SUSTAINABLE POWER SOLUTIONS
With a presence in over a hundred countries and a broad range of products and services in the power generation, electrical grid and rail transport infrastructure markets, Alstom is at the forefront of economic, social and environmental progress.

We design, produce and offer innovative technologies and solutions to our customers which meet essential needs, are increasingly efficient and ever more respectful of the world we live in.

Our 93,000 employees rigorously apply the Alstom Code of Ethics and work closely with our community of stakeholders to deliver solutions and services that bear the label with Alstom.

ALSTOM POWER

For over a century, Alstom has been committed to improving standards of living through the provision of reliable and affordable power based on high tech clean energy infrastructures and solutions.

With Alstom Power, global expertise and local presence combine with heritage and innovation to generate power safely and cost-effectively.

Known as a leading partner for engineering, procurement and construction (EPC) of new power plants, we are also experts in retrofitting, modernising and servicing existing plants.

With Alstom, you are never tied to one technology or approach: our portfolio covers all fuels – from components to entire plant projects. And given the importance of operational performance and lifecycle management to profitability and sustainability, we offer comprehensive services and power automation and control solutions that help you produce cleaner energy while deriving the maximum value from every investment.

25% of global power generation capacity depends on Alstom technology

1,260 GW of power production relies on major components supplied by Alstom

100 years of industry leading expertise

with Alstom
ALSTOM POWER: 47,000 EMPLOYEES IN 80 COUNTRIES
Alstom is a global leader in sustainable power generation thanks to a wide range of expertise, a broad portfolio of proven solutions and a tireless commitment to innovation.

01 CLEAN POWER CLEAR SOLUTIONS
With Alstom, power generation is becoming more competitive, reliable and eco-friendly because we support the adoption of new clean energy solutions and improve the environmental balance of operating plants.
// MORE ON PAGE 7

02 THE WIDEST PORTFOLIO
Alstom offers an unsurpassed range of state-of-the-art technologies, services and lifecycle management solutions for power generation. We cover both thermal and renewable energy sources and we cater to all the needs of power producers and industrial customers.
// MORE ON PAGE 13
INTEGRATED TURNKEY SOLUTIONS
Alstom’s Plant Integrator™ approach combines unique technology of components, system design, project management skills, EPC capabilities and manufacturing excellence to deliver superior solutions.
// MORE ON PAGE 25

INNOVATIVE TECHNOLOGY
Covering all stages of the plant life cycle, Alstom’s research and development focuses on creating innovative technologies that address market needs. We aim to set the benchmark for innovative and environmentally conscious applications.
// MORE ON PAGE 29

RECORD-BREAKING REFERENCES
Alstom’s global reference list includes many projects that are milestones or benchmarks in the production of clean, efficient, flexible and integrated power.
// MORE ON PAGE 33
To help you contribute to the global need for greater energy sustainability, Alstom provides high quality solutions for thermal and renewable power.
Alstom’s commitment to clean power

How Alstom is helping you meet the challenges of energy sustainability. 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.

**Clean Power Clear Solutions™**

**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 aging 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
1 in 5 people globally lacks electricity

A 5% increase in coal plant efficiency would decrease global CO2 emissions by 8%

Only 20% of renewable energies in global electricity generation
Alstom’s clean power offering is based on a comprehensive portfolio of products and services designed to meet your specific needs.
With Alstom, you can have one partner for a full and balanced portfolio of proven solutions for coal, gas, oil, nuclear, hydro, wind, geothermal and biomass.

We are also developing solar, ocean and carbon management technologies.
Whether for new or existing power plants, we develop sustainable technologies from all energy sources and provide you with clean, smart and efficient solutions.
HYDRO
Endless reservoirs of pure power
More than a century of development underlies Alstom’s leadership in hydropower. Besides many industry firsts, we have also provided the technology at the heart of various record-breaking plants. Today, over 25% of global hydropower capacity relies on Alstom turbines and generators and we are the only company that can offer real options at every stage – from water to wire and from equipment to services.

WIND
Farming the skies for power
Building on thirty years of experience in wind power, Alstom offers onshore turbines with outputs of up to 3 MW. We are also currently building a new generation offshore wind turbine with a 6 MW output. Packed with state-of-the-art technologies, our turbines feature benefits like Alstom PURE TORQUE® technology, which ensures drive train reliability.

BIOMASS
Clean power from organic matter
You will benefit from greatly reduced CO₂ emissions with our biomass-fired steam power plants. Building on the experience of retrofitting biomass co-firing systems for nearly two decades, we have also developed capabilities to receive, handle, store and process biomass materials, ready for direct injection into boilers.

