

MAN Diesel & Turbo

III FÓRUM COGEN/CANALENERGIA



MAN Diesel & Turbo solutions for

COGENERATION

Rheinberg, Germany

Volkswagen Group

Corporate Structure



Volkswagen Group 2016: **US\$210+ Billion in Revenues and +600,000 Employees**

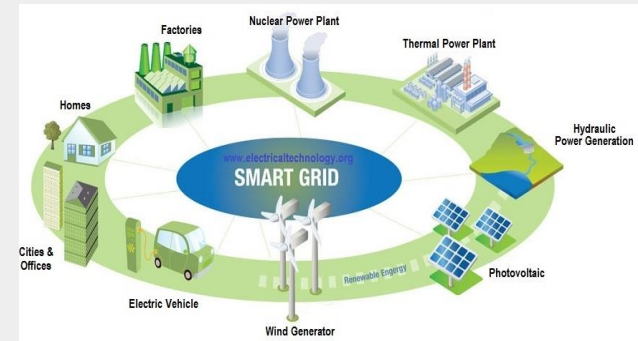
Trends – What we believe



→ Smartgrids & Microgrids
Distributed and intelligent systems closer to the loads

→ Biofuels
Biogas and Biomethane high potential

→ High efficiency systems
Great contribution will come from Cogeneration market expansion.



Market opportunities arising with changing environment

MAN Turbines

Portfolio for cogeneration application



Heavy Duty Gas Turbines

THM



10 – 12 MWeI

MGT6000



6.63 MWeI

Steam Turbines

All Models

Backpressure and Condensing



1 – 160 MWeI

MGT6000 Gas Turbine Series

MGT6100 for Electrical Generation

A large industrial gas turbine engine is shown in a cutaway view, revealing its internal components. The engine is mounted on a metal frame. In the background, there is a large industrial facility with multiple smokestacks and buildings, likely a power plant or refinery, under a clear blue sky.

6'630 kW_{el}

Electrical efficiency: 32.2%

For CHP systems (global eff.)

Efficiency 89.3%

MGT6000 Gas Turbine Series

Global References – Power Generation



Customer

CSVW (Volkswagen China/ Shanghai motors)

Location

Shanghai, China

Scope

4x MGT6200 Gas turbine packages

Power Output

6.63 MWeI

Steam Production

15 t/h @ 10 bar per unit (total 60 t/h)

Hot Water Production

1.1 MW per unit (total 4.4 MW)

Operation Hours > 18'000

as of June 2017



MGT6000 Gas Turbine Series

Global References – Power Generation



Customer

Solvin (joint venture of Solvay and BASF)

Location

Rheinberg, Germany

Scope

1 x MGT6200 Gas turbine package

Power Output

6.63 MWeI

Steam Production

13.5 t/h @ 13 bar (superheated 250°C)

