A COMPLETE RANGE OF SOLUTIONS

Turn your asset management challenges into eco-efficient solutions

Investing in quality, innovative equipment that optimises your electrical infrastructure and heightens your return-on-investment is essential.

You need to ensure that your assets operate optimally throughout their lifetime and you need a responsive partner with comprehensive and high quality services to support you in your challenges.

"Who knows your assets better than the original equipment manufacturer?"

Alstom Grid offers a full range of services tailored to your needs and managed by field experts.

Our technical specialists take care of your assets: networks, transformers, protection, information and control equipment, power electronics equipment and entire air-insulated or gas-insulated substations. They make sure that all quality and safety regulations are respected and met.

Alstom Grid offers complete services to cover all operations and maintenance needs so that you to get the most from your assets.

- From network consulting and planning to operational implementation
- From asset diagnostics to condition-based maintenance
- From emergency support to full operation and maintenance
- From technical training to customised competence development programme

Make your equipment smarter and more sustainable thanks to field-proven expertise

At Alstom Grid, our mission is to ensure that your energy network is reliable, efficient and environmentally-friendly. We leverage the technical know-how of our equipment design and manufacturing engineers into customised services solutions.

Alstom Grid local services units around the world are managed by strict quality management systems - including our own methodology - and fulfill the requirements of ISO 9001, environmental standard ISO 14001 and OHSAS 18001.
Global expertise delivered locally

Combining the expertise of a global manufacturer with local services centres, Alstom Grid is the best partner for high voltage asset management throughout the equipment lifecycle.

Product Lifecycle Management
- Erection, testing and commissioning
- Inspections and maintenance
- Emergency support, diagnosis and repair
- Oil analysis for transformers
- Spare parts supply and strategic inventory management
- Decommissioning and recycling

Long Term Maintenance
- Preventive and corrective maintenance
- Spare parts management
- 24/7 support and condition monitoring
- Dedicated team with response time commitment
- Full operation of the substation

Renovation, Modernisation, Extension (RME)
- Substation optimisation and lifetime extension with complete refurbishment
- Obsolescence solutions with technological enhancements and upgrades
- Substation extension and electrical ratings increase

Network consulting
- Power systems analysis and engineering
- Infrastructure audit and optimisation
- Network expansion, reinforcement or integration studies
- Stability and security analysis (post incident, reliability, availability and maintainability)

Technical training
- Tutored e-learning
- Modular training
- Software training
- Competence development programme
- Education partnership

Condition monitoring
- Strategic equipment or full substation monitoring and control
- Asset conditions in real time
- Preventive maintenance and optimised asset management

Alstom Grid offers complete, innovative, high quality services to optimise your electrical infrastructure, improve your return-on-investment and extend the lifetime of your assets. Our local technical experts provide comprehensive solutions to get the most out of your assets during their lifecycle.
At our Technical Institutes, training combines theory with practical hands-on experience with real equipment or in ‘sand boxes’ for software courses.

You can choose from a large range of training methods: tutored e-learning, classroom courses, hands-on, set curriculums, 3D modules and competence development programme.

Alstom Grid Technical Institutes offer a full range of training in electrical grid safety, operations and maintenance, protection, control and network management solutions - all near your location. These value-adding courses encompass all aspects of electricity from fundamentals to in-depth equipment knowledge. Trainees benefit from trainers’ expertise in techniques and field experience.

When considering operational performance, theoretical study is necessary but not sufficient to optimise site personnel competence. What makes a real difference is the experience gained through practice.

Reliability analysis tools offer electrical system managers an effective way to monitor performance and ensure supply quality for complex power systems. Beyond the standard power flow or short circuit calculations, these studies provide the information required to improve network reliability in a cost-effective and sustainable manner.

Our range of tested, tailor-made solutions for upgrading, expanding or even reducing your network, ensures that your system will operate reliably and safely.

As a leading industry system integrator, we have the global experience and expertise to analyse, specify and design network systems to meet your exact requirements.
# Product lifecycle management

Get the most from your assets at all stages of their lifecycle

Transmission assets constitute an important capital investment and are critical to the successful operation of your electrical power systems. Taking care of your equipment components is essential to keep your assets safe and reliable. Alstom Grid offers complete services to cover all operational and maintenance needs so you get the most from your assets and investment. Based on our manufacturing experience, Alstom Grid proposes efficient and customised solutions to increase the life of your equipment.

