ENERGY AND EFFICIENCY
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Electrical Equipment, Automation and Process Control, developing specific applications covering the entire production process.

ENERGY GENERATION

- Cogeneration y Trigeneration
- Combined Cycle Power Plants
- Conventional Thermal Power Plants
- Desulfuration Plants, etc...

EFFICIENCY

- Efficiency equipment
- Installations Reautomatization
- Energy Management System
High-end products and engineering solutions designed to meet the most demanding applications
Turnkey Solutions

- Project Management
- Complete Electrical Engineering
- Development of Software, PLCs, SCADA, Protections...
- Supply of Electrical and Control Equipment
- Integration and Coordination with other suppliers
- Integral Testing
- Electrical Erection and/or Erection Supervision
- Commissioning
- Training
- Maintenance Services and 24-hour online assistance
- Spare Parts

Customer: (-) time (-) problems (+) reliability

Cost
Benefit
Complete Electrical Installation

- Electrical Connection Substation
- Main and auxiliary service transformers
- Electric generators
- Medium-voltage distribution
- General plant control system, regulation, electrical protection, monitoring and operation
- Motor Control Centers (MCC)
- Low-voltage distribution and lighting
- Batteries, UPS and DC Distribution
- Earthing Systems

Design and Construction of Electrical Panels

- Distribution Panels from 1 to 36 kV
- Transforming Substations
- Motor Control Centers, from 400 Vac to 7,2 kV
- Control and Protection Panels
- Lighting, pushbutton panels, etc.
- Vac and Vdc distribution panels
- Desks, Consoles, Synoptic/block diagrams
### Main Automation for Processes

- Custom-made engineering solutions for:
  - New projects
  - Upgrades or expansions

- Software development and specific control functions:
  - Ensuring the quality of the process and increasing productivity
  - Maximizing plant performance and profitability
  - Flexibility and adaptability for future expansions

- Scalable and open-architecture based on recognized standards, enabling integration with third-party software, communication with a wide variety of industrial devices, and interface with other levels of the plant.

- Own hardware control system platforms and software tools.
Process Automation

- **Automation Systems**
  - Control desk and local control panels
  - Field devices and sensors
  - Logic and sequential control systems based on programmable controllers PLCs
  - I/Os remote units for field data acquisition
  - Industrial networks (Profibus-DP, Modbus, Ethernet,..)
  - Engineering stations
  - Human Machine Interface systems for supervision and process control (SCADA)
  - Control, supervision, and remote technical assistance.
Process Automation
Cogeneration and Trigeneration

**Agri-food Sector:**
Greenhouses, Canning Industry...

**Industrials Processes:**
Ceramic, Textile, Waste-paper...

**Tertiary Sector:**
Hotels, Hospitals, Airports...
Cogeneration and Trigeneration

Plants designed to arrangements for the provision of electricity and combined heat / cold.

- **Integrated Control System**
  - Interconnection to the electrical grid: line protection, measurement and control positions.
  - Integrated control for generators:
    - Control Sequences
    - Voltage and reactive power regulation.
    - Synchronization.
  - Control of auxiliary systems (water, air, etc,...)
  - Boiler/ Absorption machine Control
  - SCADA System for control y supervision
  - Remote Control

- **Electrical Generators**
  - Synchronous until 60 MVA
  - Continuous Voltage until 4.000 kW
  - Synchronous with permanents magnets until 8 MVA
Efficiency

Efficiency Grid ➔ best performance ➔ energy saving

Objetives

- **Provide uninterrupted power** to the entire plant or controlled process
- **Maximize** the efficiency of the variety of installed equipment and maintenance personnel
- **Allow flexibility** and adaptability to accommodate rapid growth (integration)
- **Get a saving** in energy consumption per production unit and emissions reduction
- Integration of the information in a local control panel and supervision for taking decisions
- **Electricity reduction** cost for the end customer

INGETEAM, guided by ISO 50001 and EN 16001 (energy management systems) is able to facilitate the incorporation of energy management.
AC Frequency Converters based on a combination of a rectifier stage with different options (DFE or AFE), a capacitor bus and an inverter stage with two or three levels depending on the output voltage.
Example of Energy Saving

Anual Energy Saving

Up to 50 %
Range of Products

Motor Voltage V

Power KW

HV - IGBT's
Air & Water Cooled

Press-Pack IEGT's

Press-Pack IGCT's

E.G. & E.E
ENERGY GEN.
EFFICIENCY
SERVICES
PROJECTS

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Energy Management System

- **Ingeteam EMS**
  - Assures continuous power service
  - Maximizes process productivity
  - Provides the tools to help control energy costs
  - Flexible and scalable to integrate future plant expansions

