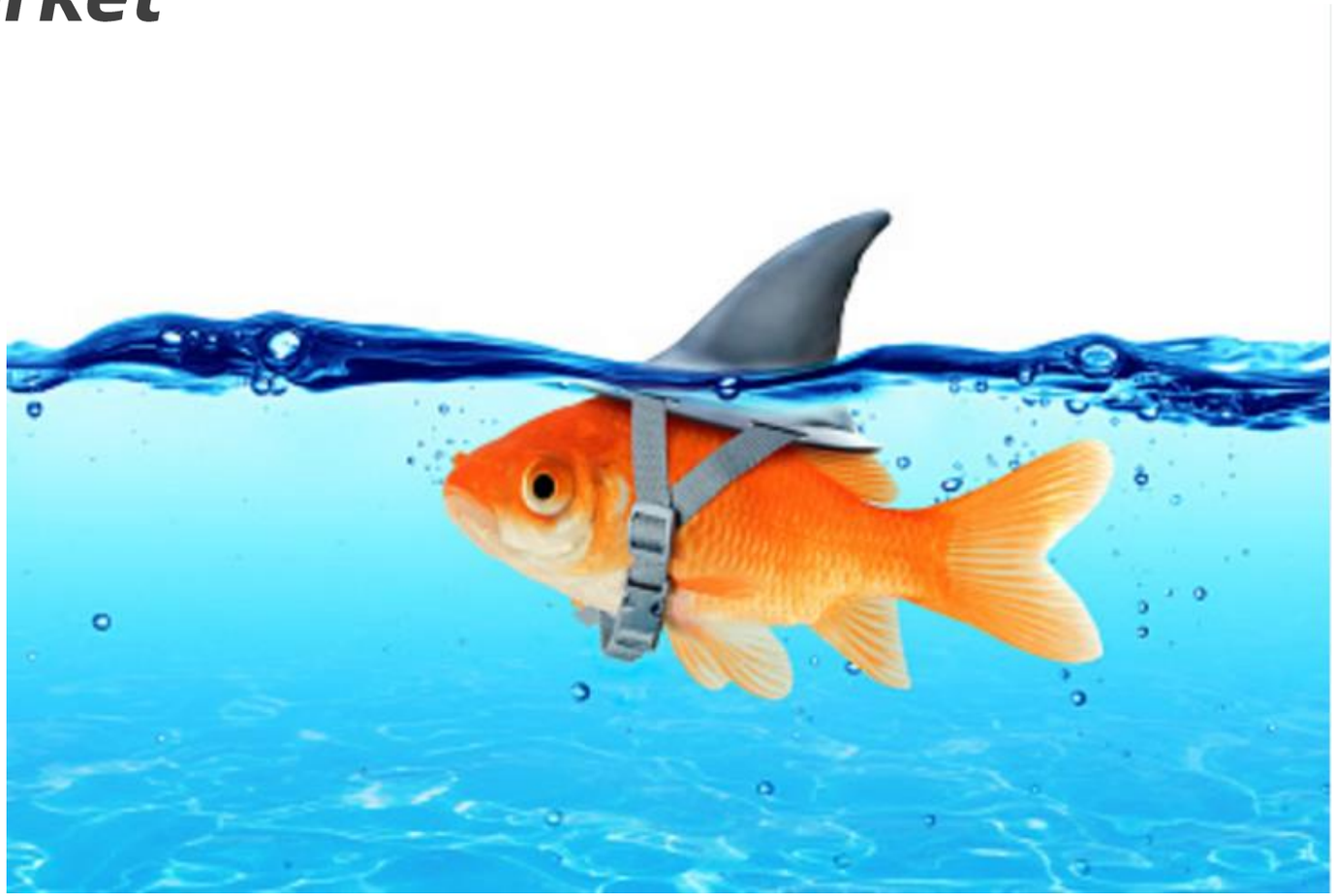
ENEVO GROUP

Integrated Solutions for the Energy Value Chain

COMPANY PROFILE ENEVO GROUP

Evaluation objective at 3 years:

