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HYDROELECTRIC POWER PLANTS ENERGY ACCUMULATORS



LOW ENVIRONMENTAL IMPACT AND HIGH EFFICIENCY

Water is one of the oldest energy resources used by humans, essential for survival, food production and hygiene. It also plays a key role in one of the most widely used forms of renewable energy: hydropower. According to recent data from the International Renewable Energy Agency (IRENA), the total capacity of hydropower plants worldwide exceeds 1.4 GW, constituting nearly 40 percent of total renewables. These plants are becoming increasingly efficient. Today's technologies make it possible to convert about 90 percent of water energy into electricity, a significantly higher rate than conventional sources. Hydropower uses the force of gravity to enhance the movement of water and release all its potential energy. The water is channeled into a reservoir, usually a lake, protected by a dam upstream. A series of large pipes allows the water to flow downstream, where the power plant with turbines is located. Thanks to the difference in height created, the water gradually increases its energy and, having reached the power plant, sets in motion the turbines, which, mechanically connected to an alternator, generate electricity. At that point, the electricity is passed through

a transformer, which lowers the intensity of the current and raises the voltage to facilitate its input into the grid. GBE has supplied three hydropower plants in Georgia with four 8MVA 35kV/10.5kV transformers, two 16MVA 35kV/10.5kV transformers, two 30MVA 110kV/35kV transformers, and other transformers for auxiliary services. All transformers are designed for installation at 1400m above sea level, and the enclosures and radiators and painted class C4-M. Recall that a pumped-storage hydroelectric power plant also serves as an energy store. Excess electricity generated by wind or solar plants when weather conditions are favorable can be used to pump water into the upper reservoir. Later, when there is no sun or wind, the water can be dropped to generate electricity through turbines. In this way, the hydropower plant has a stabilizing effect on the power grid. Hydropower is a source that makes an important contribution to combating climate change, because it avoids the use of fossil fuels and reduces emissions of carbon dioxide, climate-altering gases and particulate matter, combating pollution and the greenhouse effect. It also contributes to land reclamation and irrigation in times of drought.

GBE:
25 YEARS
OF ACTIVITY



The GBE Group in 2024 achieved a new record, not only in terms of total turnover that grew by nearly 10 percent, but also in terms of units produced, particularly for the power division. Investments made on the production process have been significant. The production of high-voltage disk windings with the new horizontal and vertical winding machines ensured greater autonomy for the in-house manufacture of the windings, but the reason for the excellent result is the presence of six new specialized figures for the assembly and testing of large transformers up to 63MVA (BIL750kV). The new automatic line with two robots for making resin cores has also made a difference, and by freeing us from the speculation of the last two years on the price of this semifinished product, it has allowed us greater flexibility and, above all, competitiveness in favor of our customers. This year will see the start of construction of the new 6,000-square-meter production facility with new 1,800-square-meter offices spread over three floors. The new production area will enable us to double the current production of oil transformers and reactors with assembly of standard products in line and eight new island stations for assembly of the special units.

RESIN TRANSFORMERS FOR DRILLING SHIP

THE ZERO IMPACT OFFSHORE SPECIAL

A drilling ship is a vessel designed for offshore exploratory drilling of new oil and gas wells or for scientific purposes. In recent years, such mobile platforms have been used in deep and ultra-deep waters, equipped with the latest and most advanced dynamic positioning systems. A drilling ship can be used as a platform to perform well maintenance or completion work such as casing and tubing installation, subsea tree installations, and well casing.

Such ships and/or mobile platforms are a way to perform various types of drilling. They have the functional capability of semi-submersible drilling rigs and also have some unique features that distinguish them from all others, first and foremost the ship-shaped design. They also possess greater mobility and can move quickly by their own propulsion from one drilling site to another, unlike platforms and barges. Finally, they have the ability to save time by navigating between oil fields around the world.

They must be built according to design specifications set by the oil production company or investors. Every component of these types of ships must strictly adhere to the design specifications for offshore application and be certified by an appropriate marine agency. On one of these drill ships in record time, a high-tech, state-of-the-art solution was adopted

- a static conversion system that allows

GBE PARTICIPATED IN THE PROJECT BY PROVIDING 2 CAST RESIN POWER TRANSFORMERS FOR CONVERTER APPLICATION, 1 x 6.6 MVA 11 kV/0.69 kV Dd0, 50 Hz STEP DOWN AND 1 x 6.6 MVA 0.69 kV/11.49 kV Dd0, 60 Hz STEP UP

energy to be received from land through a fixed platform.

