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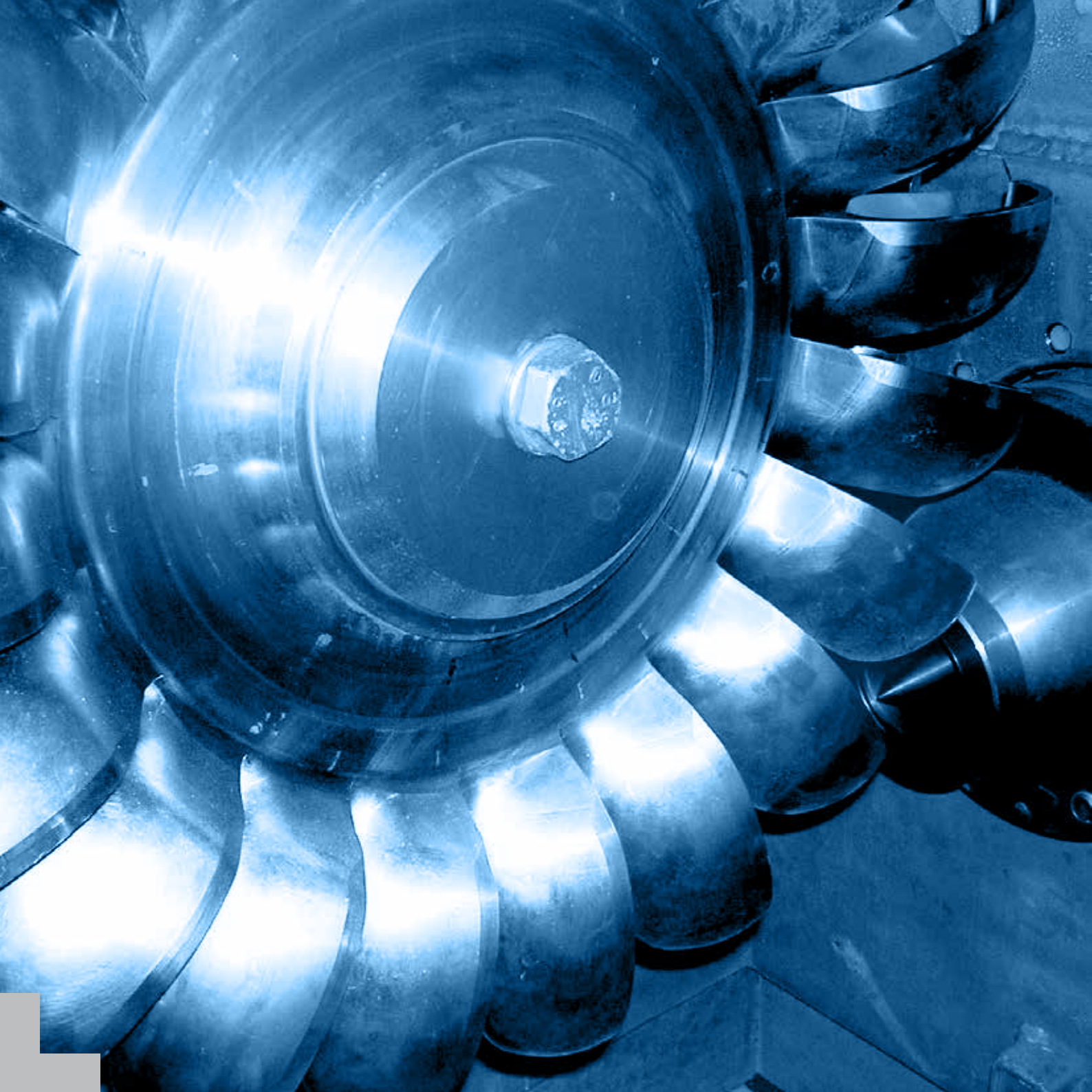
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Hydro | Power Plants



Tecnologies for renewable energy since 1925



*Innovation
and experience
for a clean
energy*

About us

The Company

E++ was born in 2008 from the experience of some Italian realities operating since 1925 in the energy, automation and electromechanic sector. The Company operates in the field of renewable energies and energy efficiency and aims to be a point of reference providing solutions to the today's ever-changing market.

The Company, thanks to an excellent technical staff and an R&D team constantly committed to experimenting with new technological solutions, has already completed hundreds plants under its belt.

