



**expert services & solutions**  
for the renewable energy  
& storage sectors





## expert services & solutions for the renewable energy & storage sectors

**PROTASIS** provides a wide range of expert services and solutions for the Renewable Energy and Energy Storage sectors, including assessments, consulting, engineering design, testing, maintenance, support of operation and turn-key solutions to satisfy the strategic and operational requirements of any **Renewable Energy Sources' Plant (RES)** or **Energy Storage System (ESS)**.

These services and solutions apply to Renewable Energy Plant and Energy Storage System developers, manufacturers, grid operators, state authorities and individual stakeholders.

### The services and solutions we provide, include:

- ⦿ Electrical Planning Studies, Consulting and Support Services
- ⦿ Design Studies & Consulting
- ⦿ Operation Studies & Consulting
- ⦿ Grid Code Compliance Studies & Consulting
- ⦿ Smart-Grid Design Studies
- ⦿ Protection - Control & Monitoring Systems
- ⦿ Cybersecurity Services
- ⦿ Electrical Equipment Maintenance Services
- ⦿ Asset Management Services
- ⦿ Energy Storage Systems Services

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## 1 Electrical Planning Studies, Consulting and Support services

**PROTASIS** provides assessment of the stakeholders' goals and objectives, in a power system planning, along with the necessary recommendations. Our experts undertake special power system studies for the connection of planned Renewable Energy Sources (RES) and Energy Storage Systems (ESS) to the utility grid, as well as for the expansion of existing facilities, covering the HV Substation and MV distribution system.

Our expert services set up to ensure the overall quality, safety, reliability of your installation, are divided into two distinctive areas:

### Grid Impact Studies (GIS):

- ⦿ Static security assessment: power flow and contingency analysis, transfer limit analysis and short circuit calculations
- ⦿ Dynamic security assessment: modelling and simulation of RES plants and ESS
- ⦿ Grid integration connection studies (HVAC, HVDC)
- ⦿ Assessment of candidate Points of Interconnection (POI) and different network configurations for safe power evacuation

### Technical feasibility and Front-End Engineering Design (FEED) studies:

- ⦿ Preliminary design of electric network and sizing of power equipment
- ⦿ Technical requirements for primary and secondary equipment
- ⦿ Conceptual design of control, protection schemes and Substation Automation Systems (SAS)
- ⦿ Evaluation of potential RES applications with ESS
- ⦿ Project budgetary cost estimation







## 2 Design Studies & Consulting

Thorough and detailed design studies are the key for the procurement and installation of equipment during the execution phase in new RES projects. Such studies might, also, be performed during operation, to evaluate the adequacy of the installed equipment, if necessary.

**PROTASIS** experts carry out design studies, covering the interconnection substation as per the grid operator's requirements and the MV network at RES side, including but not limited to:

- ⦿ Technical specifications for primary and secondary equipment
- ⦿ Cable sizing and ampacity calculation
- ⦿ Circuit breaker duty calculation
- ⦿ Insulation coordination
- ⦿ Switching transient analysis
- ⦿ Harmonic analysis
- ⦿ Cable sheath bonding design
- ⦿ Grounding grid study
- ⦿ Protection, control and interlocking schemes design
- ⦿ Current and voltage transformer adequacy

## 3 Operation Studies & Consulting

Operation studies are required to ensure the successful start-up of a new RES project, and the safe and reliable operation of the existing RES plants. PROTASIS experts have extensive experience in supporting the operation of electric networks by providing the following consulting services:

- ⦿ Power flow analysis
- ⦿ Short-circuit current calculation
- ⦿ Protection relay setting and coordination study
- ⦿ Arc flash hazard analysis
- ⦿ Fault and disturbance analysis
- ⦿ Dynamic performance analysis
- ⦿ Power quality measurements and analysis

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## 4 Grid Code Compliance Studies & Consulting

**PROTASIS** engineers, with their substantial knowledge and skills, use cutting-edge modelling and power system analysis software to conduct grid code compliance studies, related to RES plants. To collect, verify and record data, essential for the simulation of a plant's electric network, a structured methodology is performed onsite.

### Grid Code Compliance simulation

- ⦿ Detailed modelling of RES plants on state-of-the-art simulation software, based on vendors' equipment data
- ⦿ Static simulation of RES plants performance for the evaluation of compliance with the grid code requirements, such as reactive power capability
- ⦿ Dynamic simulation of RES plants performance for the evaluation of compliance with the grid code requirements, such as Fault Ride Through (FRT) capability and frequency response

### Grid Code Compliance testing and monitoring

- ⦿ Utilization of fast transient recorders and power quality analyzers to collect measurements and verify grid code compliance, throughout the lifetime of the facility



## 5 Smart-Grid Design Studies

The significant increase in the deployment of smaller or larger electric energy generation plants that are, mainly, based on renewable energy sources in the past years, has led to the development of the smart grid concept. The distribution field devices of the smart grids become nodes on communication networks and act as intelligent remote agents to operations, control and asset management centers. These processes require increased operational complexity, bidirectional communication capability, distributed computing/intelligence, large communication infrastructure and large initial capital investments.