## Erection and commissioning

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<tr>
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<tbody>
<tr>
<td><img src="image" alt="Erection and commissioning" /></td>
<td>Our local teams ensure that the asset is erected, tested and commissioned according to our own state-of-the-art standards. Our certification process, based on “on-the-job coaching” guarantees the same high level of quality anywhere the asset is installed.</td>
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## Maintenance and repair

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<td><img src="image" alt="Maintenance and repair" /></td>
<td>Alstom Grid recommends regular maintenance on your equipment. Maintenance plans must be carried out by a qualified field services supervisor with the prerequisite technical levels. Maintenance levels 3 to 5 (Excelec referential) must be conducted by the manufacturer. Our local teams support you in emergency repairs, time-based, predictive and corrective maintenance. Necessary repairs are conducted depending on the condition assessment.</td>
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## Strategic spare parts management

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<td><img src="image" alt="Strategic spare parts management" /></td>
<td>Although some parts mainly play a supporting role, they are vital for optimal operation. Any problem associated with any component can result in damage or failure of the equipment. Alstom Grid proposes strategic spare parts to avoid risks. A strategic spare parts stock focuses on main and critical components. Strategic spare parts management is an effective solution to cope with urgent corrective maintenance and to control replacement lead times and costs. Several options are proposed depending on the level of availability needed: stock at an Alstom facility, stock within your facility or benefit from a shared stock as part of a “Spare Parts Club”.</td>
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## Oil analysis

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<td><img src="image" alt="Oil analysis" /></td>
<td>With over 25 years of experience, our laboratories perform reliable fluid analysis tests in order to provide you with an expert assessment of the overall condition of your transformers. Based on test analysis and diagnostics, you can anticipate any dysfunction and limit losses. Necessary maintenance and repairs can be conducted while avoiding any outages or induced production downtimes. Alstom Grid has a dedicated team to ensure diagnosis within 8 days and emergency requests in 8 hours, with advice on a case-by-case basis. Alstom Grid also offers long term contracts to regularly monitor transformer conditions and analyse potential dysfunction risks.</td>
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## Decommissioning

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<td><img src="image" alt="Decommissioning" /></td>
<td>During decommissioning, Alstom Grid is committed to handle equipment correctly with recyclers and collectors governed by regulations and directives with a special focus on preserving the environment. Alstom Grid objectives are to reuse a maximum number of parts, thus using less raw materials and meeting other customers’ needs for obsolete equipment still in service.</td>
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Long term maintenance

Optimise asset performance for the long term

Whether for a specific critical product range within your electrical infrastructure or the entire network, Alstom Grid can provide you with lifetime support for Alstom Grid, Alstom-legacy or third-party equipment, including full lifetime operations and maintenance management.

Our experts provide complete and comprehensive services to ensure substation stability, security, reliability and performance (asset management, preventive maintenance, strategic spare parts, technical training...)

Alstom Grid provides three incremental support packages (expertise, performance and serenity) for your infrastructure over its entire life, or a combination of services to complement your existing resources and competencies:

- Responsibility for controlling and operating electrical networks on any original manufacturer’s equipment
- Asset management: usage planning, operations, condition-based maintenance, repair and replacement
- Dedicated experts with prompt response times and 24/7 emergency support capability on all fault rectification-related issues

Renovation, modernisation and extension

Give your substation a second life

When facing performance improvement or obsolescence issues, Alstom Grid performs an assessment of your equipment in order to make the best decision between replacement and renovation, modernisation and extension. Based on site diagnostics, our services experts provide the best solutions for your electrical infrastructure. In general, renovation, modernisation and extension of a substation is the most cost-effective solution offering lower implementation costs, higher return-on-investment and a shorter lead-times than a replacement.

Renovation

- Expand the life of ageing equipment, replace worn circuit-breakers, switches, control and protection equipment, process transformer oil
- Conduct power transformer life extension, circuit-breaker mid-life overhaul and substation refurbishment to ensure equipment safety, reliability and performance

Modernisation

- Adapt new designs and technology to equipment in operation to avoid obsolescence
- Conduct gas-insulated substation (GIS) modernisation, disconnector motorisation
- Add condition monitoring system

Extension

- To face evolving power demand, increase electrical ratings such as nominal current, short-circuit current and nominal power
- Add solutions to existing substations such as GIS bay extensions, GIS upgrades, or transformer cooling upgrades to increase performance
Condition monitoring and asset management

Keep a constant watch over your substation and optimise asset management

Energised equipment produces large quantities of information every day which can be used to avoid outages or failure. Alstom Grid offers condition monitoring that keeps a constant watch over your assets.

