

# POWERING O&M PERFORMANCE

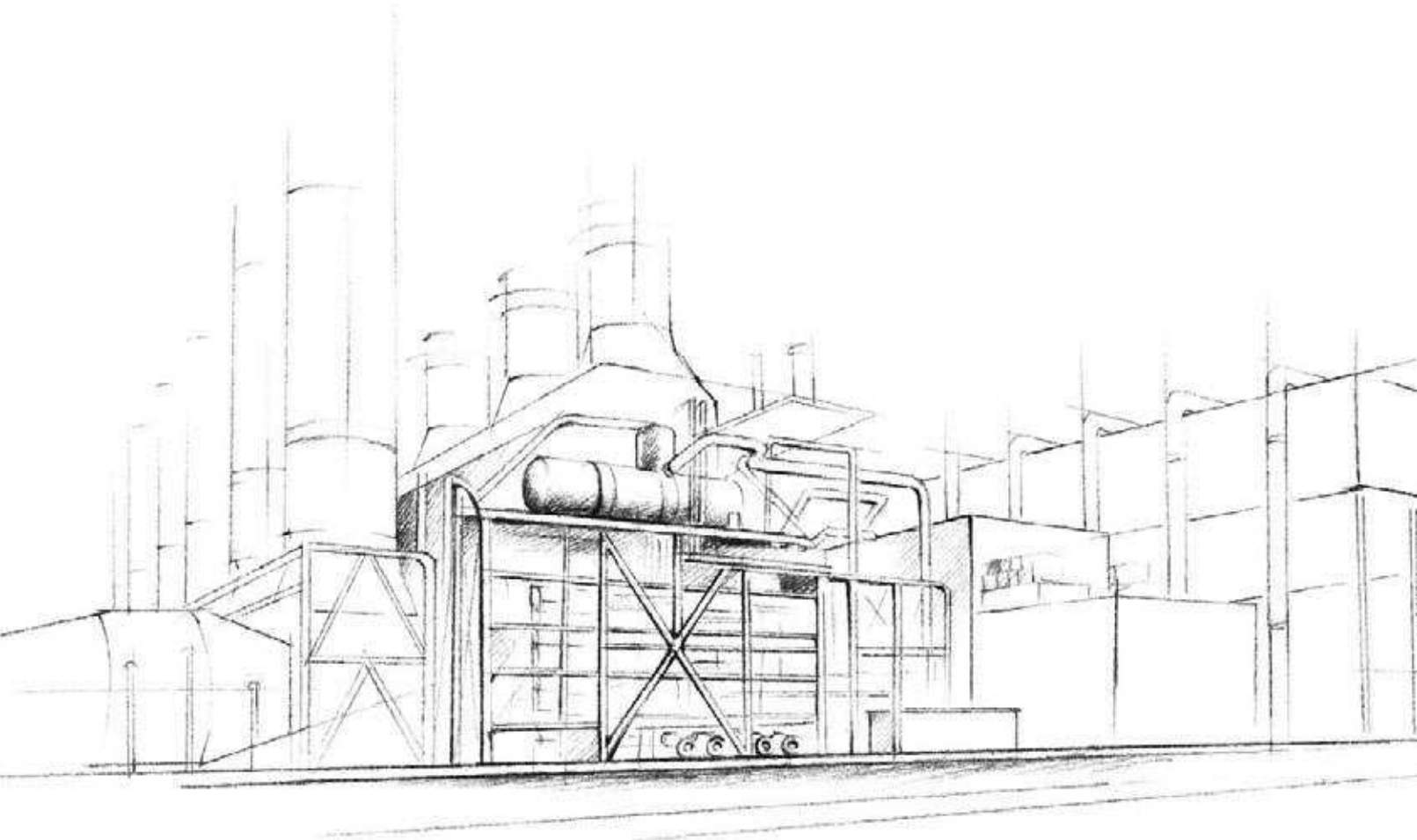


POWER |

*We are shaping the future* |

**ALSTOM**

# Team up with a **POWERFUL PARTNER**



Alstom Power Operation and Maintenance Contracts are a transparent set of answers to the business critical questions that every power plant owner faces.