GBE participated in the project by providing 2 resin power transformers for converter application, a 6.6 MVA 11kV/0.69 kV Dd0 50 Hz step down and a 6.6 MVA 0.69 kV /11.49 kV Dd0 60 Hz step up.

The supplied transformers are built with all the characteristics of naval application, ensuring excellent resistance to high ship inclination and at the same



time meeting the necessary requirements for drilling such as high vibration resistance.

The windings are encapsulated in resin, the core is treated with high-cementing and class H insulating paints, all carpentry is galvanized according to standards for marine application, and all this allows the proper operation of the transformer in a particularly aggressive environment with high humidity and presence of salt.

The testing was attended with DNV certifier and all routine tests and type and special tests were performed as prescribed by DNV standards for marine application.

The transformers supplied for this type of application are made with a lateral reinforcing structure to ensure mechanical stability, while all winding mounting brackets are made with elastic details



so as to ensure perfect tightening, even in case of frequent temperature variation of the windings.

This static conversion system can enable the supply of power to other docked ships whose main and auxiliary engines remain off with emergency, refrigeration, heating and lighting operating.

This achievement highlights the effectiveness of strong collaboration between companies in implementing efficient projects.

HIGH EFFICIENCY TRANSFORMERS FOR DATA CENTERS

EXCELLENT OPERATION SYSTEMS



In recent years, Data Centers have undergone a major transformation, driven by the growing demand for digital services. The introduction of technologies such as 5G, the Internet of Things (IoT), Artificial Intelligence, and Machine Learning has evolved these centers from simple physical spaces to highly optimized and intelligent infrastructures. A data center is a physical facility designed for processing, storing, and managing large amounts of data. They are not simply repositories for data, but dynamic ecosystems-also known as CEDs, or Data Processing Centers-planned to ensure scalability, resilience and security. Many companies are investing billions in developing more advanced and efficient facilities as both governments and businesses recognize Data Centers as strategic assets, similar to critical infrastructure such as power plants and transportation networks. According to recent studies, the global Data Center market is set to grow considerably, with investment over the next decade quadrupling. Data centers house servers, storage systems, network equipment and other resources essential to ensure the continuous and uninterrupted operation of applications, services and digital platforms. This implies that all equipment used in data centers must be efficient, reliable and free of defects. To ensure business continuity, data centers are equipped with redundant power systems, uninterruptible power supplies (UPS), backup generators, and sophisticated cooling systems to prevent equipment overheating. GBE has been supplying transformers for these

types of applications for many years, both oil and resin, not only in Europe but globally. Numerous customers rely on our expertise, appreciating the strict quality criteria of our manufacturing process that ensure high quality products with above-average standards. Among the numerous projects in the Data Center sector, we would like to highlight the recent supply made in Northern Europe, consisting of 20 units of 6MVA and 43 transformers of 3.15MVA. These transformers are cooled with FR3® biodegradable vegetable ester, which has minimal environmental impact and high performance with TUP (Thermally Upgraded Paper) paper, belong to Dyn11 group, and have insulation classes of 12kV and 24kV, with frequency of 50Hz. All transformers include accessories for control and verification and are equipped with protection boxes with copper bars for cable entry from below. Power transformers were supplied with a hot-dip galvanized tank to contain liquid.

GBE HAS BEEN SUPPLYING TRANSFORMERS FOR THIS TYPE OF APPLICATION FOR MANY YEARS, BOTH LIQUID FILLED AND CAST RESIN UNITS, NOT ONLY IN EUROPE, BUT ALSO GLOBALLY.

