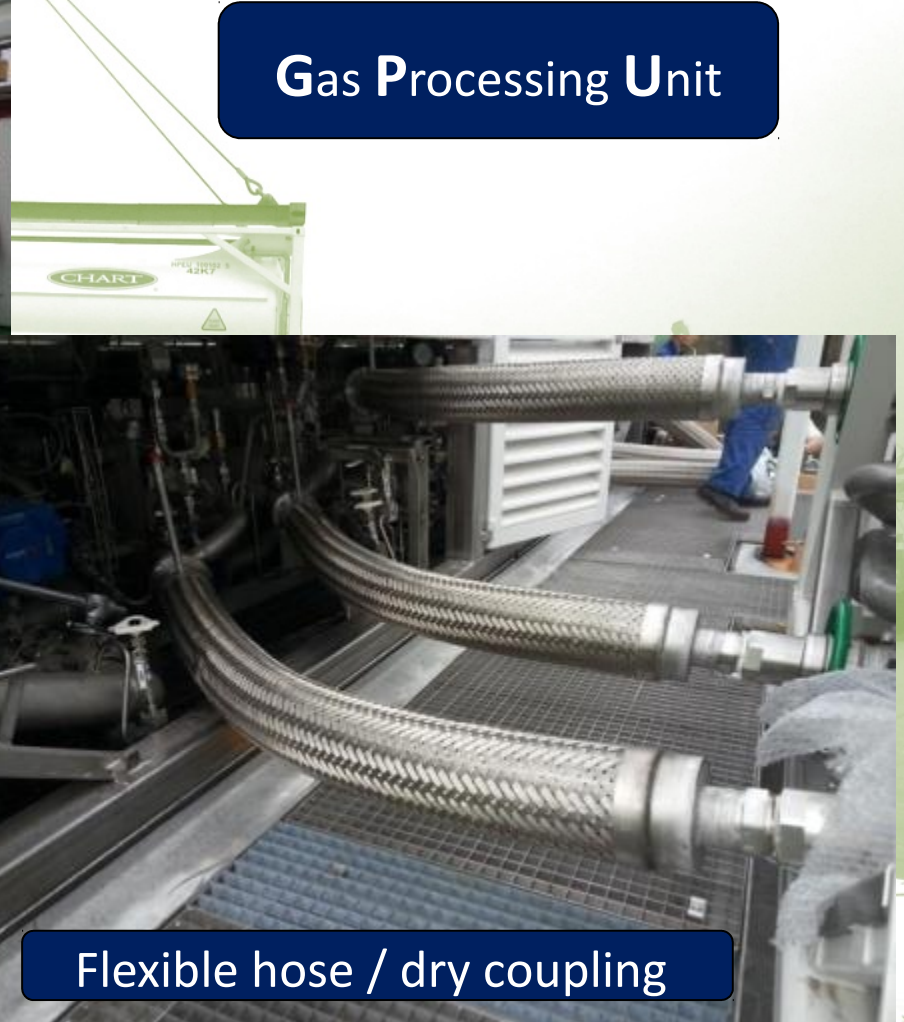
2 x 40 ft. LNG Container Typ C, Capacity < 30 t

