

# Integrated Solutions for the Energy Value Chain



## COMPANY PROFILE ENEVO GROUP







Engineering &  
Consulting

**Multivendor system  
integrator for protection  
& SCADA systems**

**Design for Electrical &  
Automation**



Substation  
Automation &  
Protection Systems

**Energy efficiency  
projects (PFC, VFD, SVC)**

**Automation expert,  
PLCs and Control  
Systems**



Process Control  
& Electrical  
Automation

**Cybersecurity for  
industrial application**

**Substation Experts**



IT, Telecom &  
Cyber Security

# Diversity of industries and technologies



Power Generation



Power T&D



Energy efficiency



Water



Oil & Gas



Industry

System integrator  
of  
**Schneider Electric**



Advanced Partner

Protection

**SIEMENS**

Advanced Partner

Power Quality

**SIEMENS**

Advanced Partner

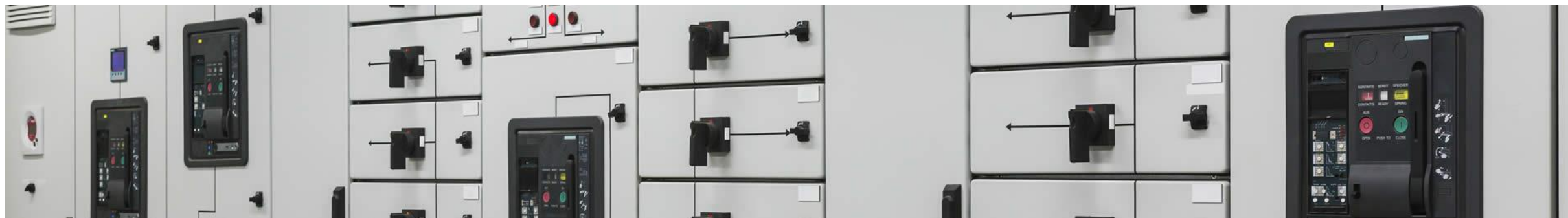
Substation Automation

**SIEMENS**



**Rockwell Automation**





- At ENEVO, we understand the importance of integrating primary equipment, control, protection, security and communication into a unitary system that responds promptly to all the requirements of an electrical network.
- Our staff has expertise in standard load flow and fault analysis techniques and has access to powerful software tools such as EDSA Paladin design Base 2.0, PSS SINCAL, PSS/E, PSS/ADEPT and ETAP.
- Communication design and implementation services for copper, fiber and wireless media-based systems.
- Various SCADA protocols: IEC 61850, DNP, IEC 60870-5-101/103/104, Modbus.

## PROTECTION AND SCADA SYSTEM SERVICES

### ENGINEERING

- Master Planning & Feasibility Studies
- Protection Coordination Studies
- Secondary System Design
- Interfaces with other subsystems
- Protection tripping matrix interlocking
- Interfaces, IO list, HMI, IEC list

### PANEL DESIGN & PRODUCTION

- Detailed wiring design
- Order codes and BOM

### CONFIGURATION

- Protection relays logic, control system configuration and software development
- BCU and RTU logic & interlocking
- Communication and data systems
- Integration of the Control & Protection Systems
- HMI screens & reports

### ADVANCED APPLICATION

- 61850 Custom Deployments and Standardization
- Automatic Disturbance Retrieval
- Transformer Monitoring
- Software platform for data management
- Synchrophasors System

### FAT AND TRAINING

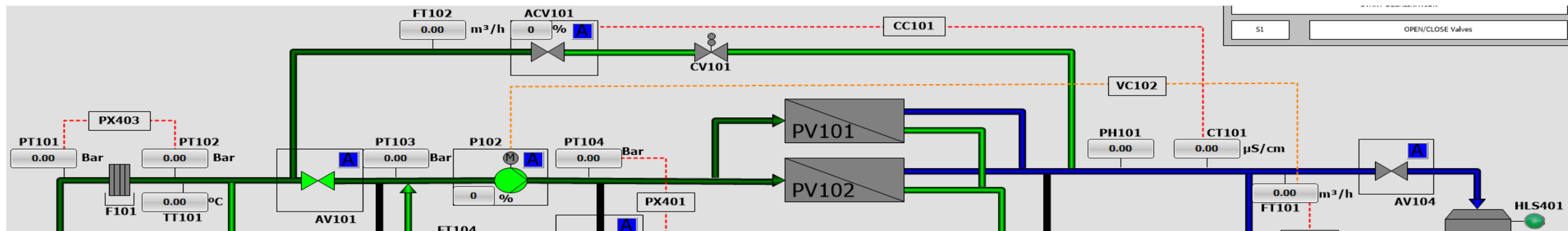
- Testing functionality in own laboratory prior to FAT
- Preliminary FAT and FAT with client presence
- Training of the client

### SAT

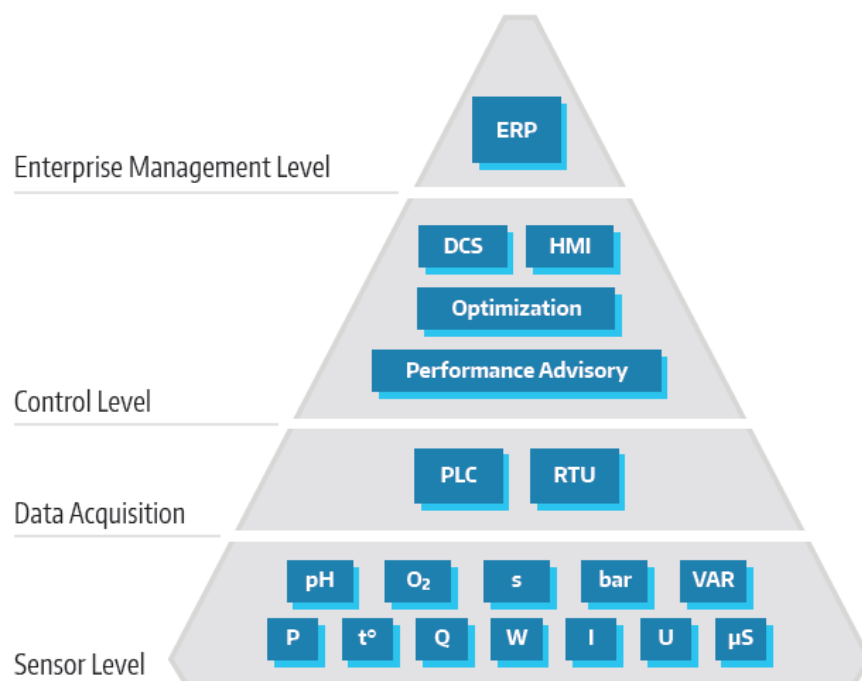
- Onsite support to EPC/end user for appropriate primary equipment wiring to Control & Protection system
- Control & Protection final configuration and SCADA P2P tests



# Process Control & Electrical Automation



## CROSS-PLATFORM AUTOMATION & OPTIMIZATION



## PROCESS AUTOMATION SERVICES

### ENGINEERING

- Functional design specification
- System architecture
- Interfaces with other subsystems
- Modulating control structures, sequential control
- Emergency shut down specification
- HAZOOP studies and SIL analysis
- Interfaces, IO list, HMI

### PRODUCTION OF DCS CUBICLES

### PANEL DESIGN

- I/O's layout and assignment
- Detailed wiring design, X-wiring
- Order codes and BOM

### HARDWARE AND SOFTWARE FAT AND TRAINING

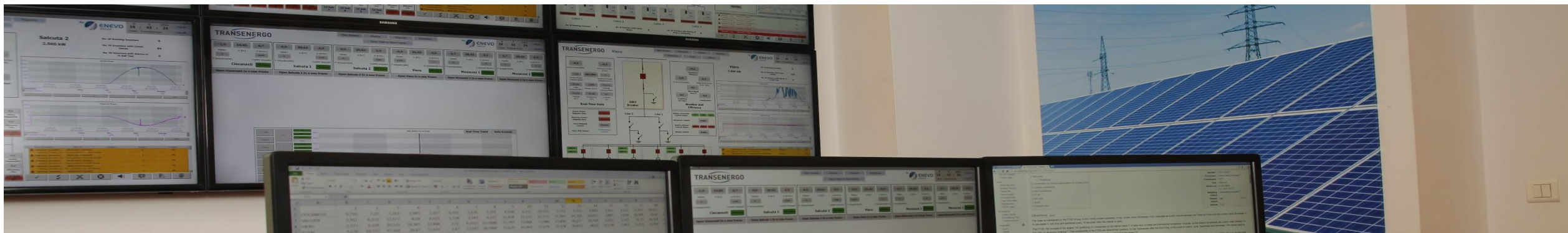
- Testing functionality in own laboratory prior to FAT
- Preliminary FAT and FAT with client presence
- Training of the client

### CONFIGURATION

- Control system configuration and software development
- Advance control applications
- Communication protocols
- Integration of the Control & Protection Systems
- HMI screens & reports

### SAT

- Onsite support to EPC/end user for appropriate wiring to Control system
- Control & Protection final configuration and testing



## Dispatch & Communications Services

- ENEVO Group delivers secure and fast communication systems and services for the energy sector, from initial design, through commissioning and to O&M
- Our staff has expertise in a wide range of communication infrastructure, protocols and secure networks communication and redundancy solutions
- Vast experience in dispatch architecture and implementation using IEC 60870-5-104 and Modbus protocols, sustaining up to 50000 Data Points
- Design and implementation of Renewable Energy Dispatcher Facilities with more than 1 GW monitored installed power

### Communication Infrastructure

- High-level and low-level design implementation and maintenance
- HMI configuration
- Communication & Automation software logic
- Database development and administration
- VPN Communication (site to site and remote access )
- Network Monitoring Solution
- Virtualized environments
- Gap analysis and goal achieving methodology
- Modbus, DNP, IEC 101,103 and 104, IEC 61850 protocols integrated

### Information Security

- Identity and access management
- Intrusion Detection System and Intrusion Prevention System (IDS&IPS)
- Data Loss Prevention
- Database Security
- VPNs
- Network Access Control
- Network Traffic/Behavior Anomaly Detection
- Protocol Filtering
- Distributed Denial of Service
- Unified Threat Management
- Network/Infrastructure penetration testing

### Monitoring & System Management

- Log/events collection and analysis
- Database activity monitoring
- Security information and Event Management
- Change Control

### FAT AND TRENING

- Testing functionality in own laboratory prior to FAT
- Preliminary FAT and FAT with client presence
- Training of the client



