Shaping a Better Energy Future

CESI
Trust the Power of Experience
Testing • Consulting • Engineering • Environment
• **Testing, Inspection** and **Certification** services for HV, MV and LV electrical components;

• **Engineering** and **Consulting** services for power systems and markets, transmission and distribution grids, generation plants, renewable and hydro plants;

• **Environmental** Consulting and **Structural Engineering** services for Energy, T&D, Industry and Transport sectors;

• Production of **Solar Cells** for Space and Terrestrial (CPV) applications.
Business Lines

* Milan (CESI), Berlin (IPH), Mannheim (FGH).

* Testing & Certification
  - Testing Laboratories*
  - Certification
  - Health Safety
  - Environmental Risk Management
  - Solar Cells

* Consulting, Solutions & Services
  - Systems Planning
  - Networks Operations
  - Engineering Consulting
  - Smart Grids
  - Power Generation

* Engineering & Environment – ISMES
  - Environmental & Sustainability Consulting
  - Environmental Monitoring & Studies
  - Structural & Civil Engineering
CESI: over 50 years of experience

CESI is a world leading technical consulting company with over 50 years’ expertise operating in several areas including: Transmission and Interconnections, Smart Grids for Distribution, Renewable and Solar, Testing, Certification and Quality Assurance. CESI also develops and manufactures advanced multi junction photovoltaic solar cells for both space and terrestrial (HCPV) applications.

With an annual turnover of more than 110 million Euro, CESI operates in more than 40 countries around the world, with a total network of about 1,000 professionals. The company’s key clients include governmental institutions, regulatory authorities, major utilities, Transmission System Operators (TSOs), Distribution System Operators (DSOs), generation companies, manufacturers, system integrators, financial institutions and international electromechanical and electronic manufacturers.

Established in 1956 to support the development and security of the Italian Electricity Grid operations, CESI is today an international center of excellence in testing and certification of electromechanical components and in electrical systems R&D, providing laboratory testing and certification services to the electromechanical industry. CESI is a fully independent joint-stock company with premises in Milan, Berlin, Mannheim, Dubai and Rio de Janeiro. CESI’s main shareholders are Enel, Terna, Prysmian Cavi e Sistemi and ABB.

It provides its clients with technically innovative, cost-effective solutions to improve their competitiveness and performance. To know how, please check all of our references on www.cesi.it.
Some of our references worldwide
Legend

- Representatives
- References
- References described in the present document

Main Regional Headquarters

- Southern Europe & Northern Africa
  Milan – Italy
- Northern Europe
  Berlin – Germany
- Middle East & Asia
  Dubai – United Arab Emirates
- Americas
  Rio De Janeiro – Brazil
Components and electric systems interact together thanks to our 50+ years testing experience. With our peerless and unique know-how we are the best partner for those businesses that trust the power of experience. IPH GmbH in Berlin Germany and FGH Engineering & Test GmbH in Mannheim Germany are incorporated companies and fully integrated platforms of the CESI test facilities and are accredited following ISO 17025, by the German and Italian Bodies – respectively DAKKS and ACCREDIA that assess, verify and monitors our laboratories continuously. We are also proud co-founder of the Short Circuit Testing Liaison (STL) providing a forum for voluntary international collaboration among testing top professional organizations. CESI is also an international assessment body accredited ISO 17020 for Quality Assurance and Inspections, EN 45011 for products and notified body following Atex EU directive for equipment in potential explosive atmospheres. Certificates and test reports from CESI, IPH GmbH and FGH Engineering and Test GmbH are internationally recognized by Authorities, Utilities, Transmission Operators and Electromechanical Manufacturers.

CESI’s many Testing facilities may assess:
- Electromechanical components from Low Voltage to Ultra high Voltage levels in alternating and direct current
- Electronic embedded components for terrestrial or airspace vehicles, smart network devices and meters etc;
- High voltage AC and DC cables and accessories;
- New solutions about HVDC systems;
- Power Electronics systems;
- Drives and Motors systems up to 45MW.

