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SISHIP ECO PROP

The ECO - friendly PROPulsion
for compact ships

Quelle:BDB Duisburg

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Electric Propulsion … not new

electric propulsion system anno 1886

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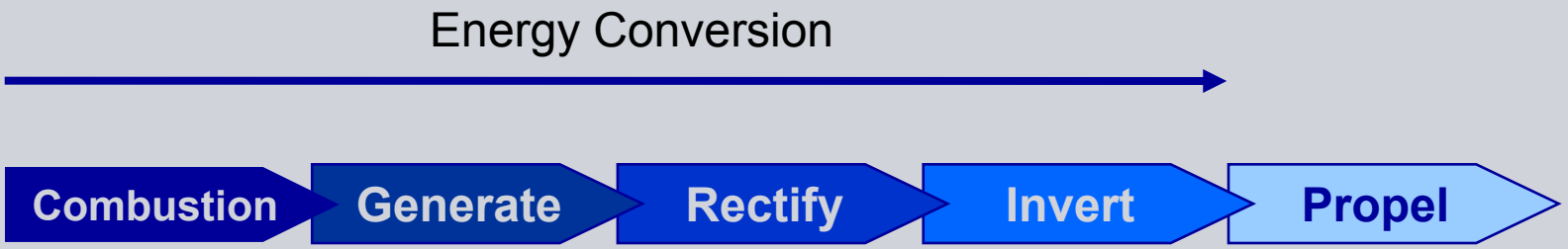
What is Diesel-Electric Propulsion?

With diesel-electric, a prime mover drives a generator which feeds a propulsion motor through a switchboard and converters



Facts
Diesel-Electric Propulsion

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- **Diesel-electric propulsion systems require 8-10% more primary power than diesel-mechanical systems**
  → Losses in additional system components,
  i.e. generators, cables, converters, motors

- **Diesel-electric propulsion systems have higher weight compared to diesel-mechanical systems**

- **Diesel-electric propulsion systems have higher investment cost compared to diesel-mechanical systems**

→Diesel-electric propulsion systems will only be used, if the a.m. facts will be compensated through other advantages

How can Diesel-Electric Propulsion be more efficient?

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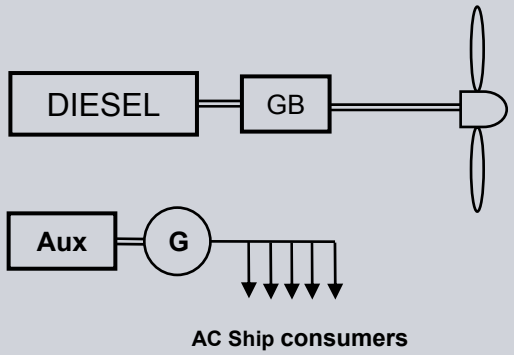
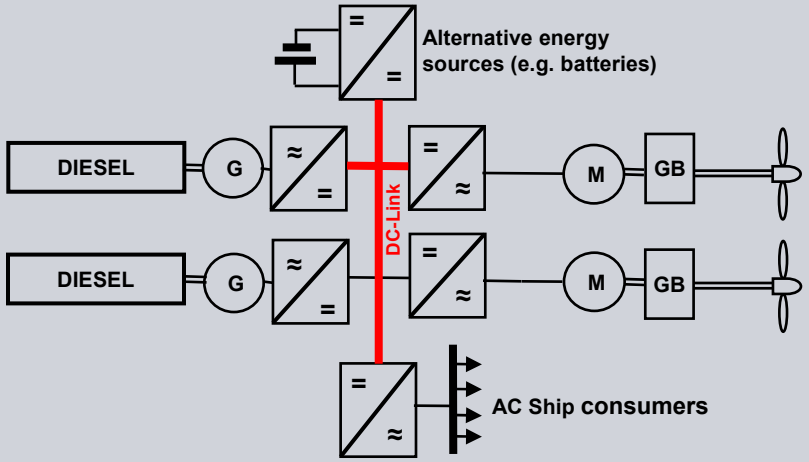
- **Optimized overall efficiency by**
  - Using Diesel Engines in the most effective operating point
  - Less total installed power
  - Combination with alternative energy sources
  - Integration of Auxilliary Systems (Ship consumers)