“ … after 3 years to become relevant on the market”

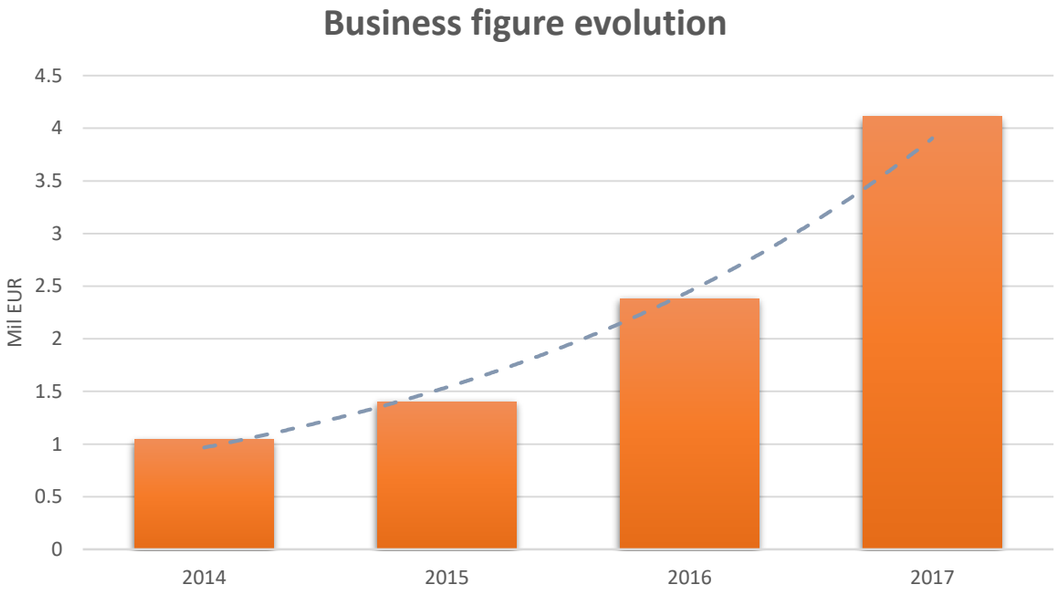


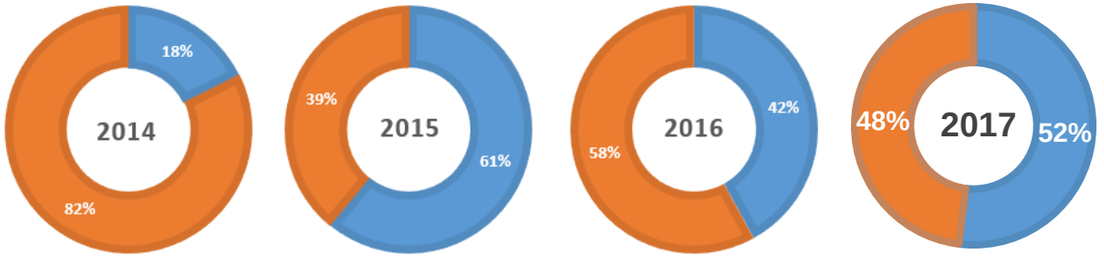
Operational indicators 2014 → 2017

Bigger deals ▲52%

Increased exports ▲63%

Fewer projects ▼45%





Enevo in brief

Engineering & Consulting

Substation Automation & Protection Systems

Process Control & Electrical Automation

IT, Telecom & Cyber Security

6

industries:

Power Generation, Power Transmission and Distribution, Water, Oil & Gas, Steel, Food & Beverages

4

offices:

Bucharest, Resita, Saudi Arabia (Al Jubail) and Australia (Melbourne)

35

Projects in 2 years

on SCADA and control, for power generation, power T&D, steel and diary industries