By combining innovation and experience, E++ addresses companies, private and public entities, offering complex plants that supply low and medium power and are able to integrate different technologies according to the characteristics of the installation site. The Company looks after the procurement of the most advanced components at the best market conditions, choosing from time to time the solution that is most suited to the client's specific demands and following, for the different technologies, the project through in all its stages: from project financing to plant design, from its execution to maintenance and after-sales support.

The quality system E++ is certified according to the UNI EN ISO 9001 standard.

E++ for hydroelectrics

E++ sets out to be a qualified Main Contractor and System Integrator in the design and construction of “turnkey” hydroelectric power plants.

Ranging from feasibility study to project financing, from design and construction of new plants to renovation and revamping projects, E++ produces turnkey hydroelectric power plants, working in partnership with the best manufacturers of turbines and components on an international scale and guaranteeing efficiency and performances in line with clients' needs.

Feasibility study

E++ avails itself of expertise and specialised tools for the preparation of the technical and economic feasibility study which shall provide clients with an overview of the preliminary situation, thus putting them in a condition to decide whether and how to construct their hydroelectric power plant.

Business plan

The business plan model is developed by constantly updating the costs required to produce, manage and maintain the plant, taking into account the rates and incentives paid towards plants powered by renewable sources. E++ offers the preparation of the business plan and economic-financial models in two stages:

- + preliminary feasibility business plan
- + business plan accompanying the final project





Installation

E++ deploys small plants with different technologies (Pelton, Francis and Kaplan): up to 10 MW mini hydro-power, micro hydro-power up to 100 kW and Pico hydro, below 5 kW (suitable for small isolated users). These plants have low environmental and landscape impact.

E++ build new power plants by managing overall project implementation to provide turn-key solutions.

We also specialize in revamping old plants by optimizing returns.

O&M

We develop internally automation systems for remote monitoring. Our staff can deal with assistance and maintenance aspects of each plant installed.

- + Ordinary and extraordinary maintenance
- + Plant management and control
- + After-sales support

Turbine-generator units

SCREW Turbines

Screw turbines are suitable for low heads (1.5 - 6 m) and medium flow rates (0.5 - 5 m³ / sec) sites. This type of technology can be applied, for example, to sewage treatment plants, irrigation canals and old mills renovations.

KAPLAN Turbines

Turbines suitable for sites with low water heads (2.0 - 30 m) and medium- high flow rates (0.5 - 30 m³/sec), Kaplans are used on rivers or irrigation canals. Thanks to the possibility of adjusting the angle of inclination of the blades, and the opening of wicket gate, these turbines are particularly suited to changes in the flow rate. A double-regulating turbine is able to run with good performances up to 20% of the rated flow rate, whereas a single- regulating turbine can do so up to 30% of the rated flow rate.