- **Products and Services**
  - Consultancy and engineering (Automation & Control, energy efficiency, communications)
  - **INDAR/INGEDRIVE.** High efficiency motors and power converters
  - **INGESAS MULTITRANS.** Energy measurement equipment
  - **INGESAS PQM300.** Power quality analyzers
  - **INGESAS PL300/PD300/PM300, INGESAS TCP.** Protection relays (motors, transformers, switch breaker)
  - **INGEGRID.** Power electronics for energy management (energy recovery, energy storage, reactive power control)
  - **INGESAS RIO.** Remote IO units

- **Communications**
  - **INGESAS IC3.** Powerful IEC61850 communications client for substations and industrial environments.
  - **INGESAS GATEWAY.** Protocol converter family offering standard-based communication solutions (Modbus, IEC 61850, IEC 60870-5-101/104, DNP3, OPC, ICCP, etc.)
Energy Management System

- **SCADA**
  - Fully integrated solution for plant power consumption supervision, control and data acquisition: INGESYS IT
  - Categorize major power consumers, efficiency and influence factors
  - Energy base line creation
  - Open-architecture and scalable
  - Real-time supervision to integrate process control
  - Web access module

- **EMS. Analysis**
  - Fully integrated approach to control energy costs both for production processes and power installation.
  - Power consumption analysis and electricity pricing
  - Forecasting energy consumption
  - Early detection of power capacity limits
  - Report generator, with historic data, trends and statistics
  - Energy efficiency rates and indicators
Energy Generation

Thermal Plants and Desulfuration Plants
- Angola - Thermal Plant Dos Caminhos Do Ferro / LS Energía-ENE
- Angola - Thermal Plant Quiveva-Lobito / LS Energía-ENE
- Spain - Distributed Control System (DCS) FGD de C.T. Lada IV (Desulfuration Plant) / Iberdrola
- Spain - Electrical Engineering FGD de C.T. Lada IV (Desulfuration Plant) / Iberdrola
- Spain - Sistema Control Distribuido (DCS) FGD de C.T. Velilla (Desulfuration Plant) / Iberdrola
- Spain - Ingeniería Eléctrica FGD de C.T. Velilla (Desulfuration Plant) / Iberdrola
- Spain - C.T. Combined Cycle Boroa / Bizkaia Energía- ESB (2x300 MVA + 1x200 MVA)
- Spain - Sangüesa Plant / E.H.N. – Acciona (1x25MVA)
- Spain - C.T. Escombreras / Iberdrola (2x332MVA)