Operation Hours > 20'000

as of June 2017

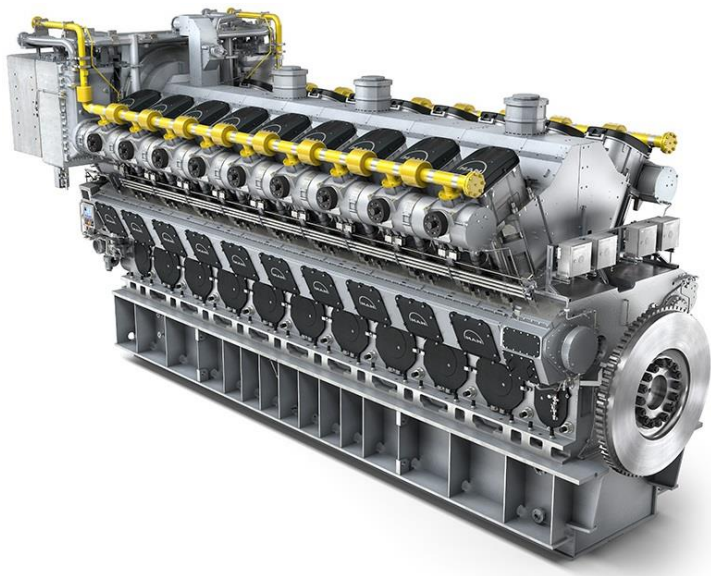


Power to Heat Ratio of approximately 0.6

Efficiency > 80%

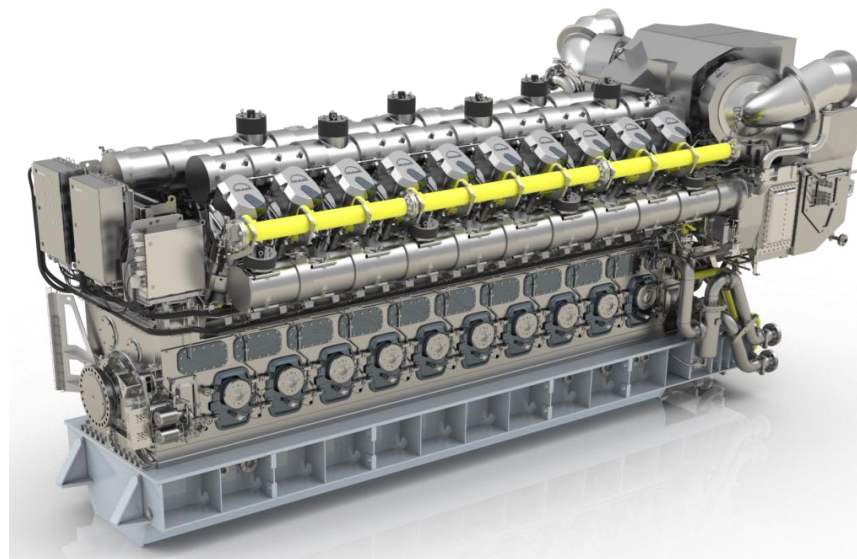
MAN Large Gas Engines

51/60G and 35/44G for Power Generation



51/60G:

- Otto Gas Engine
- 14 – 20 MWe (14V + 18V)
- Family Concept with 51/60 and 51/60DF
- 1-stage and 2-stage Turbo-charging available



35/44G:

- Otto Gas Engine
- 6 – 12 MWe (12V + 20V)
- 1-stage and 2-stage Turbo-charging available

Multiple Configurations to suit all project requirements = optimized solutions

MAN Diesel & Turbo Reference Project

VW Braunschweig Factory



Customer

VW Braunschweig Factory

Location

Germany

Scope

1 x 20V35/44G

Power Output

10 MWeI

Fuel

Natural Gas

Application

Cogeneration (electrical, heat)

Power to Heat Ratio of approximately 0.6

Efficiency > 80%

MAN Diesel & Turbo Reference Project

Wykes



Customer

Wykes Engineering Co. Ltd

Location

United Kingdom

No. and engine type

1 x 20V35/44G

Power Output

10MWel

Fuel

Biogas

Application

Cogeneration (electrical, heat)