UL CERTIFICATION in progress

ANSI C:57.12.00 AND IEEE STANDARD



For the U.S. market, the transformer must comply with ANSI C:57.12.00 and IEEE standard. The technical specifications are slightly different from what is required by the IEC standard, but for UL certification all products must ensure specific construction characteristics and approved by the body. GBE in 2024 started the UL certification phase for both oil and resin transformers. For the former we are certifying the paint used for case protection and the gaskets for oil sealing. For the latter, we have certified the resin-encapsulated medium voltage insulation system and are certifying the class H insulation system for low voltage impregnation. Once we get approval from UL we are ready to certify both series. GBE has been in the U.S. market for many years with direct and indirect supplies made by its customers on turnkey installations. We already have local partners in some U.S. states with whom we are already able to offer not only sales but also after-sales service. In 2025 we participated as an exhibitor at the INTERSOLAR US show in San Diego, California, and we will be exhibiting at the Offshore Technology Conference 2025 from May 5-8, 2025 in Houston, Texas, Booth 1328A.

SHUNT REACTORS

MODERNIZATION OF POWER TRANSMISSION NETWORKS

Shunt reactors are used wherever there is a need to compensate for capacitive reactive power generated by long, lightly loaded transmission lines as well as underground cables, thus allowing for increased active power and avoiding overvoltage issues.

Typical applications include: wind farms, subways, urban distribution systems, industrial zones, substations and more. This type of shunt reactors can be made with air, resin or oil insulation. GBE guarantees all the indicated solutions, however, the oil version is the most versatile especially for high voltage. The reactor with or without a magnetic core has windings made of aluminum and/or copper. If the reactor has a core this is equipped inside the columns with air gaps to ensure the desired inductance value. The design used is suitable not only for mechanical stresses during normal operation, but especially for resisting failure situations in networks.

Shunt reactors can be connected directly to the power line or to a tertiary winding of a three-winding power or distribution transformer. This opens up countless possibilities for their use and a very wide range of powers, voltages and currents to which they can be subjected.

Over the past five years in Europe and in all industrialized coun-

tries, power companies have been striving to modernize their transmission networks for an increasingly efficient supply of electricity. This is due both to an increasing demand for electricity as a result of an aging of the grids themselves, and to the construction of new power generation facilities (particularly renewable energy) that, by providing intermittent generation, put a strain on the grids. Investments in transmission and dis-

SHUNT REACTORS CAN BE CONNECTED DIRECTLY TO THE POWER LINE OR TO THE TERTIARY WINDING OF A THREE-WINDING POWER OR DISTRIBUTION TRANSFORMERS.

tribution infrastructure include significant growth in the shunt reactor market.

GBE's supplies of shunt reactors in oil, resin and air are many in both medium voltage and high voltage. Our strong experience in the production of shunt reactors also rewarded us in 2024, when 17 shunt reactors immersed in mineral oil and/or FR3 with hermetic case or made according to British Design, 8 VPI air-insulated



and/or epoxy resin encapsulated reactors were supplied.

The quality of the product is recognized worldwide; in fact, there is no shortage of major supplies of shunt reactors in the Asian and South American markets.

CAST RESIN POWER TRANSFORMER

100% RELIABILITY AND EFFICIENCY

In recent years, as a result of the ever-increasing demand for energy production and distribution, not only has the demand for transformers increased, but so too has the power required, and there are more and more projects for the construction of substations to power production plants, where a cast resin power transformer is required.

The reliability and efficiency of this transformer are essential. Any downtime is costly, not only because of the very high repair costs, but above all because of the significant loss of production and turnover.

That is why, in the cast resin power division, from design to delivery, GBE never compromises on quality. High quality standards are the basic criterion in the selection of components and all materials used in manufacturing.

In cast resin power transformers, the secondary and primary windings are encapsulated in cast resin. The secondary, in strip or transposed cable, can be made in a single coil or in several coils connected to each other by medium voltage cable. The primary, on the other hand, is made with two coaxial coils connected in series. This increases heat exchange by convection and radiation thanks to the larger surface area of the coils and also facilitates handling and assembly thanks to their reduced size and weight. All the supporting structure of the core is manufactured in our factories using cut, welded, and subsequently galvanized sheet metal. In a power transformer, the masses involved and the heights are considerable, and therefore greater rigidity must be ensured throughout the structure for handling and transport. For this purpose, unlike a distribution transformer, the specific design includes lateral reinforcement bracing.