**PROTASIS provides smart-grid design studies, covering both research and development in:**

- ⦿ Low-carbon electricity generation (mainly Renewable Energy Sources)
- ⦿ Fast/Efficient/Smart Power Management: Smart transactions of electric energy
- ⦿ Power Demand Smoothing: Smoothing the curve of power demand vs. time (peak-shaving and valley-filling)
- ⦿ Electric Energy Storage Units: Electric energy supply or storage becomes available whenever required
- ⦿ Power Converters: Used as interface links between low-carbon electricity generation units (including any storage devices) and the main grid of constant frequency and voltage
- ⦿ Self-healing and tolerance of attacks: A grid, which can rapidly detect, analyze, respond and restore from perturbations
- ⦿ Smart Power metering: A power monitoring system (with a cloud-based interface) that tracks, controls and records the characteristics of the power being delivered, based on the real time demand of the loads at the points of interface
- ⦿ Smart Power Quality and Condition monitoring: A quality monitoring system (with cloud-based interface) that regulates and compensates for changes in droops, sags, dips in the power transfer interfacing stages to the loads







## 6 Protection - Control & Monitoring Systems

Independent Power Producers (IPPs) erect, own and operate high (HV) and medium (MV) voltage installations (HV/MV & MV substations and MV networks), in order to inject electrical energy, produced by RES, into the distribution and transmission grid.

PROTASIS is a competent and vendor-independent systems' integrator, developing turn-key solutions for the renewable energy sector. We provide all required services and equipment for the protection, control and monitoring of the IPP electrical network:

### HV/MV Step-Up Substation – TSO/IPP Side:

- ⦿ Design, manufacturing and commissioning of the Substation Automation System (SAS) for Air (AIS) and Gas (GIS) Insulated Substations, according to the latest TSO specifications, including:
  - ⚡ Protection and control system engineering
  - ⚡ Protection Relays
  - ⚡ Protection and Control Panels
  - ⚡ SCADA system, based on standard communication protocols and redundant topologies
  - ⚡ Protocol gateways for data exchange, with both TSO and IPP Remote Control Centers (RCC)
- ⦿ Remote Terminal Units (RTU), as per the latest TSO requirements
- ⦿ Cybersecurity solutions for the detection and prevention of the OT network cyber-threats
- ⦿ Digital Powerline Carrier Systems (PLC), according to the latest TSO requirements
- ⦿ Integration of diagnostic and monitoring systems for primary equipment (PD, GDA) and cables
- ⦿ Provision of meters, certified by utility for net-metering



#### **RES Collector Substation:**

- ⦿ Protection and control system engineering
- ⦿ Protection relays for MV switchgear (SWGR)
- ⦿ Local electrical SCADA system for MV SWGR monitoring and control
- ⦿ Cybersecurity solutions for the detection and prevention of the OT network cyber-threats

#### **Remote Control Center (RCC):**

- ⦿ Fully expandable SCADA system, able to monitor and control several substations
- ⦿ Automated periodical and on-demand reports, including all required electrical data
- ⦿ Remote access to the RCC, via web browser and mobile phone applications, with different control and monitoring authorizations per user
- ⦿ Able to collect data independently to the SAS vendor, via standard communication protocols

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## 7 Cybersecurity Services

The current protection, control and monitoring systems are interconnected devices, based on microprocessors, forming an Operation Technology (OT) network. Cybersecurity of the OT network is, therefore, critical for the safe and reliable operation of the infrastructure. Identifying this necessity, the European Union has issued the "EU NIS 2016/1148 CYBERSECURITY DIRECTIVE".

To ensure your compliance with the respective directive, PROTASIS provides turn-key solutions for essential service operators, including electrical energy production, distribution and transmission companies.