60%

Of revenue

From international projects

3.000+

IEDs

integrated and monitored through our solutions

3

EMS-SCADA Dispatch Centers

Designed and implemented by ENVO Group

500.000+

Data collection points

aggregated

1+ GW

Of renewable energy

Aggregated in ENEVO designed dispatch aplications

Diversity of industries and technologies

Power Generation

Power T&D

Energy efficiency

Water

Oil & Gas

Industry

Advanced Partner
Protection
SIEMENS

Advanced Partner
Power Quality
SIEMENS

Advanced Partner
Substation Automation
SIEMENS

System integrator
of
Schneider Electric

NATIONAL INSTRUMENTS Alliance Partner

GE

ABB

PHOENIX CONTACT

CISCO

HUAWEI

Substations and Protection Systems

- 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

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

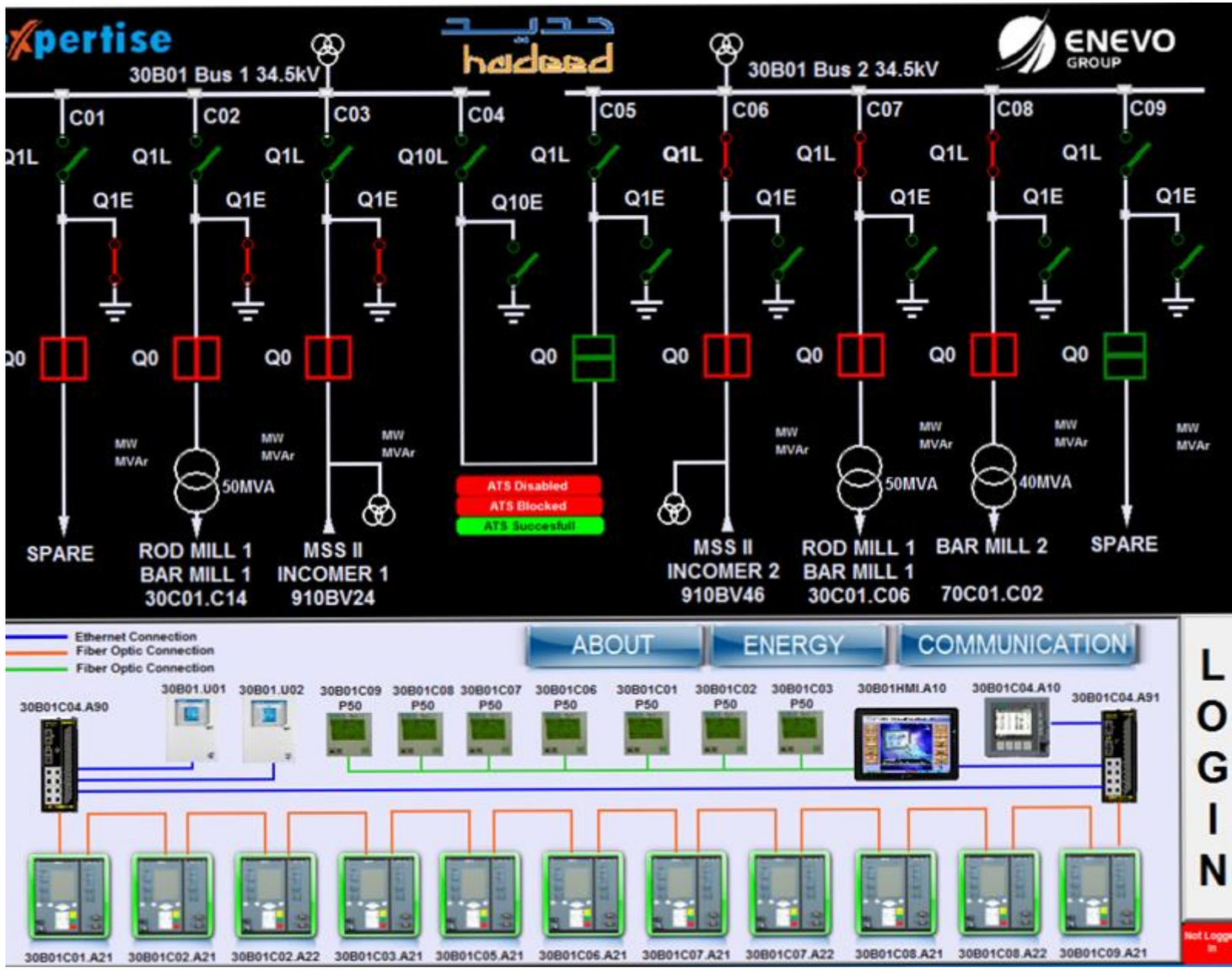
Client: Saudi Basic Industries Corporation – Hadeed Steel Industries, Arabia Saudita

