Welcome to Methanol Technical Workshop 20th March 2018 in Copenhagen

This technical workshop is a cooperation between Methanol Institute and MDT designed to address options for ship owners in efforts to comply with IMO regulations on emission reduction strategies with methanol dual-fuel technology

Kjeld Aabo
Director
New technologies
Promotion 2 stroke

Methanol Technical Workshop,

Copenhagen 20th March 2018 – Programme

8.30 – 9.00	Registration and Coffee	
9.00 – 9.15	Welcome	Gregory Dolan Kjeld Aabo
9.15 – 9.35	Introduction to MDT and MDT 2-stroke engines and applications	Kjeld Aabo
9.35– 10.05	Service experience and latest engine design for Methanol application	Lars Bay
10.05 – 10.25	Coffee	

Methanol Technical Workshop,

Copenhagen 20th March 2018 – Programme

10.25 – 10.45	FGSS system for Methanol handling onboard	Roberto Camelli
10.45 – 11.05	Emission test and TIER III compliance	Rene S. Laursen
11.05 – 11.25	Evaluation of Methanol	Daniel Sahnen, Dipl.-Ing. Research and Development (RD) MEYER WERFT GmbH & Co. KG
11.25 – 12.10	Lunch – (and walk to DA/DRC)	
12.10 – 12.30	Methanol vessel operator safety training at Diesel Academy	Dan Porup
12.30 – 13.30	Presentation of test engine 4T50ME-GI/ LGI at the Diesel Research Centre	Lars Bay

Volkswagen Group

12 brands

VOLKSWAGEN FINANCIAL SERVICES

AKTIENGESELLSCHAFT

MAN Group

Key Figures 2016

MAN SE

Business areas	**Commercial Vehicles**	**Power Engineering**

Divisions	**MAN Truck & Bus**	**MAN Latin America**	**MAN Diesel & Turbo**	**Renk** (76 %)
	Revenue '16: € 9.2 bn	Revenue '16: € 0.7 bn	Revenue '16: € 3.1 bn	Revenue '16: € 0.5 bn

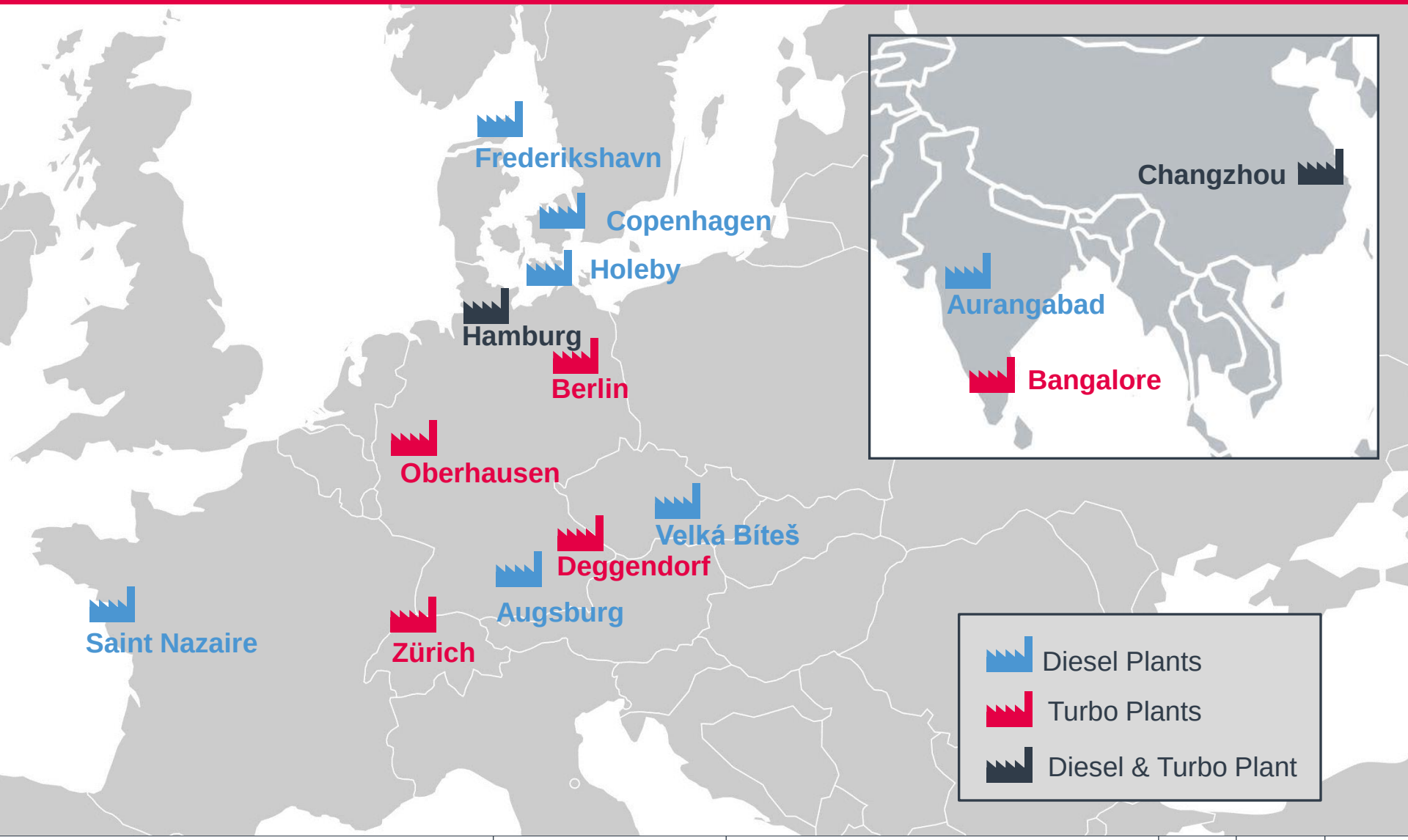
Investments: **Sinotruk** (25.0 % +1 share), **Scania** (17.4 %*)