Handling LNG



Drip tray

Gas Processing Unit



Flexible hose / dry coupling

Ready for service



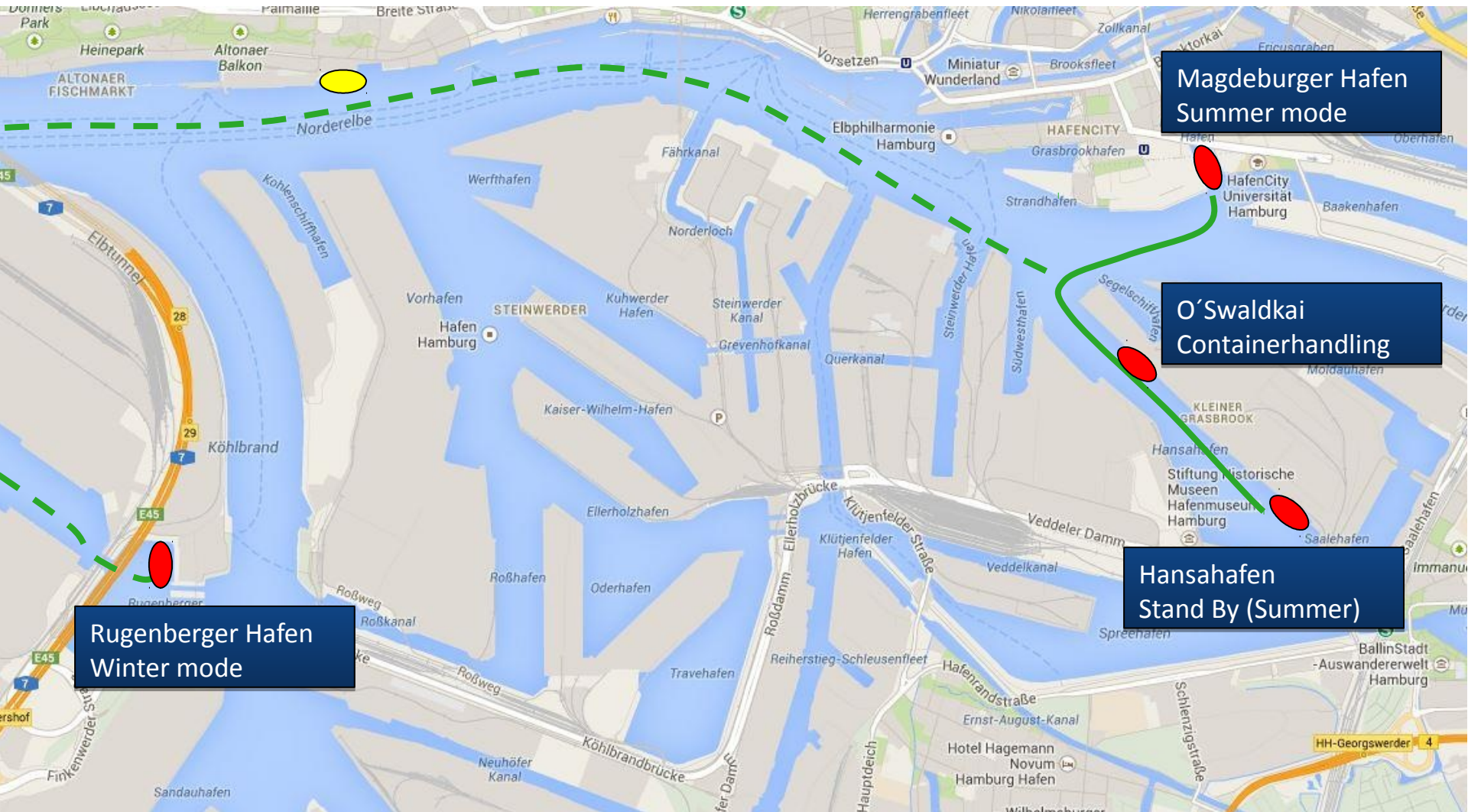
Head Office: Blohmstraße 23 / D-21079 Hamburg / Tel.: +49-(0)40-24199-0 / Fax: +49-(0)40-2801899
Service Hotline: +49-(0)173-9229311 **Email:** info@becker-marine-systems.com



LNG HYBRID

 **becker** marine systems

Moving the Barge...