Project Summary:

- Replacement of 2x30/40MVA Trafo with 2x40/50MVA Siemens Trafo
- 2x AVR Panels
- Replacement of 7 existing GIS switchgear with 9 new GIS Siemens Switchgear
- Replacement of 27 primary cables (7.200 m), 42 secondary cables (6.800 m), 156 cable joints
- **10 days of implementation during the general maintenance plant shutdown.**

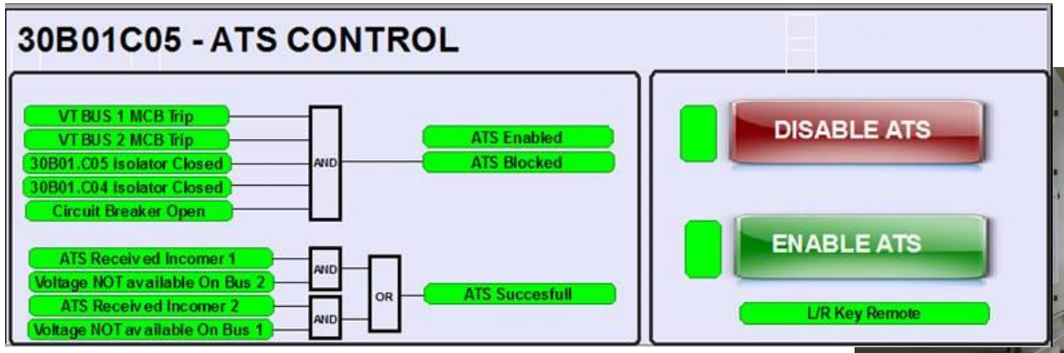
Services offered:

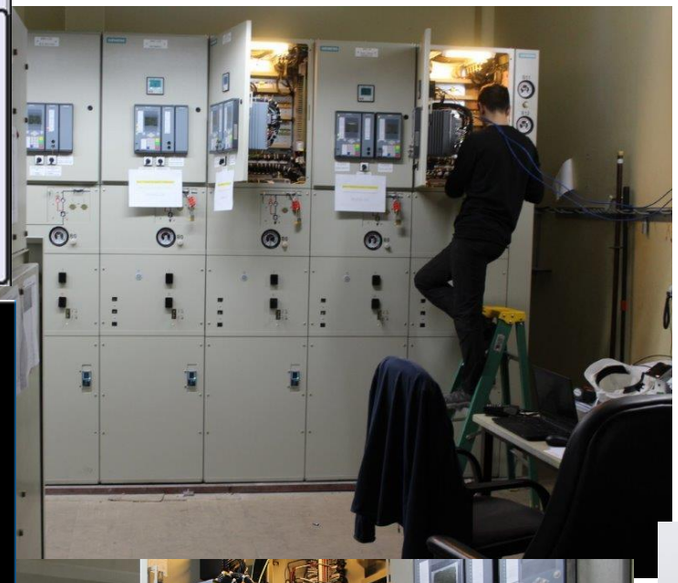
- General Management of the project
- Basic and detailed engineering; As-Built
- Procurement, delivery , erection, testing and commissioning of the primary equipment
- Cable laying and testing
- Protection Coordination Study, testing and settings implementation
- SCADA for the 34.5 kV Substation
- Training