* Voting rights

The MAN Group in 2016: €13.6 billion revenue, 53,824 employees

Design and production network

MAN Diesel & Turbo sites in Europe and Asia



Turbomachinery

Wide-ranging product range for various industrial applications

- Compressors, expanders, gas turbines and steam turbines for the oil & gas industry, the process industry and power generation
- Full machinery train competence including compressor, drive and expander
- Reactors for the chemical and petrochemical industry, special apparatus for science

Power Plants

Broad portfolio for engine-based diesel and gas power plants

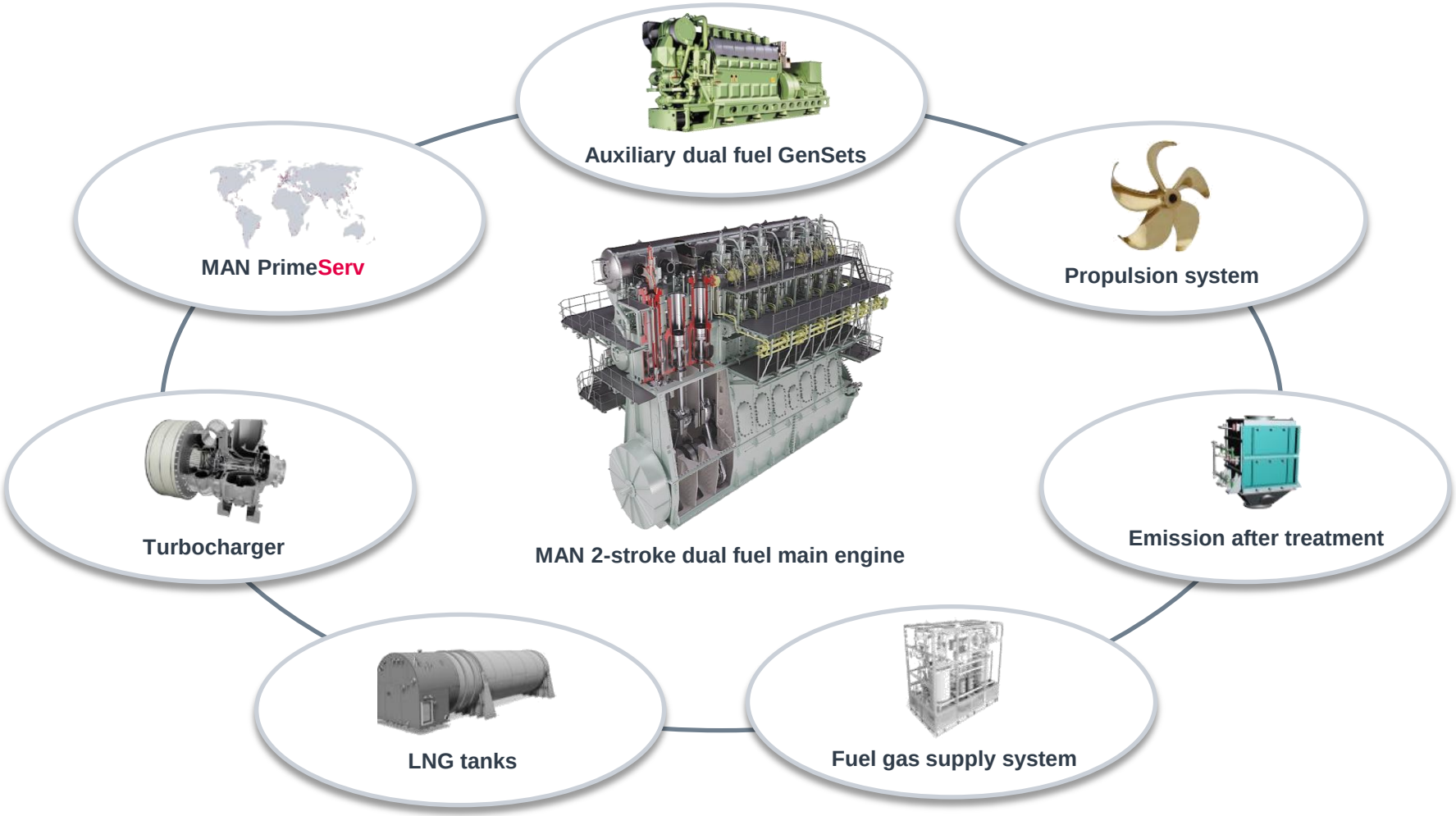
- Two-stroke and four-stroke engines from 1,100 kW to 77.500 kW
- Diesel and gas power plants up to 300 MW
- Combined heat and power plants, motor combined cycle
- Excellent fuel flexibility: diesel, heavy fuel oil, biofuels, gas, dual fuel incl. Methanol.
- Operation and maintenance, complete services
- Expandable, modular concepts

Engines & Marine Systems

Comprehensive product portfolio for marine applications

- Two-stroke and four-stroke engines for marine applications
- Output range from 450 kW to 82.4 MW
- Marine GenSets from 450 kW to 11.2 MW
- Fuels: heavy fuel oil, diesel, gas, dual fuel
- Propellers and complete marine propulsion systems incl. fuel gas systems (MAN Cryo)
- Axial and radial turbochargers for two-stroke and four-stroke engines, injection systems, systems electronics

MAN Diesel & Turbo – Out of one hand:



Marine applications

Powered by two-stroke and four-stroke engines

Container Ship

LNG Tanker

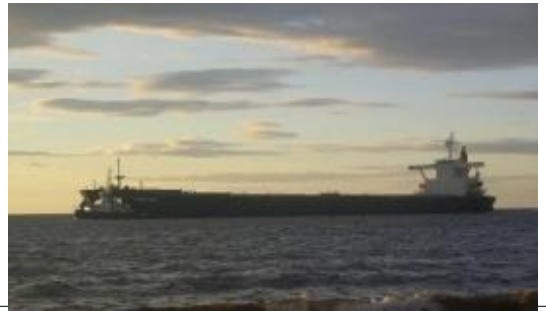
Navy

General Cargo

Cruise

Offshore

Bulker



Tanker

Fishing

Design and Manufacturing

Copenhagen, Denmark

Design of Two-Stroke Engines

Production of Spare Parts

PrimeServ Academy

R&D Center

Diesel House

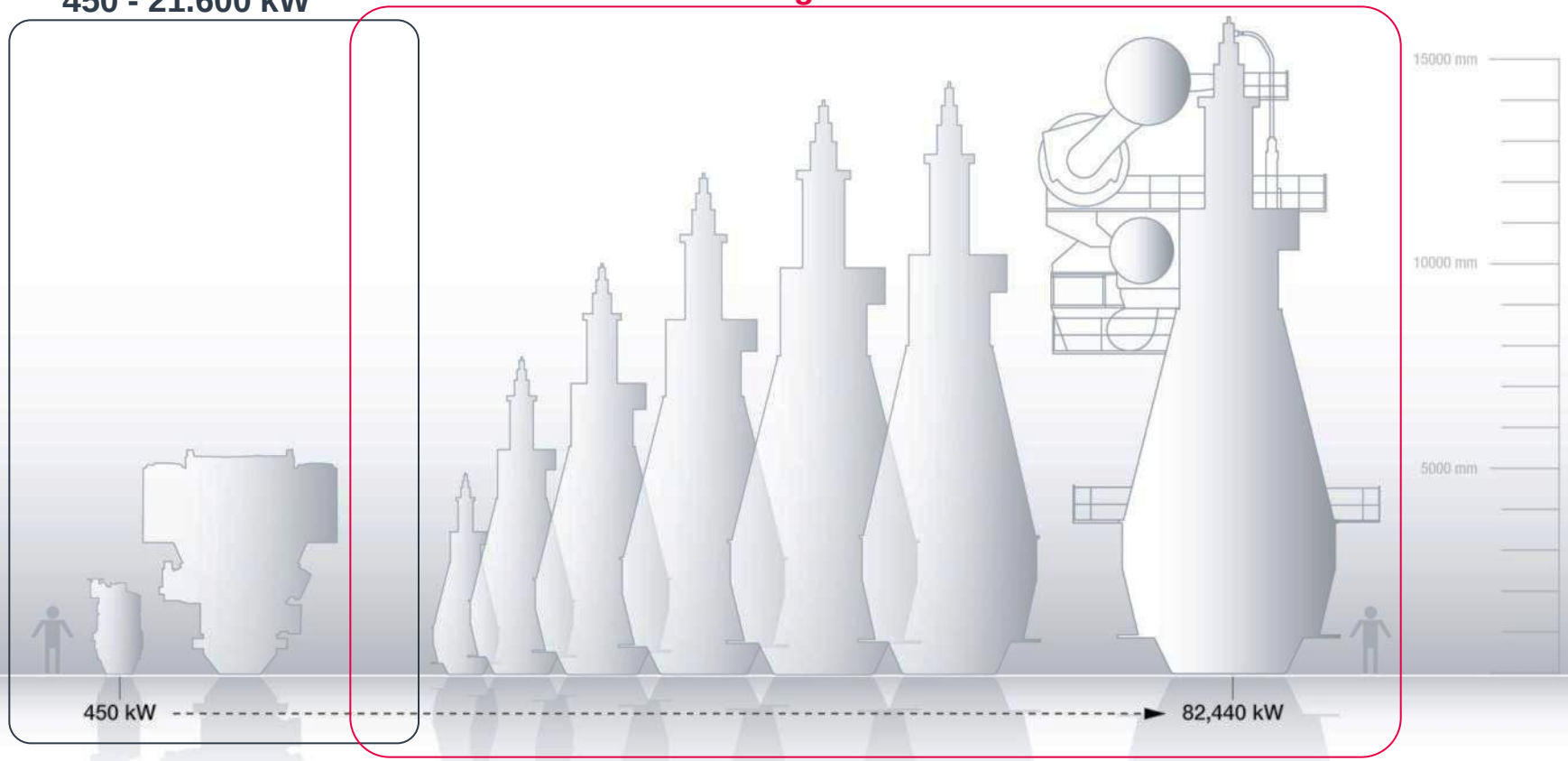
Employees (31.12.2016) **: 1,250**

Most comprehensive engine programme

Diesel engines from 450 kW to 82,440 kW

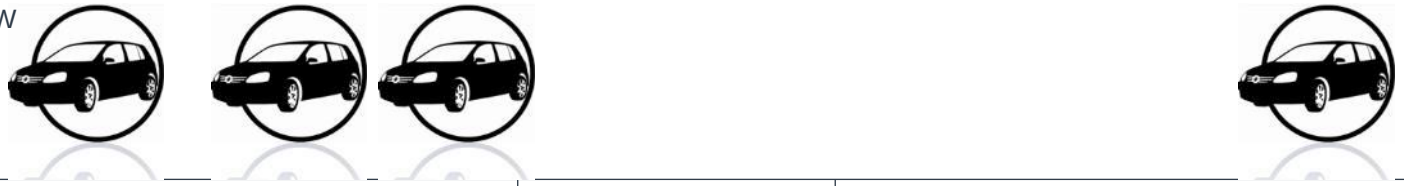
Four-stroke engines
450 - 21.600 kW

Two-stroke engines 3.200 - 82.440 kW



Comparison
(number VW Golf TDI)

4 29 195 747



Licensees Network

More than 100 years of license business

China P.R.					
CSIC, Shanghai Qiyao Engine (SQE)		■		■	1980
CSIC, Shaanxi Diesel Engine Heavy Ind., (SXD)		■	■		1978
CSIC, Henan Diesel Engine Heavy Industry (HND)		■			2007
CSIC, Dalian Marine Diesel (DMD)	■				1980
CSIC, Yichang Marine Diesel (YMD)	■				1989
CSIC, Qingdao Haixi Marine Diesel (QMD)	■				2014
CSIC, China Shipbuilding Industry Corporation Diesel Engine Co., Ltd.(CSE)	■				2017
CSSC, CSSC Marine Power (CMP)	■	■			1980
CSSC, Hudong Heavy Machinery (HHM)	■	■	■		1978
CSSC – CSSC-MES Diesel (CMD)	■				2007
Yuchai Marine Power Co., Ltd. (YCMP)	■				2016
JingJiang Dingkun Machinery Co., Ltd. (DKM)	■				2018
Weichai Heavy Machinery (WHM)		■			2008
Hefei RongAn Power Machinery (RPM)	■				2008