# Rehabilitation of Rolling Mill 1&2 - 34.5/13.8 kV S/S

**Client: SABIC– Hadeed Iron & Steel Company, Kingdom of Saudi Arabia**

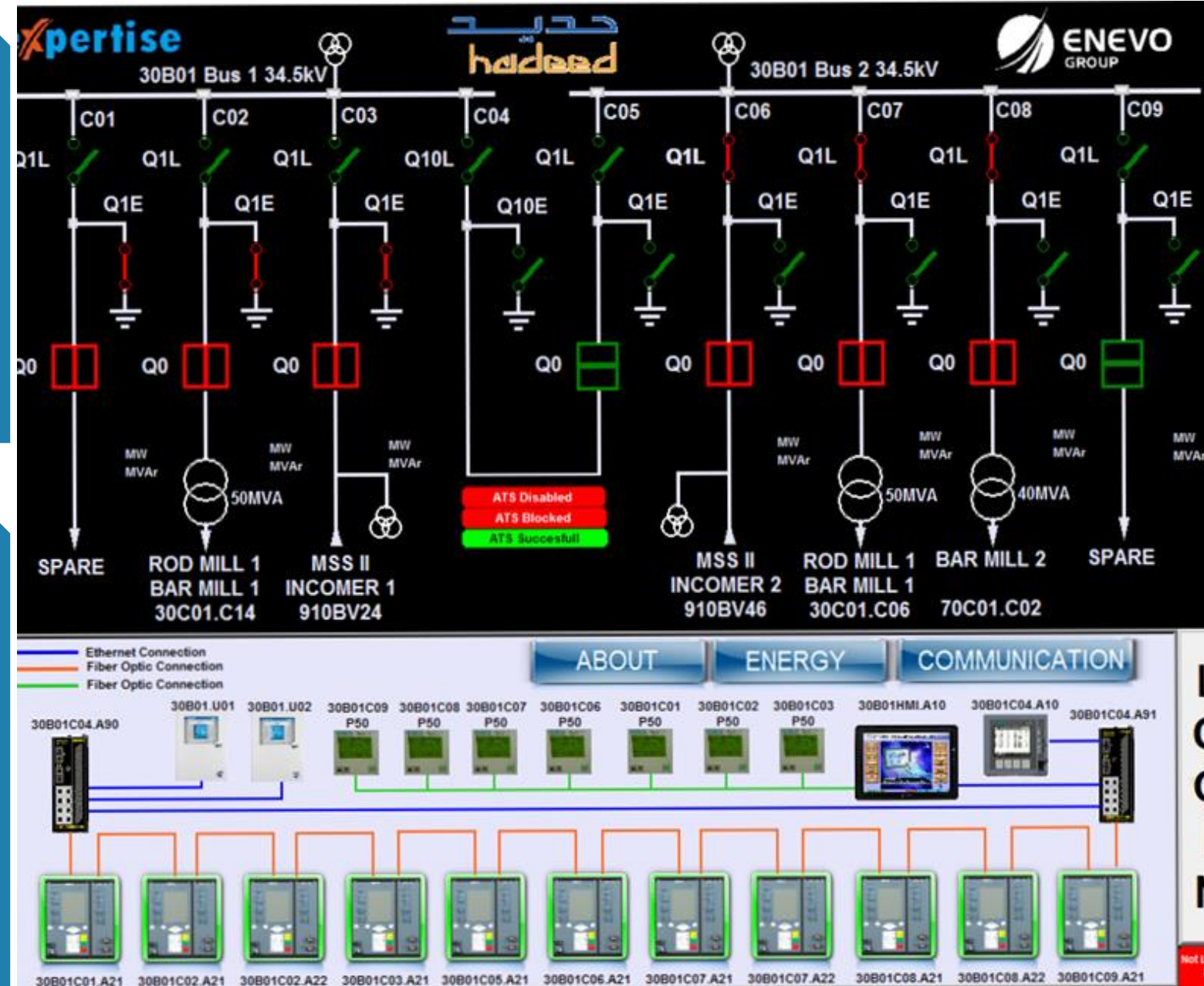
## Project Summary

- Replacement of 2x30/40MVA Transformers with 2x40/50MVA Siemens Transformers
- 2 x AVR Panels
- Replacement of 7 existing GIS with 9 new GIS Siemens Switchgear
- Replacement of 27 primary cables (7.200 m), 42 secondary cables (6.800 m), 156 cable joints

**ONLY 10 DAYS FOR EXECUTION**

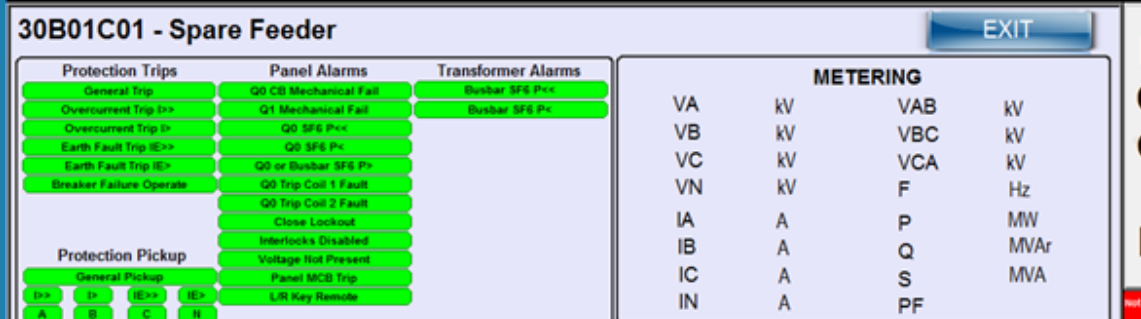
## Scope of Works

- General Management of the project
- Basic and detailed engineering; As-Built
- Procurement, delivery, erection, testing and commissioning of the primary equipment
- Cable laying and testing
- Protection Coordination Study, testing and settings implementation
- SCADA for the 34.5 kV Substation
- Training





**Client: SABIC – Hadeed Iron & Steel Company, Kingdom of Saudi Arabia**






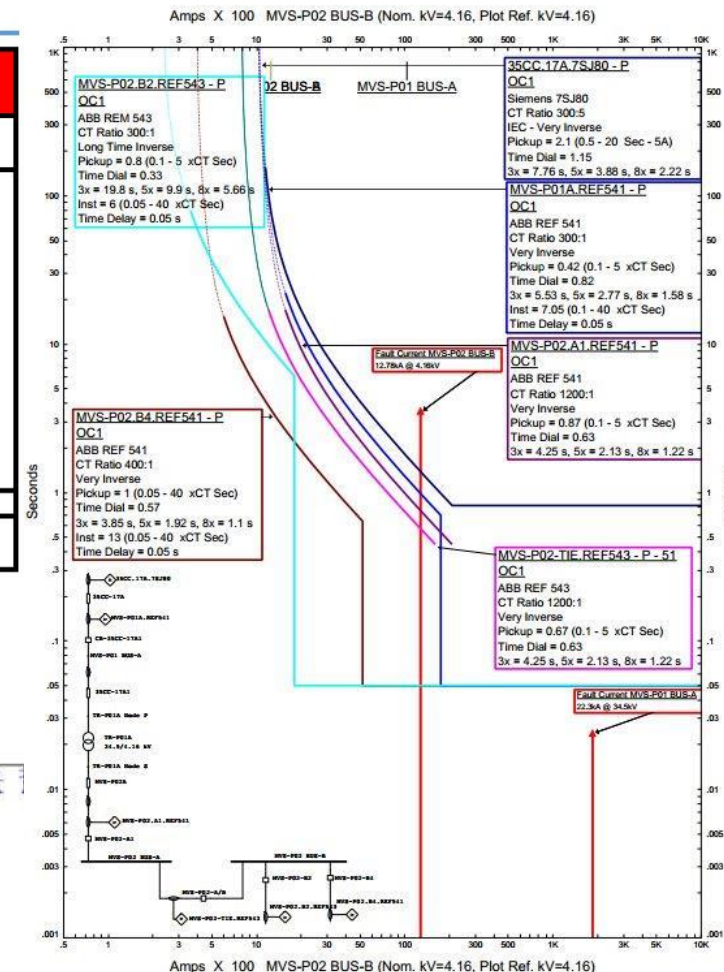
Client: SABIC – Sabtank Industrial Port – Jubail, Kingdom of Saudi Arabia

## Project Summary

- 30 affiliates
- 62 substations
- Voltage levels modeled: 34,5/13,8/6,6/0,4 kV
- More than 55.000 documents reviewed
- More than 1.000 Switchgear reviewed

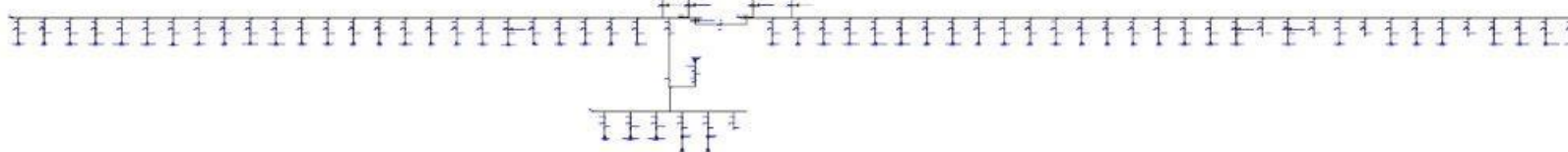
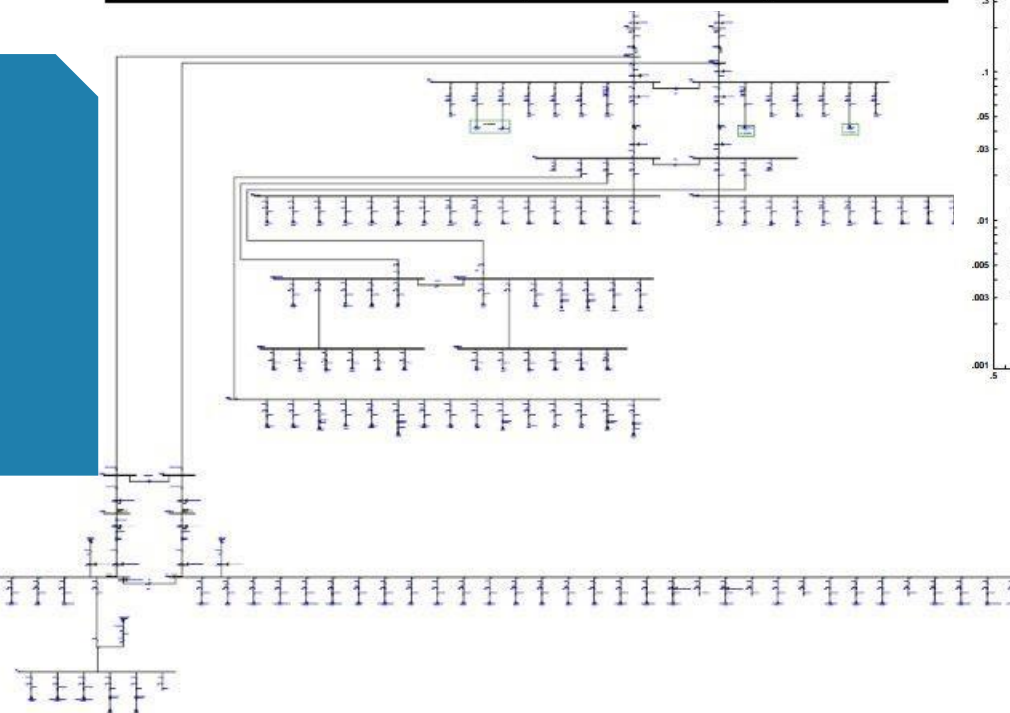
SABTANK ELECTRICAL HAZARD LABELS

<div>  <b>DANGER</b> </div>		
Arc Flash and Shock Hazard Appropriate PPE Required		
<b>Arc Flash Protection</b> <ul style="list-style-type: none"> <li>Flash Protection Boundary: <b>1.53 m</b></li> <li>Hazard Risk Category: <b>1</b></li> <li>Incident Energy at (cal/cm<sup>2</sup>): <b>3.9</b></li> </ul>		<b>Required PPE</b> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Hard Hat</li> <li><input checked="" type="checkbox"/> Safety Glasses</li> <li><input checked="" type="checkbox"/> Safety Goggles</li> <li><input checked="" type="checkbox"/> Face Shield</li> <li><input type="checkbox"/> Flash Hood*</li> <li><input checked="" type="checkbox"/> Ear Protection</li> <li><input type="checkbox"/> Long Pants</li> <li><input type="checkbox"/> Long Sleeve Shirt</li> <li><input checked="" type="checkbox"/> FR Shirt *</li> <li><input checked="" type="checkbox"/> FR Pants*</li> <li><input checked="" type="checkbox"/> FR Coverall*</li> <li><input type="checkbox"/> Flash Suite</li> <li><input checked="" type="checkbox"/> Leather Shoes</li> <li><input checked="" type="checkbox"/> Leather Gloves</li> </ul>
<b>Shock Protection</b> Shock Hazard when enclosure doors are closed Shock Hazard Voltage <b>4160V AC</b> <ul style="list-style-type: none"> <li>Limited Approach: <b>1.52 m</b></li> <li>Restricted Approach: <b>0.66 m</b></li> <li>Prohibited Approach: <b>0.18 m</b></li> </ul>		<b>Voltage Rated Gloves <b>7500V AC</b></b> *Minimum arc rating of 8 cal/cm <sup>2</sup>
Supply from: <b>Transformer XT-13</b> Equipment ID: <b>SA-13</b> Protective Device: <b>35CC – 8A</b>		Affiliate: <b>IBN-SINA</b> P.O. 4300036896 Date: Jan-2017



