

# Power Solutions

Independent Power Producers



Engineering the Future – since 1758.

**MAN Diesel & Turbo**







## MAN Diesel & Turbo

The responsible way in leading technology

MAN Diesel & Turbo is the world's leading designer and manufacturer of low and medium speed engines. Our involvement with electrical power generators goes back to 1904 when we supplied the first ever diesel generator sets to the Kiev Tram System.

Since those early days, MAN Diesel & Turbo has never lost its technological pre-eminence in the large engine field. Likewise, our engines have never relinquished their status as the most efficient combustion engines available.

More than ever before, MAN Diesel & Turbo's development focus is on the environmental performance of our engines. Using our unrivalled grasp of large engine technology, we aim to make our engines progressively cleaner, more powerful and more efficient.

With our absolute commitment to reducing emissions while increasing fuel efficiency and power density and, with our proven competence in clean engines and power plants, we intend to be part of the global emissions solution.





## Our Offering

### Long-term power partnerships

The Power Development Department within the MAN Diesel & Turbo Power Plant business unit is dedicated to providing comprehensive solutions for the global power generation industry. A speciality is the development of turnkey projects initiated by Independent Power Producers (IPPs) committed to supplying electricity under very exacting Power Purchase Agreements (PPAs).

In an holistic approach, Power Development deals with the total process from the initial feasibility study to the search for sites, the choice of suitable MAN Diesel & Turbo technology, initial governmental or local approvals, finance and plant operations.



#### The services we provide are:

##### Project evaluation

- In-depth market analysis
- Comparative technology analysis
- Life cycle cost modelling
- Pro forma modelling
- Technical evaluation
- Environmental screening
- Credit analysis
- Tax structuring and optimisation

##### Project development

- Project structuring
- Project specific studies
- Site evaluation and selection
- Power Purchase Agreements (PPA)
- Fuel Supply Agreements
- O&M Agreements
- Host Government Agreements
- Turnkey construction contracts
- Environmental & project permitting

Acting as a long-term power partner in both the development and the financing of a project, the expertise and experience of Power Development allow customer expectations to be met - or even exceeded. To achieve this, Power Development works closely with project sponsors, equity investors, governments, utilities, municipalities and local and international financial institutions.

MAN Diesel & Turbo has a proven track record in power projects, including both equipment supply and turnkey plant construction. MAN Diesel & Turbo technology covers a wide range of decentralised power plant applications up to 300 MW<sub>e</sub>, using either liquid fuel, gaseous fuel or dual-fuel solution.

MAN Diesel & Turbo is also capable of developing and engineering power plants in combination with other energy generation technologies, including cogeneration, trigeneration and diesel combined cycle technologies.

As well as promoting the construction of traditional diesel and gas engine power plants, MAN Diesel & Turbo Power Development aims to act as a catalyst for innovative solutions. A topical example is a Wind-Diesel project where MAN Diesel & Turbo generators with bio-fuel capability provide back-up for a wind turbine park.

# Choloma III

Honduras – 265 MW



As part of a fast-track approach, the customer and MAN Diesel & Turbo cooperated in an interim bridge financing arrangement that ensured that the first, 90 MW phase of the power plant went online on schedule, i.e. within six months.

On the one hand, Honduras required electrical power urgently, on the other, expectations were that arranging finance for the 230 MW<sub>e</sub> project with the Central American Bank of Economic Integration would take up a great part of, or even exceed, the customer's six month lead time commitment under the Power Purchase Agreement (PPA).

In the event, based on the guarantee of income from the Honduran government under the PPA, bridge financing was arranged.

A temporary loan from MAN Diesel & Turbo covered 50% of the 90 MW first phase until long-term financing of the complete project was in place. The customer financed the remaining 50% from his own resources. The bridge finance was covered by a guarantee from Germany's export credit agency Euler-Hermes, with whom MAN Diesel & Turbo cooperates on a regular basis. By the time the first phase was completed, long-term finance for the complete 230 MW<sub>e</sub> project had become available and the bridge loan was repaid.