CNPC Jichai Power Company Limited (CNPC)		■			2009

Croatia					
Brodosplit	■	■			1967
Uljanik	■				1954

Japan					
Kawasaki Heavy Industries (KHI)	■	■	■	■	1911
Mitsui Engineering (MES)	■			■	1926
Mitsubishi Heavy Industries (MHI)		■			1929
Hitachi Zosen Corp.	■				1951
J.F.E. Engineering (JFE)			■		1964
Diesel United (DU)			■		1963
Niigata Power Systems			■		1973

Korea					
Hyundai Heavy Industries (HHI)	■				1976
STX Engine (STX)		■			1977
STX Heavy Industries (STX HI)	■			■	1977
Doosan Engine	■	■	■		1983

Poland					
H. Cegielski Poznan (HCP)	■				1959
Fabryka Silnikow Agregatowych (FSA)		■			1995

Spain					
Navantia		■			1965

U.S.A.					
Fairbanks Morse Engine (FME)		■	■		1995

■ **Low-Speed** ■ **Medium-Speed/MAN** ■ **Medium-Speed/Pielstick** ■ **Turbocharger**

Worldwide location

Global network of service hubs

Global megatrends

Drivers of our business

TRANSPORT

Increase of world trade and international passenger traffic

- Worldwide seaborne trade will double until 2030
- Growing demand of energy efficient ships and propulsion solutions

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Increase of energy demand

- Global energy demand will almost double until 2030
- Growing importance of decentralized energy generation

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INDUSTRY

Increasing demand of industrial products

- Worldwide consumption will nearly double until 2025 with another 1.8 billion people entering the global consuming class