Conventional System



Advanced Diesel Electric System

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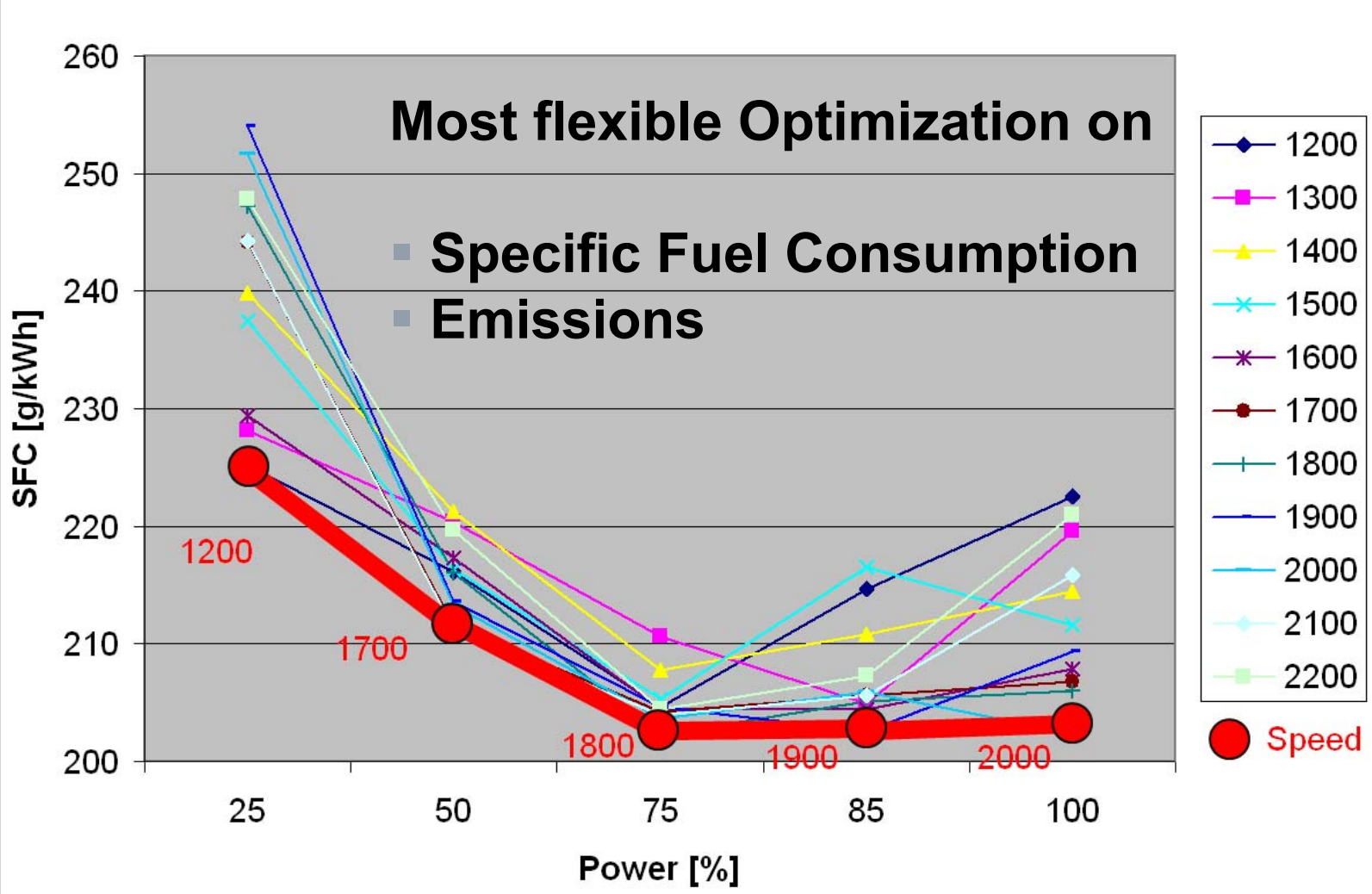
Optimization of Diesel Performance



Two Systems for Diesel Electric & Hybrid - Propulsion

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Industry Basis

SISHIP Drive LV

Reduction of weight

Reduction of size

Reduction of engineering cost

Automobile Basis

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Electrical PropulsionPower

above 800 kW

Electrical Propulsion Power

up to 800 kW

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Concept

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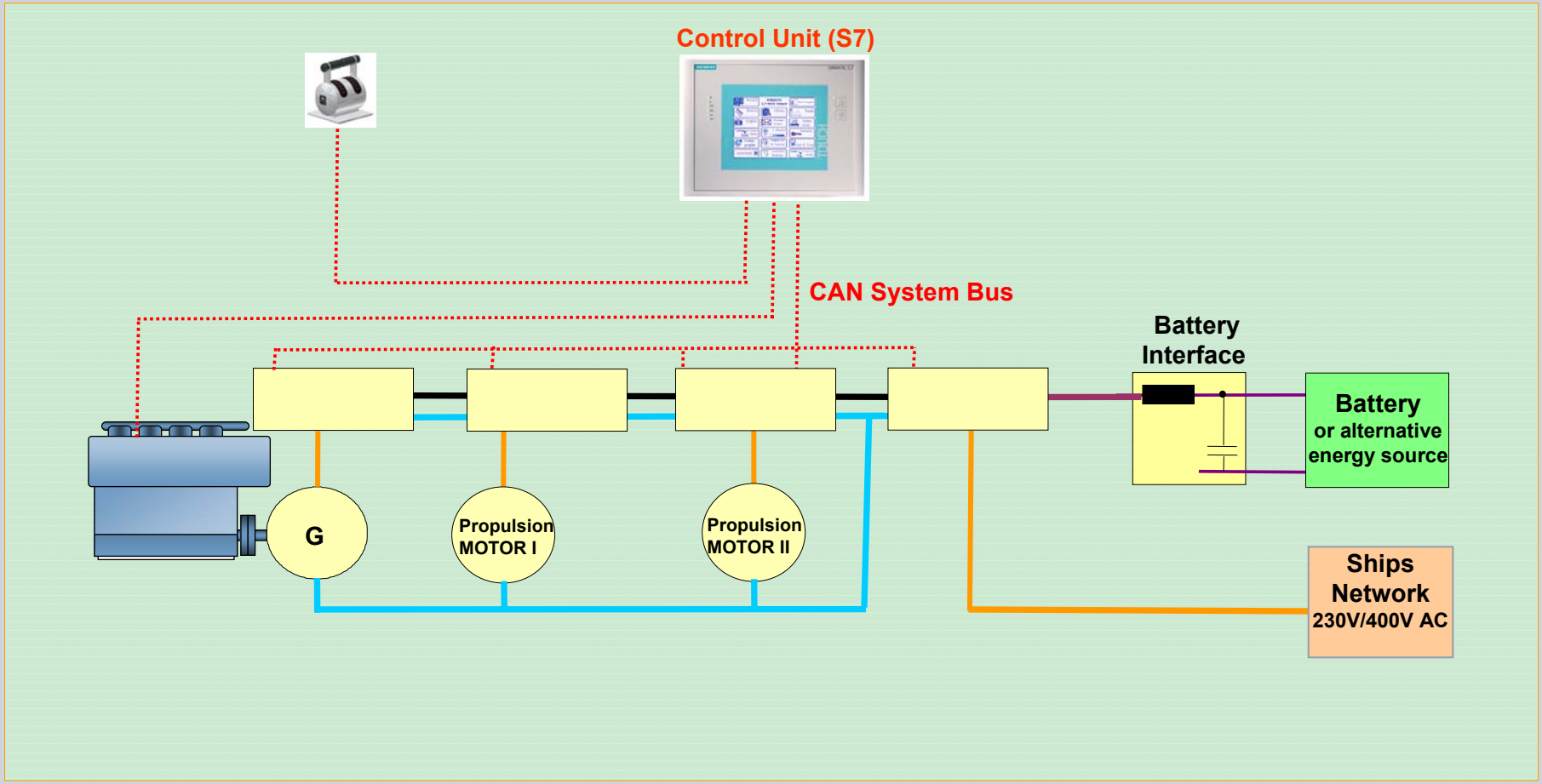