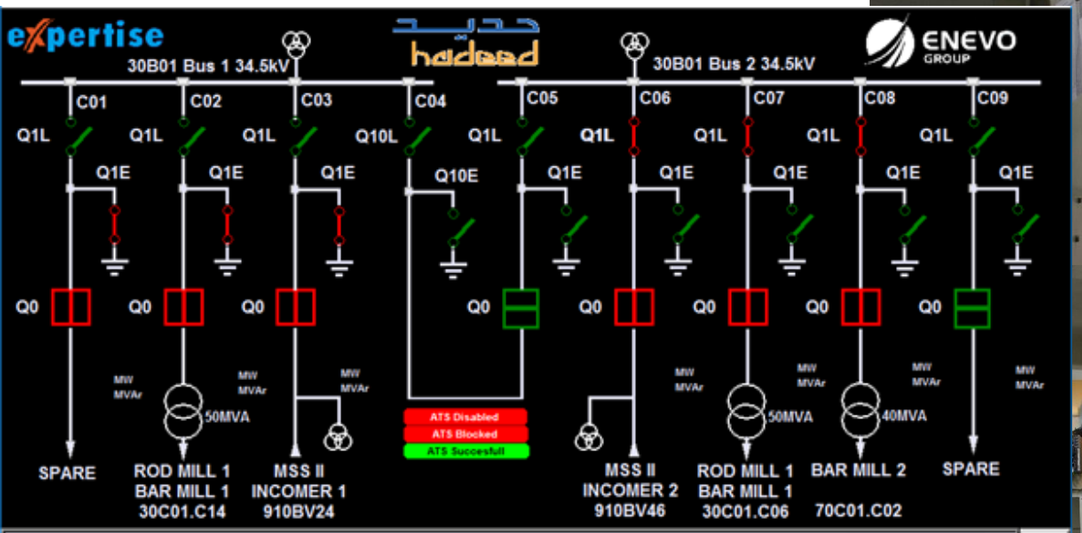


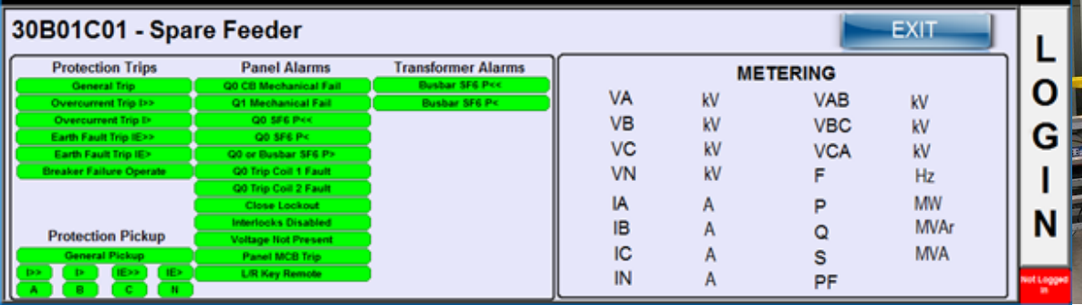
Rehabilitation of Rolling Mill 1&2 - 34.5/13.8 kV S/S

Client: Saudi Basic Industries Corporation – Hadeed Steel Industries, Arabia Saudita









Arc Flash Study

Client: Sabtank Industrial Port – Jubail, Saudi Arabia

Project Summary:

- 30 affiliates
- 62 substations
- Voltage levels modeled: 34,5/13,8/6,6/0,4 kV

Services:

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

SABTANK ELECTRICAL HAZARD LABELS

⚠ DANGER

Arc Flash and Shock Hazard
Appropriate PPE Required

Arc Flash Protection
- Flash Protection Boundary: 1.53 m
- Hazard Risk Category: 1
- Incident Energy at (cal/cm²): 3.9

Shock Protection
Shock Hazard when enclosure doors are closed

Shock Hazard Voltage 4160V AC
- Limited Approach: 1.52 m
- Restricted Approach: 0.66 m
- Prohibited Approach: 0.18 m