As a full-service provider, Alstom Power O&M offers long-term contracts tailored to meet all your operational, maintenance and support requirements for gas turbine and combined-cycle power stations.

These contracts focus on what matters most to your business – maximum profitability. As a leading provider of operation and maintenance services with more than 18 years of power

station management experience, we have exclusive insights that back our promise to power the performance of your plant.

Our performance-oriented Operation and Maintenance Contracts are customized to suit your business objectives. With flexible scope, duration and levels of responsibility, we provide a tailored package that reduces your risks and ensures maximum availability.

Our four contract models provide increasing degrees of collaboration. The most basic form of partnership is given by the 'm' contract: a planned and unplanned maintenance contract. 'o&m' adds operational support. In 'o&M', we add full responsibility for general maintenance management and in 'O&M' we take over all operational and maintenance responsibility.



● Active Operation and Maintenance Contracts globally.

# Find **STRENGTH** in numbers

When you opt for an Alstom Power Operation and Maintenance Contract you are buying into a wealth of global know-how and experience.

Alstom's installed base of 700 GW of power generation equipment represents 20% of the worldwide thermal capacity. Having installed more than 700 gas turbines in simple and combined-cycle power plants worldwide, we have accumulated a level of operational expertise and technical knowledge that is unrivalled in the industry.

Alstom Power O&M currently oversees operations and maintenance of more than 70 plants, 147 gas turbines and over 42 GW of power. This provides an abundance of experience and data from which benchmarks and best practices are developed that make a real difference to the long-term efficiency and profitability of a plant.

With more than 200 local service centers strategically located in 70 countries around the world, Alstom Power understands local needs and conditions. This global reach and local presence allows us to respond rapidly and efficiently in all circumstances.

Setting global standards goes beyond profitability and commercial excellence. All our activities comply with international standards for quality management as well as Environment, Health and Safety (EHS) performance.





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**EXPERIENCE MAKES  
THE DIFFERENCE**

**Our track record and broad  
base of contracts gives us the  
skill and experience to power  
the performance of your plant**

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# A strategy to **SECURE INVESTMENTS**

Utilities, independent power producers and merchant power generators are all looking to maximize the returns on their asset investments by optimizing operations and managing risk.

Alstom Power Operation and Maintenance Contracts are designed to power the return on your investments. We align our goals with your operational needs to offer performance-oriented contracts with flexible guarantees, incentives and risk sharing.

We devise effective maintenance strategies for your plant based on professional assessment of the critical plant equipment and supported by condition based monitoring programs to support you in maintaining your asset value.

Deploying highly trained personnel and state-of-the-art management tools and processes, we promote safe, reliable and efficient plant operations.

As a leading Original Equipment Manufacturer (OEM), we also give you direct access to our extensive technical expertise and equipment

know-how, thus reducing the need to make large investments to develop in-house engineering.

Predictable operational and maintenance costs, in-house OEM expertise, world-class safety standards and environmentally sound solutions offer sustainable economic growth throughout your plant lifecycle.

Team up with Alstom Power O&M to achieve your long-term business goals.





# Benefits AT EVERY STAGE

It is never too late or too early to talk to Alstom Power O&M about Operation and Maintenance Contracts. We set the stage for top performance by providing industry-proven processes for all phases of the project, from mobilization through generation to transfer.

