SERVICE CONTRACTS
FOR GAS TURBINES AND
COMBINED-CYCLE POWER PLANTS
Services for thermal power plants

Alstom is dedicated to keeping thermal power plants competitive. Thanks to our OEM (Original Equipment Manufacturer) know-how and involvement in around 25% of the world’s power production capacity, we operate from a position of proven expertise. With 15,000 power industry professionals spread across 200 world-wide locations, Alstom Thermal Services supports our customers with extensive service solutions for daily operations and maintenance while helping to enhance lifecycle management.

In a changing competitive and regulatory environment, flexibility and expertise are key. Building on our global fleet and project execution experience, we partner with owners of Alstom and other OEM equipment to help maximise performance and lifetime profitability while keeping safety, reliability and environmental compatibility top priorities.

Alstom is a global organisation that cultivates cutting-edge expertise at the product/technology level while maintaining a strong local presence to meet site-specific needs and efficiently deliver tailored solutions in both established and emerging markets. Whether you require support in the areas of skills or systems, we have the technology, solutions and presence to meet your needs.
A strategy to secure investments
Utilities, independent power producers and merchant power generators are all looking to maximise the returns on their asset investments by optimising operations and managing risk. Alstom service contracts are designed to power the return on your investments. We align our goals with your operational needs to offer framework agreements or performance-oriented contracts with flexible guarantees, incentives and risk sharing.

Predictable costs
As a leading Original Equipment Manufacturer (OEM), we possess extensive technical expertise and equipment know-how, which we can share with you. This reduces the need for you to make large investments to develop your own in-house engineering skills. An Alstom service contract is the simplest way to control operational and maintenance costs, access OEM expertise and ensure world-class safety and environmental standards for your plant.

Maintaining asset values
We devise effective maintenance strategies for your plant, based on professional assessment of the critical plant equipment. Using monitoring programmes we support you in maintaining your asset value and by deploying highly trained personnel and state-of-the-art management tools and processes, we promote safe, reliable and efficient plant operations.

Not just for Alstom equipment
We are not limited to serving Alstom equipment. Many of our customers have equipment from other manufacturers but are drawn to Alstom by the unique range of service contracts that meet their specific needs.
Our power generation offering is based on a deep understanding of power markets and our customers’ needs. It is organised around three levers to maximise the return of assets over their entire lifecycle.

**REDUCING COST OF ELECTRICITY**

It takes competitive assets to keep electricity affordable. We enable power companies to compete successfully in the marketplace and provide affordable electricity to consumers. We help you reduce the cost of electricity through:

- Efficiency improvements
- CAPEX reduction/scaling up
- Capacity Factor increase (renewable)
- Lead time reduction
- Competitive O&M
- Competitive financing

**LOWERING ENVIRONMENTAL FOOTPRINT**

Clean generation is one way of demonstrating environmental responsibility. Another is lowering resource usage, visual impact and noise pollution. In both cases, we can help you meet or exceed regulations and environmental standards. That is why Alstom innovates in the following areas:

- Renewable portfolio
- Natural resource optimisation
- Pollutants control (SOx, NOx, PM, mercury)
- CO2 emission reduction & CCS
- Land use, visual impact and noise
- Water intensity reduction & recyclability

**INCREASING FLEXIBILITY & RELIABILITY**

Intermittent power generation is a growing challenge of energy security, as is maintaining an ageing installed base and adapting it to changing market conditions. We help you tackle both issues so that you can enjoy dependable operations with:

- Maintainability and outage time reduction
- Operational and fuel flexibility
- Designs and service for improved availability and reliability
- Climate packages
- Energy storage
INCREASING FLEXIBILITY & RELIABILITY

>98.5% reliability
Average equivalent reliability factor for Alstom fleet with O&M contract from 2012 to mid of 2014.
Effective management of a power plant is only possible when you take into account the full lifecycle in all decisions. Thanks to our long experience and our global fleet insights, Alstom is able to help customers make choices that will stand the test of time. Alstom’s long-term agreements and operation and maintenance contracts allow owners to better define and manage their risks and responsibilities throughout the plant lifecycle.

Optimising the whole lifecycle

Alstom offers two main types of service contracts:

**Long-Term Agreements**

**EFFICIENT FRAMEWORK AGREEMENTS**

Alstom Long-Term Agreements (LTAs) provide you with a framework contract that defines prices and conditions in advance. Besides offering preferential conditions for high quality parts and services, the LTA reduces your administrative overhead and simplifies planning. LTAs offer many immediate advantages:

- Defined preferential prices for parts and services
- Flexibility scope to suit your operative strategy
- Extendable to include almost any aspect of plant maintenance

**Operation and Maintenance Contracts**

**FEE-BASED CONTRACT WITH RISK SHARING**

Alstom Operation and Maintenance (O&M) contracts let plant owners devise completely new management strategies by outsourcing risks and responsibilities. Pick a standard agreement, tailor the service and equipment scope to suit your needs and then enjoy the performance and availability guarantees that Alstom provides.