CESI offers also:
- Climatic chambers;
- Pollution tests labs;
- Anechoic chambers for electro-magnetic test;
- Mechanic and vibration platforms for shock test;
- Explosion emulation laboratories;
- IT communication and Interoperability laboratories for smart components and systems.

CESI has also been working for 30 years in the research, development and manufacturing of High Efficiency solar cells both for space and terrestrial applications (High-CPV technology) thanks to close cooperation with relevant international space agencies including those of Europe and Italy, and Russia. Today, more than 60 satellites with CESI solar cells fly around the globe with CESI solar cells.
In 2013 CESI implemented its new HVDC cables and accessories test laboratory platform at FGH-Mannheim, where Development Tests, Type Tests and Prequalification Tests can be delivered on HVDC cable systems for power transmission up to 600kVdc. The very large building – 60 m x 25 m x 27 m high – is divisible into three bays. Three HVDC generators up to 1,200kVdc and one 3,000kVpk, 300 kJ impulse generator are available. The new laboratory can perform tests on a wide range of electrical equipment under HVDC conditions, including converter valves, DC breakers, DC line accessories and more.

Furthermore, in 2013 a new preparation hall for clients has been completed at CESI’s Milan platform. This new building, which includes a 20 m x 12 m x 12 m high section, can host two clients at the same time for preparation works.

As part of a continuous renovation process of control, automation and measuring systems used in testing activities, in 2013 CESI carried out numerous interventions, like the new supervision system in the Milan platform for monitoring the 2,000 MVA short-circuit generator used for power tests on MV and HV electrical equipment.
CESI, through its German subsidiary IPH GmbH, carried out a complete type testing of the 24kV 10,000A 80kA Siemens Generator Switchgear HB3-80, devoted to protecting the most critical and delicate transformers of a power plant against failure coming from the generators. The breaker used is a Vacuum-Generator-Circuit-Breaker tested in accordance with IEEE C37.013.

Since this assembly was placed in a part of the grid which has the highest rated current, the biggest challenge was the performance of the temperature rise test at both 50Hz and 60Hz, due to the 10,000A steady current supplied and the huge space required (the test itself required almost 30 m³).

Thanks to the new High Current Test Laboratory – one of CESI’s most recent investments, put in service at the beginning of 2013 – IPH has been able to fulfill IEEE Standard requirements and provide the client a third party test document attesting the positive results of such tests that is recognized the world over.

Throughout this Laboratory CESI can now test any large equipment with permanent current up to 50,000A and with frequencies between 15 and 65 Hz.
Project Data

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<th>Client</th>
<th>State Grid Electric Power Research Institute (SGEPRI)</th>
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<tr>
<td>Job Type</td>
<td>Testing</td>
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CESI in China for the construction of the biggest High Power Laboratory in the world

The Laboratory State Grid Inspection & Testing Center for Electrical Equipment (Changzhou, Jiangsu Province) was funded by State Grid Corporation of China and built by SGEPRI. The new Testing Center will focus on electric equipments test and inspection based on High-Power Laboratory.

The project of the latter includes a maximum charge voltage of 1,100kV and 4 sets of short-current generators; an AC/DC High Voltage Test Hall; and an Environment and Mechanical Test Hall, for test requirements of switch gear, circuit breaker, transformers and other equipments for rated voltage up to 1,100kV.

CESI, involved in the design of the Laboratory (133,340 sqm), gave its support during the electromechanical components’ and industrial equipments’ acquisition process and certified the laboratory’s performances.
A lot of electromechanical manufacturers are delocalizing their productions in Asia and Far East Countries to get the best from fast growing markets and lower manpower costs.

Within this scenario of globalization, CESI was asked to provide Quality Assurance services during the manufacturing process of a 660kV and 800kV HVDC pilot-project in China.