1st Power Supply - 05/2015



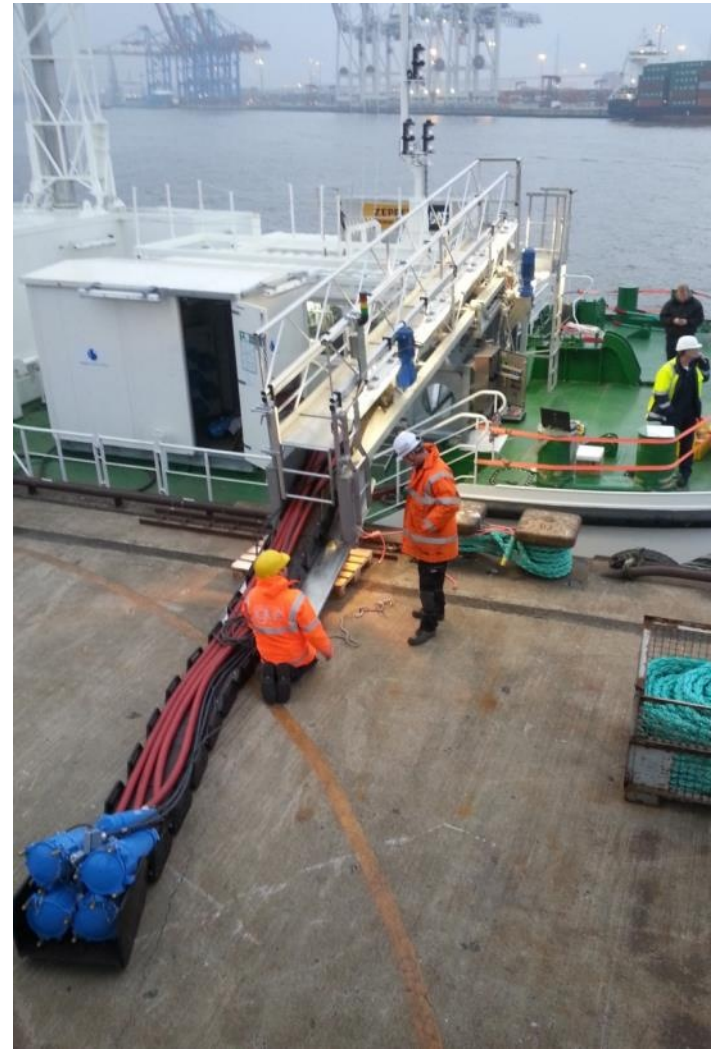
Project start 02/2012 + + + Keel laying 01/2014 + + + Launching 09/2014 + + + 1st Power Supply 05/2015

Infrastructure Hamburg

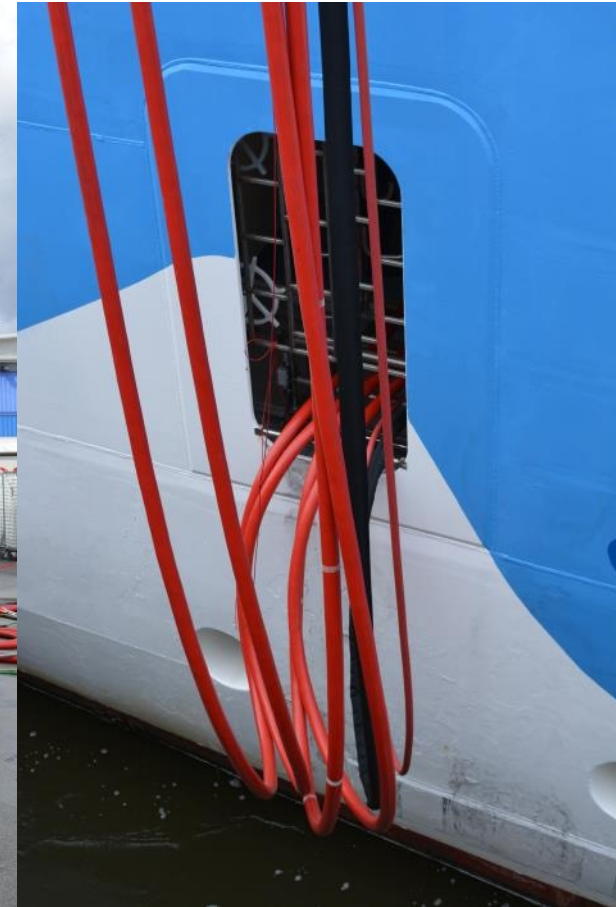


Project start 02/2012 + + + Keel laying 01/2014 + + + Launching 09/2014 + + + 1st Power Supply 05/2015