Power to Heat Ratio of approximately 0.6

Efficiency > 80%

Electrical efficiency of

Efficiency: 48%

MAN Diesel & Turbo Reference Project

AENA Airport Barcelona



Customer

AENA Airport Barcelona

Location

Spain

Scope

5 x 18V32/40DF

Power Output

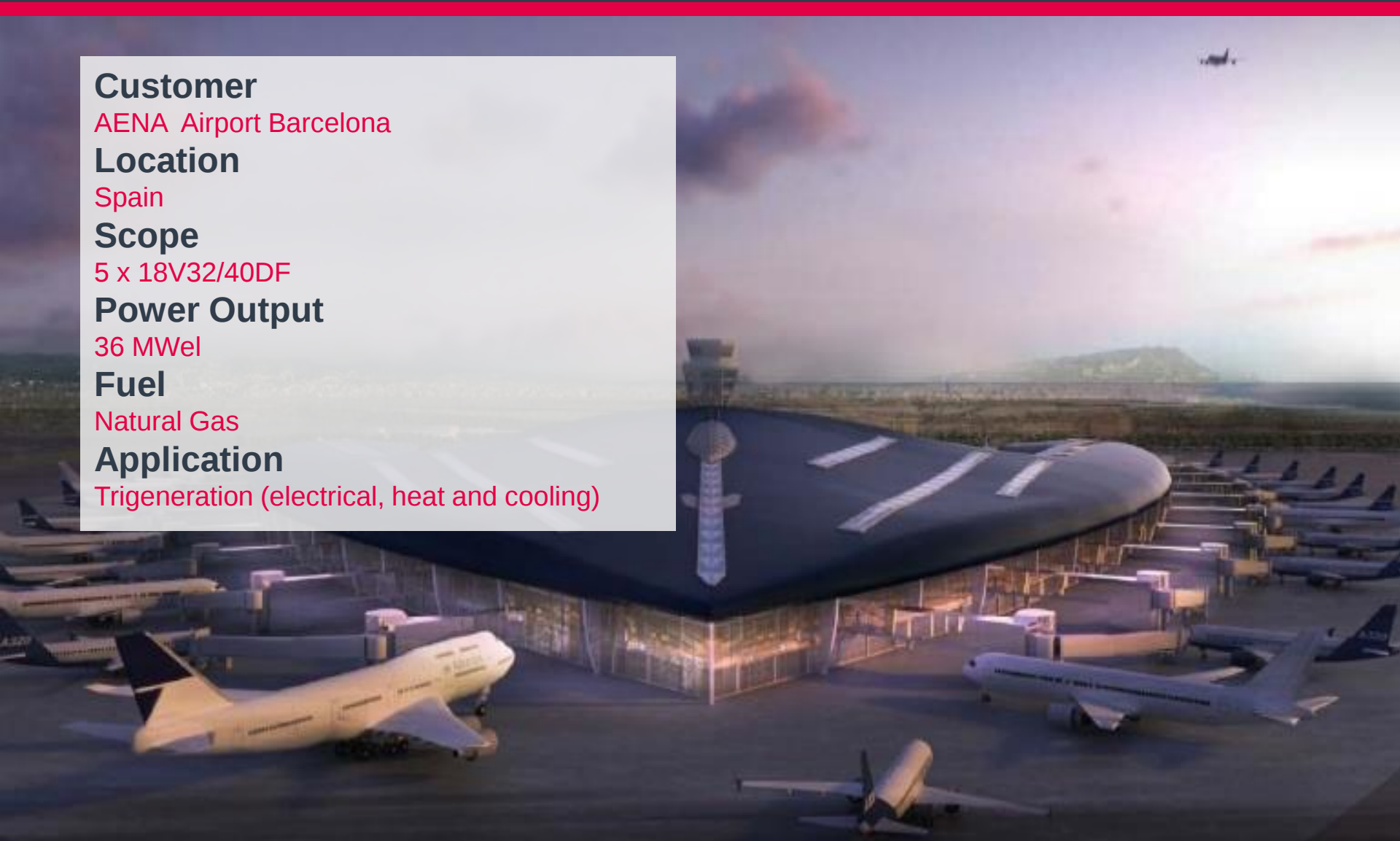
36 MWeI

Fuel

Natural Gas

Application

Trigeneration (electrical, heat and cooling)