CESI utilized its experience to design review, qualification of manufacturers, pre-inspection of production lines and of test laboratories, in-production inspections (production supervision) and witnessing to type and routine tests of transformers.
Helping the Indian giant

India is facing a rapidly increasing demand for testing activities of electromechanical components produced in the region. Crucial to succeed within this trend is the development and empowerment of the National Power Testing Laboratory.

CESI aided NPTL in the feasibility, detail design and equipment specification for the development and construction of the 750kV High Power Short-Circuit Test Facility.

Once again, CESI confirms its worldwide leadership in Testing Laboratory design, built up over 50 years of successful operations in the Testing Business.
### A pioneer test performed by CESI to assess reliability of ABB’s large size motors

The oil & gas is one of the few growing industrial sector with an highly performance demanding market for variable speed systems.

A common work was set up to develop and realize structures to be used for testing reliability and load performances of large size motors (up to 30MW) and medium voltage drives (up to 30kV).

CESI has run a specialized mechanical study to establish the good measurements of a completely inertial platform capable to compensate the vibrational solicitation of the motors. The platform, which is the only one existing in Europe for such motor sizes, can offer to CESI’s clients advanced and complex tests.

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<tr>
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The railways market is facing an increasing request for reliable and high performance services all over the world: quite a big challenge in a large country with environmental constraints like Russia.

IPH, CESI’s subsidiary, is asked by the Federal Russian agency of railway transport, for accreditation as competent and third-party testing Body in the field of testing and components. The subject of accreditation comprises railways’ applications which are fixed installations, as DC switchgear, and electric equipment for rolling stock.

The accreditation is validated both for products liable to certification and to conformity declaration.
Project Data

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<tr>
<th>Client</th>
<th>International electromechanical oil &amp; gas manufacturers</th>
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<tr>
<td>Job Type</td>
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CESI is confirming its status as a certifications’ provider

The Company operates as a notification body for the certification of equipments which are used in potentially explosive atmospheres, always according to the directive 94/9/CE (ATEX) and/or the IECEX’s scheme. Furthermore, CESI gives its support to the most important international oil & gas engines manufacturers as ABB and Ansaldo Sistemi Industriali.

It also plays a big role in the field of electrical products’ certification and on the HV & UHV’s equipments for the main international constructors.

CESI, together with IMQ company, operates under the CSQ brand for the certifications of management systems of quality, environment, security.
CESI Space Cells
Fuel Indian Satellites

ISRO is the Indian Space Agency, a department of the Government of India that is in charge of development of Indian space programs, including Low Earth Orbit (LEO) and Geostationary Earth Orbit (GEO) satellites like the Indian National satellites (INSAT) for telecommunication services and the Indian Remote Sensing satellites (IRS) for management of natural resources. ISRO also develops the satellite launch vehicles (so-called GSLV for the INSAT; and PSLV for the IRS) and is working on longer-term Moon and Mars programs.

CESI was successfully awarded the first large order for supplying ISRO with Triple Junction InGaP/InGaAs/Ge High Performance solar cells. These cells will be utilized to manufacture solar arrays for their satellites. This paved the way for CESI to enter the Indian space market, where the company is now collaborating with ISRO for the development of solar cells business in India.
Ionozond’s Project
High Efficiency Space Solar Cells

CESI is one of the few III-V solar cell manufacturers worldwide to entirely own the relevant fabrication technology, that has been used so far to power more than 60 satellites for 25 countries. Kvant is in charge for the realization of the Solar Arrays that will provide energy to the satellites of the Ionozond constellation (Russian Federation), which is intended for the measurement of the ionosphere geophysical parameters and the monitoring of the upper atmosphere and near-Earth space. CESI is in charge for the production of the 10,000 CTJ 28% Triple junction InGaP/InGaAs/Ge bare solar cells, 27% minimum average efficiency, which Kvant will use as “building bricks” for the manufacture of Ionozond’s solar arrays.