GEOTHERMAL
The power beneath your feet
As a proven leader in harnessing geothermal energy, and with a core competence in steam turbines, Alstom offers modular and adaptable solutions based on state-of-the-art technology, honed by years of experience and delivered through a global organisation.

SOLAR
Harvesting the sun belt
As a leader in steam turbines, boiler technology and plant integration and working in partnership with solar industry experts, Alstom is developing concentrated solar power (CSP) solutions. CSP offers significant potential for efficient utility scale production and allows the integration of storage, giving you an extended period of access to clean solar power.

OCEAN
Tidal potential
As part of our commitment to clean power, Alstom is poised to become the world leader in the promising field of ocean power. With a fully dedicated team in ocean R&D, we are developing and industrialising new technologies for tidal energy.
NUCLEAR
The power to provide CO₂-free
Alstom’s market share speaks for itself: 30% of all nuclear power plants worldwide run with Alstom turbine generator sets and we are the only turbine manufacturer able to completely design, engineer and manufacture turbine islands for all types of reactor.
From components to integrated turbine islands, Alstom is in a unique position to support nuclear as a proven and powerful CO₂ free source of energy.

GAS
The most flexible technology today
Based on 70 years of experience in turnkey gas power plant projects, Alstom offers an extensive range of high performance gas-fired power plants. Our plant solutions are in the highest-class of efficiency and are built largely with in-house technology and components.
We offer simple and combined cycle gas power plants, steam tail add-ons and co-generation plants using modular solutions that ensure operational flexibility, high plant efficiency, fuel gas composition adaptability and environmental excellence.

COAL / OIL
Class leading developments in fossils
Having built more than 240 steam power plants in the last 80 years, Alstom is able to design, implement and maintain coal and oil power plants in full accordance with your requirements.
We offer class leading reliability and flexibility to meet today’s market challenges. And our latest ultra-supercritical designs, and suspension firing and fluidised bed technologies deliver high combustion efficiency while minimising emissions and fuel costs.
CARBON CAPTURE SOLUTIONS

Essential, viable and competitive

To meet future CO₂ emission reduction targets, Alstom is developing solutions to capture CO₂ from coal and gas power plants and store it permanently underground.

We are focussing on oxy-combustion and post-combustion capture systems because these efficient technologies promise to provide optimum environmental and commercial benefits while also being suitable for the installed base worldwide.

Several pilot plants have been in operation around the world and full carbon capture commercialisation is expected before 2020.

Our integrated solutions support the production of more affordable power so that a greater number of people can enjoy a higher standard of living and a cleaner, healthier environment.

PHILIPPE COCHET / President, Alstom Thermal Power and Executive Vice-President of Alstom
Air Quality control systems
Pure air, clean solutions
Because we only have one world, protecting the environment is a priority. With Alstom, you can comply with even the most stringent air quality control regulations more easily because our equipment is designed for higher efficiency and lower operations and maintenance costs.

As the number one provider of Air Quality Control Systems (AQCS) for power and industry, we offer solutions for all types of gaseous and particulate pollutants – including SOx, NOx, mercury and particulates.

// EXPERTISE ACROSS FUEL BOUNDARIES
With Alstom, you benefit from best technologies and broad experience in emissions control, automation and control and industrial power production. Our portfolio covers power generation and industrial applications including aluminum, iron & steel, waste to energy, pulp & paper, oil & gas, cement and other industries.

450 GW of Air Quality Control Systems (AQCS) supplied for power generation worldwide
2,700 units of gas cleaning systems supplied for aluminum, iron & steel, waste to energy, pulp & paper, oil & gas, cement and other industrial applications.

AIR QUALITY CONTROL SYSTEMS
Pure air, clean solutions
Because we only have one world, protecting the environment is a priority. With Alstom, you can comply with even the most stringent air quality control regulations more easily because our equipment is designed for higher efficiency and lower operations and maintenance costs.

As the number one provider of Air Quality Control Systems (AQCS) for power and industry, we offer solutions for all types of gaseous and particulate pollutants – including SOx, NOx, mercury and particulates.
The power to process

Team up with Alstom to power industrial processes more efficiently, save resources and meet your environmental targets. Our comprehensive product portfolio, decades of expertise and plant integration capabilities make us the ideal partner for improving water and power cost efficiencies, reducing emissions and recovering waste heat in industrial plants.

Alstom is also the leading supplier and innovator of pulverisers for industrial mineral operations and the market leader for new steam turbines and air quality control solutions for industrial power with a range of waste to energy and biomass solutions.
SHOAIBA – 5,600 MW – SAUDI ARABIA
Our global network delivers high quality, cost-effective equipment and related services to customers around the world. We pride ourselves on using consistent processes in execution, engineering and manufacturing – delivering the highest level of product excellence in each of our locations.
SERVICES AND LIFECYCLE MANAGEMENT

With Alstom, after sales support means much more than replacement parts because sustainability depends on excellence throughout the lifecycle. We support your specific lifecycle management needs with specific solutions, cutting edge technologies and a global-local presence.