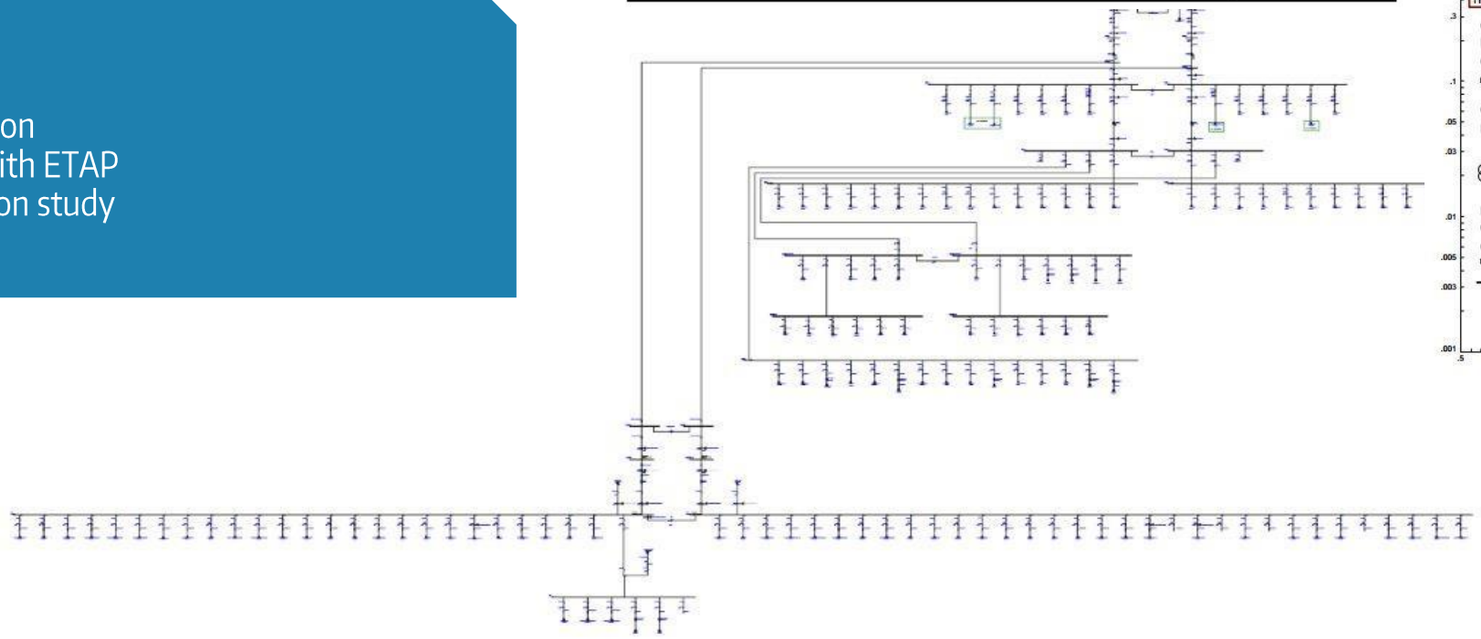
Required PPE

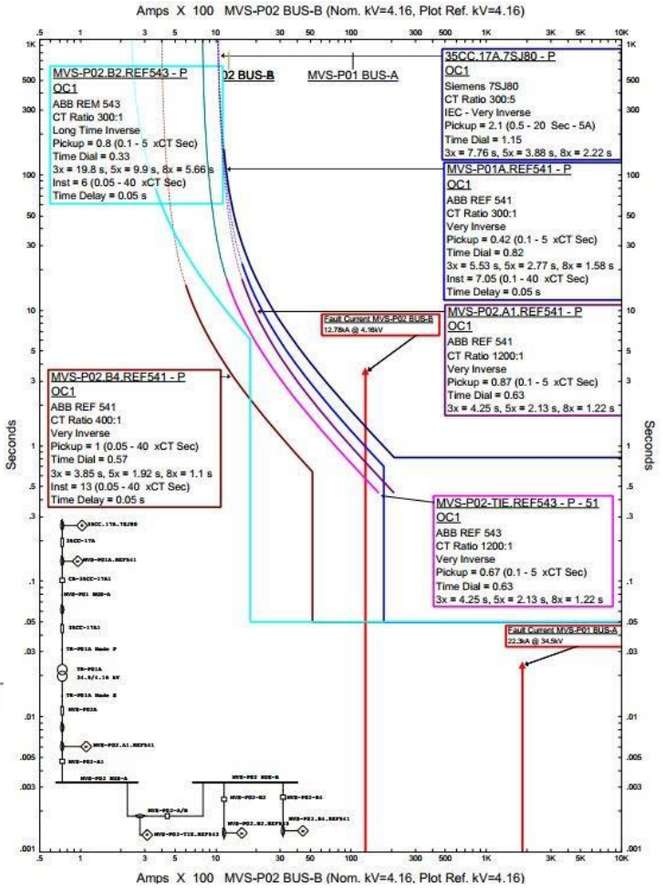
✓ Hard Hat	☐ Long Sleeve Shirt
✓ Safety Glasses	✓ FR Shirt *
✓ Safety Goggles	✓ FR Pants*
✓ Face Shield	✓ FR Coverall*
☐ Flash Hood*	☐ Flash Suite
✓ Ear Protection	✓ Leather Shoes
☐ Long Pants	✓ Leather Gloves