## MOBILIZATION

Thanks to vast experience as a provider of turnkey plant solutions and O&M services, Alstom is in a unique position to support you with:

- In-depth analysis of a plant's condition or design, depending on whether it is in the operational or planning stage
- Recruitment of site personnel, training and HR strategies to meet contract targets
- Strategic selection of spare parts and tools to ensure maximum availability
- Setting-up IT systems, generation tools and processes
- Strategic selection of local suppliers of goods, parts and services
- Plant design reviews for optimum maintainability

## GENERATION

There is no profitability without high availability and performance. Alstom Power O&M generates value by:

- Operation and maintenance planning and execution based on your power demand projections
- Efficient parts and inventory management
- Provision of ongoing specific training and development of plant specialists
- Use of state-of-the-art management tools and processes to optimize operation and maintenance
- Development and implementation of monitoring techniques to enhance condition based maintenance
- Plant performance monitoring and diagnostics
- Environmental and safety focused operation

## TRANSFER PLANNING

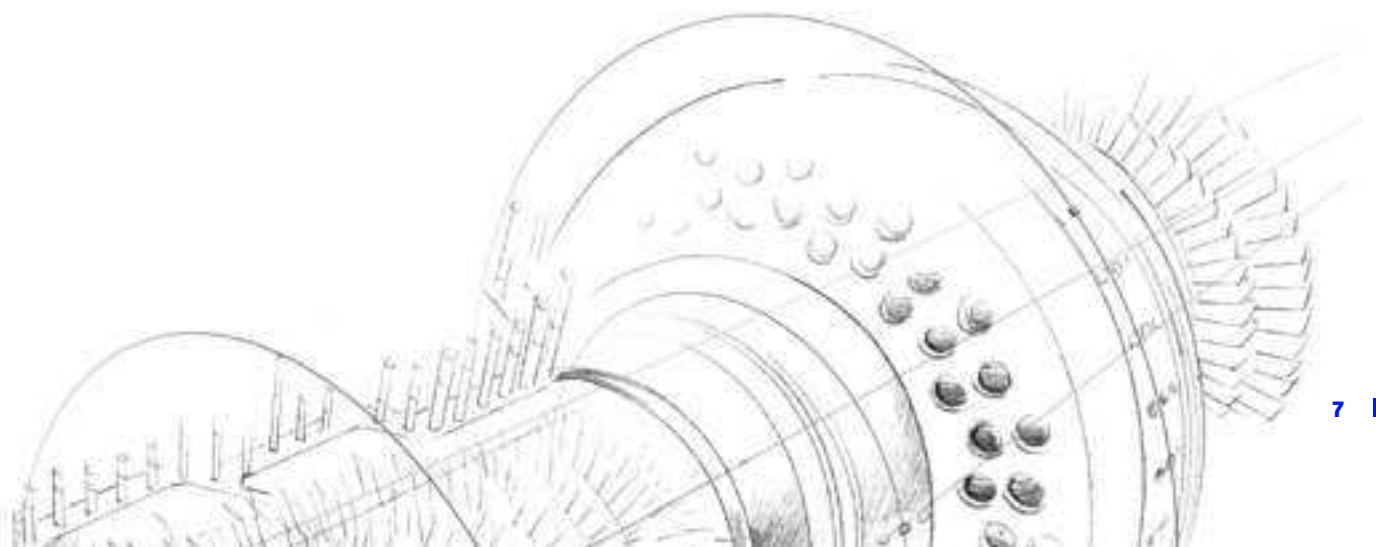
We maintain records of all our on-site activities. This is a vital benefit for the smooth transfer of operational responsibility.

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### PLANNING YOUR POWER

**Alstom Power O&M works with you to develop your operation and maintenance concept from the beginning to the end.**

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# FLEXIBLE contract models

In power generation, plant technology and business models may vary widely. Alstom Power O&M recognizes this and powers technical and business performance with fully-tailored contracts that best suit your operation and maintenance strategy.