Two configurations for Advanced Diesel Electric Systems

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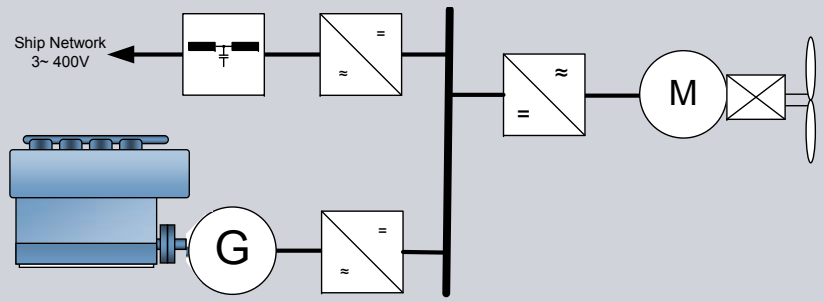


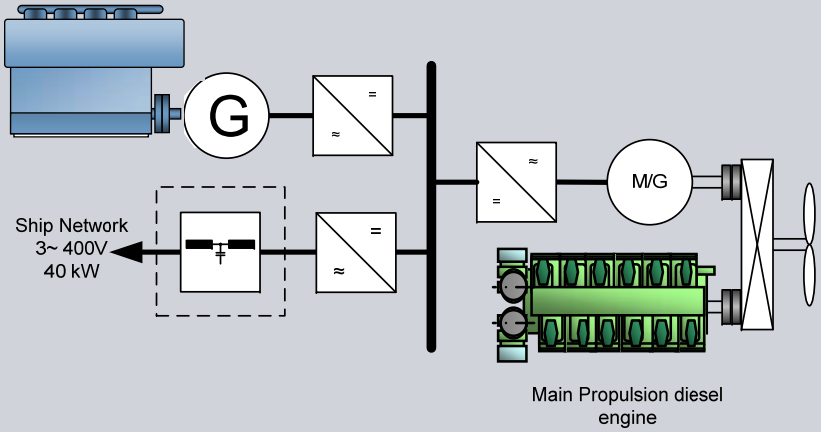
Advanced Diesel Electric Configuration

+ optimized efficiency througout wide range of operating profile

+ high redundancy / flexible arrangement of equipment

- higher invest

- more losses at high power output compared to conventional propulsion



Hybrid Configuration

+ basically same advantages as standard diesel electric configuration

+ best overall efficiency by using Diesel- direct and Diesel-electric modes

+ optimized utilization of Diesel engines in low load condition

+ easy Integration in existing Diesel- mechanical propulsion (Refit!)

"Hybrid propulsion is the technical term for propulsion systems which are the combination of a mechanical, an electric propulsion and the service system - however holistically integrated"