For some applications, the cast resin-encapsulated power transformer is equipped with a 9 to 17-step on-load tap changer for regulation. Adjustment is automatic, using a voltage balance that performs remote switching. Last year, the production of resin power transformers doubled compared to the previous year. We manufactured 15 cast resin power transformers with power ratings from 6.3MVA upwards and primary voltages even higher than class 36kV.

THE CAST RESIN TRANSFORMERS FOR INDOOR INSTALLATIONS ARE PARTICULARLY VALUED FOR THEIR RELIABILITY AND EFFICIENCY, LOW MAINTENANCE COSTS, NO CONTAMINATION HAZARD OR FIRE RISK



GBE: SUSTAINABLE PRODUCTION

ENVIRONMENTAL RESPONSIBILITY AND ECONOMIC GROWTH HAND IN HAND



GBE has always been aware of the importance of sustainability in the production of transformers and reactors and has always paid the utmost attention to the sustainability of the materials used and the efficiency of resources.

Every year, through our sales network and at every event and trade fair, we promote the use of vegetable esters. These drastically reduce environmental impact while offering better performance and, above all, a longer operating life for transformers.

Sustainability at GBE also extends to the processes and innovations used in production. Last year, significant investments were made in the production process, making the company more efficient and environmentally friendly. This was achieved by replacing traditional, energy-intensive production methods that generate significant amounts of waste with highly industrialized production.

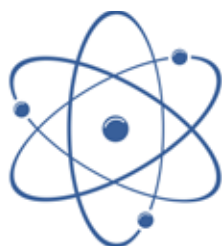
Automated machinery has been purchased, including a robotic cutting line for automatic core weaving, which allows precise control over production parameters, reducing errors and therefore waste. These investments have enabled us not only to increase production, but also to reduce downtime and improve product quality.

The desire to reduce our dependence on fossil fuels, and therefore the carbon footprint associated with the production of transformers, is now an environmental responsibility for us. To date, approximately 400kW of photovoltaic panels have been installed on the roofs of our production facilities, and we will double the installed capacity next year, as sustainability also means integrating renewable energy into the production process. Finally, we would like to point out that GBE is certified to ISO 9001, ISO 45001 and, of course, ISO 14001. The latter plays a fundamental role in sustainability, focusing on waste reduction, energy efficiency, and pollution prevention, all integrated with workplace safety, process optimization, and product quality, demonstrating that environmental responsibility and economic growth can go hand in hand.

CASEHISTORY

NUCLEAR ENERGY 4th GENERATION

WHY NOT BELIEVE IN IT?



If traditional nuclear power seems a matter now closed forever and forgotten, the current technological challenge is to produce energy like the sun, that is, with nuclear fusion. This has been talked about for many years, but while it is true that the Green Deal we adhere to requires us to bring Europe's net greenhouse gas emissions to zero by 2050, it is also true that we have to get the energy from somewhere. Nuclear fusion can be an effective solution, with its undoubted advantage: it does not produce greenhouse gases. In Italy, as in Europe, an ever-increasing need for energy has attracted major investments in new technologies among them the next-generation nuclear one. GBE has always believed in technological progress and has never spared its commitment and enthusiasm in facing new challenges. In the past years we have supplied several transformers for nuclear power plants abroad. The references are many, as well as for every other type of power generation plant. As part of the research projects for nuclear fusion, GBE participated, through a prestigious compa-

ny from Vicenza specializing in power electronics, in the DTT (Divertor Tokamak Test) project with the supply of a 1000 KVA resin transformer with voltages 20kV/0.55-0.55kV group Dd0y11 to power a 12-Pulse converter. DTT is an experiment under construction at the ENEA Research Center in Frascati that plays a leading role in fusion research, whose main objective is to explore solutions for extracting the heat generated by the fusion process and will in fact be our country's largest research investment. As in the past with previous deliveries to the RFX consortium in Padua and Japan, GBE aims to be a partner at the forefront of technology in developing special transformers for the most diverse needs in research and industry. Specifically, in this case, the challenge for GBE was to supply a high-performance resin-insulated 1MVA box-type transformer. The dual-secondary transformer is capable of cyclically delivering peak power of 300% for 100s and is used for special electronic power supplies serving the plasma confinement electromagnetic field error control system generated by 27 coils. Always in step with progress.

