

Company Profile



ANSALDO ENERGIA GROUP

Ansaldo Energia is a leading international player in the power generation industry, to which it brings an integrated model embracing turnkey power plants construction, power equipment (gas & steam turbines, generators and microturbines), manufacturing, services and nuclear activities.

Ansaldo Energia is active as full service provider with

a broad portfolio on heavy duty gas turbines offering complete maintenance solutions on power generation rotating equipment and plants, built both by itself or by other OEMs.

Our mission is to deliver innovative, proven, state-of-the-art, flexible solutions for the power generation industry, aimed at increasing the Customer's value.

1853	Giovanni Ansaldo & Co. established	2007	OSPMT concept launch
1923	First Power Plant	2010	150th Gas Turbine manufactured
1962	First superficial 600 MW Power Plant	2012	100 years of Steam Turbine manufacturing
1991	Ansaldo Energia established	2014	Incorporation of Joint Ventures with Shaghai Electric Company
1995	First Combined Cycle Power Plant based on Ansaldo Energia GT	2016	Acquisition of Alstom advanced HDGT technology.
2005	Total Technological Independence	TODAY	Global leading OEM of GT and ST





At present, Ansaldo Energia SpA is 88% owned by Cdp Equity in the Cassa Depositi e Prestiti Group, an Italian state-owned entity which has been promoting the country's economy since 1850, and 12% by Shanghai Electric, the world-leading producer of power generation machinery and mechanical equipment. Ansaldo Energia currently employs over 3,200 people and has an international presence through local companies and branch offices in Italy, where Group

headquarters and Ansaldo Nucleare are, in China with the two joint ventures Ansaldo Gas Turbine Technology and Shanghai Electric Gas Turbine, in Switzerland with Ansaldo Energia Switzerland, in the United Kingdom with Ansaldo Nuclear Ltd, in Russia with Ansaldo Energia Russia, in the United Arab Emirates with Ansaldo Energia Gulf (Abu Dhabi). The broad-based presence allows the group to quickly react to customers' needs and to better offer them its rich value proposition.



Power Plant

With more than 100 years of experience in the electrical and mechanical engineering business together with its in-house capability for all major components, such as generators, steam and gas turbines, Ansaldo Energia offers multiple choices: from the turboset package, which can be supplied as a standalone equipment or by integrating the thermal cycle to provide the entire power island, to the complete turnkey plant.

We do not impose pre-packaged products to our Clients, indeed, thanks to our modular approach and customer oriented attitude, we integrate the benefits of pre-engineered modules with the specific customer requirements to find the optimal choice for any solution. Thanks to our wide proven but innovative product portfolio we build plants providing clean, reliable and efficient technologies in several applications, for base

load operation, peak demand or cogeneration purpose, in severe environment or severe grid conditions.

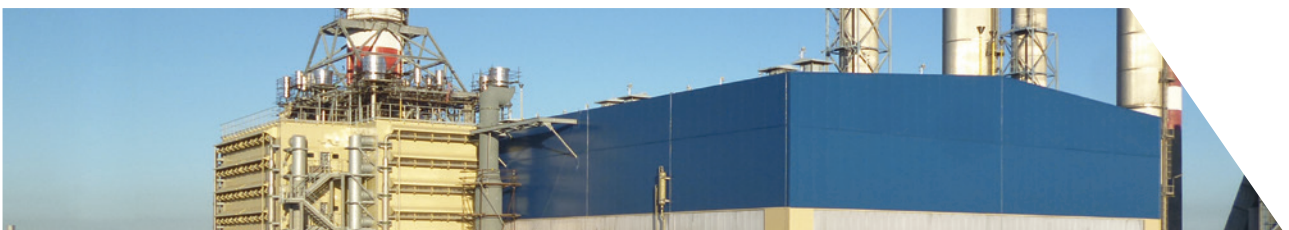
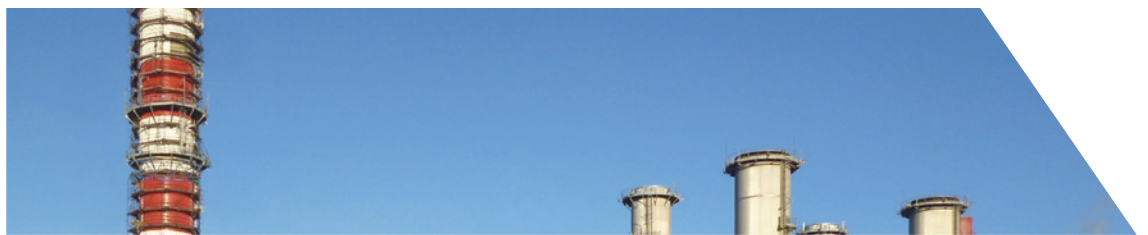
Innovative solutions to reduce at minimum the environmental impact and architectural solutions to meet client's distinctive character and expectations, with full respect for the land social-cultural framework in order to promote plant acceptance and territorial integration.