Some key indicators for potential hybrid propulsion candidates

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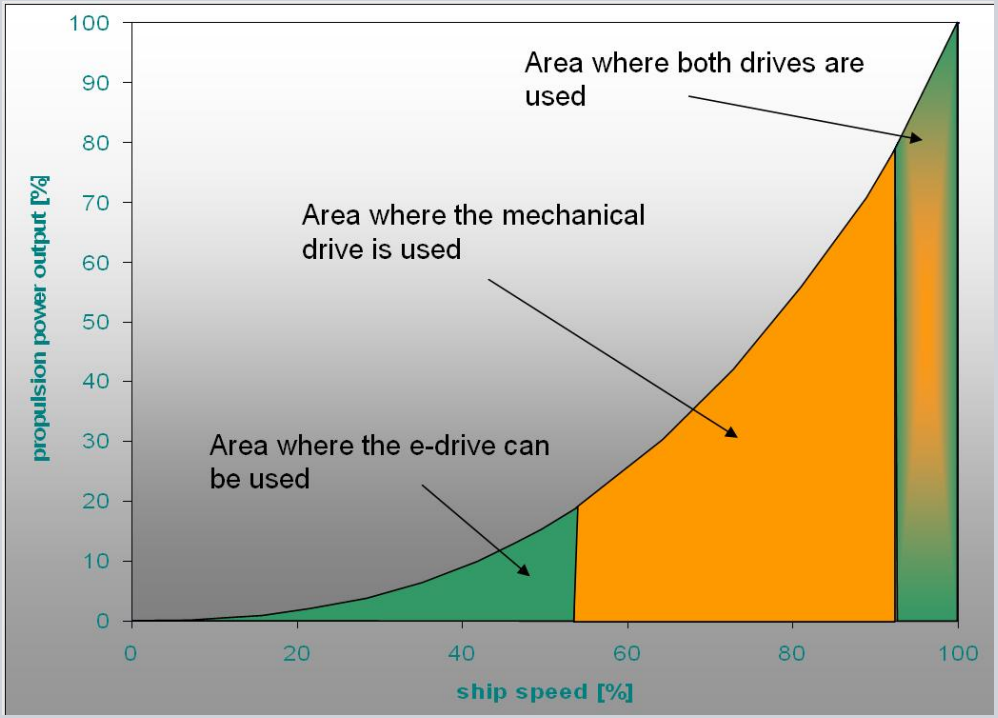
- The propulsion power is to satisfy very different operating conditions (e.g. down hill / up hill)
- Big variations in propulsion- and service power demand
- Max. power demands for prop. and service systems are not simultaneous (e.g.loading pumps)
- The max. service power demand does not justify an all electric concept



applies all to Inland Navigation

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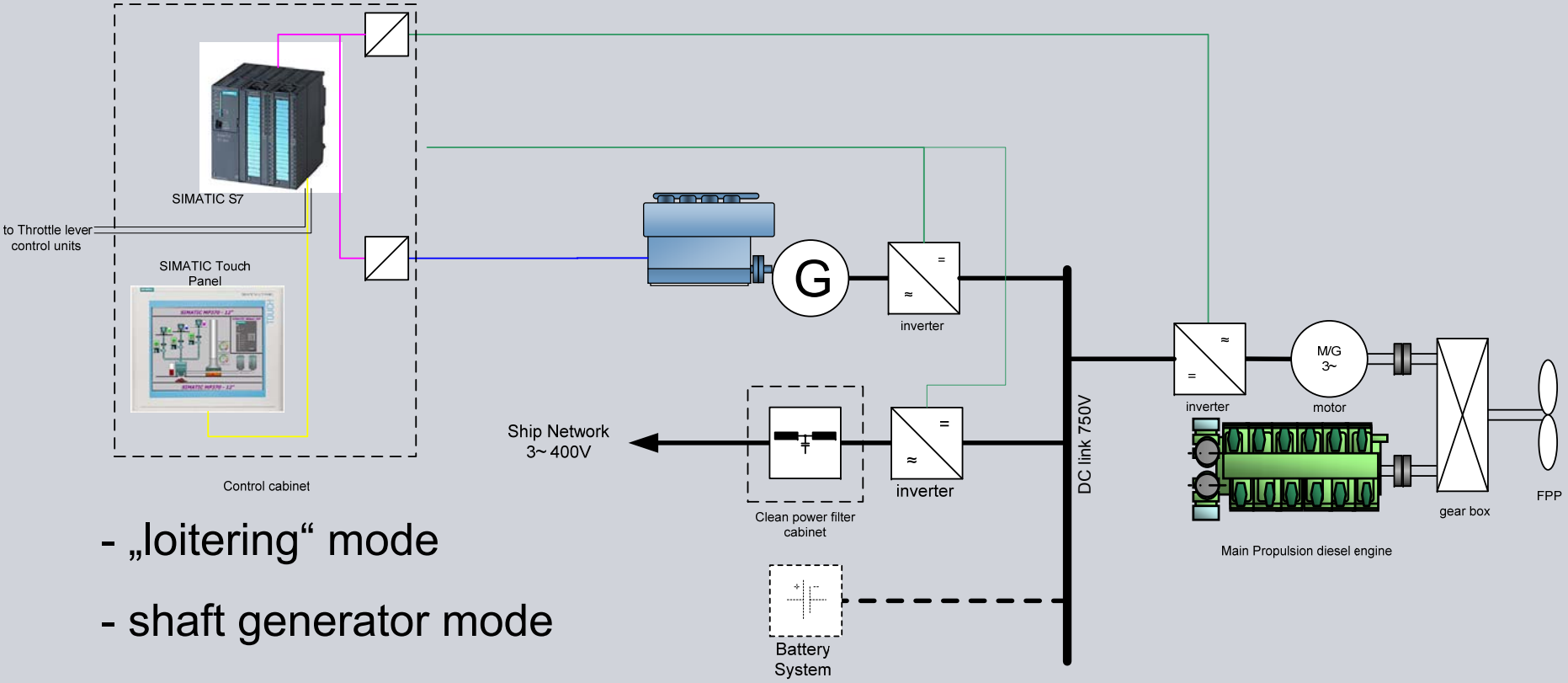
Advanced Hybrid configuration