## Scope of Works

- Data Gathering
- As-Built Documentation
- ETAP Network modelling
- Protection coordination study
- Optimization Study



# Rehabilitation of SCADA & Protection System for 230/34,5/13,8kV MSS1

**Client: SABIC– Hadeed Iron & Steel Company, Kingdom of Saudi Arabia**

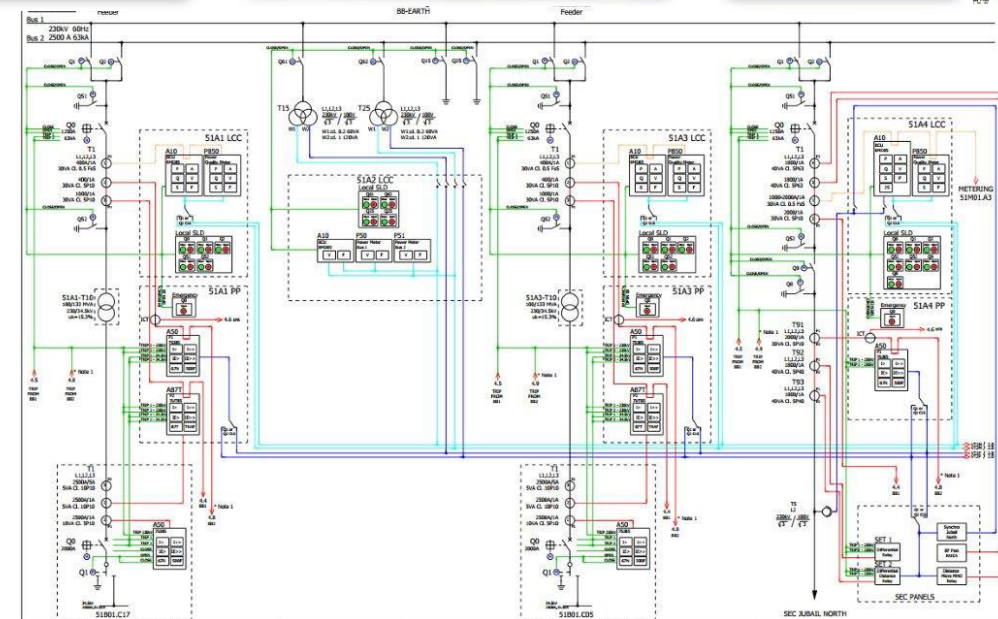
## Project Summary

- New protection system for GIS 230kV MSS1 (700 MVA, Interconnection with SEC)
- New protection system for 34,5kV MSS1
- New protection system for 13,8 kV MSS1
- New protection system for 13,8kV DR A/B/C
- 6 new AVR's
- SICAM PAS Upgradation for the utility
- Developing commissioning modifications and procedures



## Scope of Works

- General Management of the project
- Basic and detailed engineering; As-Built
- Procurement, delivery, erection, testing and commissioning of the equipment
- Protection Coordination Study, testing and settings implementation
- ATS, interlocks and interconnections
- Upgrade SCADA SICAM PAS with integration of other existing substations
- Training







# Complete SCADA, Protection system and DCS for the hydropower development of Jiu River

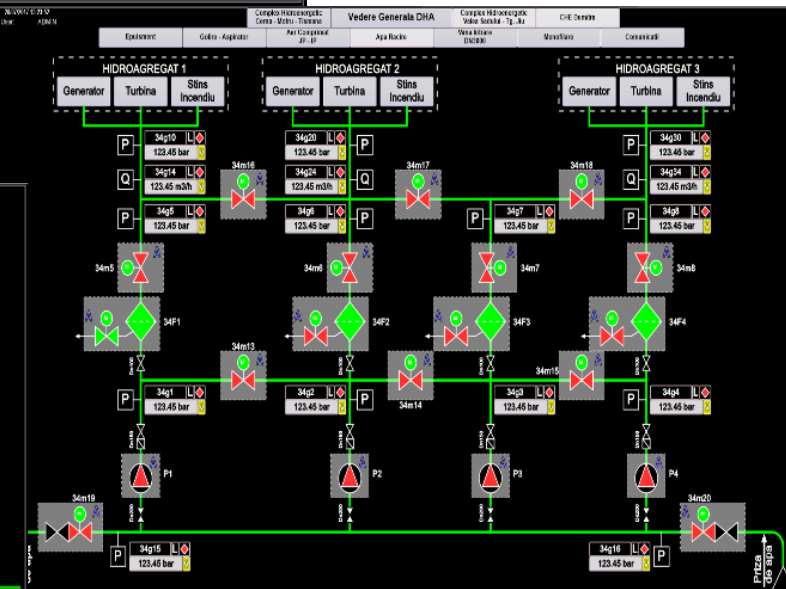
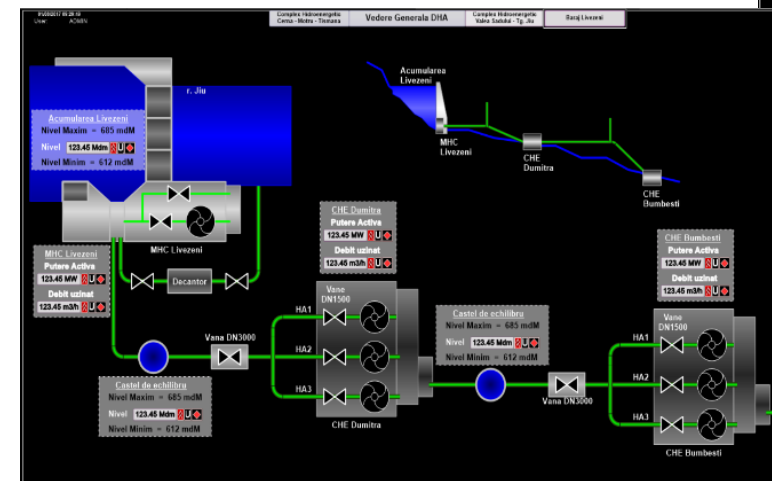
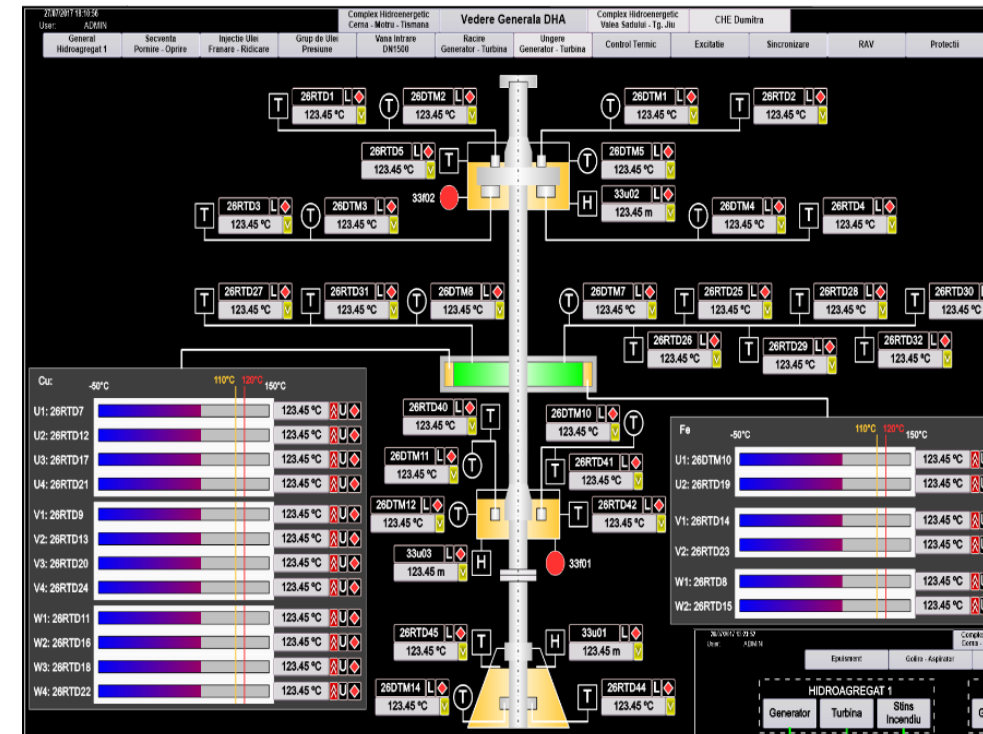
Client: Hidroelectrica, Romania