And, finally, we offer time to market flexibility: in recent years, our quick turnkey delivering as per Customer's need has turned into fast track solutions.

Simple cycles as well as advanced combined cycles, steam fossil fired, hydroelectric, geothermal and nuclear power plants as well as power generation from renewable sources: we build plants for your future.

Model	Module Power Size, MW	Total Power, MW	Scope of Supply
Thermal PP	40 ÷ 1000	13,500	Power Island, EPC
Open Cycle PP	> 80	7,000	Power Island, EPC
Combined Cycle PP	> 120	23,000	Power Island, EPC
Total		43,500	

References since 1950



Gas Turbines

Ansaldo Energia Gas Turbines are characterized at the same time by robust and proven design and advanced technology, featuring high performance and low environmental impact, high flexibility and reliability, thus being suitable for several applications and environmental conditions as well as fuel diversification. Our current production includes E, F and H class technology, ranging from 80 MW to 538 MW (ISO Power).

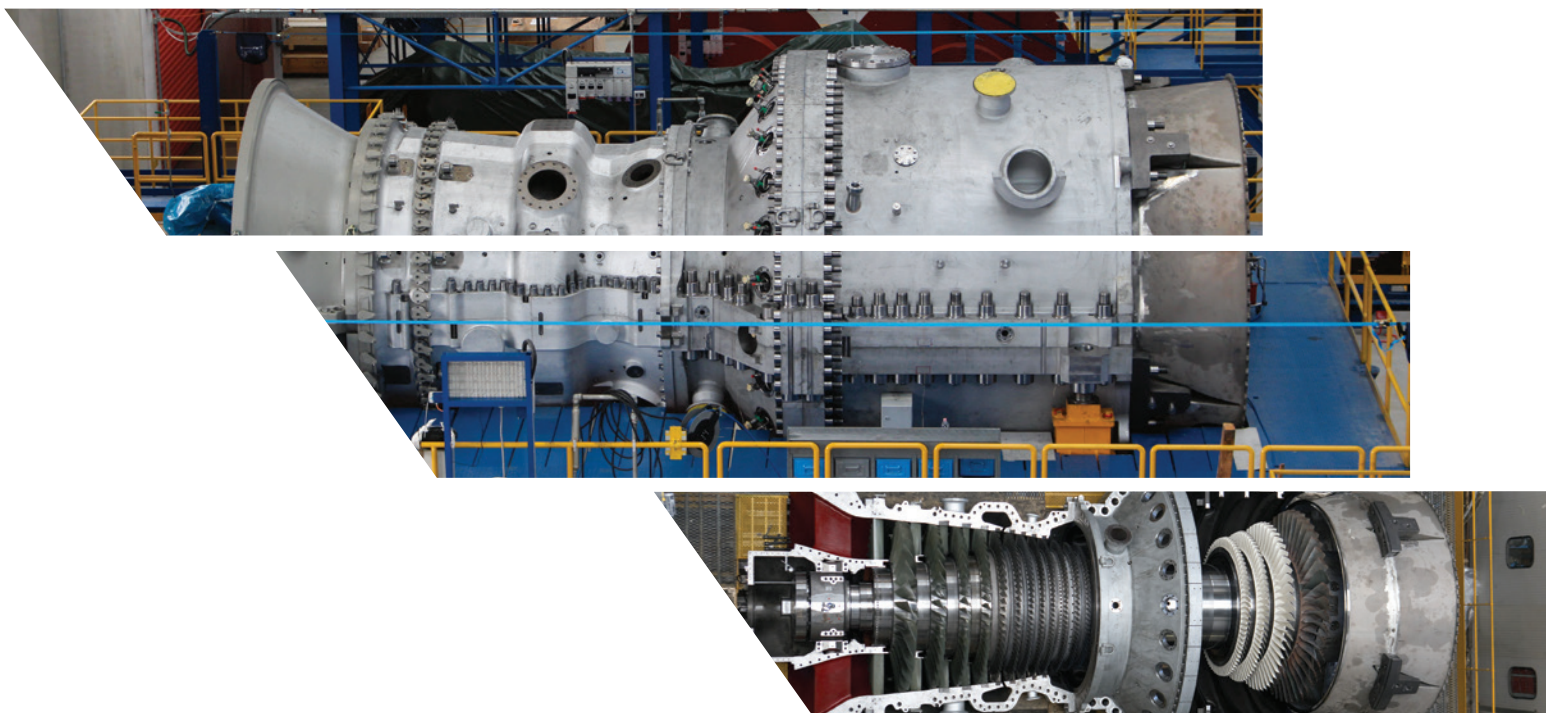
A smart maintenance approach based on extended inspection intervals, easy maintenance features and