- „loitering“ mode
- shaft generator mode
- „zero emission“ mode
- hybrid mode

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Components

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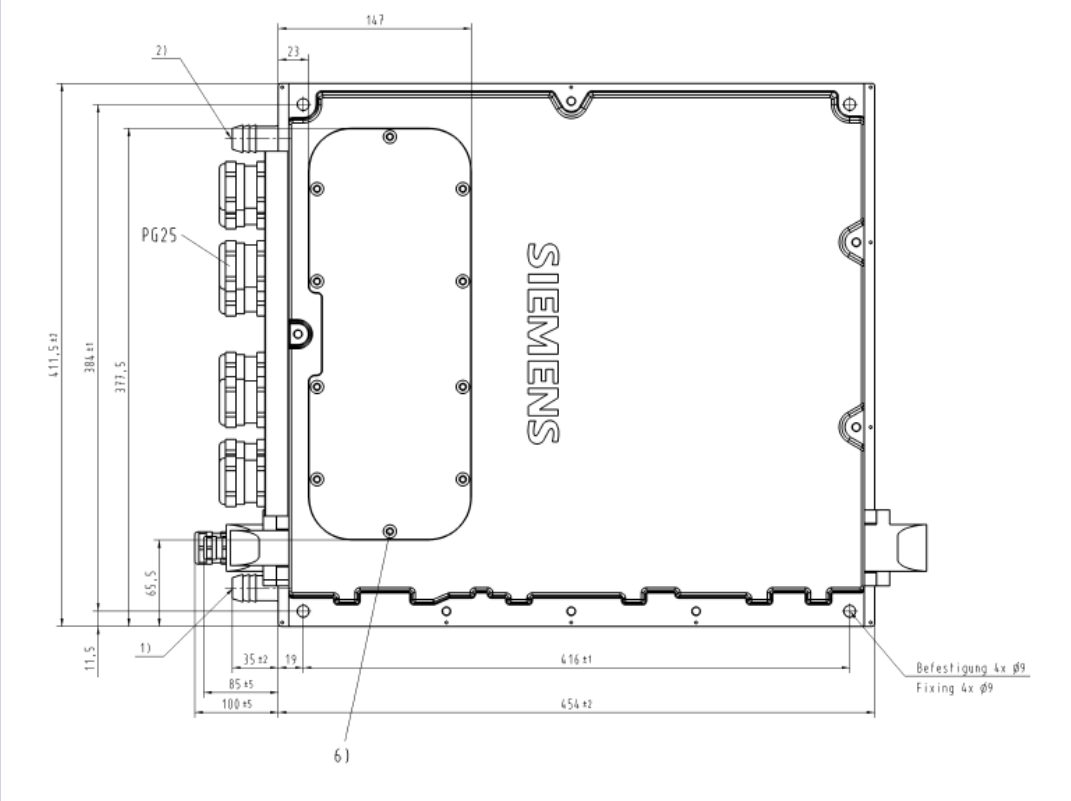
Dimensions: 495 x 415 x 180mm

Weight: 30 kg

Output power: max. 250 kVA



Components
Permanent Magnet Motor / Generator

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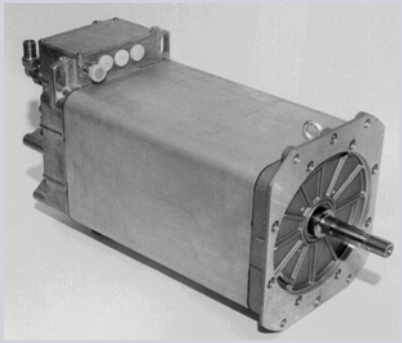

TYPE A
Motor / Generator 140 kW / 3800 rpm (cont.)
Dimensions(LxWxH): 560 x 245 x 245mm
Weight: 120 kg

TYPE B
Motor / Generator 180 kW / 3200 rpm (cont.)
Dimensions: 560 x 310 x 310mm
Weight: 180 kg

TYPE C
Motor / Generator 260 kW / 1500 rpm (cont.)
Dimensions: 660 x 510 x 500 mm
Weight: 500 kg

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Hybrid Configuration Example