POWER OIL DIVISION, CONTINUOUS GROWTH

THE RELIABILITY OF OUR PRODUCTS PAYS OFF

Global energy demand is constantly growing and energy requirements are becoming increasingly important, also due to the current trend towards greater use of electrical devices. The need to reduce or eliminate the use of fossil fuels in favor of renewable sources is essential to make our environment healthier and more livable. Starting in 2035, a ban on the production of cars with combustion engines will be implemented in Europe, and in the very short term, new homes will have to be equipped with heat pumps, as it will no longer be possible to install natural gas or other fuel boilers. New renewable energy production plants will be needed, with a consequent upgrade of the electricity grids for the transmission and distribution of energy and, therefore, new investments to meet the increased consumption of electricity. Power plants are rarely located in the area where the energy is used, so it must be transported over distances of up to hundreds of kilometers. To enable the transport of large quantities of energy while minimizing waste on the grid and the associated voltage drop, HV/MV power transformers are used. The higher the voltage of the grid and the transformer primary, the lower the current value for the same power transferred, and consequently the lower the losses on the grid. The increase in energy demand and new installations has led to an unprecedented increase in the demand for power transformers, which are gen-



erally oil-insulated because they are better suited for high-voltage applications. The resin solution is not advantageous for powers above 25MVA and is not applicable for voltages above 52kV. GBE has doubled its production of oil-filled power transformers over the

last year to meet the ever-increasing demands of its customers, and thanks to continuous investment in this division, we are confident that we will double production again in the next 24 months with the new production plant.

KNOW-HOW

CARBON FOOTPRINT

GBE SPA: A VIRTUOUS COMMITMENT TO REDUCE CARBON FOOTPRINT



The carbon footprint measures the amount of greenhouse gases emitted into the atmosphere by the activities of individuals, companies, or entire countries. It is calculated in tons of CO₂ equivalents, including methane, nitrogen oxide, and CFCs. Direct emissions come from the use of fossil fuels, while indirect emissions come from the consumption of electricity and resources. To reduce its environmental impact, GBE SPA has embarked on a process of calculating and reducing its emissions. The process begins with careful data collection, monitoring all possible sources of emissions: from energy consumption to business travel and

waste management. Every single area of the company, from production facilities to offices, is analyzed to identify critical areas. Since last year, GBE SPA has adopted measures to reduce its CO₂ emissions, focusing on the use of renewable energy and energy efficiency. The company wants to stand out as an example of environmental responsibility, helping to slow down the natural disasters caused by the greenhouse effect. Through its commitment, GBE SPA demonstrates that businesses can also play a crucial role in the fight against climate change by implementing concrete solutions for a more sustainable future.

OUR NEW TEAM MEMBERS

THE COMPANY'S MAIN INVESTMENT IS IN ITS PEOPLE



The founding partners of GBE Group
Francesco Muzzolon,
Giuliano Sanson,
e Renato Tapparelli

Responsiveness, speeded replay and quality of service



Tijana Vukovic

Sales Office Supervisor

Working at GBE S.p.A., and in particular in the sales department, allows me to be part of a young, dynamic, and collaborative team, where every member has the opportunity to contribute to the company's success. One of the strengths of the sales department is its strong customer focus. We are always ready to listen and understand our customers' needs, striving to offer customized solutions. Thanks to the language skills of each member and the quality of our products, we are able to serve a wide range of customers at a national and international level.

The supportive atmosphere and willingness to help each other are essential for maintaining high motivation and ensuring that projects run smoothly. Collaboration between different departments, such as sales, technical, and production, is crucial for providing fast and effective solutions to our customers.

Among our next goals is certainly the desire for continuous improvement of the commercial process, with a focus on responsiveness, speed, and quality of service. We want to be an office that responds quickly to customer needs, without ever sacrificing the accuracy and effectiveness of our solutions. A further objective is the expansion of the commercial network, including through participation in trade fairs and events in the sector, which allow the commercial team to come into direct contact with new potential partners.

A welcoming environment that promotes collaboration



Kledi Shera

Administrative Office

There are many things I appreciate about working at GBA S.p.A., many of which are undoubtedly the welcoming and educational environment that promotes collaboration, the opportunity for professional growth, the recognition and appreci-

ation from managers and owners, and the relationship with my colleagues.