### Security Assessment Report:

- ⦿ **Phase 1:** Mapping and modelling of all network assets, topology and flows
- ⦿ **Phase 2:** Detection, identification and scoring (according to the severity/importance) of the vulnerabilities, exposures and cyberthreats

### Industrial Intrusion Detection System (IDS):

- ⦿ System for the monitoring of the OT network traffic in a non-intrusive manner, based on Deep Packet Inspection (DPI)
- ⦿ Alert services are based on the violation of rules and communication protocols' patterns

### Industrial Intrusion Prevention System (IPS):

- ⦿ Devices (firewalls and secure gateways), performing active protection functions for the OT network, based on the IDS feeds and alerts, rules and DPI

### OT Managed Security Service Provider (MSSP):

- ⦿ PROTASIS maintains its own Security Operation Centre (SOC), able to collect and process data from several remote sites, substations, wind parks, photovoltaic parks, etc
- ⦿ Site owners are immediately alerted, in case of a cybersecurity event (cyberthreat)
- ⦿ Simplified security assessment reports for each site are issued periodically, including detected cyberthreats and OT network modifications





## 8 Electrical Equipment Maintenance

Asset Owners are required to perform routine maintenance of their substations, to ensure a steady and safe flow of electricity. **PROTASIS** provides a complete suite of the highest quality services to RES project developers and asset owners. Our personnel includes experts in operations and maintenance services, vital for the long-term performance and reliability of HV & MV substations.

Our highly trained engineers and technicians are equipped with a wide range of specialized tools, equipment, asset and workforce management software to accomplish maintenance tasks.

**We offer a broad range of maintenance solutions, customizable to each customer's site, while we manage every element of service with our in-house team of substation qualified personnel.**

**We provide HV/MV substation maintenance services on pivotal equipment such as:**

- ⦿ HV Disconnecting & Earthing Switches
- ⦿ HV Lightning Arresters
- ⦿ HV Voltage Transformers & Current Transformers
- ⦿ HV Gas Circuit Breakers
- ⦿ HV Gas Insulated Switchgears
- ⦿ HV/MV Power Transformers
- ⦿ Protection relays testing and SAS diagnostic analysis
- ⦿ MV Switchgears & Bus Bars
- ⦿ Station Service Transformers
- ⦿ Batteries & Battery Chargers
- ⦿ Grounding Systems

Visual, electrical and mechanical inspections, as well as all required measurements and tests of the above assets are performed, as per the latest IEC standards.

Our work will produce comprehensive reporting, using advanced asset management software, test sheets per equipment, recommendations and remediation proposals.

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## 9 Asset Management Services

**PROTASIS**, as an IBM Silver Business Partner implements IBM Maximo® solutions to assist clients with asset management tasks and operations, optimize their processes and maximize their ROI.

Asset Management can provide a comprehensive answer for physical asset management. IBM Maximo® provides a platform that delivers asset lifecycle and maintenance management. With customizable options for automation and user assistance, Asset Management can help exploit new capabilities and maximize asset value, while decreasing management costs.

### In practice, IBM Maximo Asset Management:

- ⦿ Provides visibility, control and automation in managing all types of assets in a single, central platform
- ⦿ Enables full control of inventories
- ⦿ Facilitates the development of a coordinated program for preventive, predictive, routine, and unplanned maintenance
- ⦿ With advanced scheduling functionality, it allows deployment of personnel with the appropriate skills at the right time, for the right job
- ⦿ Helps ensure compliance with contracts, service level agreements and standards

## 10 Energy Storage Systems Services

Moving towards a future of sustainable green energy, the ever-growing penetration level of intermittent and fluctuating renewable energy sources and extensive exploitation of the smart micro-grid concept creates the need for power system flexibility. To this end, Energy Storage Systems forms an alternative source of power, which combines reliable, **economic balancing**, and flexible energy service.

- ⦿ Comparative analysis of operation principles and applicability perspectives of alternative storage technologies available, considering techno-economic criteria, such as:
  - ⚡ Scope of exploitation (buffering, peak-shaving/valley-filling, DC system supply, net-metering, etc.)
  - ⚡ Investment and operation cost
  - ⚡ Energy potential
  - ⚡ Redundancy needs
  - ⚡ Space requirements, etc.
- ⦿ Integration of Battery Management System, provided by the ESS manufacturer, with superior supervisory and control systems
- ⦿ Steady-state modeling of the hybrid AC-DC electric Grid (load-flow analysis, static stability, harmonic distortion studies, electric loss calculation, short-circuit analysis)
- ⦿ Transient-state modeling of the hybrid AC-DC electric Grid (dynamic stability, grid code compliance, electromagnetic transients)
- ⦿ Administrative support for successful connection to the Grid (design and documentation review)

At **PROTASIS** we use the correct methodology and best practices to satisfy the highest technical standards, set out in the requirements of our ISO 9001:2015 Quality Management Systems norms, ISO 14001:2015 Environmental Management System norms and our OHSAS 18001:2007 Occupational Health and Safety Management System norms.

**Contact our company at [info@protasis.net.gr](mailto:info@protasis.net.gr) for more information and details on how we can better serve your Renewable Energy Plant or Energy Storage System needs and how we can solve important aspects challenging your operations.**



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