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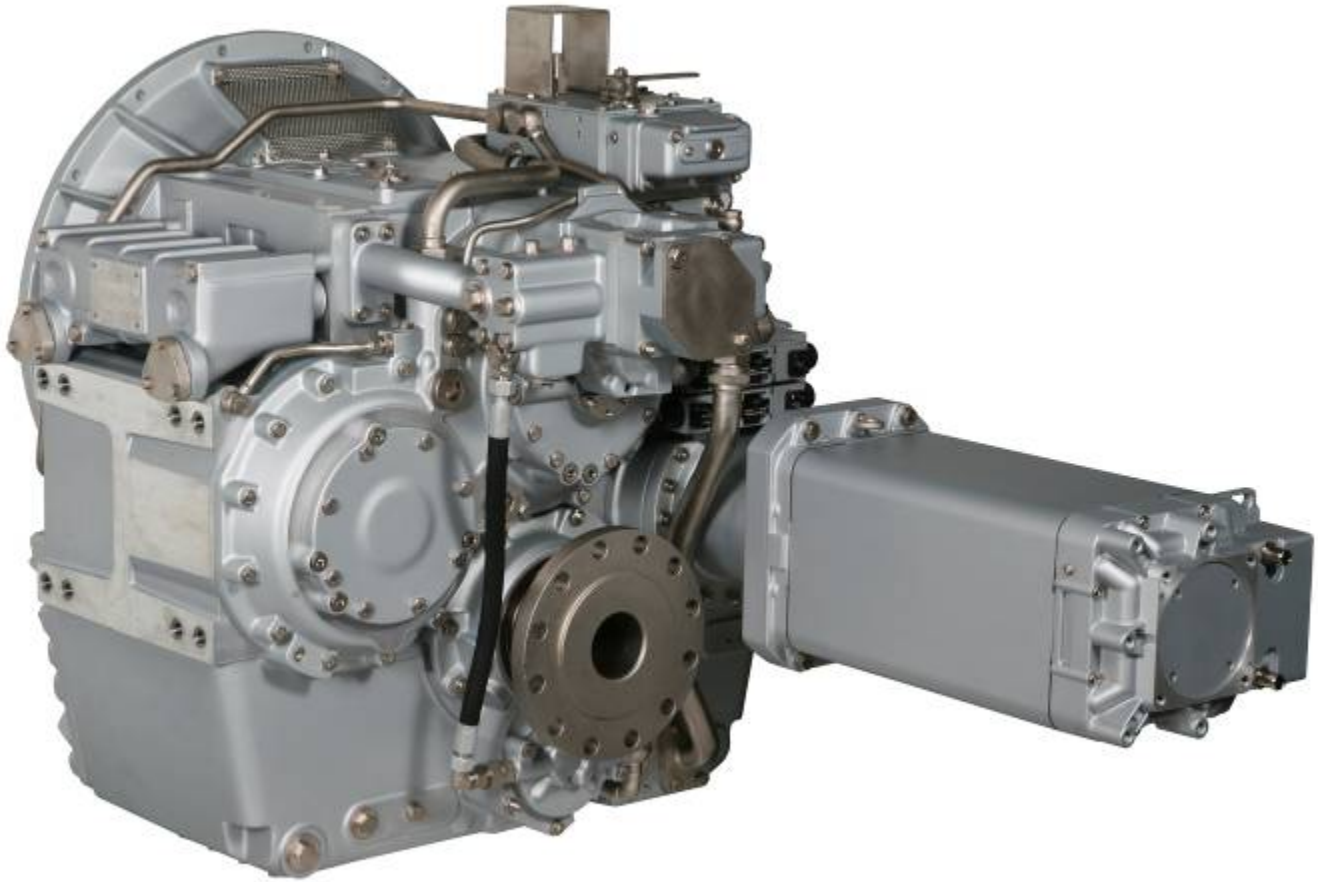

140 kW E-power combined with ZF 4650

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Diesel Electric configuration

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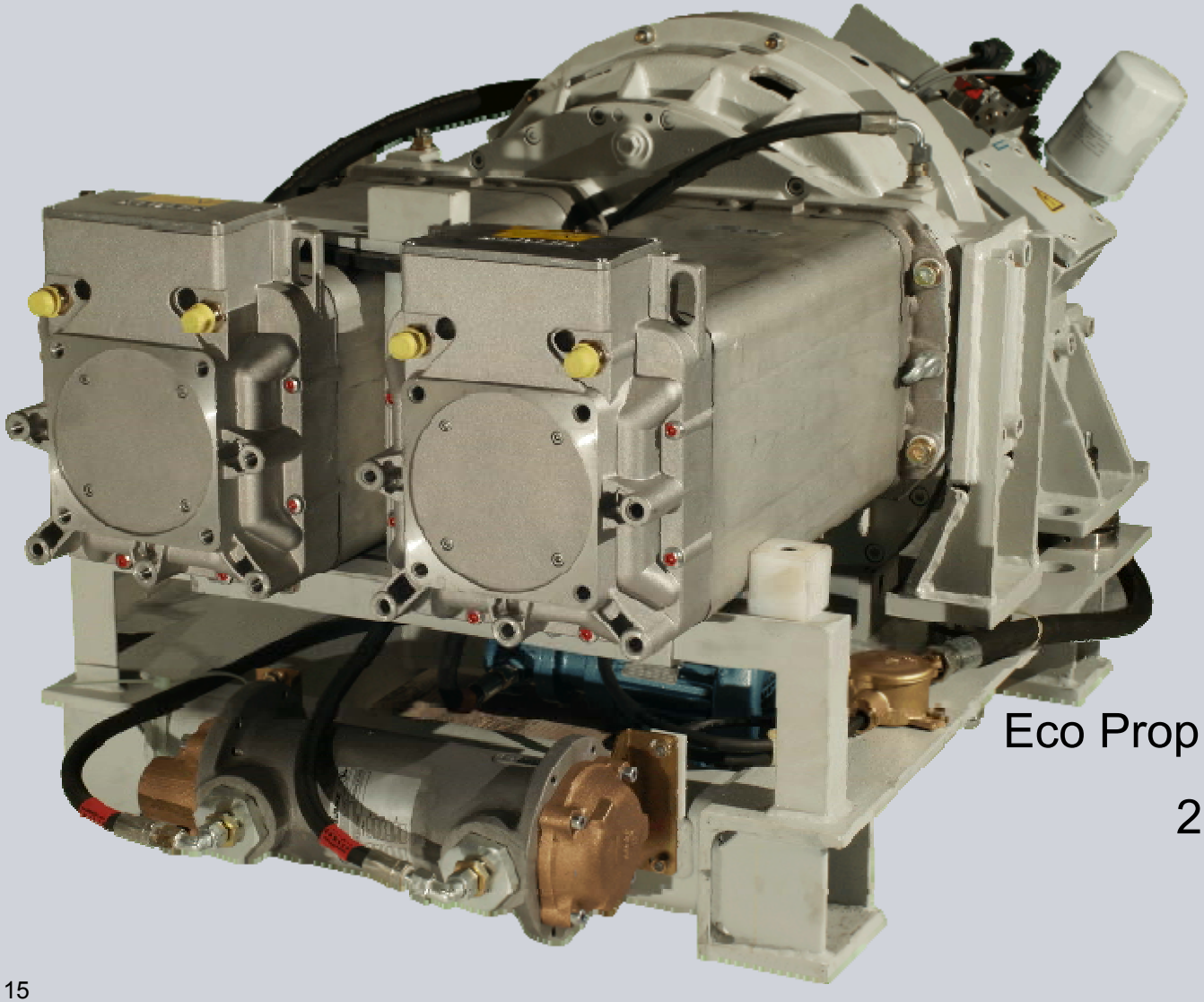