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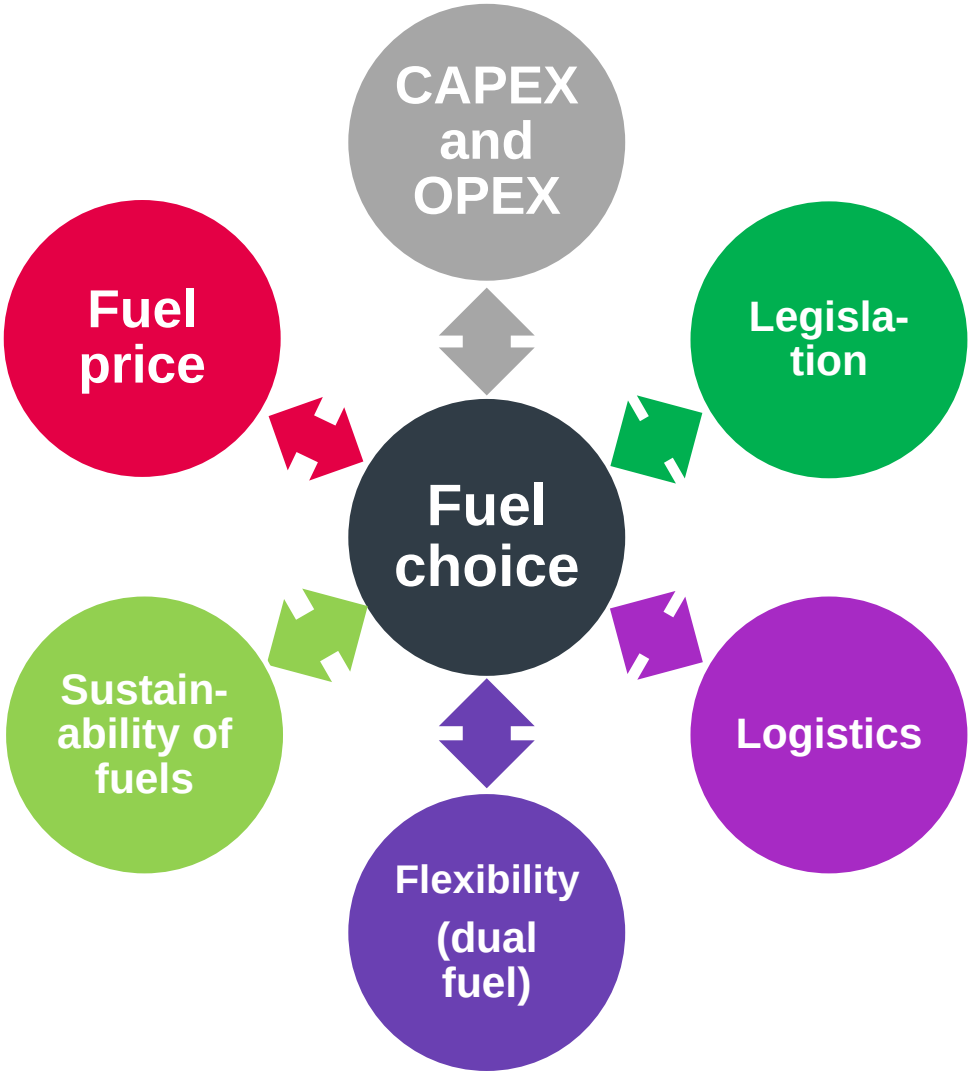
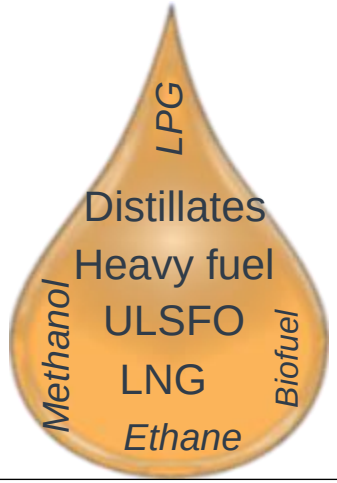
CLIMATE