Armed with the proper information received from our installed monitoring tools on strategic equipment or on the complete substation, we can provide a full assessment of the substation or strategic equipment in real time. We can thus optimise asset management (usage planning, operations, maintenance, repair, replacement) - avoiding unexpected outages, saving on costs and maximising your electrical system’s availability and performance.

Green services

Overcome efficiency and reliability challenges in a sustainable way

Sustainable development and reduction of environmental impacts are major concerns in the energy industry today. High voltage manufacturers and users have a heavy responsibility to the environment from design to end of life, including operations and maintenance.

To face growing environmental concerns and regulations, Alstom Grid supports you in your daily challenges:

- Decreasing power consumption
- Using ecological and sustainable solutions
- Limiting greenhouse gas emissions coming from SF₆ and transport in particular
- Reducing industrial waste with equipment lifetime extension and recycled components
- Improving safety for your technicians

Experts can help you to make the most of your assets at any stage of their lifecycle in a sustainable way:

- **SF₆ management**: delivery, quality checks, training and certification, leak detection and repair, decontamination workshop
- **Transformer upgrade to vegetable oil**: fire safety conditions improvement, equipment lifecycle extension, environmentally-friendly and cost efficient
- **End of life management**: gases and SF₆ recycling, equipment decommissioning and recycling, component re-use
AIR INSULATED SUBSTATION (AIS)

Optimise your air-insulated substation with a complete range of services for all your equipment

Circuit breaker

Circuit-breakers are key to ensuring network stability, reliability and safety. You must ensure they operate optimally throughout their lifetime.

Based on our manufacturing expertise and time-proven field experience, Alstom Grid offers the most cost-effective and efficient solutions to increase the life span of your circuit-breakers and generator circuit-breakers.

From onsite assessments, periodic inspections and mid-life overhauls through to complete life-extensions, Alstom Grid can customise the most appropriate programme for your circuit breaker according to its type, age, operating conditions and ratings.

An efficient, pro-active monitoring system combined with Alstom Grid’s expert services team is the best way to prolong equipment life. Our condition monitoring services solutions can drastically reduce the risks of failure.

Our global services teams bring you innovative technological solutions to keep your high voltage circuit breaker equipment up-to-date, safe, reliable and efficient. Asset management optimises your infrastructure performance while keeping your operating costs under control.

Alstom Grid offers complete and comprehensive services for all types of circuit breakers

Alstom Grid offers complete services solutions for all current and legacy products: from circuit breakers to power transformers ranging from 66 kV to 1200 kV, including disconnectors and instrument transformers.

In addition to erection and commissioning services, spare parts and repairs, Alstom Grid offers equipment assessments, condition monitoring and asset management optimisation.

Our services include:
- Equipment periodic maintenance
- SF₆ analysis and leakage repairs
- Oil verification and analysis
- Condition monitoring
- Long term maintenance
- Renovation and modernisation solutions
- Technical training

"With decades of experience, Alstom Grid’s services team can handle your maintenance and spare parts needs for all current Alstom Grid or Alstom Grid-legacy products and equipment, as well as for third-party equipment."
**Disconnected**

Disconnected provide visible and reliable air isolation to ensure the safety of people working on high voltage networks.

Alstom Grid disconnectors are designed for a working life of over 40 years and they perform under the most harsh operating conditions. However, problems can occur due to mechanical damage during transportation and onsite erection carried out by inexperienced personnel. Alstom Grid specialists are available to ensure rapid disconnector installation and erection supervision if requested.

The substitution, upgrading or overhaul of disconnectors is also possible and our teams work closely with customers to save costs by using new or refurbished components on existing equipment whenever possible.

**Instrument transformer**

An instrument transformer, by nature, requires little maintenance. Considering their importance within the network and the regular overvoltages and short circuit currents that they face as part of normal operating conditions, it is generally recommended that they receive regular preventive maintenance. An annual service visit makes sure that the instrument transformers have not been damaged, thus ensuring their designed lifecycle.

Alstom Grid offers a broad range of instrument transformer services, including preventive and corrective maintenance and ‘à la carte’ maintenance to suit your specific needs, as well as equipment installation and replacement.

**Power transformer**

When working with large power transformers, attention to detail is very important. Alstom Grid services teams provide specialised technical services covering the complete lifecycle of your transformer.