Eco Prop propulsion unit

250 kW

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References

Passenger Vessel

2 x 200 kW DE Propulsion

Delivery 2008

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References

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References

50m Inland Passenger Ship
2 x 180 kW DE Propulsion
3 x SISU 66 CTIM 4-V
Delivery 2012

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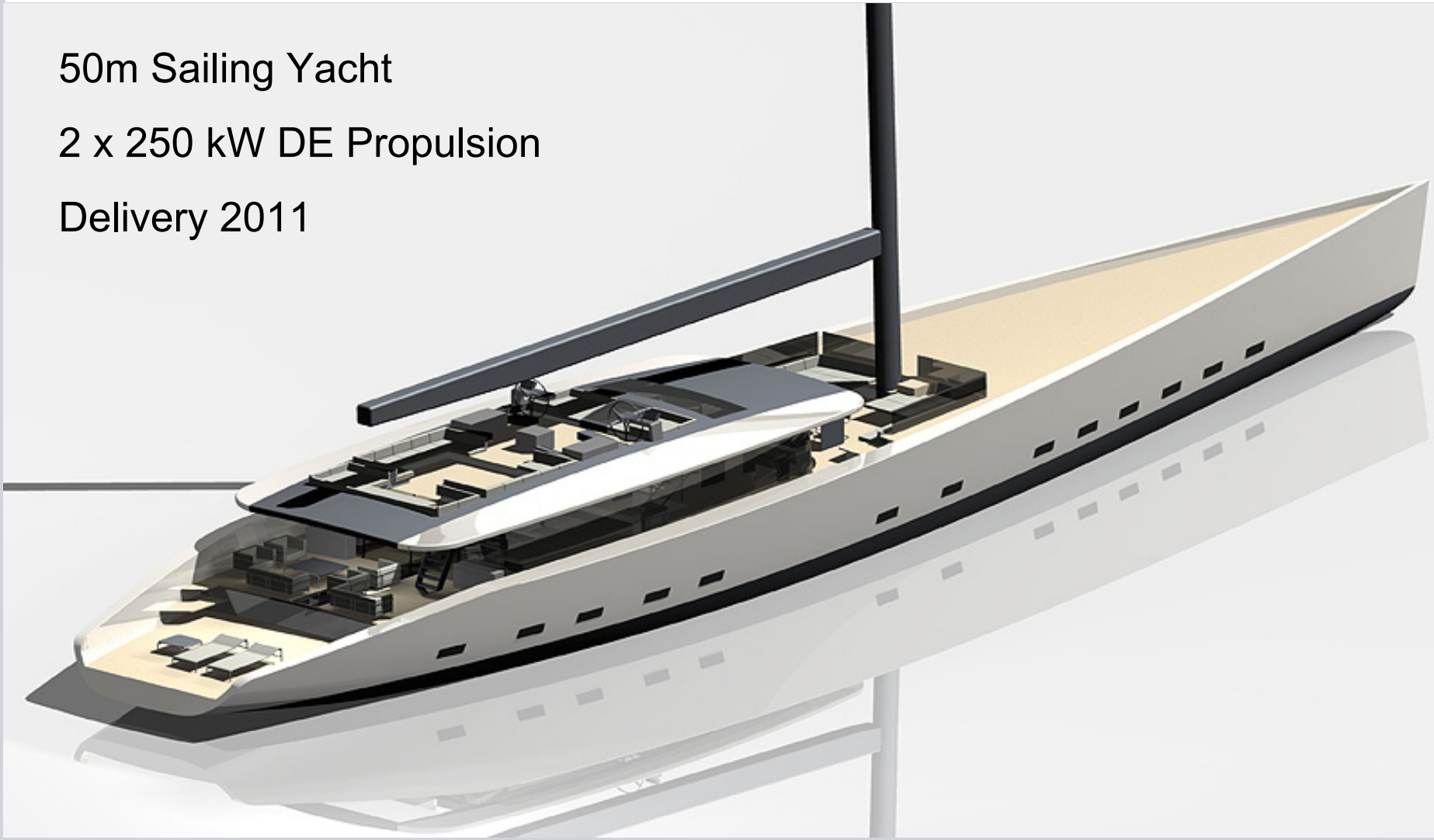
References