SPECIFIC SOLUTIONS
In a changing competitive and regulatory environment, our customers face significant lifecycle management challenges. So we offer solutions tailored to your specific needs and can take into account the full lifetime and whole plant scope. Our strengths lie in reducing O&M costs and increasing performance while cutting emissions and keeping a close eye on health and safety.

CUTTING-EDGE TECHNOLOGIES
With Alstom, sustainability means helping owners to extend the lifetime of their ageing equipment by providing access to the latest technology through cost-effective retrofits. As an original equipment manufacturer (OEM) and global service organisation we are always on the cutting edge. This allows us to offer best-in-class products based on feedback from our field service network and the latest developments from our design engineers.

GLOBAL-LOCAL PRESENCE
Our global reach is unparalleled in the market, because we are committed to long-term relationships with our customers based on understanding plant needs and regional requirements. The goal of all our products and services is to help you to increase operational flexibility, optimise performance and increase reliability and availability.

LOCAL PRESENCE
Expertise on full plant equipment across all technologies:
- 25 centers of expertise around the world
- Largest service organisation in the world

15,000 Service employees worldwide
over 200 locations in 70 Countries with Alstom
CLEAN POWER, CLEAR SOLUTIONS™

IMPROVING PERFORMANCE AT EVERY OPPORTUNITY
Alstom continually creates solutions for enhanced performance to maximise your asset profitability.

DYNAMIC MARKETS AND COMPLIANCE CHALLENGES
With an integrated plant optimisation approach, Alstom helps provide solutions to meet the new economic and environmental imperatives.

AGING PLANT LIFETIME EXTENSION
Thanks to Alstom expertise and solutions older plants can be cost-effectively kept competitive and reliable.

// BEYOND BRAND BORDERS
You don’t have to own Alstom-made major plant components to benefit from our lifecycle-enhancing solutions. We have decades of experience in servicing and integrating other manufacturers’ equipment. So we can offer a one-stop service to plant owners across OEM-brand boundaries.
Thanks to our modular technologies, unique integration methods and proven EPC skills, Alstom can offer turnkey solutions that maximise performance and minimise project risks.
OPTIMISING THE VALUE CHAIN

Alstom creates real value for you by optimising the entire value chain and the overall plant performance. With a unique perspective based on our extensive plant portfolio and field service experience, we can analyse the entire lifecycle and all the processes of your plant as an integrated system: our goal is always to present specific investments in their true context and provide you with a choice of products and strategies for achieving their business objectives.

DESIGN AND DEVELOPMENT

Whether you are looking for new plant packages or refurbishment, Alstom offers innovative technologies that optimise efficiency, power output and sustainability. Our approach starts with an in-depth assessment and analysis of your project needs. Then we select the best-fit technologies, products and services and tailor the solution to optimise the ecological, technical and commercial benefits.

FULL COMPONENT SUPPLY

Alstom is the only original equipment manufacturer (OEM) to offer the full portfolio of components required for a power plant.

We build parts as close to the project as possible but ensure the same standard of excellence throughout our global supply chains. Turbines and generators have been Alstom’s core competences for more than 100 years and our operation and maintenance (O&M) experience is continually feeding back to our design and manufacturing processes.
POWER PLANT CONSTRUCTION
Our turnkey plants set benchmarks for availability, reliability and overall plant efficiency. With world-class project management and capabilities including plant concept, design, manufacturing and construction, we are also a recognised project manager able to lead a consortium, whether or not we are the main supplier. Our services include:

- Plant construction management
- Site installation
- Commissioning
- Training

OPERATION AND MAINTENANCE
Alstom’s global field service organisation and plant support centres help owners make the most of their plant. Based on a century of supporting what we build, Alstom offers performance upgrades, lifecycle cost optimisation, flexibility enhancements, life extensions and emissions reduction solutions for both Alstom and other OEM equipment – on demand or in the context of a long-term service agreement or operations and maintenance contract.

We optimise performance and reduce management uncertainties through:

- Preventive and corrective maintenance
- Parts delivery and upgrade packs
- Integrated control and remote monitoring services
- Field service and O&M contracts
We are addressing social and environmental challenges through our strong commitment to developing and applying sustainable new technologies for power generation.
A SUSTAINABLE CAPACITY TO INNOVATE

To produce affordable and sustainable power in global markets challenged by economic and climate instability, depends on a stream of innovation that Alstom generates in-house and through collaborative R&D.
We focus our R&D efforts on applying new technologies to existing plant platforms and developing solutions to reduce the cost of electricity and increase flexibility and reliability.