Voltage Rated Gloves 7500V AC
*Minimum arc rating of 8 cal/cm²

Supply from: Transformer XT-13	Affiliate: IBN-SINA
Equipment ID: SA-13	P.O. 4300036896
Protective Device: 35CC – 8A	Date: Jan-2017

ساب تانك sabtank





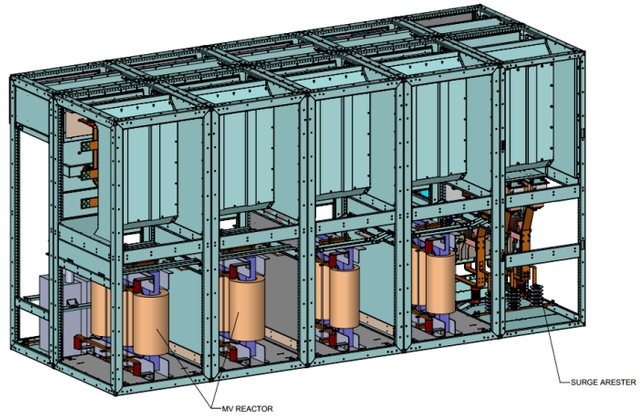
Power factor correction 16 MVAr

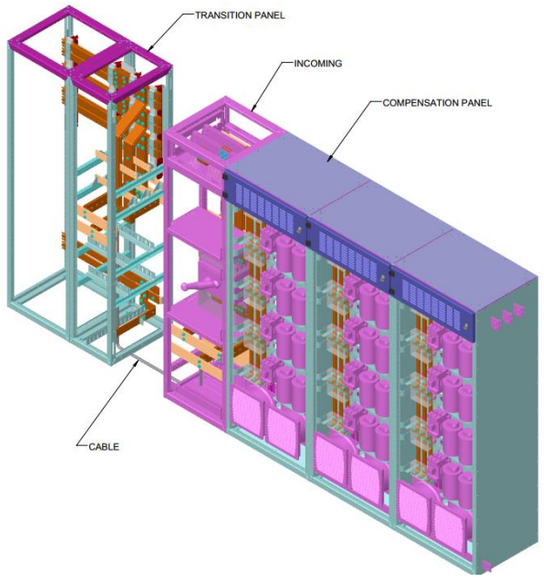
Client: Saudi Basic Industries Corporation – Hadeed Steel Industries, Saudi Arabia

Project Summary

- Installation of 4 sets of capacitors 3000kVAr (voltage level 4.16kV)
  - 2 steps of1000kVAr
  - 2 steps of 500kVAr
- Installation of 4 sets of capacitors 1200kVAr (voltage level 0.48kV)
  - 10 steps of 100kVAr
- 0.96 Power Factor