50m Sailing Yacht

2 x 250 kW DE Propulsion

Delivery 2011



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Experience with technology

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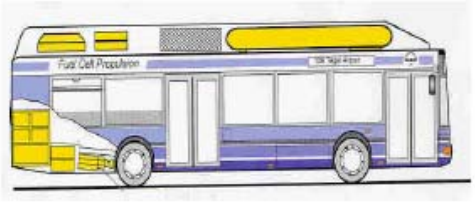

MAN Fuel Cell Bus II, 12/01

SBETI, 30ft Battery Bus, 06/02

FEYS, Dieselelectric Yachts

Battery Bus with Inductive Charging, 09/02

BMB 10m Hybrid Bus Aosta (ITL)

ISE, 40ft Hybrid Bus for New Jersey

ISE, 40ft Gasoline Hybrid Bus

Van Carrier

MAN, Fuel Cell Hybridbus

Purolator, Hybrid Delivery Truck

ISE, 40ft HICE Hybrid Bus

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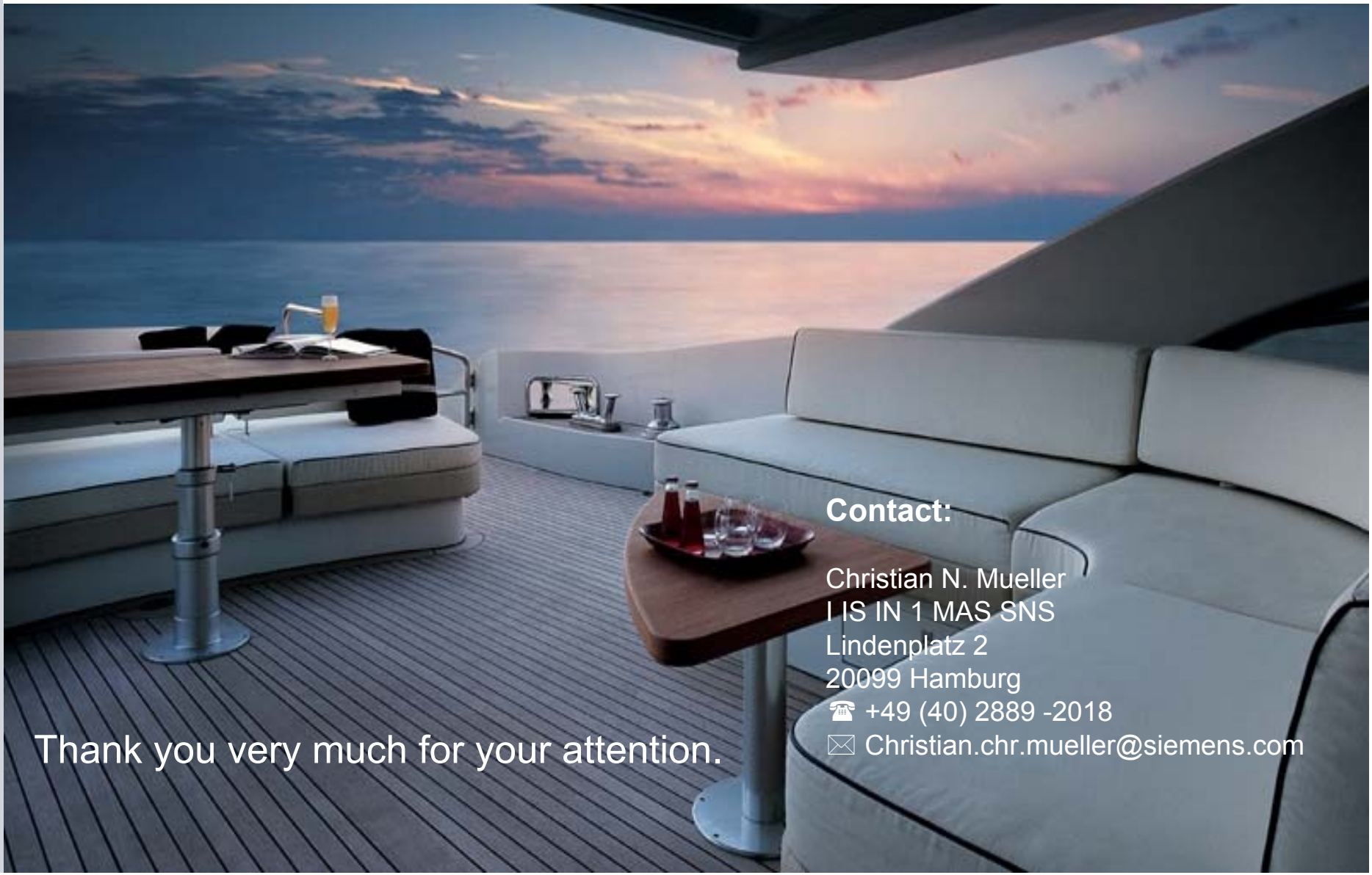

Thank you very much for your attention.

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