We offer four basic contract models, which can be subsequently adapted

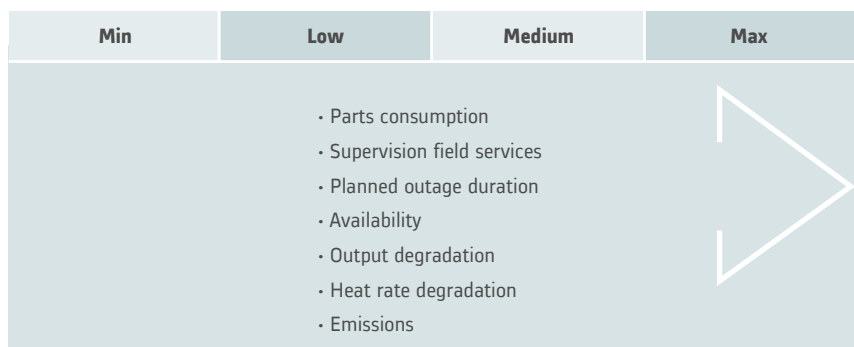
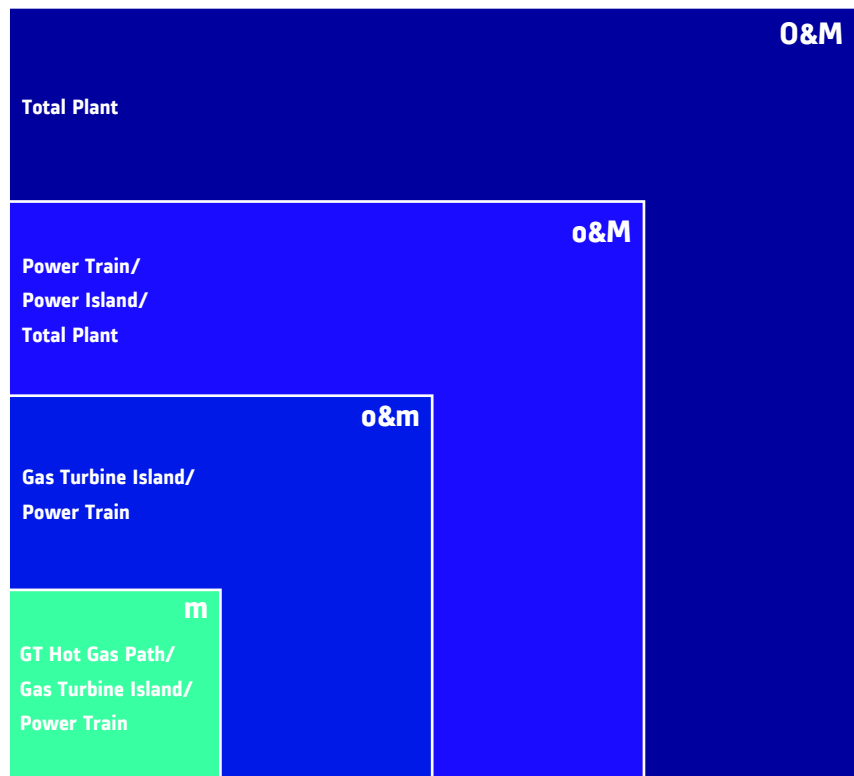
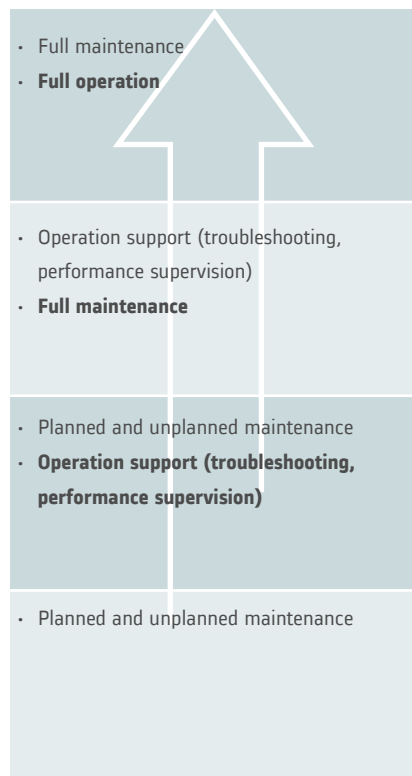
to your specific needs. The variables include: equipment scope (ranging from gas turbines to complete plants), contract duration, operating regime, risk and responsibility shares.