With an Alstom O&M contract you enter a fee-based agreement that offers the following major advantages:

- Risks can be effectively mitigated and shared
- Leverage Alstom’s extensive experience in plant asset management
- Flexible contract models to suit every business need
contracts
of anticipation
Alstom Long-Term Agreements (LTAs) help you to predict your long-term maintenance expenditure and lay the foundation for optimising your plant profitability. As framework agreements that define preferential prices and conditions in advance, they save you overheads, increase business efficiency and maintain full business flexibility.

By choosing an LTA, you ensure cost predictability and timely completion of planned maintenance. This allows you to stabilise the return on your capital investment. Typically, Alstom LTAs have a duration between 6 and 20 years.

We offer the following framework agreements that can be tailored to perfectly match your business goals: Long-Term Service Agreement (LTSA), Long-Term Parts Agreement (LTPA) or a Long-Term Reconditioning Agreement (LTRA).

**LTSA**
Long-Term Service Agreement
- Project management
- Planning and execution of outages on time and material basis
- Supply of new parts, reconditioned parts and consumables
- Provision of supervision and craft labour

**LTPA**
Long-Term Parts Agreement
- Project management
- Planning support for planned maintenance
- Supply of new parts, reconditioned parts and consumables

**LTRA**
Long-Term Reconditioning Agreement
- Project management
- Planning for planned maintenance
- Supply of reconditioned parts and consumables

**Additional options for Long-Term Agreements**
You can enjoy fast operation support by experienced Alstom engineers at the Alstom Plant Support Center™ (PSC). By careful diagnosis, based on real time measurements from your plant and by leveraging the benchmarked data gathered from our global fleet, Alstom can help you make the most efficient use of your hot gas path inspection. Based on our diagnosis we can propose improvements, upgrades or retrofits that help you optimise your maintenance costs and increase plant performance. Rotor and structural parts, lifetime monitoring and optimisation packages are available as well.
agreements of planned maintenance

Scope
Together with our local Alstom representative, you determine the exact scope of your individual LTA. At least two hot gas path inspections per gas turbine are included in the framework agreements, but the range of services available within the LTA extends to cover every possible aspect of power plant operations. You will receive preferential conditions for the parts or services covered by the agreement and the risk of unexpected price fluctuations will be eliminated. Whatever the details of your agreement, it represents a partnership with Alstom.

System options
- Gas turbine hot gas path parts
- Thermal block
- Complete power train

Service options
- Spare parts
- Reconditioning
- Technical consulting / Plant Support Center™
- Improvements
- Inspection planning
- Field service
- Assessments
- Inventory management
- Condition monitoring
A partnership for performance

In power generation, plant technology and business models may vary widely. Alstom recognises 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.

**O&M contract**
Full operation and full maintenance
- Mobilisation including project management, recruitment of site staff and operation & maintenance set-up
- Selection and procurement of initial spare parts and tools
- Full operation, including optimisation 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 labour and subcontractors
- Full administration, fuel handling, parts inventory, parts delivery, environmental compliance and quality

**O&M contract**
Operation support and full maintenance
- Mobilisation 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 labour and subcontractors for all maintenance related work

**m contract**
Planned and unplanned maintenance
- Mobilisation including project management
- Selection and procurement of initial spare parts and tools
- Supervision or complete execution of planned and unplanned maintenance, including supply of new parts, reconditioned parts and consumables
Maintenance contracts
risk reduction

Sharing the operational risks

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

O & M
- Full Operation
- Full Maintenance
- Operation support*
- Planned and unplanned maintenance
- Planned and unplanned maintenance
- New parts
- Reconditioning services

O & M
- Parts consumption
- Availability or reliability
- Output degradation
- Heat rate degradation
- Emissions

* (troubleshooting, Performance supervision)
Gearing up for top performance

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

Mobilisation
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 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 optimise 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.
Effective operation and maintenance management systems are key to maximising plant performance. Alstom has developed state-of-the-art tools and processes that can be used to make your plant more competitive.

**Condition based maintenance (CBM)**
Our CBM programme combines benchmark and real-time data to determine the best and most reliable maintenance strategy. An array of local and remote assessment techniques such as thermography, vibration monitoring, ultrasonic measurements and lubricant analysis are employed to determine the state of components while on load. Thus Alstom staff at the plant supported by experts at the head office can schedule a repair during a low demand period and prevent secondary damage. The net effect is significantly increased reliability, better availability and reduced maintenance costs.