Climate change

- Introduction of emission standards
- Growing significance of gas as fuel

Influencing Factors on Fuel Choice





Fuel Types

Residual

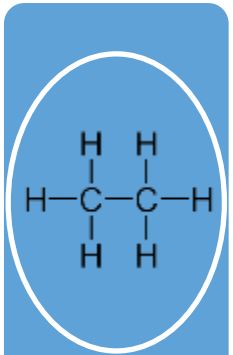
Distillates

ULSFO

Methane

Methanol

LPG



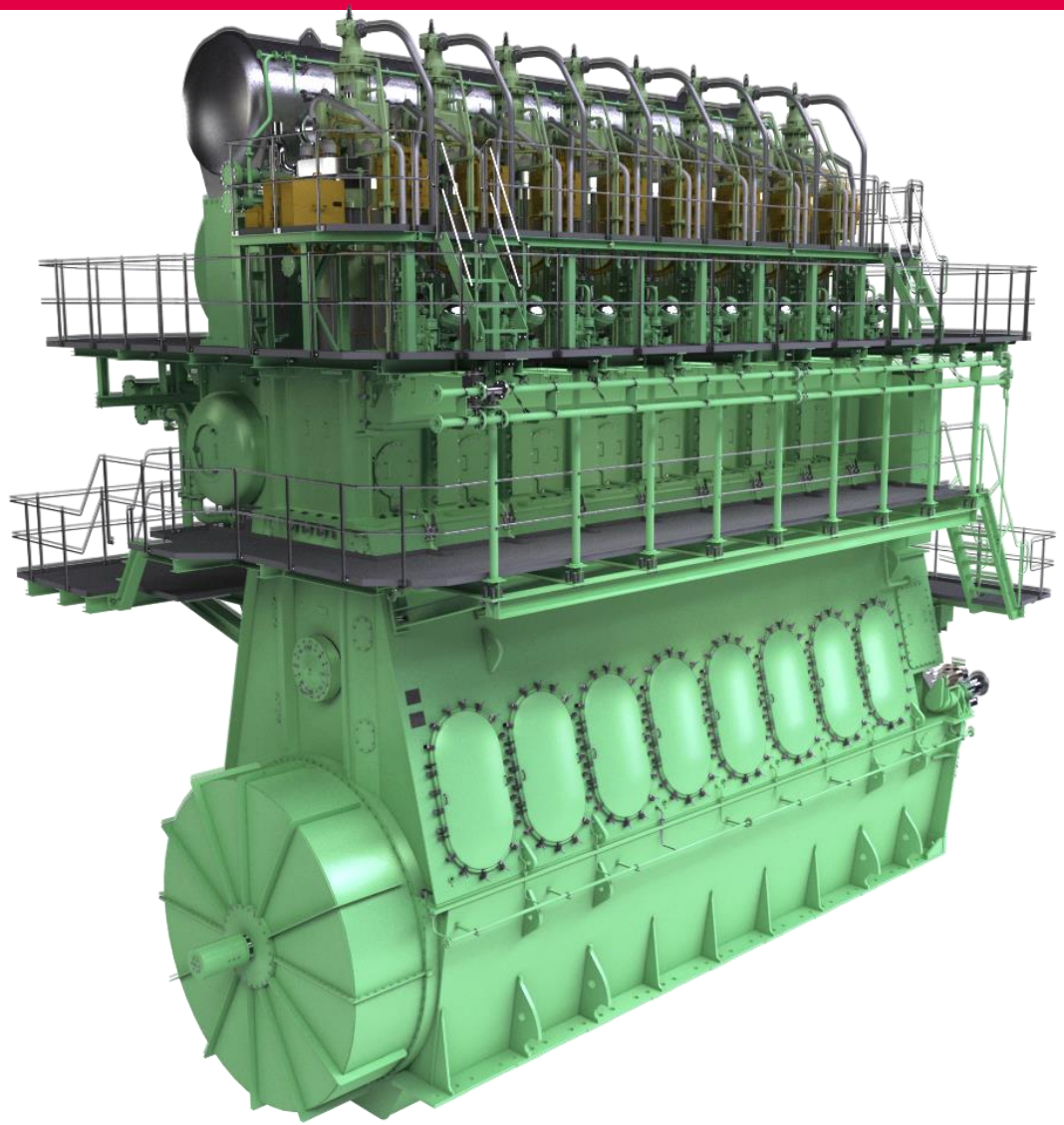
Ethane

Biofuel (2nd+3rd gen.)