## Project Summary

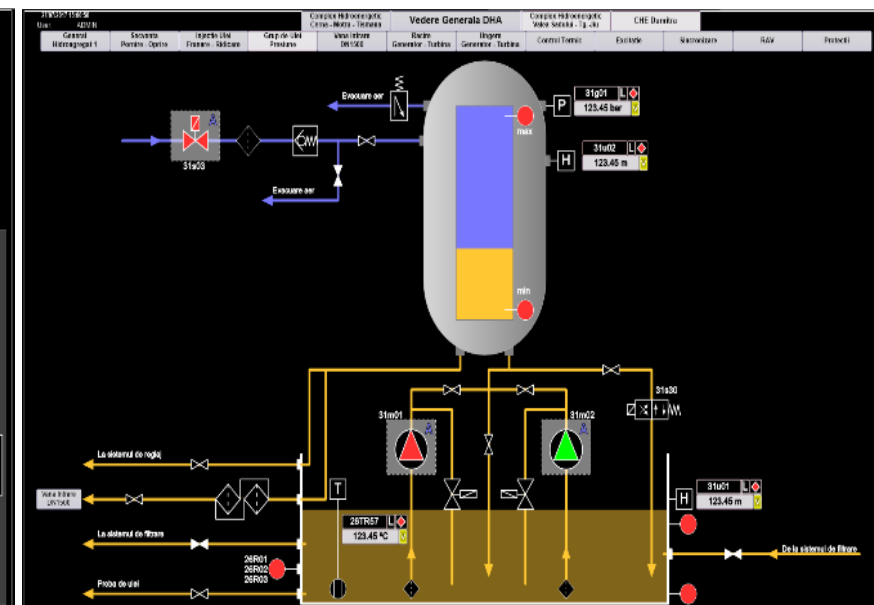
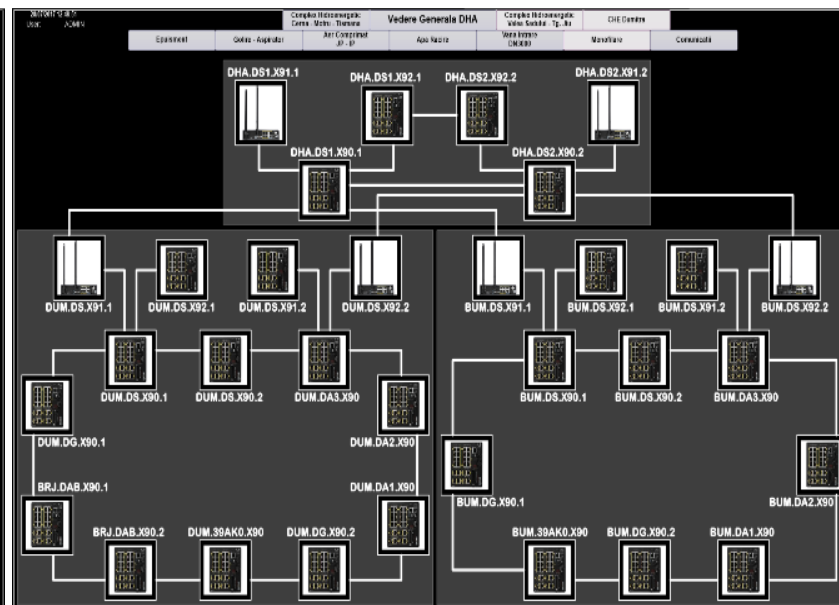
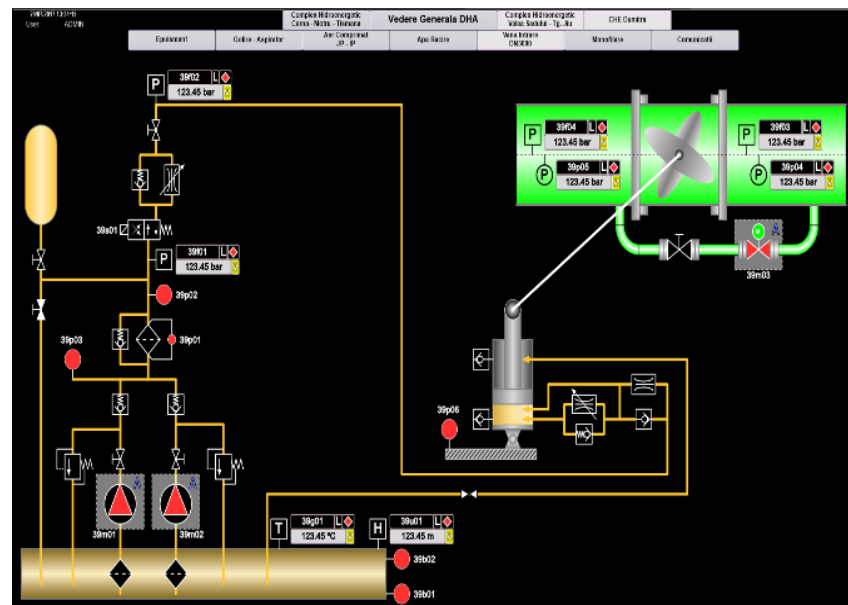
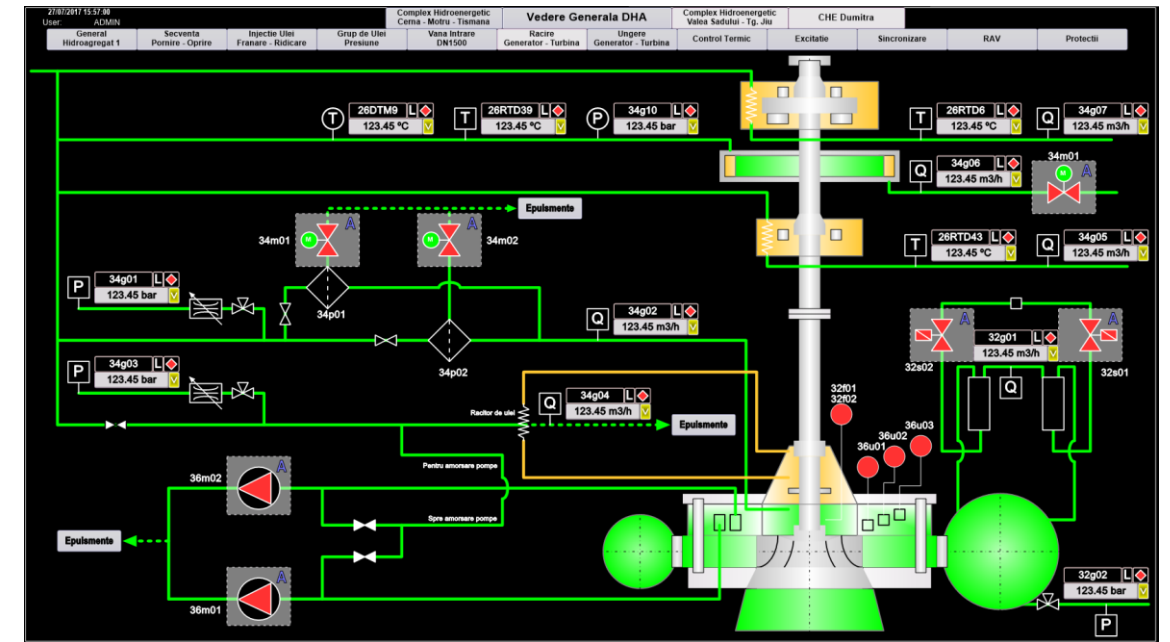
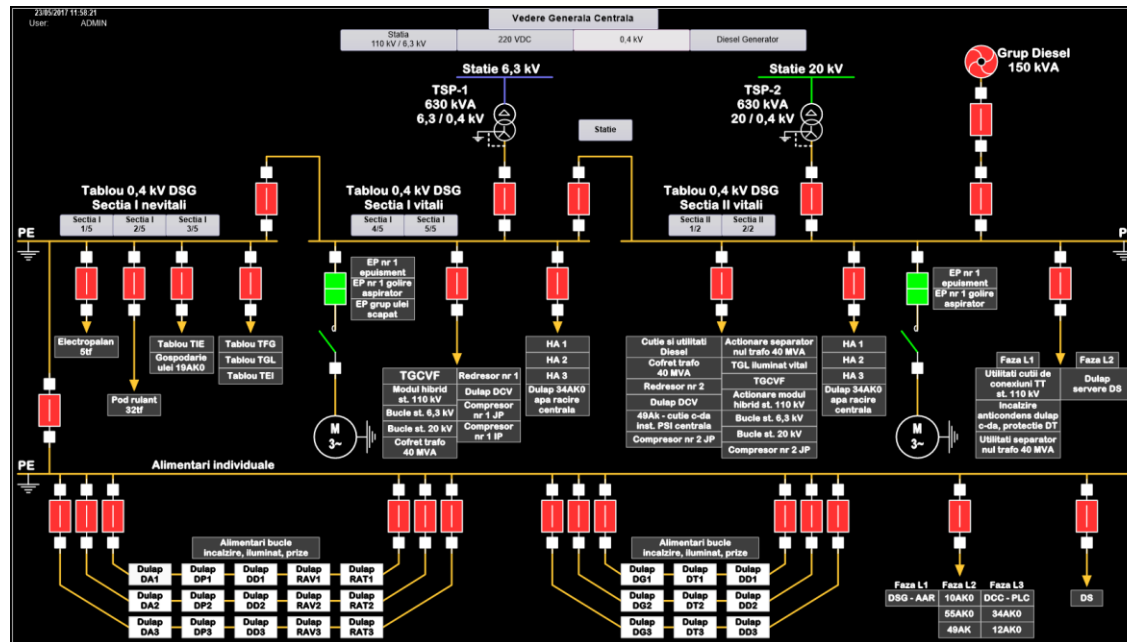
- Dumitra Hydropower Plant – 3 x Vertical Francis Turbines
- Bumbesti Hydropower Plant – 3 x Vertical Francis Turbines
- Livezeni Dam and Micro Hydropower Plant
- Regional Dispatch Center (DHA Tg Jiu)

## Scope of Works

- Basic and detailed engineering
- Automation equipment supply
- Electrical Protection Supply
- Livezeni Dam Installations supply
- PLC Programming
- Protection relay configuration
- Communication network development
- SCADA Software development
- Installation, testing and commissioning



# Control Systems and Protection for Power Plants





# Power factor Correction 16,8 MVar Project in SABIC

**Client: SABIC, Kingdom of Saudi Arabia**

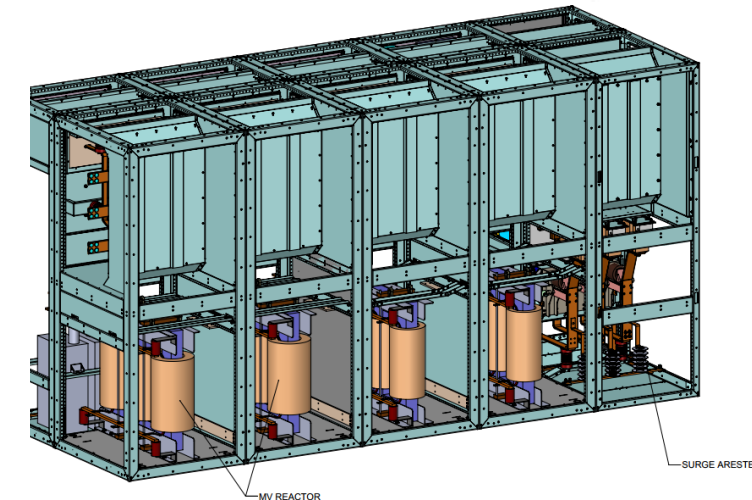
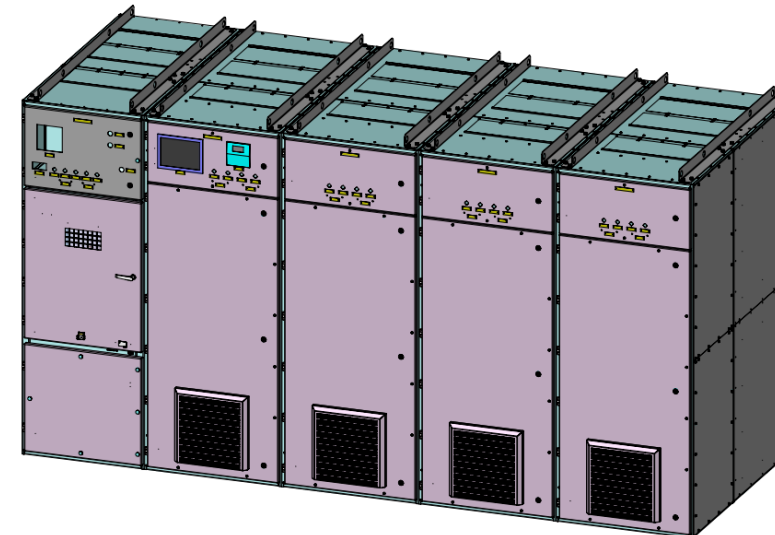
## Project Summary

- Installation of 4 sets of 3000 kVAr capacitors (voltage level 4.16kV)
- 2 steps of 1000 kVAr
- 2 steps of 500 kVAr
- Installation of 4 sets of 1200 kVAr capacitors (voltage level 0.48kV)
- 12 steps of 100 kVAr
- 0.96 Power Factor

**ONLY 5 DAYS FOR EXECUTION**

## Scope of Works

- Project management
- Power Factor Study
- Basic & Detail Engineering
- Procurement of Power factor Panels & Capacitors
- Testing and Commissioning of the System
- Integration in Hadeed SCADA System (ABB MicroSCADA)

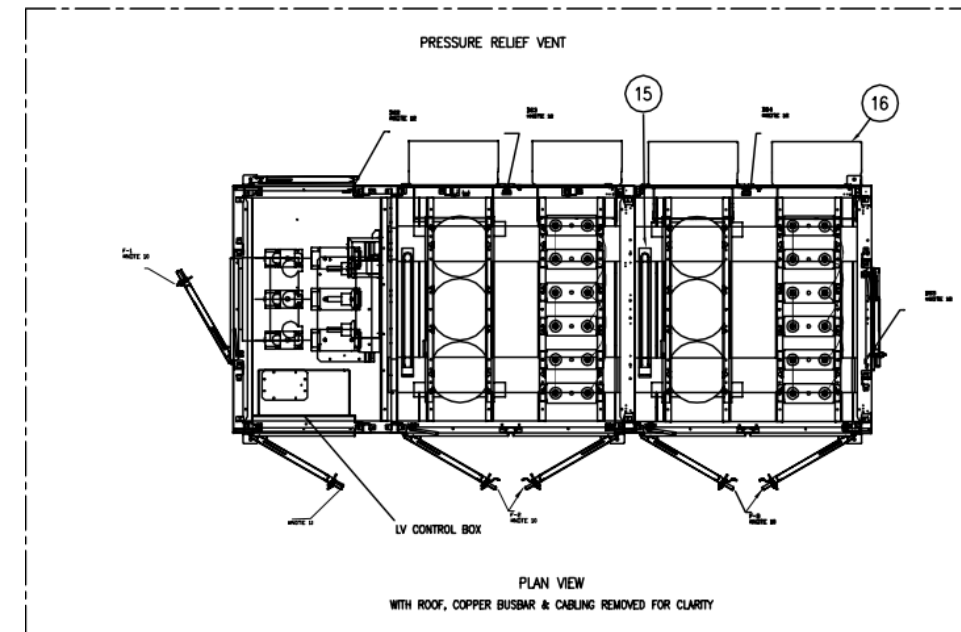


# Power factor Correction 7,5 MVar Project in SABIC

Client: SABIC, Kingdom of Saudi Arabia

## Project Summary

- Installation of 1 set of capacitors 2000kVar (voltage level 6.6kV)  
*4 steps of 500kVar*
- Installation of 1 set of capacitors 2500kVar (voltage level 6.6kV)  
*4 steps of 625kVar*
- Installation of 1 set of capacitors 3000kVar (voltage level 6.6kV)  
*4 steps of 750kVar*
- 0.96 Targeted Power Factor