customized service agreements allow Customers to choose the best solution to fit their needs.

Optimized maintenance plans, low lifecycle costs, easy and reliable operation are some of the key factors for selecting our gas turbines.

The auxiliary equipment, including the control system, have been specifically designed by Ansaldo Energia to meet the stringent requirements of the new generation advanced gas turbines while keeping an user friendly background and easy maintenance.

Model	Technology Class	Unit Power MW	Efficiency %	Grid Frequency Hz
AE64.3A	F	80	36.4	50/60
AE94.2	E	190	36.3	50
AE94.3A	F	340	40.3	50
GT26	F	370	41	50
GT36-S5	H	538	42.8	50
GT36-S6	H	369	42.3	60



Steam Turbines

Ansaldo Energia has 100 years' experience in design, manufacturing and installation of steam turbines. Thanks to continuous product improvements combined with the traditional reliability, efficiency and robustness of our products, we offer a unique and balanced value package based on innovation and reliability. Our machines are built by a broad design platform and based on a well proven, pre-engineered modules to provide a wide range of power rating and applications. Current production includes large ratings for reheat applications suitable for the highest steam parameters

for supercritical and ultrasupercritical conditions, compact modules for smaller ratings and single and two cylinders model for non reheat thermal cycles. Our design can also cater for district heating and cogeneration applications. All models are completely assembled in our workshop, with the exception of the bigger low pressure sections, which are quickly and easily installed on field. Geothermal steam turbines are based on impulse design.

Model	Unit Power MW	Total Power MW	STPP	CCPP	CHP	Geo
Geothermal	40 up to 150	1,000				
Reaction Non Reheat	40 up to 350	3,300				
Reaction Reheat	100 up to 1,000	14,900				
Others <small>Impulse and other Reaction Technologies</small>		73,800				
Total		93,000				

References since 1950



Generators

Ansaldo Energia generators combine the proven design of a long tradition and know-how, dating back to 1920, with the high performance and reliability ensured by the worldwide experience gained in more than 1300 applications.

Ansaldo Energia generators can be customized project by project according to Customer's need, in order to meet their unique technical specifications and requirements.

The generator technology is continuously improved and updated by dedicated R&D activities including new design tools, finite element 3D analysis of mechanical, electrical and ventilation behavior.

All our models show excellent quality and are suitable for several applications such as:

- Simple and combined cycle power plants
- Steam power plants
- Geothermal power plants
- Nuclear power plants
- Rotating synchronous compensators
- Hydro Power Plants.

Our manufacturing and commissioning skills provide with the Customer the best and tailored solution for any application.

Model	Unit Power MVA	Total Power MVA	GT	ST	Geo	Nuc	Hydro
Air Cooled Turbogenerator	up to 440	66,600	■	■	■		
H₂ Cooled Turbogenerator	up to 700	27,900	■	■			
H₂/H₂O Cooled (2/4 poles) Turbogenerator	up to 1,200	31,000		■		■	
Hydrogenerator	up to 420	26,500					■
	Total	152,000					

References since 1950



OEM Service

Today, Ansaldo Energia leverages decades of experience in the OEM Service Business for power equipment. Services are tailored to specific users' needs ensuring the best adherence to each customer's business model. Flexibility and competence are combined to provide the most suitable solution for every plant. As OEM of several Gas Turbines, Generators and Steam Turbines, Ansaldo Energia offers integrated technical and commercial solutions for the full plant.

Our broad portfolio and extensive competencies assure that solutions are fully compatible, integrated and optimized.