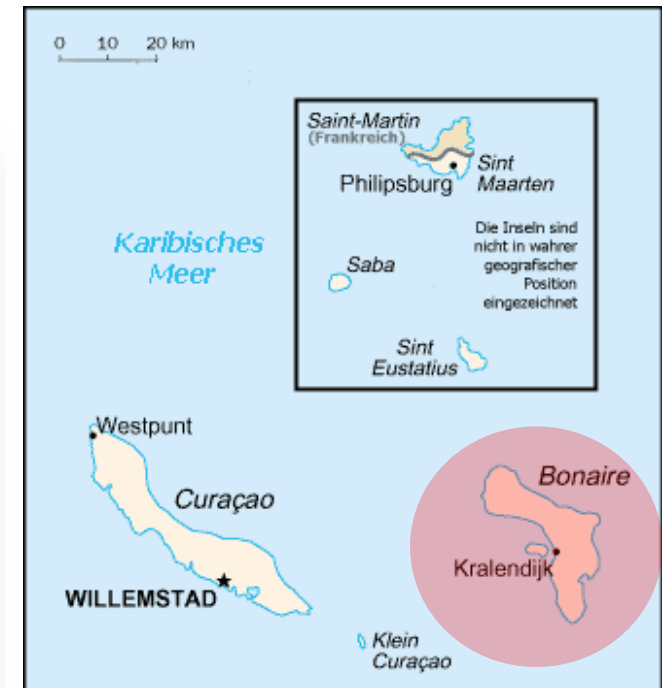
Hybrid Project Bonaire

Benchmark for an Island Grid



Bonaire Netherlands Antilles

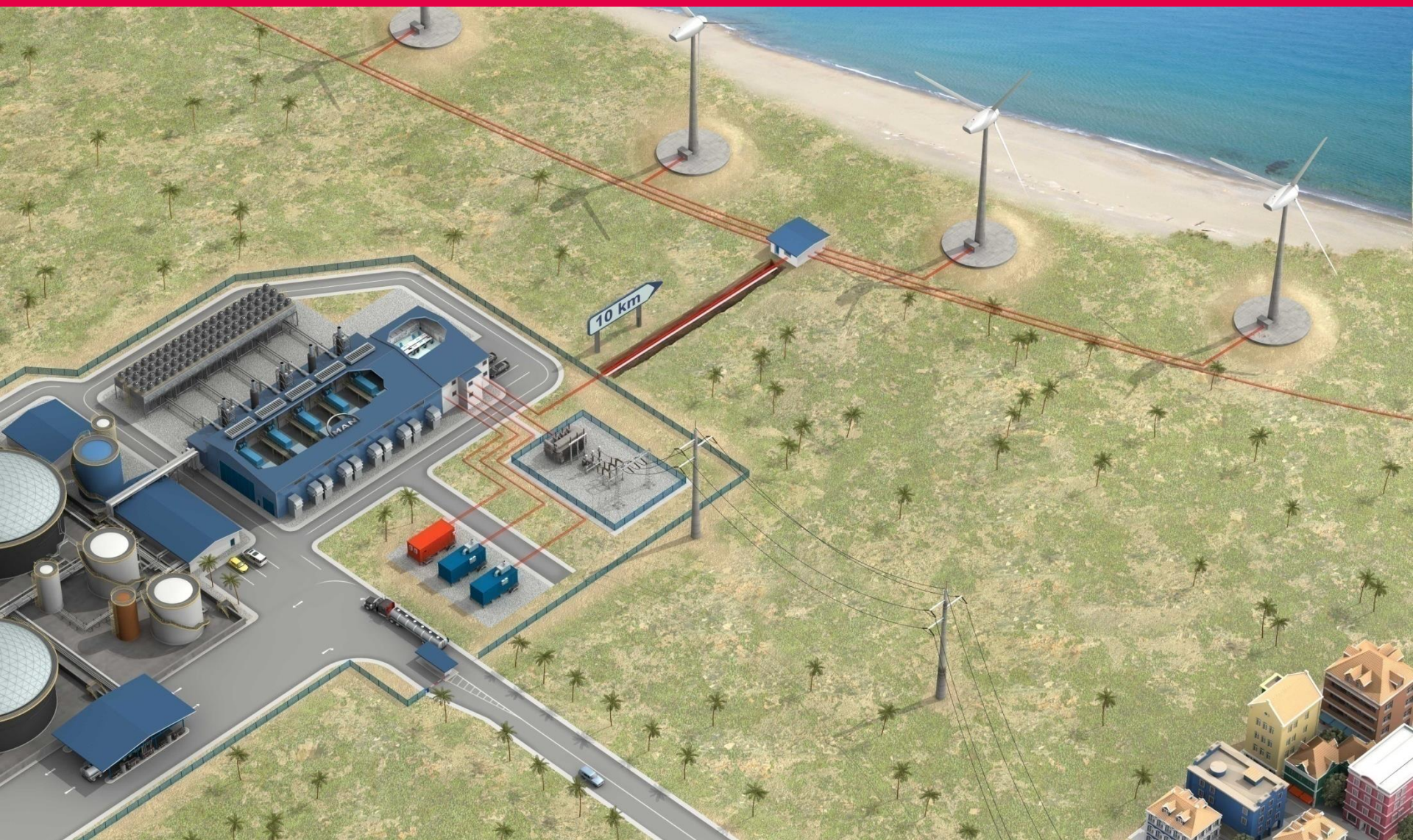
Worldwide largest Wind Diesel Power Plant



- Area 294 km². Population approx. 16.500
- Electricity consumption 75.000 MWh/year
- Peak demand: 11 MW 5,3 MWh/capita