The strengths of the organization I work for are its flexibility, the young environment where you are constantly motivated in your work, the company's investment in human capital, and my role, which allows me to be in contact with people from different departments.

I maintain cohesion with other departments and colleagues by always being available to listen to opinions and ideas. I really appreciate the mutual support and the work of my colleagues, giving feedback and participating in refreshments, lunches, and dinners that the company organizes for employees, all with respect for managers and owners.

Compliance with our corporate code of ethics



Giulia Foscaro

Purchase Office

I greatly appreciate the solidity of the GBE S.p.A. group, a company that has always invested in innovation and personal growth. I also appreciate how the company has been able to adapt and respond quickly to new and constantly evolving market needs.

We work in a very collaborative environment, where there is synergy between colleagues, which facilitates teamwork and priority management. In addition, the company offers the opportunity to develop skills through various targeted training courses, allowing us to grow professionally on an ongoing basis.

As the purchasing department is in contact with various internal departments, I always try to maintain clear and constant communication with my colleagues, listening to their needs and looking for solutions that meet them.

The purchasing department is constantly working to improve supplier selection and strengthen partnerships to ensure on-time deliveries and the most advantageous commercial conditions. The selection of our suppliers is very thorough, and compliance with our corporate code of ethics is one of the essential conditions for becoming

ing a new partner of the GBE S.p.A. group. Our team participates in various national and international trade fairs, professional events, and workshops to keep up to date with market developments and expand the selection of future suppliers.

A future goal is to implement order management through advanced digital tools.

A modern and dynamic work environment



Luca Bernecole

Technical Department

I am new to the GBE S.p.A. team and find everyone very willing to answer questions, both to teach me how things

should be done and to help me understand the reasons behind certain design choices. We challenge ourselves and never stop learning, regardless of how long we have been working here. The presence of young people helps to create a modern and dynamic working environment, and the similarity in age makes it easier to work as a team and solve new challenges together. There is also continuous communication between the Technical Office and production, which leads to constant improvement by learning from mistakes.

I really appreciate the good atmosphere among colleagues and the absence of silos between areas of expertise. Management is willing to listen to staff and find a middle ground together.

In the Technical Department, we aim to shorten the time between receiving an order and sending it to production, so as to allow space and time for any critical issues to arise.

We are trying to optimize our filing system to make it easier to consult old projects and, for example, to be able to supply accessories that are requested for old serial numbers.

We are constantly improving and updating our internal guidelines and applying them to the entire production process.

We aim to improve the appearance and timing of drawings sent to customers so that we can make the desired changes within a reasonable time frame.

THE NEXT TRADE SHOWS

TO DISCOVER GBE PRODUCTS AND TECHNOLOGY

ELEKTROTECHNIK – DORTMUND
12/02/2025 – 14/02/2025

INTERSOLAR NORTH AMERICA 2025 - SAN DIEGO
25/02/2025 – 27/02/2025

KEY 2025 RIMINI
05/03/2025 – 07/03/2025

AMERICANA 2025 - MONTREAL
12/03/2025 – 13/03/2025

ELTEFA - STUTTGART
25/03/2025 - 27/03/2025

HANNOVER MESSE – HANNOVER
31/03/2025 – 04/04/2025

OTC - HOUSTON
05/05/2025 – 08/05/2025

EM POWER - MÜNCHEN
07/05/2025 – 09/05/2025

ALL ENERGY 2025 - GLASGOW
14/05/2025 – 15/05/2025

DRIESCHER MOOSBURG - MOOSBURG
05/06/2025

SOLAR & STORAGE 2025 - BIRMINGHAM
23/09/2025 – 25/09/2025

DATA CENTRE WORLD 2025 – PARIS
05/11/2025 – 06/11/2025



NEW MANUFACTURING FACILITY OPENNING 2026



HEADQUARTER



OIL FILLED TRANSFORMERS PLANT



POWER AND CAST RESIN TRANSFORMERS PLANT



STEELWORK PLANT



GBE ENGINEERING SYSTEMS LTD



GBE AUSTRALIA