Cable Handling Units



1st Power Supply – 05/2015



Project start 02/2012 + + + Keel laying 01/2014 + + + Launching 09/2014 + + + 1st Power Supply 05/2015

Concept Summer & Winter

Main Operation:

Cruise Ships
Supply 60Hz / 11kV
20 – 90 Operations
10 – 12 Hours

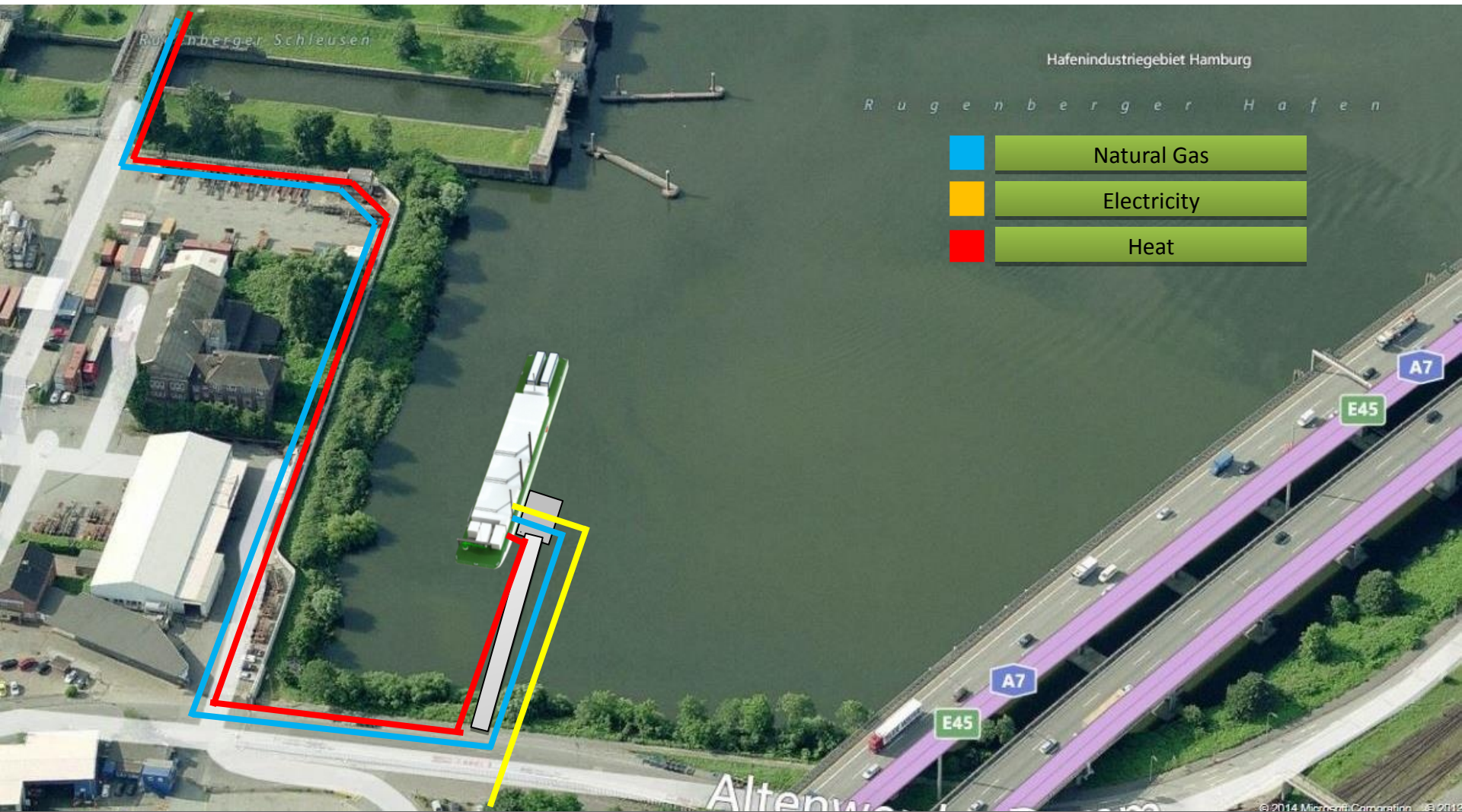
Alternativ Operation:

Industrial Clients
Supply 50Hz / 10kV
24 Hours / 7 Days

...creating revenue




Concept Winter



Hafenindustriengebiet Hamburg

R u g e n b e r g e r H a f e n

-  Natural Gas
-  Electricity
-  Heat



LNG HYBRID Barge in Hamburg



2013, Winner



2014, 3rd place

Deutsch-Norwegische | Norsk-Tysk
HANDELSKAMMER



2015, Winner
Category Voyage



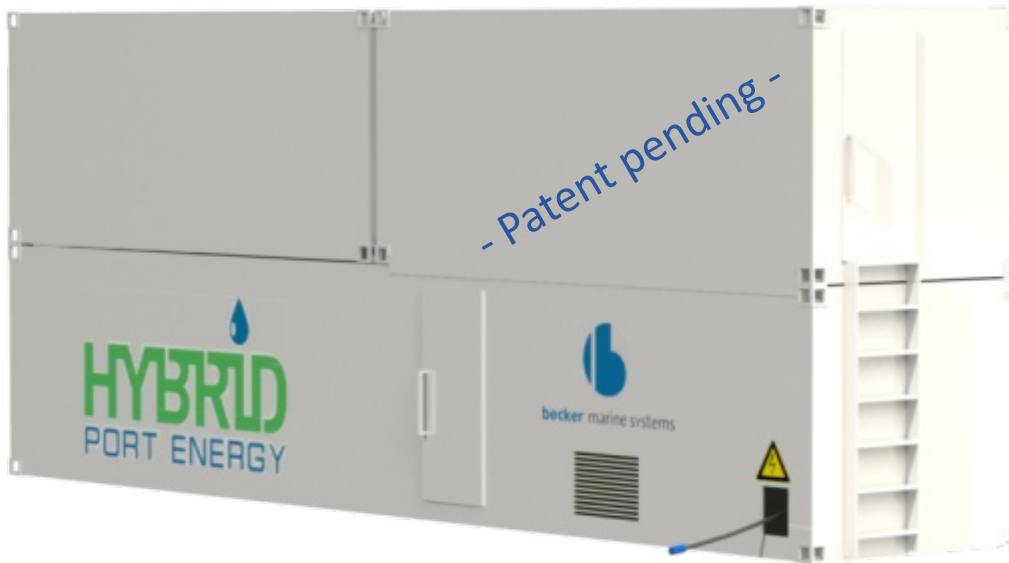
2015, Winner Environmental
Initiative of the year

Project start 02/2012 + + + Keel laying 01/2014 + + + Launching 09/2014 + + + Arrival Hamburg 10/2014



LNG HYBRID PowerPac

Green
Future



PowerPac Dimensions:

- 40 ft high cube Container (2x)

Capacity:

- 1 x ~10 t LNG Container

Powerplant:

- 1,5 MW - LNG GenSets

Weight: ~60 t

Classified TÜV / BV

Engine: Gas Engine
Max. Power: ~1500 kW_{el.}
Frequenzy: 60 Hz
Voltage: 6,6 kV

LNG HYBRID PowerPac

Positioning on the aftship or restricted areas on board the ship



PowerPac Handling

– Option –



Thanks for your attention!

Becker Marine Systems

Christian Becker

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Greener future starts now

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