To lower the environmental footprint of energy production, we are developing and enhancing large scale systems to manage the environmental impact of current electricity production methods. At the same time, we are expanding our portfolio to introduce vital new technologies that tap into new sources of energy.

R&D WITH ALSTOM – SOME EXAMPLES

Smother lean performance
Alstom’s novel multi-volume dampers allow broadband damping of thermo-acoustic combustion pulsations that arise in certain operational modes. This innovative technology for gas turbines and combined cycle power plants allows lean combustion with much lower NOx emissions.

Modelling for life
Advanced engineering simulation systems, such as thermal modelling, have greatly improved the life of mechanical components in steam and gas turbines and increased the power output.

Pushing the parameters
We currently offer advanced, high-efficiency supercritical boilers that operate at steam parameters of 600/620 °C and 275 bar. However, a prototype ultra-supercritical (USC) plant operating at 700 °C and 350 bar is currently under development.

Ocean and wind initiatives
We are committed to entering the tidal energy market with a new technology. In parallel, off the coast of Belgium, we have completed the installation in sea waters of the largest wind turbine – the 6 MW Haliade™ 150, with a 150-meter rotor diameter.

Solar initiatives
Alstom has developed an innovative solar receiver steam generator for use in a new generation of 250 MW concentrated solar power plants or in 130 – 150 MW units with storage capacity. Alstom is also developing integrated solar combined cycle power plants that use both clean fuel and renewables.

Our goal is to ensure that CO₂-free solutions have a major position in our power portfolio, through organic growth of our current business, and by developing tomorrow’s technologies.

JÉRÔME PÉCRESSE / President, Alstom Renewable Power and Executive Vice-President of Alstom
Supplied equipment for the world’s largest co-fired biomass plant, the UK’s 4,000 MW Drax station

Installed the world’s first facility to both capture and store carbon dioxide (CO₂) from a coal-fired power plant at the American Electric Power station Mountaineer, West Virginia

Built the world’s largest nuclear steam turbines in operation at the 1,550 MW Chooz and Civaux power plants in France

Providing key equipment for the world’s 2nd & 3rd largest hydropower plants – Itaipu (14,000 MW) and Belo Monte (11,000 MW) in Brazil

Delivered 75 wind turbines totaling 217 MW for one of Europe’s largest onshore wind farms, Whitelee in Scotland

Producing the power island for the most efficient steam power plant in Europe, the 910 MW RDK8 coal-fired power plant in Karlsruhe, Germany

Completed the largest water and power project in the Middle East with the 1,650 MW Fujairah gas-fired power plant in the United Arab Emirates

Delivering the steam turbine island for the largest dry-cooled coal fired power station in the world – Medupi, South Africa (4,800 MW)

Supplying the steam turbine island as well as the first wet flue gas desulphurisation system in South Africa, able to remove more than 90% of the SOx generated at Kusile – the most environmentally-friendly steam power plant in sub-Saharan Africa (4,800 MW)

Refurbished world’s largest run-of-river hydro plant – Chief Joseph (5,620 MW), USA

Supplying the steam turbine island for the largest dry-cooled coal fired power station in the world – Medupi, South Africa (4,800 MW)
Providing key equipment for the world’s largest hydropower plant – Three Gorges (22,500 MW) in China

Designing and manufacturing the world’s largest custom bulb unit for Xiajing (China) with a diameter of almost 8 m

Providing the world’s most powerful hydroelectric unit with 800 MW Francis turbine and 889 MVA generator – Xiangjiaba hydro power plant, China

Engineering and procuring the steam turbine island for China’s first European Pressurised Reactor (EPR) for nuclear power plant Taishan 1 & 2, totaling 3,500 MW

Powering Southeast Asia’s first 1,000 MW supercritical steam power plant at Manjung, Malaysia – in addition to the existing three units of 700 MW each

Delivered the most efficient fossil-fired power station in Australia, the gas-powered Tallawarra at 435 MW

Equipping India’s 3 largest hydropower plants at Tehri (1,000 MW), Koyna (1,920 MW) and Subansiri (2,000 MW)

Constructed what was at the time the world’s largest commercial geothermal plant, in Wairakei, New Zealand (391 MW) – it has now been in continuous operation for over 50 years

Close to 25% of the world’s power capacity is produced with Alstom technology and services playing a central role. Our clean technologies generate electricity equivalent to the needs of around 1.2 billion homes.
Shaping a sustainable future means acting decisively in the present. Build your capabilities now with 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, 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 its 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.