FRANCIS Turbines

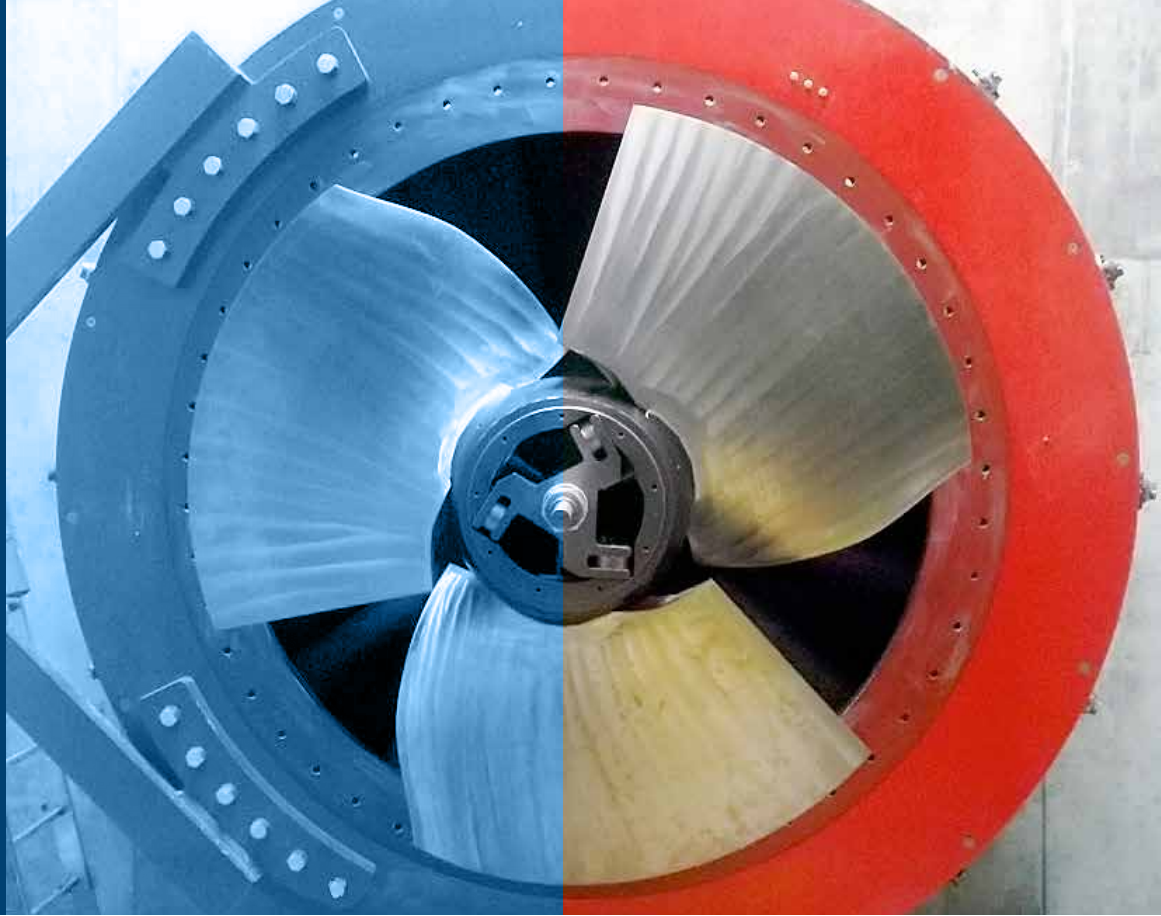
Turbines suitable for sites with medium water heads (15 - 120 m) and medium flow rates (0.25 - 5 m³/sec). The capacity to regulate the flow rate is only dependent on the degree of opening of the wicket gate. As it is a single-regulating type of machine, the Francis turbine is able to run with good performances up to 40% of the rated flow rate.

PELTON Turbines

Turbines suitable for sites with high water heads (80 - 1,000 m) and medium-low flow rates (0.05 – 2 m³/sec). The wicket gate consists of one or more nozzles that may vary their opening depending on the change in the flow rate. A single-jet Pelton turbine is able to run with good performances up to 50% of the rated flow rate, whereas a five-jet turbine can do so up to 10% of the rated flow rate.

BANKI (Cross Flow) Turbines

Turbine suitable for the widest combinations of water head and flow rate. It guarantees lower performances compared to a conventional turbine but, at the same time, the performance remains virtually stable with any changes in the flow rate.



Kaplan runner

The best hydro-power solutions

*One point
of reference
for a peculiar
service*

Three-jet Pelton turbine





Telescopic arm trashracker

Additional and civil works

Additional works, intakes and canals are essential for the functioning of the turbine. Sluices, trashracks, penstock and inlet valves: E++'s staff is able to identify the technical solution that is most suited to the characteristics of each single plant, analysing the context and providing the tools most fit for the purpose.

In proposing a turnkey service, E++ also takes care of the study and implementation of the civil works required to construct the plant's building and which are essential for intakes and canals.



*We choose
the technical solution
that is most suited
to the characteristics
of the plant*

Power and control system

The electrical control and power system is a key element of a power plant and must necessarily be integrated with the turbine-generator unit for the perfect functioning of the plant.

The E++ staff is able to design, realize and install the control system providing clients with a fast solution to all the problems that may be encountered during the commissioning stage and, subsequently, during the plant's management operations.

- + control system equipped with PLC and remote control for remote monitoring and management of the plant
- + power distribution boards for the grid connection and protection of the generator
- + LV/MV transformers, if any
- + electrical panels for the power supply of the plant's electrical appliances
- + electric metering systems for tax purposes.

After sales services:

- + Ordinary maintenance
- + Extraordinary maintenance
- + Remote control
- + Plant management

Screw turbine





Revamping of a double horizontal-axis Francis turbine

Revamping

The renovation or “revamping” of a hydroelectric power plant, be it partial or total, is the ensemble of interventions made to restructure and modernize systems and electromechanical parts by replacing outdated or out of order equipments to significantly improve yields.

E++ srl offers this kind of service related to the renovation of plants on any type of turbine (Pelton, Francis and Kaplan) by replacing and renewing the following components:

- + generator
- + control and power electrical part
- + automation
- + mechanical and hydrodynamic systems
- + steering controls, interception and cleaning works such as gates and trashrakers.