Our Multi Junction space solar cells are fully qualified for Low Earth Orbit (LEO) and Geostationary Earth Orbit (GEO), and are manufactured using proprietary and innovative know-how. CESI’s Triple Junction space solar cells have been demonstrated to have 30% efficiency, and have already been used to power more than 60 satellites for over 25 different countries. CESI is currently investing in Research & Development for Four Junction new generation solar cells.
CESI strives for delivering practical solutions able to interpret and shape a world that is becoming more and more interconnected and complex. We have a drive to concrete results.

The range of services we offer covers the entire life cycle of the infrastructure, from early stage’s techno-economic analysis, up to the support during the operation, including:

- Power system’s Master Plans;
- Feasibility studies for the interconnection of Transmission Networks;
- Power Market design and Regulatory studies;
- Technical Assessment of Distribution Networks;
- Strategic analysis, Cost-benefit analysis and Road Map definition for the implementation of Smart Grids and Smart Metering infrastructures;
- Power System studies for the Integration of RES Generation on HV and MV networks;
- Studies and consultancies for Power system Operation, including Defense and Restoration Plans, blackout reconstructions;
- Preparation of system studies and technical specification for Transmission and Distribution investments, including HVAC and HVDC interconnections, Smart Metering and Smart Grids;
- Assistance to Procurement, Installation and Commissioning for T&D infrastructures and for RES Power Plants;
- Studies, Consultancies and Engineering services for the Energy storage, with particular emphasis on battery technologies, superconducting magnetic energy, capacitors, compressed air and pumped storage;
- Studies and Consultancies for the enhancement of Transmission and Distribution networks Automation;
- Consulting and Risk Assessments for the optimal management of the electrical Assets;
- Development of tailored SW solutions in the field of Power systems planning and operation.

Sharp Ideas Powering a Smarter World

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- Studies and technical assistance in more than 15,000 km HVDC links worldwide
- Technical assistance in the deployment of more than 50 million digital meters worldwide
- Studies for grid integration of more than 10 GW of renewables
Project Data

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<td>Job Type</td>
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New interconnection networks in the Gulf area

CESI Middle East has signed an important agreement with the Gulf Cooperation Council Interconnection Authority (GCCIA) through which CESI will grant specialized professional services that support GCCIA in reaching its goal: cost optimization that maximizes the stability of the electricity interconnection network between the Gulf Cooperation Council’s member countries. The agreement was inspired by and builds upon decades of successful economic cooperation between the six countries of the GCC – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

With this three-year agreement, CESI will provide GCCIA with specialized consultancy and technical services in system operations and planning studies, pre-feasibility and feasibility studies for the development of international transmission and interconnection networks in the Gulf region.
Smart Metering Helps Reduce Loss in Electrical Systems

CESI has been selected by Uzbekenergo as technical advisor for the development of a Smart Metering installation project in Uzbekistan. The metering infrastructure, financed by the Asian Development Bank, forecasts 1 million smart meters as a first installation step in households and industrial clients in three local regions, and will be followed by similar projects financed by ADB, the World Bank and the Islamic Bank of Development for a total infrastructure of 4 million meters.

The complete smart metering installation project will make it possible to significantly reduce the current level of losses on the grid and the operating costs of the distribution company.
Project Data

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<th>Client</th>
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<td>Job Type</td>
<td>Consultancy</td>
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Energy from Ethiopia to Kenya

The Ethiopian Electric Power Corporation (EEPCO) and the Kenya Electricity Transmission Company (KETRAKO) have appointed CESI as technical consultant for the Power System Interconnector Project between Ethiopia & Kenya.

The project is designed to contribute to the integration of electricity markets in the East African Power Pool through the interconnection of power systems in the two countries, increasing supply and reducing the cost of electricity in Kenya, as well as providing revenues to Ethiopia through the export of electricity from Ethiopia to Kenya.