Our dedicated and skilled transformer erection fitters and site and commissioning engineers perform the complete transformer installation and erection, commissioning, testing and energisation. We undertake extensive onsite or in specialised workshops, investigations and repairs when required. Alstom Grid refurbishes aged transformers replacing key components and active parts as needed.

Remote monitoring of transformers provides a significant contribution towards increasing productivity. Failures can be prevented by non-intrusive tests and inspections to determine equipment condition.
GAS INSULATED SUBSTATION (GIS)

Ensure the reliability and operability of your gas-insulated substation with a partner providing a full range of services on GIS from 72.5 to 800 kV.

**Maintenance**

Gas-insulated substations provide reliability in complex environments (populated areas, mountains, small areas...) allowing the efficient operation of networks and fault clearing downstream. In order to optimise substation performance, Alstom Grid offers time-based and condition-based maintenance, on a transactional or long term basis.

**Long term maintenance**

Lack or absence of maintenance can cause deterioration or severe failures. You need to make efficient decisions on equipment management to ensure reliability and maximise long term performance in a cost-effective way. Alstom Grid offers incremental tailored maintenance levels to answer your needs, along with dedicated experts for support.

**Condition-based maintenance**

The monitoring system is easy to adapt to any GIS type. The sensors monitor and record 
$\text{SF}_6$ densities, partial discharges, circuit-breakers and other GIS conditions (centralised display of compartment status, circuit-breaker security tripping and interlocking...) allowing predictive analysis for preventive maintenance. Condition monitoring also increases performance and reliability:

- The internal arc localisation allows quick faulty compartment identification and helps secure substation automatic reconfiguration through interlock
- The detection of internal partial discharges and their analysis determine their origin and localisation

Armed with real time and reliable substation assessment, maintenance can be optimised: better scheduling, reduction of costs, planned outages, reduced failure risk...

**Modernisation**

Alstom Grid has a solution for aging GIS: an individualised industrial modernisation for substations with 20 years or more active service. Our solution extends GIS lifetime by adapting new circuit breakers and accessories and effectively uprating when requested. Our GIS life-extension programme is your best option to avoid unnecessary replacement.

Aimed at minimising complete shutdown and major civil works modifications, our GIS modernisation concept helps customers choose the best solution for each specific situation. Based on the age and state of the equipment, Alstom Grid engineers can design a ‘retrofit’ operation that can extend your total equipment lifetime to over 45 years.

**$\text{SF}_6$ management**

$\text{SF}_6$ makes equipment more resistant to the effects of pollution and climate and more reliable over the long term. The resulting size reduction allows equipment to adapt to specific environmental constraints. Operators have the responsibility of efficiently managing $\text{SF}_6$ in order to limit environmental impacts, as well as health and safety risks.

Alstom Grid offers service solutions to better manage $\text{SF}_6$. Local experts can support you in all $\text{SF}_6$ operations:
- $\text{SF}_6$ lifecycle management to manage $\text{SF}_6$ quality and pressure levels
- $\text{SF}_6$ leak detection and repair
- $\text{SF}_6$ recycling
- $\text{SF}_6$ management training
POWER ELECTRONICS AND AUTOMATION

Ensure the reliability of your power systems with comprehensive services

Alstom Grid offers targeted services support dedicated to HVDC and FACTS installations. Alstom Grid commits to continuously supporting your needs throughout the HVDC system’s lifecycle. This offer can be provided when the equipment is installed, during the warranty period and beyond.

It notably includes: remote operations support, regular inspections and maintenance, prompt response times in case of failure, on-demand expert advice, spare parts supply, training programmes and more. This offer is available in three incremental packages, enabling you to choose the solution which best fits your needs.

Remote operation support
Advanced connectivity and information received from Alstom Grid’s installed monitoring tools provide a full assessment of your equipment in real time. Alstom Grid experts are then able to evaluate the current state of the equipment, define the scope of maintenance operations and plan future required actions. This enables a better match of intervention teams, spare parts and special tools management - saving on downtime and costs, avoiding unexpected situations and maximising the electrical system’s availability.

Our field expertise at your service!

Alstom Grid concentrates on the quality of their operations and the continuous competence development of their technicians and supervisors. Their competencies, qualification levels and certifications are checked regularly. As a result, Alstom Grid provides you with the best field experts to ensure your satisfaction.

- More than 50 operational services centres in 30 countries
- 15 Technical Institutes located at our manufacturing sites
- 1,300 employees and experts
- More than 15,000 operations per year, onsite or in Alstom Grid workshops