As an owner you are primarily interested in the commercial performance of your plant. That is why our contracts contain performance goals governed

by guarantees and incentives. Based on your needs, we shoulder financial responsibility for availability, capacity and heat rate targets.

Using this partnership approach, our contracts deliver measured results aligned with your business objectives.

## Deliverables





# The **CONTRACT PORTFOLIO**

## **m** contract

Planned and unplanned maintenance

- Mobilization including project management
- Selection and procurement of initial spare parts and tools
- Supervision or complete execution of planned and unplanned maintenance, including supply of parts

## **o&m** contract

Operation support, planned and unplanned maintenance

- Mobilization including project management and recruitment of plant support personnel
- Selection and procurement of initial spare parts and tools
- Operation and maintenance support including troubleshooting
- Complete execution of planned and unplanned maintenance including supply of parts

## **o&M** contract

Operation support and full maintenance

- Mobilization including project management, recruitment of site staff and maintenance set-up
- Selection and procurement of initial spare parts and tools
- Operation support
- Full management & execution of general, planned and unplanned maintenance
- Maintenance and inspection consumables as well as spare parts supply
- Full management of craft labor and subcontractors for all maintenance related work

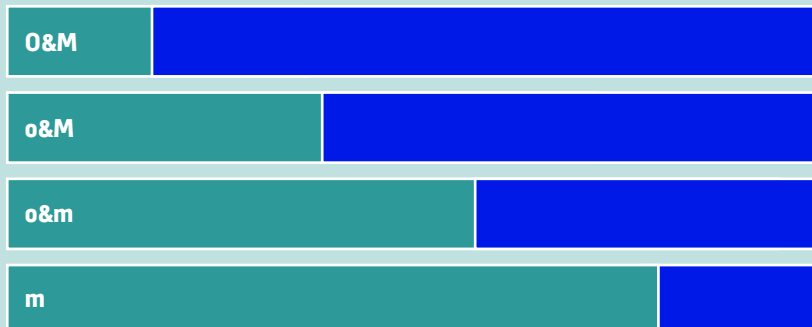
## **O&M** contract

Full operation and full maintenance

- Mobilization including project management, recruitment of site staff and operation & maintenance set-up
- Selection and procurement of initial spare parts and tools
- Full operation, including optimization of the plant performance
- Full management and execution of general, planned and unplanned maintenance
- Operation, maintenance and inspection consumables as well as spare parts supply
- Full management of craft labor and subcontractors
- Full administration, fuel handling, parts inventory, parts delivery, environmental compliance and quality

**Owner's Risk**

**Alstom's Risk**



## **SHARING THE OPERATIONAL RISKS**

We share our customers' operational risks and provide guarantees for availability, plant performance and emissions.

# Generation **SYSTEMS AND STRATEGIES**

Effective operation and maintenance management systems are key to maximizing plant performance. Alstom has developed state-of-the-art tools and processes that support the competitiveness of your plant.



## THE PLANT SUPPORT CENTER

With an Operation and Maintenance Contract you can enjoy the full benefit of remote 24/7 support from experienced Alstom engineers. By monitoring plant component health parameters and providing early warnings, the plant support center offers operational support to further increase your availability. Additionally, the support center experts seek to optimize plant performance by leveraging the benchmarked data gathered from Alstom's global fleet.

## CONDITION BASED MAINTENANCE

Our condition based maintenance concepts provide comprehensive predictive maintenance programs, which are supported by an experience based reliability and maintenance strategy. Condition based maintenance involves an array of local and remote assessment techniques such as thermography, vibration monitoring, ultrasonic measurements and lubricant analysis. These techniques allow Alstom staff at the plant, supported by expert engineers at the head office, to determine the state of components while on load, schedule a repair during a low demand period and prevent secondary damage. The net effect is significantly increased reliability and availability and reduced maintenance costs.

## COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM (CMMS)

This industry leading system customized for Alstom, allows us to schedule and plan resources and manage inventory in the most efficient manner. By use of standardized codes and reporting systems, data from Alstom administered CMMS systems is compiled and analyzed on a fleet wide basis to prevent failures.





