Gas Power Plants

Engineering the Future – since 1758.
MAN Diesel & Turbo
MAN Diesel & Turbo, as the name suggests, is best known for its robust diesel technology. But we also have increasing expertise in clean-burning gas and dual-fuel engines. Developing efficient, viable green technology is a key focus for our business.

Our dedication to quality is legendary. Our gas engines are entirely designed and built at our own facilities, giving us unbeatable hands-on control and visibility. So our engines are built to last, with more uptime and less maintenance.

Whether stand-alone engines, gensets or turnkey power plants, we create one-stop solutions that precisely meet your needs. We offer a true partnership: expert advice and lifelong support. And whenever and wherever needed, our global network of service hubs delivers expert, rapid on-the-spot assistance.
Why Go for Gas?

Gas is an increasingly popular option for power generation. One reason is the growing availability of gas via grids and LNG; another is its value for money. A key advantage of gas power plants is their flexibility: they can be activated rapidly, making them an excellent source of peaking base load power.

Above all, gas has a lower environmental impact. That makes gas an attractive choice to meet strict emissions limits or take advantage of green power incentives. And because it burns cleanly, a gas power plant can be built close to urban areas.

Even better, gas engines can produce combined heat and power (CHP). By harnessing the thermal energy that is a by-product of generating electrical energy, these systems achieve exceptional levels of efficiency. In other words, CHP, or cogeneration as it is also known, saves even more money, saves even more energy and is even better for the environment.

Gas to Energy
Clean, efficient and flexible

Gas is clean
Low emissions and high efficiency in energy production play a key role in investment decisions. As emission requirements and regulations become more and more stringent, gas offers many advantages:
- Low CO\(_2\) emissions
- Low NO\(_x\) emissions
- No SO\(_x\) emissions
- No particle emissions

Gas is efficient
Producing electricity from gas is highly efficient. Gas power plant operation and maintenance costs are lower than those of plants burning other fossil fuels.

Gas is flexible
No matter what your requirements are – power generation, CHP or tri-generation – MAN Diesel & Turbo gas engines reliably supply cost-effective energy.

**CO\(_2\), NO\(_x\) and SO\(_x\) emissions of different fuels**

<table>
<thead>
<tr>
<th>Index</th>
<th>CO(_2)</th>
<th>NO(_x)</th>
<th>SO(_x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>80</td>
<td>70</td>
<td>20</td>
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<tr>
<td>75</td>
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Coal  | Oil    | Natural Gas
**Why Choose MAN Diesel & Turbo?**

**Gas engines**

At MAN Diesel & Turbo, we recognise that a gas power plant is a significant long-term investment – and robust returns require robust engines.

**Enduring quality**

Our longstanding reputation for efficient, reliable and durable engines is something we are proud of – so we strive to uphold it. To ensure our products continue to meet our stringent standards, our engines are still produced by our skilled employees at our own facilities. We therefore have total visibility into each and every step of the manufacturing process – and we understand each and every step. The result is exceptional products that offer the dependability and efficiency essential for a robust return on any gas power investment.

**Genuine partnership**

We bring the same approach to our service. A significant investment deserves a genuine partnership – not just a quick sale of a standard, off-the-peg product that might not fully be appropriate for your situation. We take the time to listen to your specific needs, and will give you honest expert technical advice about what might work best for you – no false promises. The result is a tailor-made solution that perfectly suits your requirements.

**Genuine service**

We provide quality service to match our quality products. What MAN Diesel & Turbo offers is a genuine service. We listen to our customers’ specific needs, and give expert advice in response. As a result, we create solutions tailored perfectly to meet your individual requirements. And that is just the beginning – because a genuine service means lifelong support. With more than 150 service hubs around the globe, we can quickly mobilise the expert advice and/or replacement parts you need, so that you can get back into operation without delay. Our solutions cover stand-alone engines, gensets or turnkey power plants; we can even operate them on your behalf if needed.