CESI’s work will focus primarily on advising the clients regarding the design, supply, installation on site, testing and commissioning of roughly 1,040 km, ±500kV HVDC bipolar overhead transmission lines with OPGW.
Integrating Energy Strategies in Latin American Countries

CESI won the international competition organized by the Inter-American Development Bank (IDB) to conduct a study of energy integration between Guyana, French Guiana, Suriname and Brazil in order to attest the feasibility of the integration between the four countries and make it possible to harness the untapped energy potential of the Guianas.

The study will evaluate the potential of generation and transmission for energy exchange within the region and appoint the best form of partnership, in terms of agreements and contracts, to be signed between the countries.
Project Data

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<th>Client</th>
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<td>Brazil</td>
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<td>Job Type</td>
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Upgrading Solar Generation

CESI has been contracted by CEI Solar as part of the ANEEL (Electric Energy National Agency of Brazil) strategic research plan to conduct a study on the most up-to-date solutions for solar generation, and support the design and construction of one of the four Concentrated Photo Voltaic technology pilot plants that will be built as part of the project.

The study will advise the Brazilian Ministry on the best technological and technical options for the diffusion of solar generation in the country, with an eye to utilizing the semi-desert area in the northeast of Brazil.
Strengthening Jordan’s electric grid

CESI has signed a contact with the three Jordan’s distribution companies to strengthen Jordan’s electric grid. Under the patronage of the Jordanian Energy Regulatory Authority (ERC), Jordanian Electric Power Co. (JEPCO), Electricity Distribution Company (EDCO) and Irbid District Electricity Company Limited (IDECO) have selected CESI to model and study the Jordanian power system, and to propose a road map for the reduction of technical and non-technical energy losses.

After completing the core responsibilities under the contract, which includes developing a methodology to model and simulating the energy losses throughout the distribution system, CESI will create strategic plans to manage energy loss specific to Jordan’s entire national grid and for each of the three distribution companies.
CESI Middle East has been selected by the Arab Fund for Economic and Social Development to undertake a feasibility study to determine the best options for electrical and gas interconnections scenario to create a single energy market for 20 Arab Countries by 2030.

The project will establish a strategy and master plan for further developments in the trade of electricity and gas among the Arab countries, and to determine the trade-offs between export of electricity and/or natural gas.

The key steps of the project are: analysis of the present status and future scenarios in the energy sector, assessment of the energy exchange across the 20 Arab countries, ranking of the best natural gas and electric interconnection options, along with a time schedule and cost estimation for the implementation plan.
Electrical Highways for EU-MENA Integration

The integration of the power systems of the MENA region with the European interconnected pool (ENTSO-E) is a key requirement to enable a massive power exchange between the two areas coherently with the mission of Dii, who envisages meeting about 15% of Europe’s electricity demand by 2050. A key issue to attract investors consists of identifying clear solutions and the related profitability, for instance the benefits deriving from a new electricity highway.

CESI was awarded for this strategic study thanks to the deep knowledge of the MENA Region’s transmission networks gained through tens of planning studies to identify the main corridors (highways) necessary in the long-term (year 2050): long-term roll out plan at 2050 and to examine more in depth the first set of highways implementation in the mid-term (year 2030).
The first HVDC power transmission interconnector between Riyadh and Mecca

CESI signed a contract with the Saudi Electricity Company (SEC) to develop detailed technical specifications for a High Voltage Direct Current (HVDC) power transmission interconnector between Riyadh and Mecca covering the central and western regions in the Kingdom of Saudi Arabia. The new 800 km HDVC link will not only increase the power generation capacity of local networks but also provide a reliable back-up energy supply in emergency situations.