### Principal Details

Engine Type	14 x 18V48/60
Total Net Capacity	250 MW <sub>e</sub>

# Pacora

Panama – 50 MW

El Paso Power Company set out to develop the 50 MW Pacora diesel power plant in order to participate in the Panamanian merchant market for electrical power.

The special purpose company Pedregal Power Company, in which MAN Diesel & Turbo has equity participation - awarded the contract for the plant to MAN Diesel & Turbo and its consortium partner in 2001.

The plant was put into commercial operation in 2003 and has since been operated and maintained under a 15 year O&M contract with MAN Diesel & Turbo.

### Principal Details

Engine Type	3 x 18V48/60
Total Net Capacity	49.5 MW <sub>e</sub>



# Atlas Power

Pakistan – 225 MW



Atlas Power Ltd (APL), a special purpose company set up by the Atlas Group and dedicated to the first 225 MW power project in Sheikhpura, Pakistan, has reached various milestones in the project development process. The growing shortage of power in Pakistan has attracted the attention of some of the largest business groups in Pakistan like Honda motorcycle manufacturer Atlas-Honda.

The business groups have the financial capacity and the entrepreneurial skill to be successful in the power sector but are reluctant to exploit these opportunities because of a lack of power generation experience. MAN Diesel & Turbo was able to help convince Atlas to enter the market by providing key support during both the development and operation stages of the project.

MAN Diesel & Turbo acted as an energy consultant, helping Atlas through the development stage by making available its experience and technological skills. This included assistance in creating the financial model, structuring the approach to the lenders and negotiating key contracts such as the Power Purchase Agreement and fuel supply agreement.

In September 2007 the implementation agreement with the federal government, the 25 year Power Purchase Agreement with consumer WAPDA and the Fuel Supply Agreement with Pakistan State Oil Company were signed by Atlas Power Ltd. in the presence of MAN Diesel & Turbo.

Financial closure was achieved in early November 2007, with MAN Diesel & Turbo as one of the equity holders.

This 225 MW diesel combined cycle power plant with a life cycle efficiency of higher than  $\geq 45\%$  is in operation since the first half of 2009 after a period of less than two years for its development and all the necessary agreements and financing arrangements.

In late September 2007, MAN Diesel & Turbo also concluded a 10 year full operation and maintenance agreement with Atlas Power Limited.

#### Principal Details

Engine Type	11 x 18V48/60
Turbines	1 steam turbine in combined cycle
Total Net Capacity	213.6 MW <sub>e</sub>
Life cycle efficiency	$\geq 45\%$



## World Class Service

Our eyes on your plant



### MAN PrimeServ – peace of mind for life

With more than 150 PrimeServ service stations and service partners worldwide and our growing network of PrimeServ Academies, the MAN Diesel & Turbo after-sales organisation is committed to maintaining the most efficient, accessible after-sales organisation in the business.

PrimeServ's aim is to provide:

- Prompt, OEM-standard service for the complete life cycle of an installation
- Tuition and qualification of service personnel at our PrimeServ Academies to maximize the availability and viability of a plant
- Rapid, global availability of genuine, 100% quality-assured MAN Diesel & Turbo spare parts via local outlets or our 24 hour hotline.

### PowerManagement by MAN Diesel & Turbo

Complementing the PrimeServ after-sales offering is the MAN PowerManagement concept.

MAN PowerManagement packages provide integrated support solutions for all aspects of the running of a power or cogeneration plant. Individually negotiated agreements can cover assistance with – or delegation of – the management of all mechanical, electrical and thermal equipment. In this way the power plant operator gains comprehensive access to the technology, experience, best practices and professional resources of MAN Diesel & Turbo.

In short: PowerManagement by MAN Diesel & Turbo allows you to benefit from our specialist expertise in running a power plant while you concentrate on your own core business.



All data provided in this document is non-binding. This data serves informational purposes only and is especially not guaranteed in any way. Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions. Copyright © MAN Diesel & Turbo. D2366408EN-N3 Printed in Germany GMC-AUG-08122

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