At MAN Diesel & Turbo, we recognise that a gas power plant is a significant long-term investment – and robust returns require robust engines.
**Engines that Deliver**

**Efficiency, reliability and durability**

Our engines can achieve extremely high efficiencies (up to 90 per cent when used in combined heat and power plants). And our engines are also famously reliable. They require very little maintenance, which means less unproductive downtime.

**Dual fuel flexibility**

MAN Diesel & Turbo’s dual-fuel engines will run on gas, diesel, biofuel or heavy fuel oil (HFO), giving greater fuel flexibility. If one kind of fuel becomes difficult to obtain, or prices move beyond reach, our engines can be simply switched to another source of fuel.

**Retrofits**

If you already have a MAN Diesel & Turbo engine but want to take advantage of gas, we may even be able to convert your existing engine. Contact us to find out how we can adapt your existing 48/60 diesel engine to the 51/60 DF model.

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**The 51/60DF Engine**

**Dual-fuel flexibility**

The dual-fuel 51/60DF engine from MAN Diesel & Turbo can convert either liquid fuel (diesel operation) or natural gas into electricity — switching seamlessly from gas to diesel as required. Efficient and environmentally friendly, the versatile V51/60DF can be operated on a variety of fuels.

**Diverse fuel options**

The 51/60DF engine is designed for operation with liquid and gaseous fuels. In liquid fuel operation, the engine can run on HFO with a viscosity of up to 700 mm²/s (cSt) at 50°C (specified in CIMAC 2003 H/K700/DIN ISO 8217). Between 20 per cent and 100 per cent load, the engine can operate continuously with HFO.

**Advanced gas technology**

In gas operation, the engine injects a minimal quantity of pilot fuel into the prechamber. This amounts to just one per cent of diesel oil consumption in gas mode. As a result, the engine emits fewer pollutants and needs only small storage tanks for secondary fuel. Electromagnetic valves accurately meter gas for each cylinder individually, making the 51/60DF highly efficient. Very low firing pressure fluctuations between the cylinders mean the engine runs smoothly. And a lean-burn gas/air mixture results in very low NOx values.

**Reliable output**

The 51/60DF can be changed over from gas to diesel fuel operation at full load without output and speed fluctuations. This allows the engine to be used in a wide array of settings, from providing redundancy to delivering security in a precarious supply situation. For example, the 51/60DF can be deployed in a back-up genset, in case of power supply interruptions. Or in a gas power plant, the engine can be operated in a diesel genset in case of gas supply interruptions.
Applications
Right for any environment

Urban
In densely populated urban areas, the requirements concerning space, emissions and noise protection for a power plant are restrictive. To deliver much-needed power to cities and towns, more CHP plants are being built every year. CHP plants with MAN Diesel & Turbo engines are able to reach an overall efficiency of more than 90 per cent. In addition, their clean-burning gas technology allows them to be built close to residential areas.

Industrial
Industrial areas normally have fewer restrictions relating to space and noise protection. But gas engines still offer considerable benefits, especially in a CHP plant. Depending on the application, heat from the production process of electricity can be used in many different ways, for example heating rooms or water, or in drying processes.

Regardless of your energy needs – heating, cooling or electricity – MAN Diesel & Turbo gas engines combine the highest efficiencies with the lowest emissions. So no matter what the application, our engines can deliver advantages for your business – and the environment.

MAN Diesel & Turbo doesn’t just build engines. Our expertise covers the whole process of planning, constructing and operating a gas power plant. MAN can provide turnkey solutions for plants in excess of 50 megawatts.

Turnkey Power Plants
Built to your specifications

From start to finish
Our expertise covers the whole process of planning, constructing and operating a gas power plant. We have the technology, but we also know the suppliers, the local legal and regulatory framework, and the subsidies and incentives available. We can advise on the economic feasibility as well as the technical challenges presented by a potential new project.