#### POWER STATION MANAGEMENT SYSTEM (POMS)

Our ISO-certified Power Station Management System is built on global procedures and processes and customized to local requirements. Covering all generation aspects, it provides the plant staff the fundamental rules and knowledge of operation and maintenance management for the development of their operation & maintenance and EHS strategies and practices, leveraging Alstom's global operation and maintenance knowledge and fleet-wide experience.

#### MULTI-SITE CERTIFICATION

EHS is a key business driver for Alstom and its principles are completely integrated in our quality management system. Alstom Power O&M has been awarded with a worldwide multi-site certification for ISO9001, ISO14001 and OSHAS18001.

#### PLANT ASSESSMENT

Alstom uses an assessment process that allows benchmarking the operation & maintenance performance of your plant against industry best practices. Identifying the most effective improvement measures, the assessment facilitates a process of continuous improvements within your plant.



#### STILL A PEOPLE BUSINESS

Alstom offers access to a unique recruitment, training and career development system. Our global training and certification for operations staff includes job rotation and e-learning elements to ensure the highest level of competence at all levels.



# Powering **PLANT PERFORMANCE**

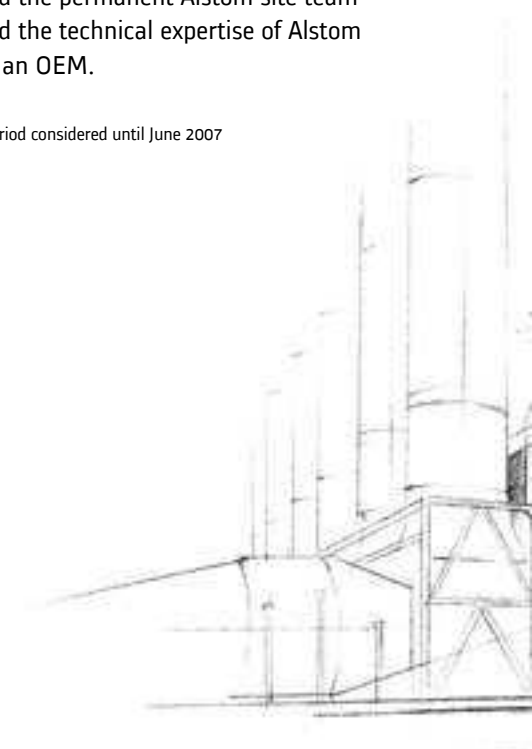
Our success stories reflect what Alstom Power O&M services are all about – turning benefits to real world competitive advantages.

## **UNMATCHED AVAILABILITY & RELIABILITY** | CASTEJÓN, SPAIN, KA26

Since the start of commercial operation in September 2002, Castejón, a single-shaft 400 MW combined cycle power plant based on Alstom's GT26 gas turbine technology, has achieved equivalent availability of 97.0% and equivalent reliability of 99.1% for the complete plant.<sup>1</sup>

The plant has been designed and built by Alstom for hc Energía and is supported by an Alstom Operation and Maintenance Contract. The excellent RAM data achieved in Castejón is the result of the close cooperation and teamwork between the customer and the permanent Alstom site team and the technical expertise of Alstom as an OEM.

<sup>1</sup> Period considered until June 2007





**AWARD-WINNING PERFORMANCE |**  
SENOKO, SINGAPORE, KA26

Senoko with its frequency response mode capability plays a vital role in stabilizing Singapore's electrical grid. Under an 'o&m' contract since commissioning in 2002, the combined-cycle plant is achieving excellent power output, efficiency and availability. For example, one of Senoko's GT26 achieved 211 days continuous operation.

Senoko was awarded 'Power Plant of the Year' in 2005 in the Asian Power Awards and 'Environmental Plant of the Year' in 2005 & 2006 and 'Best O&M Project of the Year' in 2007.