## Scope of Works

- Power Factor Study
- Basic & Detail Engineering
- Procurement of Power factor Panels & Capacitors
- Testing and Commissioning of the System
- Integration in SCADA System (Honeywell)





# Transenergo Dispatch Center

**Client: Transenergo, Romania**

## Project Summary

- Turn-key development of renewables dispatch center integrated with the EMS-SCADA System of Transelectrica.
- +100 MW Installed power dispatched
- 110/20 kV Ciuperceni Substation integrated
- 7 x 20kV grid connection points integrated
- More than 60.000 Data Points Gathered
- Equipment from Phoenix Contact, National Instruments, General Electric
- Protocols used: IEC 60870-5-101, IEC 60870-5-104, Modbus, DNP 3.0

## Scope of Works

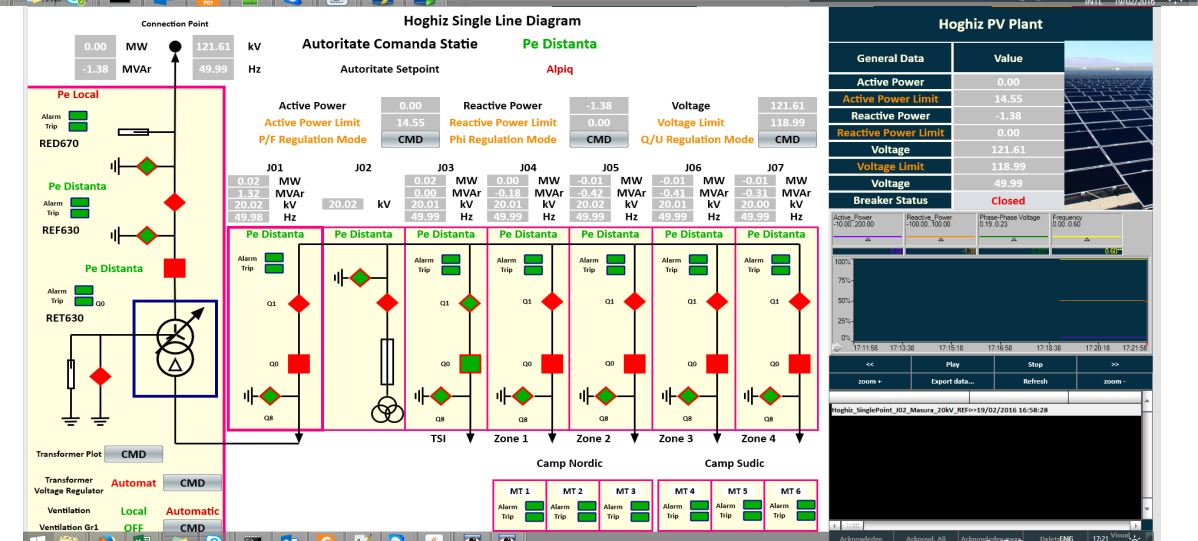
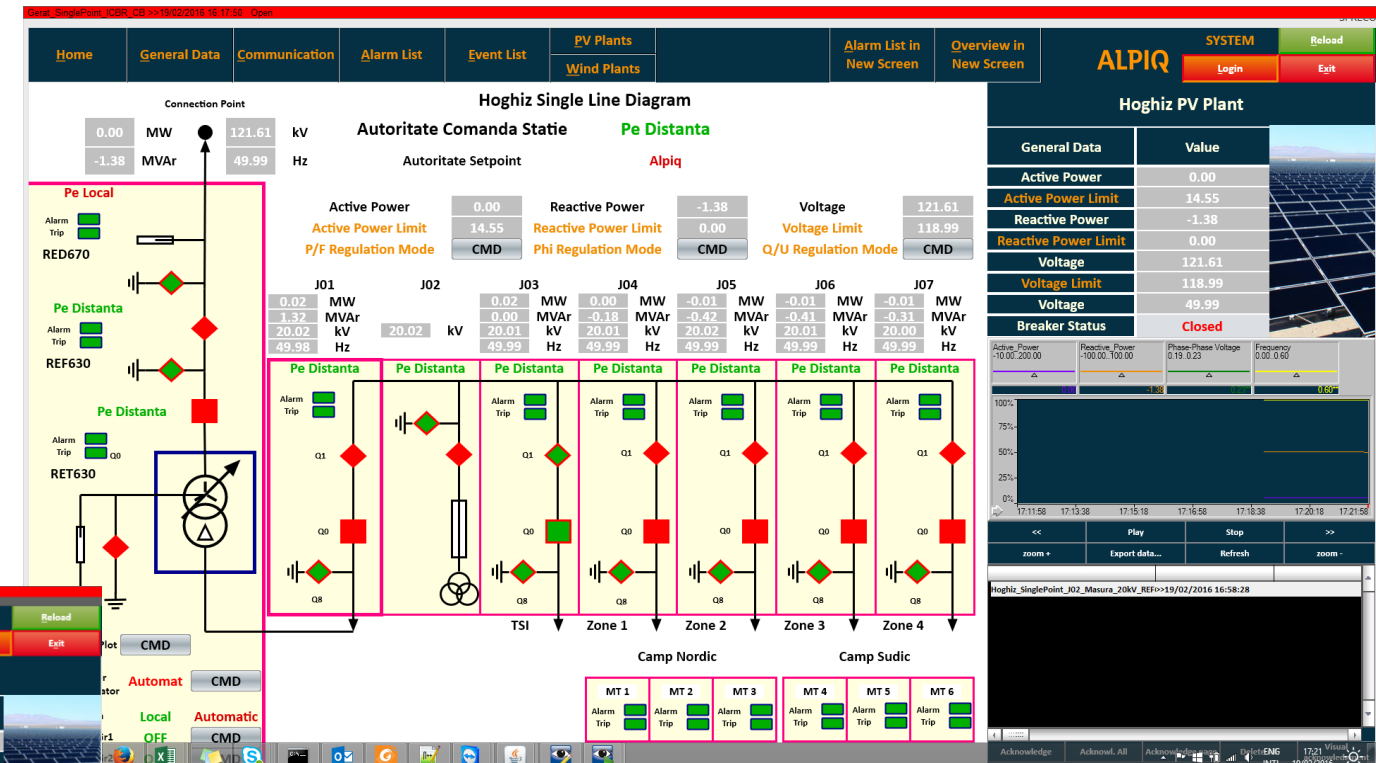
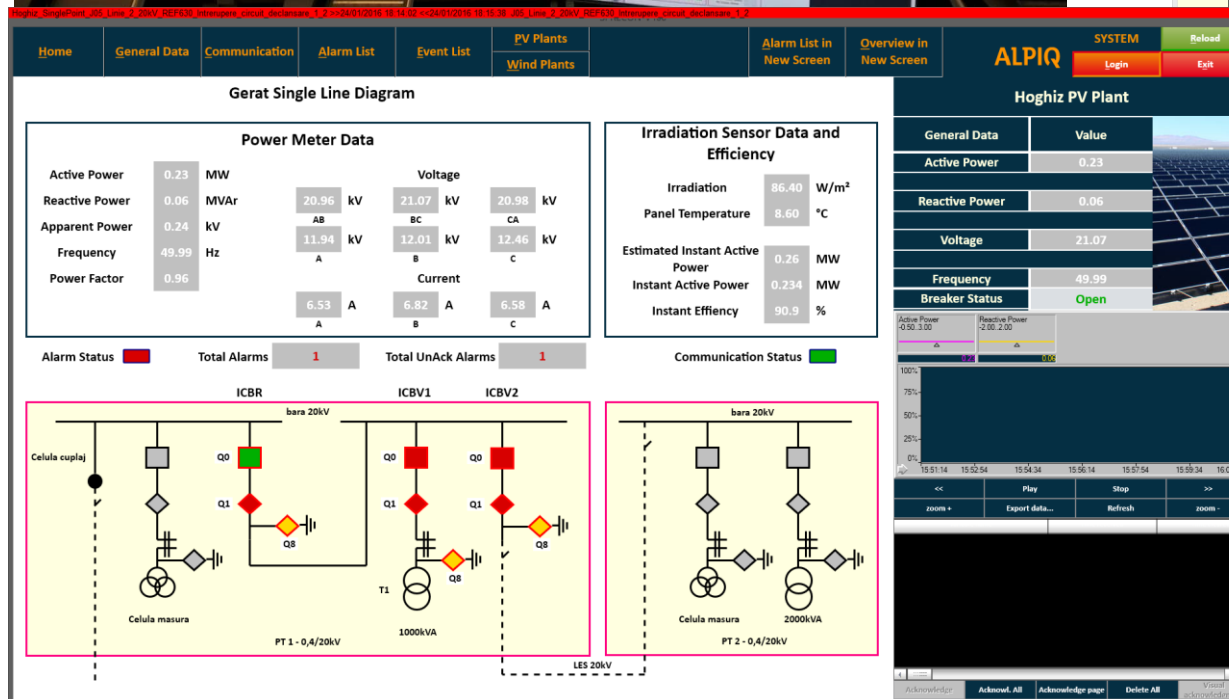
- Solution Design
- Hardware delivery and configuration
- Telecom infrastructure and cyber security
- SCADA Software Development
- Control algorithm
- Custom software for data analysis and reporting tool
- New plants integration
- 24/7 on-call technical assistance and system maintenance





# Alpiq Dispatch Center

Client: Alpiq, Romania







# Distributed Control System for autonomous desalination plant - Qatar

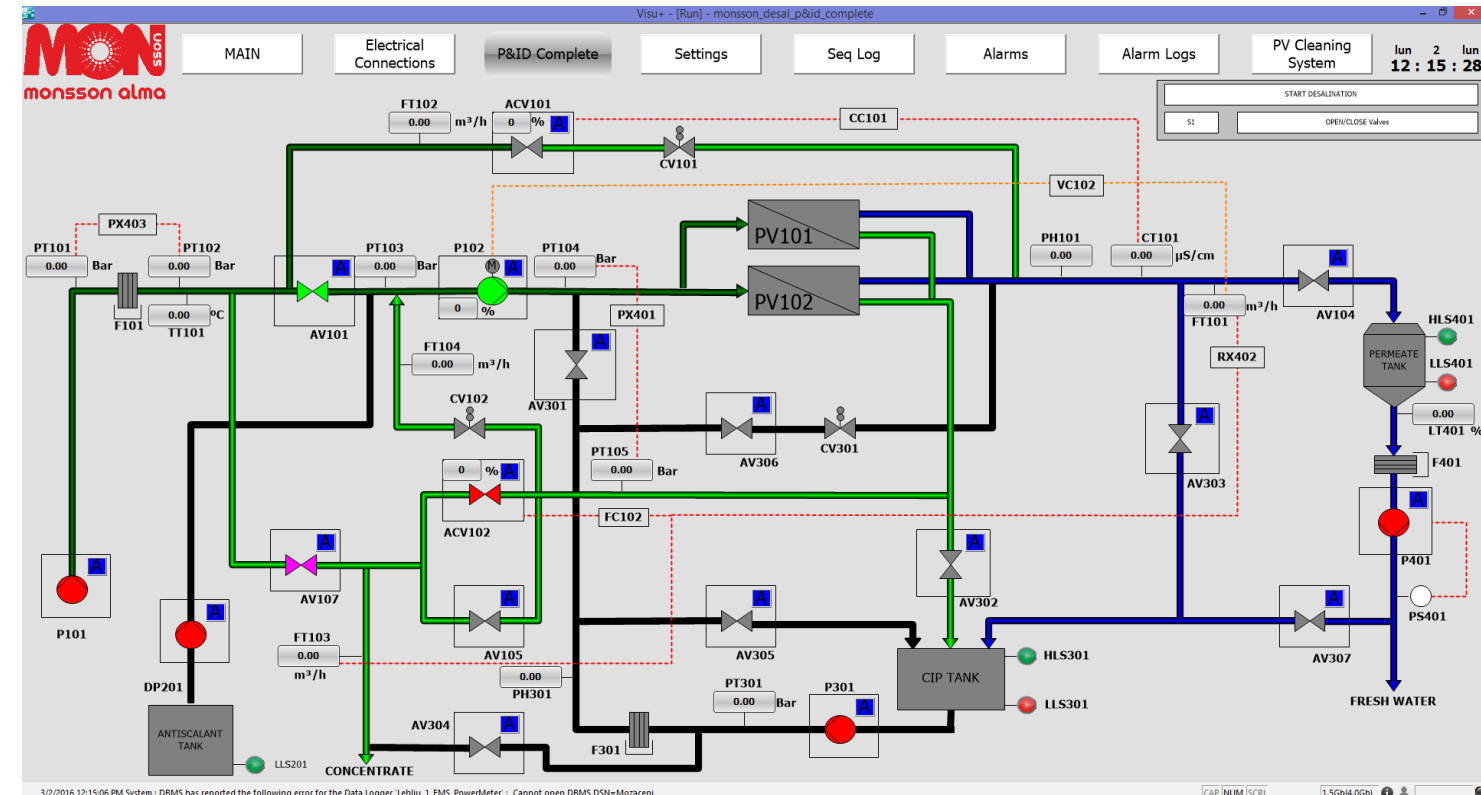
Client: Monsson, Romania

## Project Summary

- Reverse osmosis desalination plant
- Powered by a hybrid electrical system with grid, Photovoltaic modules, UPS and Diesel generator
- PV cleaning robot development