Cogeneration and Trigeneration
- Mozambique – Ressano Garcia/ GIGAWATT (Motor Gas 13x9,6MW -Rolls Royce)
- Russia– CHP Dalsem/ Rolls Royce (Motor Gas 4x6,8 –Rolls Royce)
- Holland - CHP Greenvliet / Greenvliet (Motor Gas 1x6,8MW -Rolls Royce)
- Holland - CHP Redstar/ Redstar B.V. (Motor Gas 1x7,5MW-Rolls Royce)
- United Kingdom - CHP APS Salads / APS Salads Ltd (Motor Gas 1x7,5MW-Rolls Royce)
- Norway - Test Stand/ Rolls Royce (Motores Gas-Rolls Royce)
- Romania - CHP Focsani / Municipio de Focsani (Motor Gas 1x6,8MW-Rolls Royce)
- Belgium - CHP Het Groene Huis / Het Groene Huis (Motor Gas 1x7,5MW-Rolls Royce)
• Holland - CHP Redstar/ Redstar B.V. (Motor Gas 1x7,5MW-Rolls Royce)
• Holland - CHP Van Marrewijk/ Jan Van Marrewijk B.V. (Motor Gas 1x7,5MW-Rolls Royce)
• Holland - CHP Agro Care/ Agro Care Growers (Motor Gas 1x7,5MW-Rolls Royce)
• Russia - CHP Lukoil/ Lukoil (Motor Gas 5x6,3MW-Rolls Royce)
• Turkey - CHP Sireci/ Sireci Textiles (Motor Gas 1x8,2MW-Rolls Royce)
• France - CHP Clermont Ferrand / VINCI (Motor Gas 1x17MW-GE Oil&Gas)
• Spain - CHP Intermalta/ Intermalta (Motor Gas 1x6,8MW-Rolls Royce)
• USA- Test Stand / Waukhesa (G-M 1x20MW + G 1x6,8MW)
• Spain - CHP Papertech/ Papertech (Motor Gas 1x8,5MW-Rolls Royce)
• Italy - CHP Chieri/ High Power s.p.a. (Motor Gas 1x5,1MW-Rolls Royce)
• Spain -Test Stand/ Wartsila Ibérica (Motor Gas/Diesel 1x1,2MW-Wartsila + VSD-Ingeteam)
• Spain - CHP Nufri/ Nufri (Motor Gas 2x6,8MW-Rolls Royce)
• Spain - CHP Tudela/ Hidrocantábrico (Motor Gas 2x5,1MW-Rolls Royce)
• Niger - CHP Cadbury /Cadbury Nigeria Plc (Motor Gas 1x3,6MW-Rolls Royce)
• Pakistan - CHP Rupali/ Rupali Poliestier Limited (Motor Gas 2x3,6MW-Rolls Royce)
• Yemen - Uqlah Oil Processing Facility/OMV Exploration Gmbh (Motor Gas 3x5,1MW + Motor Diesel 1x4,1MW -Rolls Royce)
• Pakistan - CHP Cresent Textil/ Cresent Nahuman Ltda. (Motor Gas 2x3,1MW-Rolls Royce)
• Spain - CHP Sales Monzón/ Sales Monzón (Motor Gas 2x6,8MW-Rolls Royce)
• Spain - CHP Movialsa III /EQTEC-Movialsa (Motor Gas 2x5,1MW-Rolls Royce)
• Italy - CHP Savigliano/ High Power s.p.a. (Motor Gas 2x6,8MW-Rolls Royce)
• Italy - CHP Chieri/ High Power s.p.a. (Motor Gas 2x5,1MW-Rolls Royce)
• Italy - CHP Mondovi/ High Power s.p.a. (Motor Gas 3x3,6MW-Rolls Royce)
• Turkey - CHP Istambul Airport/TAV Turkish Ataturk Airport (Motor Gas 3x3,6MW-Rolls Royce)
• USA- CHP Basell / Basell North América Lake Charles, LA (Motor Gas 2x8,5MW-Rolls Royce)
• Bangladesh - CHP Unique III / Everest Power (Motor Gas 3x8,5MW-Rolls Royce)
• Russia - CHP LLc Advise / Rolls Royce (Motor Gas 2x6,8MW-Rolls Royce)
• Italy - CHP AEM Canavese / AEM s.p.a. (Motor Gas 3x5,1 MW-Rolls Royce)
• Holland - CHP Elpiri / Elpiri Energie (Motor Gas 1x6,8MW-Rolls Royce)
• Holland - CHP De Jong / De Jong - Franke (Motor Gas 1x5,1 MW-Rolls Royce)
• Holland - CHP Green Vliet / Green Vliet (Motor Gas 1x6,8MW-Rolls Royce)
• Holland - CHP Kegsro / Kester Grootscholten Beheer B.V. (Motor Gas 2x8,5MW-Rolls Royce)
• Holland - CHP Agro Care / Agro Care Growers (Motor Gas 2x8,5MW-Rolls Royce)
• Spain - CHP Girasol / Bunge Ibérica (Motor Gas 3x3,6MW-Rolls Royce)
• Spain - CHP Soja / Bunge Ibérica (Motor Gas 3x3,6MW-Rolls Royce)
• Spain - CHP Monjuic / Bunge Ibérica (Motor Gas 3x3,6MW-Rolls Royce)
• Spain - CHP TTT / Tratamientos Térmicos T.T.T. (Motor Gas 1x1,8MW-DEUTZ)
• Spain - CHP Project Rofeica / Wartsila Diesel
• Spain - Sistema de Excitación Estático/ Cristalería Española
• Spain - CHP Benavente / Azucarera Benavente
• Spain - CHP / Guascor
• Spain - CHP / Campofrío
• Spain - CHP / Envirol
• Spain - CHP Bañares/ Wartsila Diesel
• Spain - CHP Tortosa - Tortosa Energía (Turbina 1 x 25 MW)
Energy Efficiency

- Spain - VDF Water Pump/Valdelentisco Desalination Plant (1x Pump 2MVA 3,3kV)
- Spain - EMS Emergency Generators /Enagas Regasification Plant (Huelva)
- Spain - EMS Emergency Generators /Enagas Regasification Plant (Cartagena)
- China - VDF / Tonting (1x 2300kW; 3,15 kV : MV100)
- Spain - VDF A.T./Red Eléctrica (4x8MW; 3,15kV)
- Russia - VDF Molinos/ Outotec (1xSAG Mill 2.300kW; 3,15 kV : MV100)
- Russia - VDF Molinos/ Outotec (1xBall Mill 2.100kW; 3,15 kV)
- Spain - Heating, Ventilating and Air Conditioning Ingeteam
- China - VDF Elevator/ Huaiabei Mining Industry Co., LTD (2x2.000kW; 3,15 kV)
- Russia - VDF Minning fan/ Norilks Nickel (2x4.600kW; 6kV)
- India - Combustion Gases Fan CHP/ NTPC Ramagundam (1x1200kW; 3,15kV)
- Spain - VDF Water Pump/Acciona Energía (680 kW; 690V : LV200)
- India - VDF Nuklear Central Pump/ Bhavini (2x3,6MW; 3,15kV + 2x2,7MW; 3,15kV)
- Spain - VDF Water Pump/Acciona Energía (680 kW; 690V : LV200)
- Germany - VDF Chemist Plant/ Basf (1130kW; 690V: LV400)