**EXCELLENCE IN MAINTENANCE PLANNING AND EXECUTION |**  
PERLIS, MALAYSIA, KA13E2

The 650 MW gas-fired, combined-cycle power plant in the state of Perlis, Malaysia is covered by an 'o&m' contract including plant management support. The plant based on Alstom's GT13E2 technology has maintained reliability above 99% and zero Lost Time Accidents (LTA) since the start of commercial operation in 2003.<sup>2</sup>

With the advantage of good planning, a combined planned maintenance (Type C Inspection on gas turbine with Type B Inspection on steam turbine and generators) was performed in only 24 days.

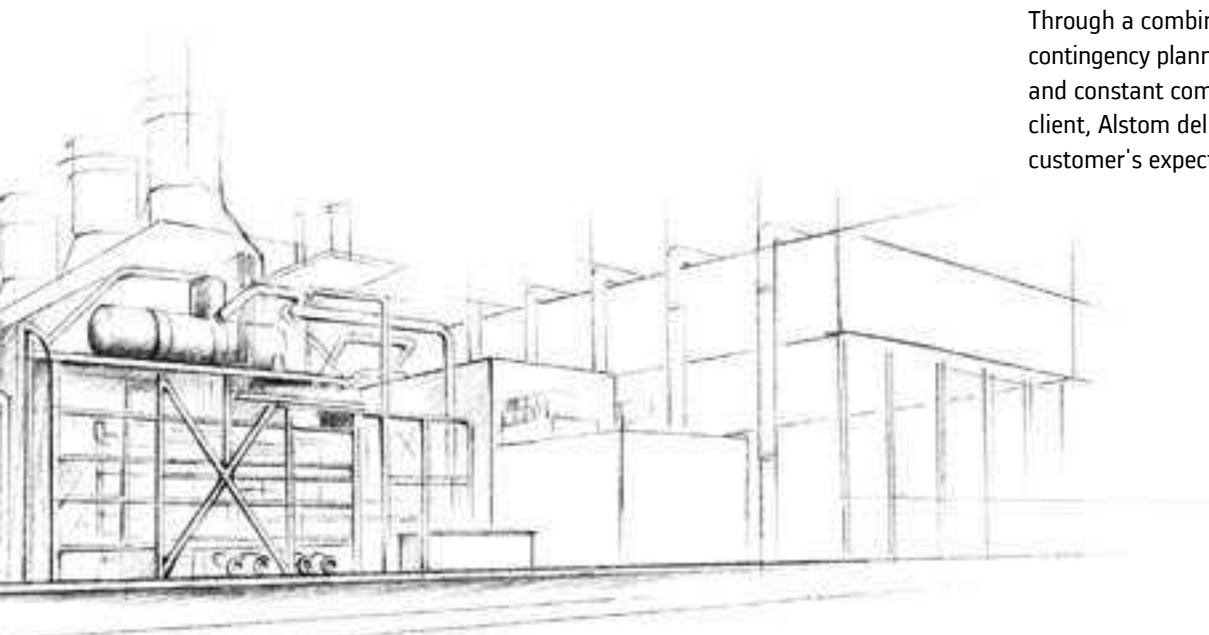
<sup>2</sup> Period considered until August 2008

**SURPRISINGLY FAST & TRANSPARENT |**  
KUALA LANGAT, MALAYSIA, KA13E2

Kuala Langat, a combined-cycle plant based on Alstom's GT13E2 technology, is one of Malaysia's most energy-efficient stations, supplying power to the country's largest electricity provider. It has been under an Alstom 'O&M' contract since 1995.

In 2008, the plant performed a challenging Type C Inspection on the GT13E2 gas turbine, replacing compressor blades, combined with a Type B Inspection on Generator 14. Alstom's team completed all disassembly, re-assembly and commissioning activities, including dual fuel firing and rotor re-balancing, in just 23 days – the shortest outage ever recorded at the plant.

Through a combination of excellent contingency planning, field coordination and constant communication with the client, Alstom delivered far beyond the customer's expectations.