## Scope of Works

- Functional Design Specification, PID and SCADA design
- DCS System development
- Hybrid Power Supply Control Algorithm
- Dispatch integration
- Custom hardware development
- Hardware and Software custom autonomous cleaning robot development



SIEMENS



## Substation Automation & Protection Systems

#	PROJECT	SUMMARY	SERVICES
1	<b>Turn-key refurbishment of 34.5kV GIS Substation and 2x50MVA Transformers, Kingdom of Saudi Arabia</b> 2015-2017 <b>BENEFICIARY:</b> Hadeed Steel Factory, SABIC E&PM  <b>LOCAL PARTNER:</b> Expertise Contracting	Replacement of 2x30/40MVA Siemens Transformers with new 2x40/50MVA Siemens Transformers Replacement of existing GIS switchgear lineup with latest Siemens GIS switchgears. Replacement of 34,5kV primary and 13,8 kV secondary power cables Civil and erection works Critical 10 days commissioning during plant shutdown	<ul style="list-style-type: none"> <li>➤ Basic and detailed design</li> <li>➤ Procurement, delivery, installation and commissioning of new Siemens transformers</li> <li>➤ Procurement, delivery, installation and commissioning of new Siemens GIS switchgears</li> <li>➤ Protection Relay coordination and configuration</li> <li>➤ Automatic transfer switch functionality, interlocks and interconnection</li> <li>➤ SCADA integration</li> </ul>
2	<b>110/20kV Ciuperceni Substation, Romania</b> 2014 <b>BENEFICIARY:</b> Bester Generationes	Substation SCADA system, TSO and DSO integration.	<ul style="list-style-type: none"> <li>➤ Engineering and Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ SCADA software development</li> <li>➤ Protection Relay configuration</li> </ul>
3	<b>Replacement of 230kV marshalling &amp; protection panels, of protection relays in the 34.5&amp;13.8kV substations and upgrade of the existing SCADA</b> 2017-2019 <b>BENEFICIARY:</b> Hadeed Steel Factory, SABIC E&PM, KSA  <b>LOCAL PARTNER:</b> Romelectro Arabia	The marshalling and protection panels of the 230kV GIS switchgears in the MSS1 substation and of the protection relays for the 34.5kV/13.8kV switchgears in DR ABC and MSS1 substations are replaced with new panels and latest generation Siemens protection relays. The new relays, approx. 80 in total, will be integrated in the MSS1 SCADA system using IEC 61850 communication protocol and through a redundant fiber optics ring. The SICAM PAS SCADA will be updated and redesigned to reflect the new modifications.	<ul style="list-style-type: none"> <li>➤ Basic and detailed design</li> <li>➤ Procurement, delivery, installation and commissioning of new Siemens SIPROTEC5 protection relays</li> <li>➤ Protection Relay coordination and configuration</li> <li>➤ Automatic transfer switch functionality, interlocks and interconnection</li> <li>➤ SCADA integration</li> </ul>
4	<b>Automatic transfer scheme for the DC load at HVDC Melo Substation, Uruguay</b> 2015 <b>BENEFICIARY:</b> Alstom, Usinas y transmisiones Electricas (Uruguay TSO)	Using Omron SCADA and control platforms, a new automation transfer logic for the DC load was designed and implemented for the HVDC back-to-back substation between Brazil (60Hz) and Uruguay (50Hz). A remote monitoring solution was also installed.	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Equipment supply</li> <li>➤ PLC programming</li> <li>➤ Communication network development</li> <li>➤ HMI interface</li> <li>➤ Commissioning</li> </ul>



## Substation Automation & Protection Systems

#	PROJECT	SUMMARY	SERVICES
5	<b>Protection System for the hydropower development on the Livezeni-Bumbesti sector of the Jiu river, Romania.</b> 2016-2018 <b>BENEFICIARY:</b> Hidroelectrica  <b>MAIN CONTRATOR:</b> Romelectro	Dumitra HPP (24,5MW), Bumbesti HPP (54MW) and the Micro-hydro plant of the Livezeni Dam (260kW) are part of the same hydro-power development on the Jiu River, AHE Tg. Jiu.  The Protection System consists of new protection panels, designed by ENEVO Group, equipped with 12 – G60, 7- F650, 3 – L90, 2 – T60, 1 – D60 and 6 – D400 redundant RTUs.	<ul style="list-style-type: none"> <li>➤ Basic and detailed engineering</li> <li>➤ Equipment supply</li> <li>➤ Installation, Testing and Commissioning</li> <li>➤ Protection Relay configuration</li> <li>➤ Communication network development</li> <li>➤ Technical assistance</li> </ul>



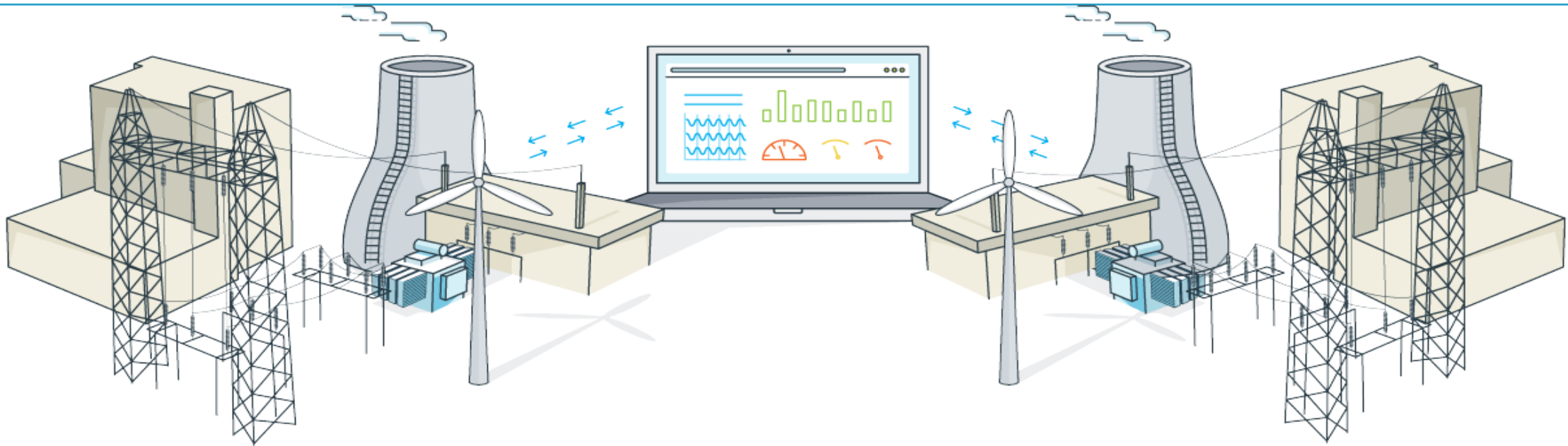
## Substation Automation & Protection Systems – Engineering and Consultancy

#	PROJECT	SUMMARY	SERVICES
1	<b>Protection Coordination Study for Hadeed Steel Factory, SABIC E&amp;PM, Kingdom of Saudi Arabia</b> 2014-2015 <b>BENEFICIARY:</b> Hadeed Steel Factory, SABIC E&PM <b>LOCAL PARTNER/</b> <b>MAIN CONTRACTOR:</b> Expertise Contracting	Hadeed Steel Factory has a complex electrical distribution network with voltage levels that range from 34.5 KV 0,48kV. The client needed a protection coordination study based on minimum and maximum fault level system for incoming supply. The goal was to isolate the fault source in minimum time and to provide maximum degree of protection to power equipment. The protection relays and power system modules are mostly ABB and Siemens.	<ul style="list-style-type: none"> <li>➤ Review Circuit Breaker &amp; Fuse Applications</li> <li>➤ Review device size or settings to meet system protection requirements</li> <li>➤ Recommendation of trip device settings for low voltage breakers</li> <li>➤ Recommendation of trip settings for medium and high voltage relays</li> <li>➤ Time current curves used to graphically illustrate selectivity between devices</li> <li>➤ Report of system coordination &amp; recommendation</li> <li>➤ ETAP model</li> <li>➤ Soft &amp; Hardcopy document result of system coordination &amp; recommendation</li> </ul>
2	<b>Arc Flash Hazard Study Analysis for SABTANK Industrial Port, Jubail Kingdom of Saudi Arabia</b> 2016 <b>BENEFICIARY:</b> SABTANK <b>LOCAL PARTNER/</b> <b>MAIN CONTRACTOR:</b> Expertise Contracting	King Fahad Industrial Port in Jubail has 30 affiliates from various industries that use its internal electrical grid. Each affiliate has built its own substations within the port grid, on the following voltage levels: 34,5/13,8/6,6/0,48 kV.  SABTANK needs an inventory of the documentation for the entire network and site validation, as built, and modelling and studies of the high, medium and low voltage grids.	<ul style="list-style-type: none"> <li>➤ On site data collection</li> <li>➤ Documentation inventory</li> <li>➤ As built documentation</li> <li>➤ ETAP Network modelling</li> <li>➤ Arch Flash Hazard Analysis</li> <li>➤ Protection Coordination Study</li> </ul>
3	<b>Tap Changer optimization for MSS2 Substation of Hadeed Steel Factory, SABIC E&amp;PM, Kingdom of Saudi Arabia</b> 2015-2016 <b>BENEFICIARY:</b> Hadeed Steel Factory, SABIC E&PM <b>LOCAL PARTNER/</b> <b>MAIN CONTRACTOR:</b> Expertise Contracting	On all voltage levels, the network supplied by MSS2 has approx. 100 transformers, with automated or manual tap changers. In order to increase the stability of the power supply the client requested a study for establishing new coordinated settings for each transformer.	<ul style="list-style-type: none"> <li>➤ On site data collection</li> <li>➤ ETAP Network modelling</li> <li>➤ Tap Changer study</li> <li>➤ Recommendation for new tap changer settings for each transformer</li> </ul>