**Computerised maintenance management system (CMMS)**
This industry leading system customised for Alstom, allows us to schedule and plan resources and manage inventory in the most efficient manner. By use of standardised codes and reporting systems, data from Alstom administered CMMS is compiled and analysed on a fleet wide basis to prevent failures.

**Power station management system (POMS)**
Our ISO-certified POMS is built on global procedures and processes and customised to local requirements. Covering all generation aspects, it provides the plant staff the fundamental rules and knowledge of operation and maintenance management. Leveraging Alstom’s global operation and maintenance knowledge and fleet-wide experience, it helps the development of O&M and EHS strategies and practices.

**Environmental and emission management**
We create more value for our customers based on our environmentally sound service solutions. Due to our extensive experience, we are able to comply with the environmental standards, without the drawbacks of high investments.

**Multi-site certification**
Environmental Health and Safety (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 OSHAS 18001.

**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.

**Building on people**
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.
Plant Support Center™

Advice and operational support around-the-clock

The Plant Support Center™ (PSC) provides direct access to a global network of technical specialists to support troubleshooting, to analyse equipment trends or to provide support during assessment and recommissioning.

Leveraging global insights – with an O&M contract or as an option to an LTA you can enjoy the full benefit of remote 24/7 support from experienced Alstom engineers in our global plant operation support network. The Plant Support Center™ experts seek to optimise plant performance by leveraging the benchmarked data gathered from Alstom’s global fleet. From Baden (CH), Richmond (US) and Kuala Lumpur (MY) we can monitor plant component health parameters and provide early warnings to further increase your availability.

The Plant Support Center™ supports you with modular service portfolio from basic to specialised service modules. Those can be provided individually or combined.

Our main modules are:

**24/7 OPERATION SUPPORT SERVICE**
Our service engineers are available around-the-clock to provide expert operational support for keeping your plant running or get it back online as fast as possible. Issues are addressed to specialists to provide recommendations for planned maintenance and longer-term plant improvements.

**MONITORING & DIAGNOSTICS SERVICES**
We provide proactive remote monitoring and diagnostic services to assist your decision-making processes. Specialised engineers monitor incoming plant data with advanced diagnostic programs, and when deviations are detected, the PSC personnel are notified for an assessment immediately.

**POWER TRAIN VIBRATION REMOTE ASSESSMENTS**
The PSC offers additional services for remote assessment of the shaft vibration behaviour and integrity of your power train.

**The Alstom Team up to achieve**

**CLEAN POWER CLEAR SOLUTIONS™**

**INCREASING FLEXIBILITY & RELIABILITY**

**24/7 remote support**
for plants equipped with GT11N2, GT13E2, GT24 and GT26 gas turbines
advantages
your long-term business goals

Trust our track record
Alstom’s installed base of 700 GW of power generation equipment represents 20% of the worldwide thermal capacity.

Teamwork counts
Alstom service contracts expressed through our collaborative global culture that honours teamwork, focuses on the goal and always puts the customer first.

Action and reflection
Our installed base and service contract portfolio 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.

We are where you are
>150 service contracts covering >330 gas turbines >85 GW installed capacity

When you opt for an Alstom service contract you are buying into a wealth of global know-how and experience. As a leading OEM with an highly-evolved service offering, Alstom offers many advantages expressed in our core values of trust, action and teamwork.

Thermal Service Gas Turbine OEM global footprint

1 Product Centre
4 Execution Centres
8 Reconditioning Workshops
10 Field Service Hubs
Local Service Centres

*Status 2013
**API Raffineria, Italy**

In July 2012 the Gas O&M team at the Falconara power plant, Italy reached a total of 2,000 continuous days without accidents – around five and a half years.

This is the outcome of Alstom’s “ZERO” accidents policy. The ability to operate without endangering any party is necessary and controllable and it ensures a safe working environment.

**TPP-26 Moscow, Russia**

Alstom became the first foreign company to build a power plant in Russia on an Engineering, Procurement and Construction (EPC) model.

The power plant is the most efficient in Russia reaching 59% efficiency in condensing mode.

In 2012, Alstom was awarded a 14 years service agreement for the maintenance of the whole plant.

<table>
<thead>
<tr>
<th>Plant</th>
<th>1 x KA13E2-1</th>
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</thead>
<tbody>
<tr>
<td>Output</td>
<td>287 MW</td>
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<tr>
<td>Contract</td>
<td>O&amp;M</td>
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<tr>
<td>Scope</td>
<td>Total plant</td>
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</table>

<table>
<thead>
<tr>
<th>Plant</th>
<th>1 x KA26 - 1</th>
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<tbody>
<tr>
<td>Output</td>
<td>420 MW</td>
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<tr>
<td>Contract</td>
<td>O&amp;M</td>
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<tr>
<td>Scope</td>
<td>Total plant</td>
</tr>
</tbody>
</table>
Hai Fu CCPP, Taiwan

Since its initial operation, the Hai Fu power plant has an outstanding starting reliability with over 12,000 starts reached between 2001 and 2013. This high performance over such a long period is possible through great teamwork and cooperation with our customers.