In addition, the link will allow multiple users to benefit from the newly created increased capacity of 3,000MW which will result in increased energy reserve margins for SEC to be able to fulfill high energy demands with greater reliability.
Designing the Egyptian electric power system

Due to the rapid growth of the energy demand in Egypt over the last years, the Arab Fund for Economic and Social Development, one of the most active Financial Institutions operating in the Arab countries, supported the Egyptian Utility EEHC for the development of a transmission system Master Plan for 2030. CESI, as a part of a consortium of international consulting firms, was awarded this contract, especially for the identification of existing bottlenecks and weaknesses in the Egyptian Power system and the development of the recommended Transmission Master Plan, with proposed schedule and estimated costs for the required reinforcements. The results of this study are of utmost importance for setting up mid and long term priorities for the country’s electrical sector.
Renewable energy in Jordan

According to the Jordan Energy strategy, Renewable energy is going to play an important role in the generation mix in the near future and the country will have to cope with the ambitious plan of integrating RES into the network.

CESI was chosen by MEMR to recommend the measures needed to maintain the security, reliability, operational integrity and efficiency of the power system in the best manner.
Off-shore wind farms for Ireland

The Renewable Integration Development Project (RIDP) is a joint plan being undertaken by the Transmission System Operators of the Irish area (Northern Ireland Electricity, Soni and EirGrid) to help execute the Government’s ambitious renewable targets of 40% by 2020 and to enable the connection of wind farms that enter the planning process.

CESI was selected to perform Phase III of this project, aimed at identifying the most appropriate schemes of development of the transmission network for the proper integration of these new generation investments. By this consultancy project, CESI is contributing to strengthening one of the most strategic corridors in Europe for the matching of the decarbonisation goals.
SA.PE.I.,
a bridge between Sardinia and Italian peninsula

SAPEI project is the electrical interconnection between Sardinia and continental Italy, realised by 500kV DC submarine cables and two conversion stations transmitting 1,000MW power flow in both directions.

CESI has supported Terna, the Italian Transmission System operator, as technical consultant from the earliest feasibility analysis, carried out at the beginning of year 2000, up to the commissioning of the system and transmission of the first power flow over the link, in 2009.
U.S. Pacific Interties’ HVDC Link Upgrading

CESI was awarded for this strategic study thanks to the deep knowledge of HVDC transmission technology. The project aims to increase the power transmission capacity of the link, ensuring the maximum reliability of this strategic interconnection line, that transports large amount of energy produced in Pacific Northwest to Los Angeles, one of the biggest energy consumption areas of the USA. This link was commissioned in the 60s and has been upgraded twice. The final step of the project includes: the study of the proper configurations for the monopolar operation of the link and the detailed engineering of the new installation to be developed.
Consultancy services in Brazil for the project on the Rio Madeira

The Interligações Eletrica do Madeira is a consortium promoted by three of the most important Brazilian utilities, who are financing the Rio Madeira project, one of the biggest transmission projects ever realised, delivering 6,300MW for over 2,300 km along the Porto Velho and Araracoara electrical stations.

CESI is acting as owner’s engineer providing expertise and technical assistance to the clients under the different phases of the project: design’s review, test specifications, documents analysis, in-production and type and routine test inspection.
A power grid across the Andes

In order to enable higher capacity power flows over the Ecuadorian region, and in particular for the connection of the industrial and heavy load centres of the capital with the production areas in the mountains, CELEC, the national Electrical Corporation, has decided to introduce the 500kV level within their power system. CESI has been awarded by one of the most important International Financial Institutions operating in the area with the technical assistance to CELEC for the Master Plan, preliminary engineering and socio-economic analysis of such a complex transmission network expansion. Thanks to this project, the energy availability of the country will be tripled over the next ten years.
The biggest
Smart Metering project ever

The Italian Smart Metering project, which allows the remote reading and operation of more than 30 Million residential and industrial Customers, today still represents the most important Smart Metering project, worldwide. Over the 10 years required to deploy an infrastructure of this size, CESI has played a crucial role providing technical consultancy and laboratory tests for the development, certification and integration of the components of the remote electric meters. Thanks to its competences CESI has rapidly become the most referenced technical consultant on Smart Metering on an international level.
The kingdom of Smart Grids & Metering

CESI Middle East has been selected by the Electricity & Co-Generation Authority of The Kingdom of Saudi Arabia, ECRA, to develop policies, specification requirements and an implementation plan for a smart metering and advanced metering infrastructure.