## Substation Automation & Protection Systems – Engineering and Consultancy

#	PROJECT	SUMMARY	SERVICES
4	<b>Optimization of internal Electrical Network, CHEMANOL, Kingdom of Saudi Arabia</b> 2018 <b>BENEFICIARY:</b> CHEMANOL, Jubail, KSA <b>LOCAL PARTNER:</b> Romelectro Arabia	Project consists in providing a complex study of the distribution system of Chemanol, considering the changes made to it since the commissioning in 2008, and to provide remedial measures to the system's problems, most importantly, maintaining the supply of the critical load during SEC (grid) incomer failure or voltage dip.	<ul style="list-style-type: none"> <li>➤ ETAP model</li> <li>➤ Review Circuit Breaker &amp; Fuse Applications</li> <li>➤ Review of load flow and cable sizing</li> <li>➤ Recommendation of trip settings for medium and high voltage relays</li> <li>➤ Report of system coordination &amp; recommendation</li> </ul>
5	<b>Complete refurbishment of Topolog river MHPPs, Romania</b> 2014-2016 <b>BENEFICIARY:</b> Transenergo MicroHidro	Hidroelectric development of Topolog river consists of 5 MHPPs (Vadu Frumos, Salatrucu de Sus, Salatrucu de Jos, Suici, Cepari) with an installed power of 6MW.  Enevo Group is offering full engineering and consultancy services for complete rehabilitation, including new hidromechanical equipment, electrical equipment and penstock, intakes and power house.	<ul style="list-style-type: none"> <li>➤ Feasibility study</li> <li>➤ Basic and detailed engineering</li> <li>➤ Technical assessment of equipment and constructions</li> <li>➤ Execution details</li> <li>➤ Permits and authorizations</li> </ul>



## Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
1	<b>DCS System for the hydropower development on the Livezeni-Bumbesti sector of the Jiu river, Romania.</b> 2016-2018 <b>BENEFICIARY:</b> Hidroelectrica  <b>MAIN CONTRATOR:</b> Romelectro	<p>Dumitra HPP (24,5MW), Bumbesti HPP (54MW) and the Micro-hydro plant of the Livezeni Dam (260kW) are part of the same hydro-power development on the Jiu River, AHE Tg. Jiu.</p> <p>Enevo Group is offering the complete hardware and software solutions for the DCS and dispatch centers of the three HPPs and for the dispatch center of the entire development (DHA Tg. Jiu).</p> <p>SCADA HMI is based on Cimplicity from GE and the PLCs are Modicon from Schneider Electric</p> <p>The Protection System consists of new protection panels, designed by ENEVO Group, equipped with 12 – G60, 7- F650, 3 – L90, 2 – T60, 1 – D60 and 6 D400 redundant RTUs.</p>	<ul style="list-style-type: none"> <li>➤ Basic and detailed engineering</li> <li>➤ Equipment supply</li> <li>➤ Installation, Testing and Commissioning</li> <li>➤ PLC programming</li> <li>➤ Protection Relay configuration</li> <li>➤ Communication network development</li> <li>➤ SCADA software development</li> <li>➤ Technical assistance</li> <li>➤ SCADA integration of all equipment related to the automation systems of the HPPs</li> </ul>
2	<b>DCS System for the “Stejaru” hydropower plant, on Bistrita River, Romania.</b> 2018-2022 <b>BENEFICIARY:</b> Hidroelectrica  <b>MAIN CONTRATOR:</b> Romelectro	<p>Stejaru HPP (210MW) is one of the oldest and largest hydro power plants in Romania. It has the critical role in Romania's electrical grid: in case of a regional or national backout, Stejaru HPP is responsible for the Black Start (restarting the grid).</p> <p>Enevo Group provides the design of the process control systems and is procuring and manufacturing the control panels for the HPP systems, the dispatching center, including the SCADA software and ITC systems.</p> <p>SCADA HMI is based on PlantStruxure Process Expert System (PES) from Schneider Electric and the PLCs are Modicon, also from Schneider Electric.</p>	<ul style="list-style-type: none"> <li>➤ Basic and detailed engineering</li> <li>➤ Equipment supply</li> <li>➤ Installation, Testing and Commissioning</li> <li>➤ PLC programming &amp; Protection Relay configuration</li> <li>➤ Communication network development</li> <li>➤ SCADA software development</li> <li>➤ SCADA integration of all equipment related to the automation systems of the HPPs</li> </ul>
3	<b>SCADA software upgrade from RSView to Factory Talk View, Otelinox, Targoviste</b> 2018 <b>BENEFICIAR:</b> Otelinox  <b>MAIN CONTRACTOR:</b> Rockwell Automation	<p>Otelinox had an automation system of it's Rolling Mill based on legacy software from Rockwell Automation, RSView, and wanted to upgrade the system to the current SCADA software solution, Factory Talk View.</p> <p>Rockwell Automation Romania, as main contractor, hired ENEVO Group to completely reprogram the SCADA application. (Because of the different philosophy of Factory Talk View platform, a direct upgrade was not possible, so the only solution was to redo the control algorithm and the HMI screens in the new software environment.</p>	<ul style="list-style-type: none"> <li>➤ SCADA software development</li> <li>➤ Technical assistance</li> <li>➤ SCADA integration of rolling mill automation equipment</li> </ul>



## Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
4	<b>PLC Systems Preventive &amp; Corrective Maintenance for SABTANK Industrial Port, Kingdom of Saudi Arabia</b> 2018 <b>BENEFICIARY:</b> SABTANK  <b>LOCAL PARTNER:</b> Romelectro Arabia	<p>SABTANK has approximately 50 PLCs from various manufacturers, including some obsolete. It required an inventory and a detailed report regarding the type of PLC, hardware configuration, back-ups, obsolescence status etc. Recommendations were made regarding equipment replacements, upgrades or missing software. Corrective maintenance was performed on the PLCs that had functionality issues.</p> <p>PLC manufacturers: GE-Fanuc, Allen Bradley, Siemens, Schneider Electric</p>	<ul style="list-style-type: none"> <li>➤ On site data collection</li> <li>➤ Documentation inventory</li> <li>➤ PLC status reports</li> <li>➤ PLC Configurations</li> <li>➤ 24/7 Normal &amp; emergency call</li> <li>➤ 2 Hours emergency response time</li> </ul>
5	<b>Power Factor Solution for Ar Razi Saudi Methanol Company, Kingdom of Saudi Arabia</b> 2017-2018 <b>BENEFICIARY:</b> Ar Razi, SABIC E&PM  <b>LOCAL PARTNER:</b> Expertise Contracting	<p>Design, procurement, testing and commissioning of 3 capacitor banks totaling 7.5MVAR, for three MV substations inside Ar Razi plant.</p> <p>The capacitor bank type is ABBACUS, manufactured by ABB.</p> <p>ENEVO Group designed a new controller for the capacitor banks, using National Instruments PLCs, increasing the versatility of the controls and integrating them into the substations SCADA systems.</p>	<ul style="list-style-type: none"> <li>➤ Data collection and system dimensioning</li> <li>➤ Basic and detailed design</li> <li>➤ Testing and commissioning of the capacitor banks</li> <li>➤ SCADA integration</li> </ul>
6	<b>Refurbishment of 6 PFC Panels, Specialty Chem, Kingdom of Saudi Arabia</b> 2018 <b>BENEFICIARY:</b> Specialty CHEM, SABIC  <b>LOCAL PARTNER:</b> Romelectro Arabia	<p>Replacement of defective capacitors from 6 PFC panels. totaling 1.8MVARs, and installation of new power factor controllers.</p> <p>Capacitors and controllers manufactured by ABB.</p>	<ul style="list-style-type: none"> <li>➤ Data collection and system dimensioning</li> <li>➤ Basic and detailed design</li> <li>➤ Testing and commissioning of the capacitor banks</li> </ul>

## Process Control & Electrical Automation

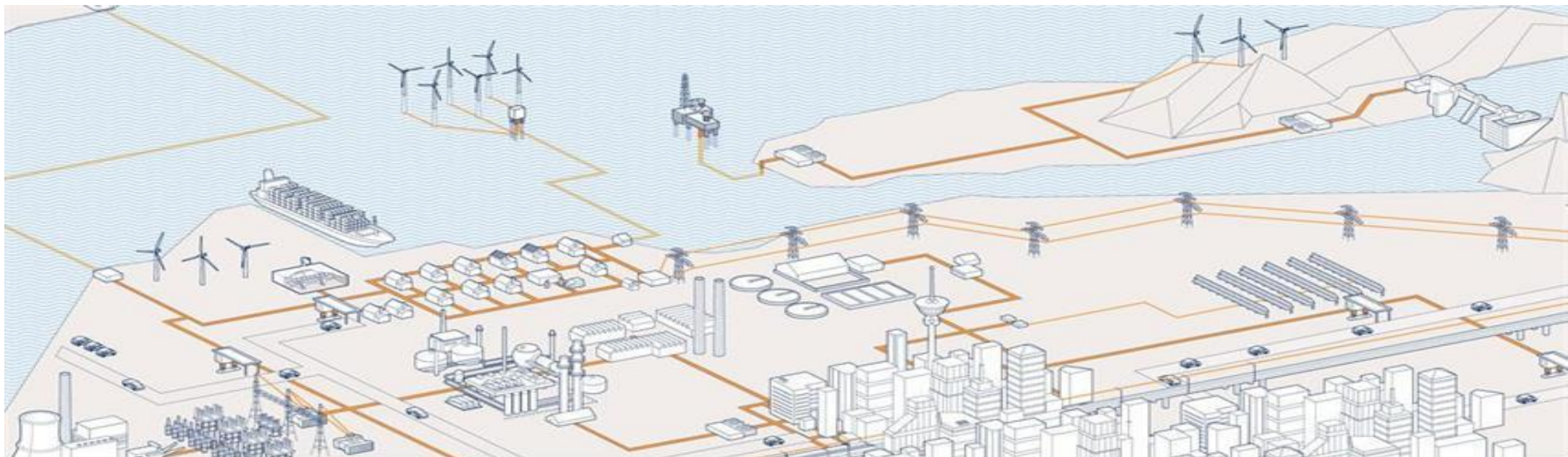
#	PROJECT	SUMMARY	SERVICES
7	<b>Power Factor Solution for MSS2, Hadeed Steel Factory, Kingdom of Saudi Arabia</b> 2015-2017 <b>BENEFICIARY:</b> Hadeed Steel Factory, SABIC E&PM <b>LOCAL PARTNER:</b> Expertise Contracting	Improve to 0.98 the power factor of the network supplied through MSS2 by installing 4x3000kVAR Capacitor banks on the 13,8kV side and 4x1200kVAR Capacitor banks on the 0,48kV side.	<ul style="list-style-type: none"> <li>➤ Data collection and system dimensioning</li> <li>➤ Basic and detailed design</li> <li>➤ Manufacturing, installation and commissioning of the capacitor banks</li> <li>➤ SCADA integration</li> <li>➤ Protection Relays configuration</li> </ul>
8	<b>Caster Booster Pumps, Hadeed Steel Factory, Kingdom of Saudi Arabia</b> 2015 <b>BENEFICIARY:</b> Hadeed Steel Factory, SABIC E&PM <b>LOCAL PARTNER:</b> Expertise Contracting	SCADA integration via hardwire and Profibus protocol of two Variable Frequency Drives for two pumps that are part of the Caster cooling system. The information from the two VFDs was collected by a Siemens S7 300 PLC that relayed it further to the WinCC SCADA workstations via Profibus. The control logic was implemented in the S7 300 using STL programming. Some Ladder and FDB components were also used. The two VFDs were integrated in the WinCC by updating the HMI to accommodate the new equipment: overview screens, details screens, commands and settings screens were created or modified, updating the WinCC alarms and the data logging procedure.	<ul style="list-style-type: none"> <li>➤ Basic and detailed design</li> <li>➤ Procurement, delivery, installation and commissioning of new VFDs</li> <li>➤ Communication between VFD controllers and S7 300 PLC</li> <li>➤ S7 300 control logic implementation</li> <li>➤ Integration of the new VFDs into the WinCC SCADA.</li> </ul>
9	<b>Distributed Control System (DCS) for autonomous desalination plant, Qatar</b> 2016 <b>BENEFICIARY:</b> Monsson Alma	Automation of an autonomous, containerized desalination plant powered by a hybrid electrical system consisting of grid supply, PV modules, UPS and Diesel Generator. The automation included both the monitoring and control of the reverse osmosis process and the logic for the power supply mix. The logic for both processes was implemented on a Siemens S7 1500 PLC. Communication with the PLC was implemented via hardwire and Modbus TCP (from the UPS) and a proprietary protocol (from the Aurora inverter) and RS485 (from 3 power meters). The S7 1500 also gathers data, sends commands, and provides time synchronization, via Modbus TCP, to the controller of an automated cleaning system for the PV panels. The hardware and software for the controller of the cleaning system is designed by Enevo Group.	<ul style="list-style-type: none"> <li>➤ Functional Design Specification, PID and SCADA design</li> <li>➤ DCS System development</li> <li>➤ Hybrid Power Supply Control Algorithm</li> <li>➤ Dispatch integration</li> <li>➤ Custom hardware and software development</li> </ul>