MAN Diesel & Turbo supports all

ME-GI engine

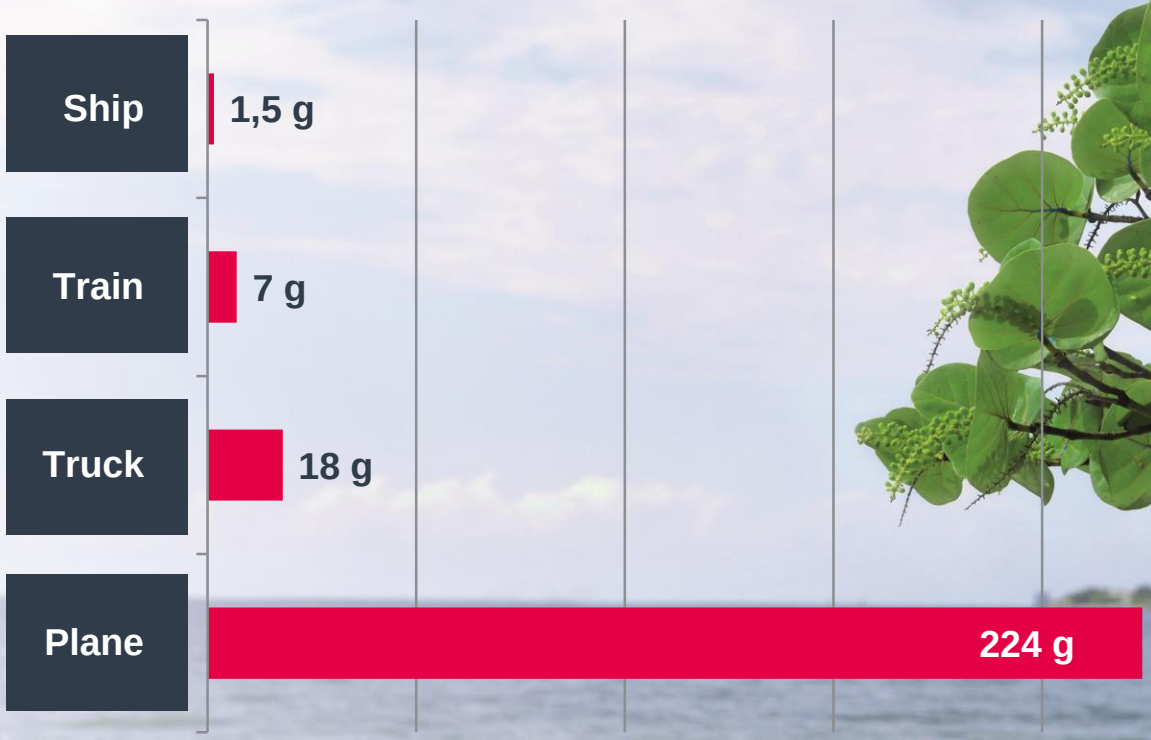
GI components



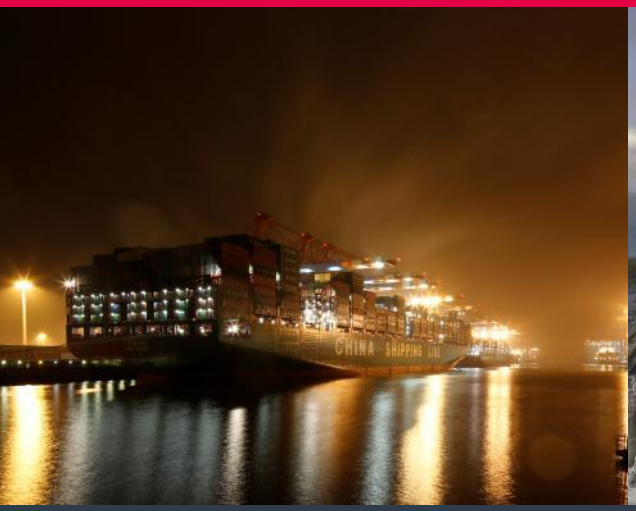
Comparing Transport Efficiency

Fuel consumption per tonne-kilometers

Fuel needed per 1km transport of 1 ton of goods



- 50% of world trade powered by MAN engines



2018

MAN Diesel & Turbo

„Engineering the Future – since 1758.“

Company Presentation

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