This new mandate, which is the first kingdom-wide project of its kind to be undertaken in Saudi Arabia, not only increases CESI Middle East’s leadership position in the Middle East, but also gives further impetus to the development of future plans based on renewable energy across the Middle East, as the implementation of smart grids allows a switch from conventional energy to renewable energy.
Modern electricity meters for Montenegro

EPCG is the largest company in the Montenegro’s energy sector, owner of both power generation and distribution assets, serving more than three hundred thousand customers. EPCG’s smart metering project is targeted at reducing the country’s energy and carbon intensity, encouraging efficiency, reducing the current level of losses and setting-up the basis for future Smart Grids.

CESI has been selected through an international tender as the technical consultant providing support to the EPCG Project Implementation Unit over a three year development, from the system specification to the commissioning of the system.
E-mobility project

Enel is developing a new generation of conductive charging stations for future city mobility concept based on electric cars.

Two different stations have been created with Enel for recharging in public multiuser stations or directly in private parkings.

CESI is supporting the entire product development process through specialized e.m.c. test and type test, and it is also the product independent accredited certifier according to the EN45011.
Engineering & Environment
We offer to our customers the most appropriate tools to meet their challenges in integrating renewable energy, optimizing hydro generation plants and monitoring environmental emission of Thermoelectric Power plants. CESI provides certification of quality and environmental management systems according to international standards (ISO 9001, ISO 14001, OHSAS 18001, UNI-EN-ISO 17025).

Our range of services aim at optimizing Thermoelectric Power Plants’ operating conditions, minimizing Plants’ environmental impact, resolving environmental litigations, reducing implementation costs of monitoring networks, improving Community’s acceptance of power plants.

CESI is a worldwide recognized leader in Dam Safety, Structural Engineering, Hydroelectric Plants Management, Natural Risks Mitigation, Environmental Management of Industrial Plants, and Environmental Impact Assessment with specific know how in:
- Dams’ monitoring systems;
- Studies of structural analysis and verifications;
- Hydrological monitoring systems;
- Emergency and risk mitigation plans (maximum flood conditions, dams break, slope stability and landslide, rock falls);
- Mitigating measures studies to define land protection planning (debris flow, water quality, biodiversity);
- Ecosystems quality analysis by monitoring campaigns according to standard parameters;
- Environmental modeling application to identify polluting sources and to evaluate the effects of different polluting scenarios.

We also performs specialized engineering services:
- Seismic monitoring of civil structures in order to protect the architectural and monumental heritage;
- Analysis of the causes of degradation and instability (e.g. ageing, earthquakes, floods, traffic vibrations, pollution, etc.);
- Design, installation and management of automatic monitoring systems, numerical analysis to verify the behaviour of the structure with operating loads and loads associated to hypothetical scenarios of interest (e.g. earthquake).

**A deep experience for a Sustainable World**

- More than 1,500 Risk Assessment Studies for the environmental performance of industrial plants
- More than 300 systems and structural analysis for dam safety and environmental protection
Project Data

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Modeling geothermal plants’ air quality

In 2013 CESI support EGP to perform a regional assessment of the results achieved so far by the AMIS® abatement systems installation program on the geothermal power plants in one of the world’s most important geothermal area, the Larderello-Travale-Radicondoli Geothermal Area (Tuscany).