# References

## Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
10	<b>SCADA Upgrade of 230/34,5/ 13,8/0,48 kV Main Substation 1 of Hadeed Steel Factory, Kingdom of Saudi Arabia</b> 2016 <b>BENEFICIARY:</b> Siemens KSA, SMS Siemag, Lux Automation  <b>LOCAL PARTNER:</b> Expertise Contracting	<p>MSS1 is the connection between Saudi Electricity Company and Hadeed Steel Factory, with an installed power of approx. 700MVA, supplying two Arc furnaces and two Casters.</p> <p>Our job was the integration of 7 Siprotec4 protection relays in the SICAM PAS SCADA using IEC 61850 protocol. The data gathered by SICAM PAS were processed and sent to workstations running PAS CC, a specialized version of WinCC with a set of libraries specific for the energy field.</p> <p>The PAS CC upgrade consisted of :</p> <ul style="list-style-type: none"> <li>Faceplates for the 7 new switchgears and displaying the data from the protection relays</li> <li>New command and control screens for the new switchgears</li> <li>Upgrading the overview screens to include the new switchgears</li> <li>Upgrading the alarms list and the data logging component</li> </ul>	<ul style="list-style-type: none"> <li>➤ SICAM PAS System Upgrade</li> <li>➤ Integration of new Siemens Siprotec4 Protection Relays into the Substation SCADA System on IEC 61850 protocol</li> <li>➤ Integration into PAS CC SCADA HMI</li> </ul>



# References

## Process Control & Electrical Automation – Engineering & Consultancy

#	PROJECT	SUMMARY	SERVICES
1	<b>Consultancy for the implementation of a new Process Control Solution in Lactate Harghita &amp; Covalact Sfantu Gheorghe, Romania</b> 2015-2016 <b>BENEFICIARY:</b> Lactate Harghita, Covalact Sfantu Gheorghe	<p>Lactate Harghita and Covalact Sfantu Gheorghe are food and beverages factories that expanded heterogeneously through the years, resulting in a fragmented control system. The owner needed to upgrade to a modern and unitary process control system, based on a clear and complete image of the existing control system.</p> <p>We did an inventory of the automation equipment in the two factories, including the wiring diagrams for the existing automation panels.</p> <p>We identified all PLCs, mainly Siemens S7, identified and validated all I/O modules, validated the communication on Profibus and Profinet, and backed-up all PLC configurations.</p> <p>A technical project was delivered for the upgrade of the process control system that the client put into its future investment plan.</p>	<ul style="list-style-type: none"> <li>➤ On site data collection</li> <li>➤ As built drawings for the electrical and automation systems</li> <li>➤ Basic design for the new control system based on SIMATIC WinCC and S7 PLCs.</li> </ul>





## Dispatch Centers

#	PROJECT	SUMMARY	SERVICES
1	<b>Upgradation of Monsson Dispatch Center</b> 2015–2016 <b>BENEFICIARY:</b> Monsson Alma	New SCADA solution for the integration of existing EMS and dispatched plants Software platform: VISU+, Phoenix Contact	<ul style="list-style-type: none"> <li>➤ Solution design</li> <li>➤ SCADA software development</li> </ul>
2	<b>Transenergo Dispatch Center</b> 2014–2015 – turn-key Ongoing – maintenance and technical assistance <b>BENEFICIARY:</b> Transenergo COM SA	Turn-key development of renewables dispatch center integrated with the EMS-SCADA System of Transelectrica. +100 MW Installed power dispatched 110/20 kV Ciuperceni Substation integrated 7 x 20kV grid connection points integrated More than 60.000 Data Points Gathered Equipment from Phoenix Contact, National Instruments, General Electric Protocols used: IEC 60870-5-101, IEC 60870-5-104, Modbus, DNP 3.0	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Hardware delivery and configuration</li> <li>➤ Telecom infrastructure and cyber security</li> <li>➤ SCADA Software Development</li> <li>➤ Control algorithm</li> <li>➤ Custom software for data analysis and production reports</li> <li>➤ New plants integration</li> <li>➤ 24/7 on-call technical assistance and system maintenance</li> </ul>
3	<b>Alpiq Dispatch Center</b> 2015–2016 – turn-key 2015–2018 – 24/7 maintenance and technical assistance <b>BENEFICIARY:</b> Alpiq Romindustries S.R.L	Turn key development of renewables dispatch center integrated with the EMS-SCADA System of Transelectrica. +45 MW Installed power dispatched 110/20 kV Hoghiz Substation integrated 4 x 20kV grid connection points integrated +10.000 Data Points Gathered Equipment from GE, Sprecher Automation, Phoenix Contact, Protocols used: IEC 60870-5-101, IEC 60870-5-104, Modbus, DNP 3.0	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Hardware delivery and configuration</li> <li>➤ Telecom infrastructure and cyber security</li> <li>➤ SCADA Software Development</li> <li>➤ Control algorithm</li> <li>➤ Custom software for data analysis and production reports</li> <li>➤ New plants integration</li> <li>➤ 24/7 on-call technical assistance and system maintenance</li> </ul>

Integrated Solutions for the Energy Value Chain

## Process Control for Renewable Power Plants

#	PROJECT	SUMMARY	SERVICES
1	<b>Onesti 18 MW PV Plant, Romania</b> 2014-2016 <b>BENEFICIARY:</b> Skybase Energy	Turn-key SCADA solution More than 20.000 points collected from +600 field devices 2 x 6kV grid connection points integrated Protocols used: Modbus, IEC 104, IEC 101 Equipment used: Phoenix Contact, National Instruments, GE Devices monitored: SunGrow Inverters, Schneider Measurements Units, ABB & GE Protection Relays, Sensors and transducers	<ul style="list-style-type: none"> <li>➤ Turn-key SCADA solution</li> <li>➤ More than 20.000 points collected from +600 field devices</li> <li>➤ 2 x 6kV grid connection points integrated</li> <li>➤ Protocols used: Modbus, IEC 104, IEC 101,</li> <li>➤ Equipment used: Phoenix Contact, National Instruments, General Electric</li> <li>➤ Devices monitored: SunGrow Inverters, Schneider Measurements Units, ABB &amp; GE Protection Relays, Sensors and transducers</li> </ul>
2	<b>Mozaceni 9+4 MW PV Plant, Romania</b> 2014-2015 <b>BENEFICIARY:</b> Sun Evolution	Turn-key SCADA solution More than 5.000 points collected 2 x 20kV grid connection points integrated Protocols used: Modbus, IEC 104, IEC 101, IEC 61850 Equipment used: Phoenix Contact, National Instruments, GE Devices monitored: AEG Protect PV, GE Protection relays, power meters	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ Hardware configuration</li> <li>➤ SCADA Software Development</li> <li>➤ Active &amp; reactive power and voltage control algorithm</li> <li>➤ Delivery of 20 kV Substation</li> <li>➤ IEC 61850 SCADA integration in 110/20kV Mozaceni Substation</li> </ul>
3	<b>Vieru 7MW PV Plant, Romania</b> 2014 <b>BENEFICIARY:</b> Transenergo	Turn-key SCADA solution More than 15.000 points collected 1 x 20kV grid connection points integrated Protocols used: Modbus, IEC 104, Aurora Devices monitored: Power One Inverters, Schneider Measurements Unit, GE Protection Relays, sensors and transducers	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ Hardware configuration</li> <li>➤ SCADA Software Development</li> <li>➤ Active &amp; reactive power control algorithm</li> <li>➤ Manufacturing, delivery and integration of power factor correction system</li> </ul>
4	<b>Lukoil 9 MW PV Plant inside Petrotel Refinery, Romania</b> 2014 <b>BENEFICIARY:</b> Lukoil Energy and Gas	Turn-key SCADA solution More than 20.000 points collected from +300 field devices Protocols used: Modbus, IEC 104, IEC 101, DNP 3.0, OPC, Aurora Equipment used: Phoenix Contact, National Instruments, General Electric Devices monitored: Power One Inverters, SNV Engineering String Combiners, Schneider Measurements Units, ABB & GE Protection Relays, Sensors and transducers	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ SCADA Software Development</li> <li>➤ Active and reactive power control algorithm</li> <li>➤ Installation of GE D400 Substation Gateway</li> <li>➤ Integration of the plant controller with the refinery DCS</li> </ul>



## Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
12	<b>Ciocanesti 2 MW PV Plant, Romania</b> 2014 <b>BENEFICIARY:</b> Transenergo	Turn-key SCADA solution More than 5.000 points collected 1 x 20kV grid connection points integrated Protocols used: Modbus, IEC 104, Aurora Equipment used: Phoenix Contact, Schneider, GE, National Instruments Devices monitored: Power One Inverters, Schneider Measurements Units, Schneider Protection Relays	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ Hardware configuration</li> <li>➤ SCADA Software Development</li> <li>➤ Active &amp; reactive power control algorithm</li> <li>➤ Manufacturing, delivery and integration of power factor correction (PFC) system</li> </ul>
13	<b>Crevedia 3+3+1,5+2,5 MW PV Plant, Romania</b> 2014 <b>BENEFICIARY:</b> Sun Partners	Upgrading the existing SCADA system with active and reactive power control functionality	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Active &amp; reactive power control algorithm</li> <li>➤ Custom hardware &amp; software development for Aurora protocol gateway</li> </ul>
14	<b>36MW Vestas Windfarm Projects, Romania</b> 2014-2015 <b>BENEFICIARY:</b> Direct Network Solutions	Integration of 5 Wind Power plants into the PET Constanta Dispatch Center	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ SCADA software development</li> </ul>
15	<b>Harman 7 MW PV Plant, Romania</b> 2014 <b>BENEFICIARY:</b> Clue Solar	Turn-key SCADA solution More than 5.000 points collected 2 x 20kV grid connection points integrated Protocols used: Modbus, IEC 104, IEC 101, Refusol Equipment used: Phoenix Contact	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Solution Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ Hardware configuration</li> <li>➤ SCADA Software Development</li> <li>➤ Active &amp; reactive power control algorithm</li> </ul>
16	<b>ACV 4,9 MW PV Plant, Romania</b> 2014 <b>BENEFICIARY:</b> Inversolar	Turn-key SCADA solution More than 5.000 points collected 1 x 20kV grid connection points integrated Protocols used: Modbus, Refusol Equipment used: Phoenix Contact Devices monitored: Refusol inverters, Protection relays, power meters, sensors and transducers	<ul style="list-style-type: none"> <li>➤ Solution Design</li> <li>➤ Manufacturing and delivery of SCADA panels</li> <li>➤ Hardware configuration</li> <li>➤ SCADA Software Development</li> <li>➤ Active &amp; reactive power control algorithm</li> </ul>

## IT, Telecom & Cyber Security

#	PROJECT	SUMMARY	SERVICES
1	<b>Telecom infrastructure for Dispatch Centers</b> <b>2014-2016</b> <b>BENEFICIARY:</b> Transenergo, Alpiq Romindustries, Monsson Alma, PET Communications	<p>Each dispatch designed and implemented is based on a complex, custom designed, geographically wide spread and secure infrastructure that combines multi-vendor, protocol independent equipment.</p> <p>Equipment used: Cisco, Fortinet, Checkpoint, GE, Fujitsu, Ruggedcom, HP, Dell, Supermicro etc.</p>	<ul style="list-style-type: none"><li>➤ High level and low level Design</li><li>➤ Turn-key redundant VPN Solutions</li><li>➤ Network monitoring and support</li><li>➤ Database development, administration and security</li><li>➤ Data loss prevention</li><li>➤ Security information and event management</li><li>➤ ITIL and ISO 27001 compliancy</li></ul>





# Thank you for your attention!

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