Constructed by experts
A special project team, comprising a mix of global and local experts, is formed to develop an integrated, tailor-made solution for each project. As a result, each project receives the benefits of both in-depth experience of power plant design and construction and relevant local understanding.

Smooth operation
Once we have built the plant, we can even operate it, so our customers can focus on their core business. We take care of everything, including staffing the plant, day-to-day operation and maintenance, troubleshooting, performance reporting and general logistics.

Lifelong support
With the benefit of MAN Diesel & Turbo’s quality service, our customers can also run the plant themselves, without difficulty.

Expertise in combined heat and power
Our solid track record in project execution includes CHP plants. Our expertise means we don’t need to call on any external specialists for assistance or form costly joint ventures. That minimises costs and potential complications.
Heat Recovery Ensures High Efficiency
Combined heat and power

Possible engine heat recovery – hot water generation for different applications

When electricity is generated in engine-based power plants, waste heat at different temperature levels is produced. MAN Diesel & Turbo offers different technologies to convert this waste heat into a useful energy form.

MAN Diesel & Turbo’s engine based CHP plants are designed to meet the overall thermal demand of the end consumer and can be used for a wide range of thermal applications – whether at industrial, city-wide or at individual building levels.

The heat extracted from engine’s exhaust gases can be utilized for steam generation required in the textiles, food, paper and chemicals industries. By including an exhaust gas or hot water driven absorption chiller, chilled water – to run central air conditioning systems in hospitals, hotels and office blocks – can be produced. The heat extracted from the engine lube oil, the engine jacket water and the charge air cooling circuits can be utilized for hot water generation, e.g. used in a district heating network for heating purposes.

Energy flow diagram for hot water applications*

Benefits

- Lower energy costs through more efficient utilization of primary energy
- Improved environmental quality through reduced emissions of pollutants
- Recovered waste heat for a wide range of sustainable thermal applications
- Operational flexibility according to changes for heat and electricity demand

General Information

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Power range (kW)</th>
<th>Speed range (r/min)</th>
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<tbody>
<tr>
<td>V51/60G</td>
<td>12,600 - 18,900</td>
<td>600, 514</td>
</tr>
<tr>
<td>V35/44G</td>
<td>10,200 - 10,600</td>
<td>720, 750</td>
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<tr>
<td>V51/60DF</td>
<td>11,700 - 18,000</td>
<td>500, 514</td>
</tr>
<tr>
<td>L51/60DF</td>
<td>8,775 - 9,000</td>
<td>500, 514</td>
</tr>
</tbody>
</table>

* Based on 20V35/44G ISO-3046 conditions; efficiencies valid at a return line temperature of 60°C and supply line temperature of 125°C.
The PrimeServ offering

The MAN Diesel & Turbo Group offers worldwide, round-the-clock service, 365 days a year. In addition to MAN Diesel & Turbo’s service headquarters in Augsburg, Copenhagen, Frederikshavn, Saint-Nazaire, Hamburg and Stockport, service centers on all continents provide comprehensive and continuous support.

MAN Diesel & Turbo engines are renowned for their quality and durability. We are a global organization with a strong local presence, delivering exceptional field service management, tailor-made solutions, and first-class technical support.

PrimeServ provides advice and assistance to customers throughout the product lifecycle, from delivery to resale. With our far-reaching network of Service centers, we respond rapidly to customer needs. What’s more, we offer outstanding service and unrivalled technical expertise. Plus, we only use genuine spare parts – safeguarding the longevity of your engine.

PrimeServ’s aim is to provide:
- Prompt delivery of high demand OEM spare parts within 24 hours
- Fast, reliable and competent customer support
- Individually tailored O&M contracts
- Ongoing training and qualification of operators and maintainers
- Global service, open 24 hours-a-day, 365 days-a-year
- Diagnosis and troubleshooting with our high performance Online Service

World-Class Service
Marine propulsion, gensets and stationary plants
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