<table>
<thead>
<tr>
<th>Plant</th>
<th>2 x KA24-2</th>
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<tbody>
<tr>
<td>Output</td>
<td>960 MW</td>
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<tr>
<td>Contract</td>
<td>O&amp;M</td>
</tr>
<tr>
<td>Scope</td>
<td>Total plant</td>
</tr>
<tr>
<td>Operation</td>
<td>Daily start-stop</td>
</tr>
<tr>
<td>Starting reliability</td>
<td>98.5 %</td>
</tr>
</tbody>
</table>

Monterrey III, Mexico

Outstanding reliability and availability achieved through an excellent working relationship and a dedicated highly qualified staff.

In 2009 the GT24 fleet average in regards to availability, reliability and service factor was even higher than the F-class 60Hz fleet.

<table>
<thead>
<tr>
<th>Plant</th>
<th>4 x KA24-1</th>
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</thead>
<tbody>
<tr>
<td>Output</td>
<td>1000 MW</td>
</tr>
<tr>
<td>Contract</td>
<td>O&amp;M</td>
</tr>
<tr>
<td>Scope</td>
<td>Power train</td>
</tr>
<tr>
<td>Operation</td>
<td>Base load</td>
</tr>
<tr>
<td>Reliability</td>
<td>99.6 %</td>
</tr>
<tr>
<td>Availability</td>
<td>95.6 %</td>
</tr>
<tr>
<td>Service Factor</td>
<td>95.9 %</td>
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</tbody>
</table>
An integrated approach

Service throughout the lifecycle

Alstom offers extensive service solutions in power generation based on our comprehensive knowledge of product and component integration and our global fleet experience. From spare parts supply to full plant operation, we offer effective solutions for gas turbines and combined-cycle plants, for our own fleet and other manufacturer’s plants.

Staying ahead of the game also means innovating. Alstom’s commitment to service product R&D allows us to deliver cutting-edge solutions, not only enhancing plant efficiency and reducing lifecycle costs, but also minimising environmental impact.

Parts
- New in-kind replacement parts with OEM quality
- Upgraded & customised components

Reconditioning & repairs
- Innovative reconditioning technologies for complete range of GT hot gas path parts
- On-site & off-site repair capabilities

Technical expertise & operational support
- Plant Support Center™
- Monitoring & diagnostic services
- Total plant assessment
- Component lifetime assessments
- Trainings
- Asset management support services

Field service
- Inspection, repair and overhaul services
- Outage planning support
- Recommissioning and trouble shooting
- On-site testing, monitoring and diagnostics

Performance improvements
- Integrated approach for full use of gas turbine upgrades
- Improvements for enhanced efficiency, availability, reliability, lifetime, environmental performance or operational flexibility

Service contracts
- Customised contract models to suit every service need and risk profile

Lifecycle Management – our knowledge is your power

Partnership throughout the lifecycle of customers’ power plants. Alstom is the leader in design and supply of power generation delivering maximum plant performance, availability, reliability and environmental compliance. With more than 100 years of experience and the largest installed base of power generation equipment across the globe, Alstom has the knowledge to best enable power generators to stay competitive with changing market requirements. Our commitment does not stop at commissioning. Alstom continues to be there through your plant’s life with a focus on performance to meet changing asset strategies.
Alstom

Alstom is a global leader in the world of power generation, power transmission and rail infrastructure and sets the benchmark for innovative and environmentally friendly technologies.

Alstom builds the fastest train and the highest capacity automated metro in the world, provides turnkey integrated power plant solutions and associated services for a wide variety of energy sources, including hydro, nuclear, gas, coal, wind, solar thermal, geothermal and ocean energies. Alstom offers a wide range of solutions for power transmission, with a focus on smart grids.

Power generation

Alstom Power offers solutions which allow their customers to generate reliable, competitive and eco-friendly power.

Alstom has the industry’s most comprehensive portfolio of thermal technologies – coal, gas, oil and nuclear – and holds leading positions in turnkey power plants, power generation services and air quality control systems. It is also a pioneer in carbon capture technologies.

Alstom offers the most comprehensive range of renewable power generation solutions today: hydro power, wind power, geothermal, biomass and solar. With ocean energies, we are developing solutions for tomorrow. Alstom is one of the world leaders in hydro power, the largest source of renewable energy on the planet.