The effects of the AMIS® spread in the geothermal concession has been evaluated by an integrated assessment conducted both analyzing the air quality measured and by applying an air quality modeling system to the 2003 scenario (27 power plants, 1 with AMIS® for a total installed capacity of about 720MW) with the 2007 scenario (27 power plants, 10 with AMIS® for a total installed capacity of about 720MW).
Project Data

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Monitoring Reactors, Protecting the Environment

Termokimik Corporation Impianti e procedimenti industriali has been charged by EDF, the French electric company, with building and commissioning two DeNOx reactors for two thermoelectric units of the Pointe des Carrières power plant located in Fort de France (Martinique). DeNOx reactors are used for the abatement of nitrogen oxides, a polluting agent produced by the combustion process, in order to respect emission limits required by new environmental rules.

CESI signed a contract with Termokimik to carry out monitoring activities required for the performance evaluation of the new reactors, as well as compile a report describing test results and comparing these results with performance levels required by EDF.
Monitoring the Backbone of Italian Renewable Energy

Italy is a pioneer in the hydroelectric sector, where it has been active since the end of the 1800s. Today, this energy source provides between 12% and 17% of Italy’s electric energy needs, making a considerable contribution to renewables in the national energy mix. Guaranteeing safe hydroelectric operability is only possible thanks to constant, ongoing monitoring efforts.

Enel Produzione has chosen CESI to assess the safety (investigation and structural assessment) of the dams relevant to hydroelectric plants in Italy, verifying:
- Safety and seismic structural stability, in compliance with new Italian legislation;
- Design and Execution of investigations through field surveys and laboratory tests;
- Seismic Tectonic Analysis.

CESI monitored more than 25 dams all over Italy in 2013 only.
Safeguarding Cultural Heritage

CESI is specialized in civil and environmental monitoring, and protecting cultural heritage is one of its most important goals. The company’s experience in this area began in the 1950s, with initial work on the Mole Antonelliana in Turin, and evolved over subsequent decades on some of the most important Italian and international sites.

One of the latest activity in this field is the monitoring system of Santa Maria del Fiore in Florence. CESI developed a feasibility study for the implementation of a new monitoring design aimed at assessing the structure of the Baptistery, paying particular attention to foundation soils and reconstruction of the subsurface lithology of the wall of the entire Piazza del Duomo area in Florence.

Just very few examples where CESI operated:
- Leonardo da Vinci’s Last Supper in Santa Maria delle Grazie in Milan;
- the San Marco Basilica and Santo Stefano bell tower in Venice;
- the Leaning Tower of Pisa;
- the Chapel of the Shroud in Turin;
- the tower of Ravenna.
The structural monitoring system allows the improvement of dam safety and the optimization of maintenance planning.

Itaipu dam, located between Brazil and Paraguay, is one of the biggest dams in the world for the production of hydroelectricity. CESI designed and installed a monitoring system (more than 300 sensors and 24 data acquisition systems) inclusive of a subsystem of communication (INDACO – CESI trade mark) and an expert system (Mistral®) to achieve hourly information data about the dam status.

CESI has over 50 years expertise in dam monitoring system design.
A delicate job in the contaminated area of Chernobyl

A delicate job in the contaminated area of Chernobyl

After the nuclear accident in 1986 a protection structure was built in order to contain the radioactive fallout.

CESI was committed to design, supply, install and start-up a monitoring system to acquire data about the structural behaviour of the protection structure. Main goal of the system was to provide information to guarantee safety conditions during the construction of the definitive “shelter”.

CESI worked with two partners: Ansaldo Nucleare and Thales Alenia Space.

With this experience CESI confirms its know-how in the structural safety sector.
Terna realised one of the most ambitious worldwide RES project, consisting of over 140MW of photovoltaic power panels put in place in over 60 different areas across Italy.

CESI acted as the Owner’s Engineer, supporting Terna in all the phases of the project, from the verification and validation of all contractors’ blueprints, giving an opinion on technical and economical aspects of the plants and in presiding the whole construction and testing phases until the Client’s acceptance. CESI’s qualified consultants have participated not only to visual inspections, functional tests and performance tests but they have also assisted Terna in the coordination of the works and the management of contractors.