# Values **YOU CAN RELY ON**

In the increasingly competitive power industry, you need a partner you can rely on. Thanks to experience leveraged from a large fleet, Alstom Power O&M combines unique technical expertise with the detailed know-how essential for performing operation and maintenance activities.

As an OEM and worldwide operation and maintenance service provider, Alstom offers a team of professionals with the comprehensive knowledge that you depend on to operate your power plant successfully in today's increasingly deregulated power market.



## PLANNING

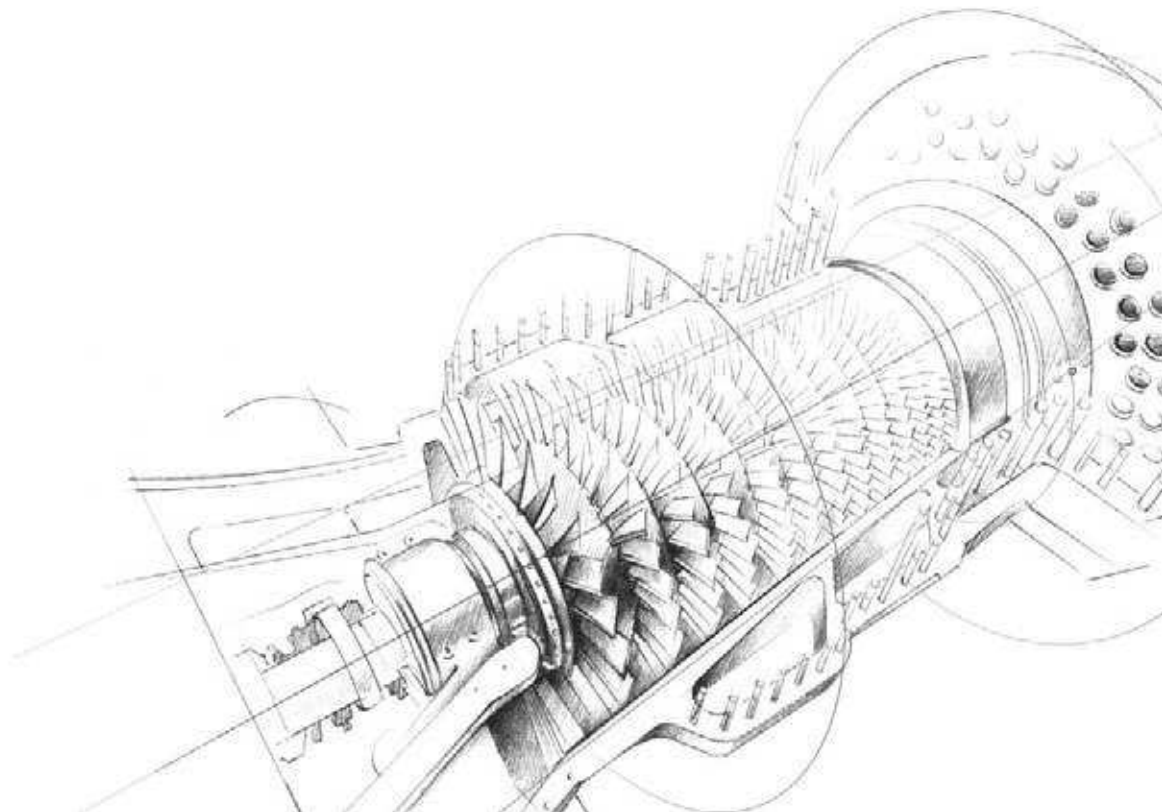
From mobilization to generation to transfer of responsibilities: planning with Alstom creates the foundation for top plant performance with industry-proven and quality-certified processes.

## PRACTICE

The Alstom Power O&M fleet provides a considerable pool of significant data and experience that is constantly evaluated to develop new best practices for operations and maintenance.

## PERFORMANCE

Alstom shares your goals and risks. We offer guarantees covering availability, reliability, heat rate and power output among others to assure you that your long-term performance goals will be met.







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