Hybrid Project Bonaire

Benchmark for an Island Grid

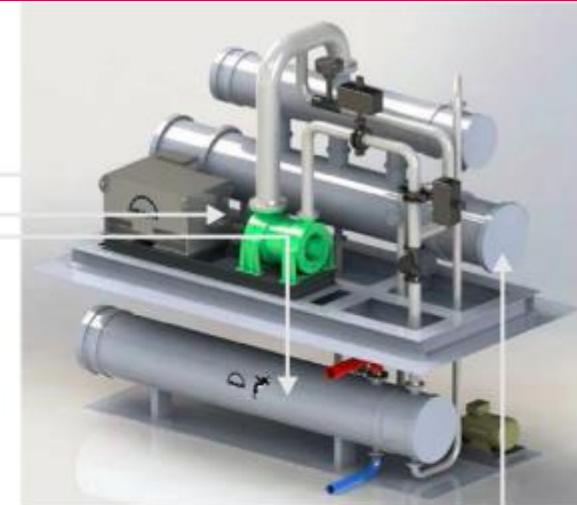
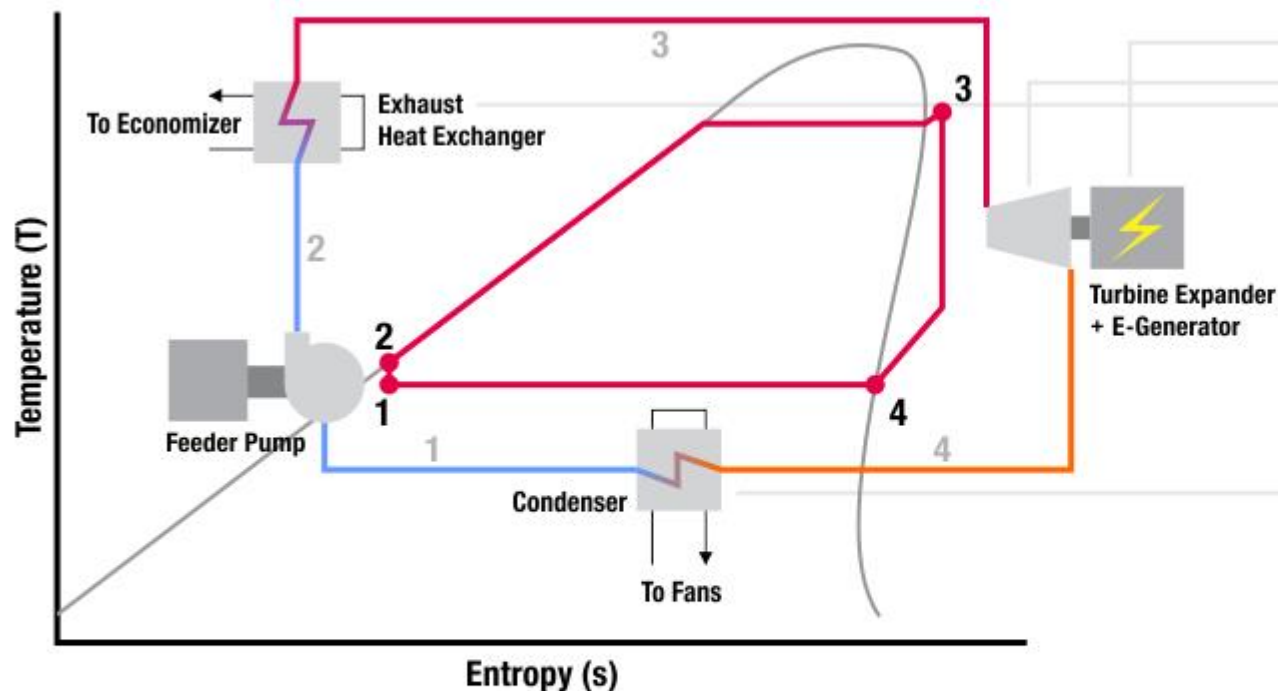


MAN Diesel & Turbo Brasil

Organic Rankine Cycle – ORCA

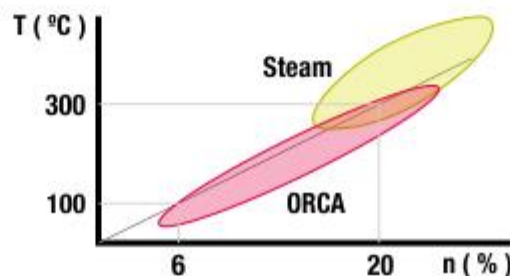


Special solution for peak load applications



For working temperatures below 370 °C

- Synthetic fluids instead of steam (Organic)
- Makes waste heat over 90° C usable
- ± 4% of additional fuel efficiency for motors



MAN Diesel & Turbo Brasil

PrimeServ Brazil



MAN | PrimeServ

More than 300 employees in Brazil
Over 50 FSEs available

MACAÉ / RJ

PrimeServ Turbo

MANAUS / AM

PrimeServ Diesel

RIO DE JANEIRO / RJ

São Cristóvão

PrimeServ Diesel

RIO DE JANEIRO / RJ

Centro (Downtown)

Headquarters in Brazil



PETRÓPOLIS / RJ

Repairshop

- Complex Repairs
- MAN PrimeServ Academy
- Repair of rotating equipment
- MDT or third party equip.
- State of the art machinery



MAN Diesel & Turbo



III Cogen Forum – 2017 – Power + Turbo