Today Ansaldo Energia is fully engaged in providing concrete answers to the challenges of the market:

Flexibility is at the hearth of our development efforts, ensuring that solutions answer to the needs of the users. Fast start-up, reduction of minimum environmental load and increased power ramp rates are examples of the way Ansaldo Energia supports the demanding needs of today's power markets;

Power and Efficiency improvements remain the most effective way to increase revenues and reduce operational costs. A full range of state-of-the-art upgrades is available for every gas turbine enhancing the capabilities of the installed assets and extending their profitable lifetime;

Maintenance cost reduction is an important goal for customers. The extensive experience on every component and the continuous improvements introduced in the fleet over the years ensure the transparent and reliable release of lifetime extensions and best reconditioning practices of components. Lifetime assessments on rotors, casings, structural parts and any other critical component in the power plant are an integral part of the service Ansaldo offers. An established global network that delivers advanced component repairs, outage management and a 24/7 remote monitoring & diagnostic center - enabled with predictive maintenance tools - offers the final complement to the Ansaldo Energia Service business value proposition.



Nuclear

Ansaldo Nucleare S.p.A (Italy) and Ansaldo Nuclear Ltd (UK), together operating under the name Ansaldo Nuclear, act as a single, integrated company that provides an in-house, fully combined capability which includes design, engineering, manufacturing, assembly, testing, commissioning, site installation and integrated logistics through-life support of bespoke solutions for all of the three nuclear business lines in which they operates:

- Decommissioning and waste management
- Nuclear New Build
- Nuclear plant service and operation assistance

For the UK market only, Ansaldo Nuclear Ltd is also operating in the defence sector.

Our strength lies in the technical knowledge, experience and dedication of our team. We are committed to providing advanced and innovative services for our existing and potential customers across the nuclear energy industry. From building a new plant, implementing major modifications on in service nuclear plants, to decommissioning an old one, or even handling nuclear waste, we have the expertise to support you. We will continue to grow and enhance our internal skill set to make sure our one-stop-shop always has the knowledge to provide our customers with the help they need. We will always strive for the highest industry standards of safety, quality and protection of the environment.

New Nuclear Power Plants (NPP)

- Technological Developments for New Nuclear Power Plants
- EPC for Plants & Systems
- Components & Equipment Design & Supply

Services to Nuclear Power Plants

- Safety Checks & Upgrading
- Plant Life Assessment & Extension (PLEX)
- Operational Services

Decommissioning & Radioactive Waste Management

- Decommissioning of NPP & Nuclear Facilities
- Radioactive Waste Management
- Temporary & National Storage Facilities



Distributed Energy

Distributed generation is achieving even more importance in all the developed countries where incentive policies are promoting its development and diffusion giving interesting and short payback time of the investment. Micro gas turbines represent the leading energy system through which distributed

generation has currently being deployed. With its 100 kWel as electrical power and about 200 kWth as thermal power, AE-T100 can achieved very high overall efficiency levels until about 90%, covering at the same time a wide power range through the possibilities to realize modular installation.

Model	Unit Power MVA	Total Power kW	Power Gen.	CHP	CCHP
AE-T100NG Natural Gas	50 ÷ 100	35,500	■	■	■
AE-T100B Bio Gas	50 ÷ 100	7,500	■	■	■
AE-T100E External Heating	50 ÷ 75	3,500	■	■	
Total		46,500			

Digitalization

Ansaldo Energia started many years ago to empower its ICT infrastructure and platforms to support the continuous competitive improvement of its products and processes. Such effort has been boosted in the last years through a Digital Transformation Roadmap with an invested of more 50M€ in 2018-2020 aimed to setup the digital twin of all its core and supporting processes. Our Vision put Human Capital in the middle of its Digital Transformation: change management, digital skills improvement, smart working and introduction of new roles (data scientists, digital architects) are key enablers to achieve the expected benefits of AE investments in Digital Transformation.

In particular:

- Customer on focus by Digital Marketing & Sales to track the whole customer life cycle from prospect to retained;
- Smart Product & Service where digital supports the new integrated paradigm to generate value to our customers mainly through the Byte2Energy project;

- Smart Factory where Genoa Factories have been selected as the first Lighthouse Plant of the Italian Industry 4.0 Plan through the development implementation and demonstration of all the 4.0 Technologies to the Manufacturing process;
- Smart EPC aimed to guarantee a stronger internal and external integration in each key phase (Engineering, Procurement and Construction) of the Project;
- Smart Safety addresses innovation to improve safety in all the different operational scenarios as a key priority of AE Digital Transformation roadmap;
- The dual of IoT is Cyber Security: to mitigate risks coming from the digitalization of our customer power plants and our factories we are developing new solutions and services in order to apply IT Cyber Security model to OT environment.