ONLY 5 DAYS FOR EXECUTION





Enevo 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

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

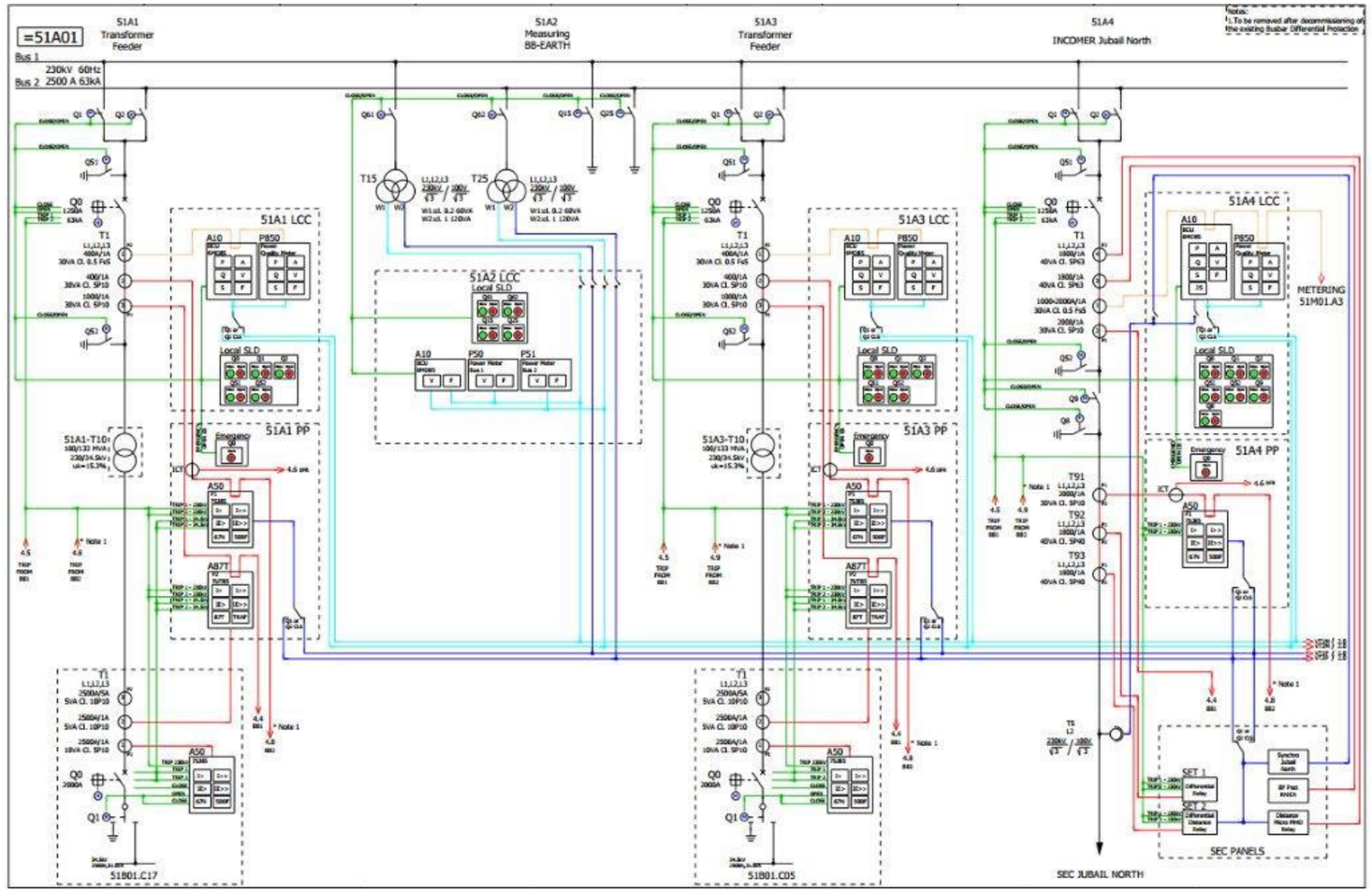
Client: Saudi Basic Industries Corporation – Hadeed Steel Industries, Arabia Saudita

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 AVRs
- SICAM PAS Upgradation for the utility

Services:

- General Managementul 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, interlockings and interconnections
- Upgrade SCADA SICAM PAS with the integration of the existing substations
- Training



Recent References

Substation Automation & Protection Systems

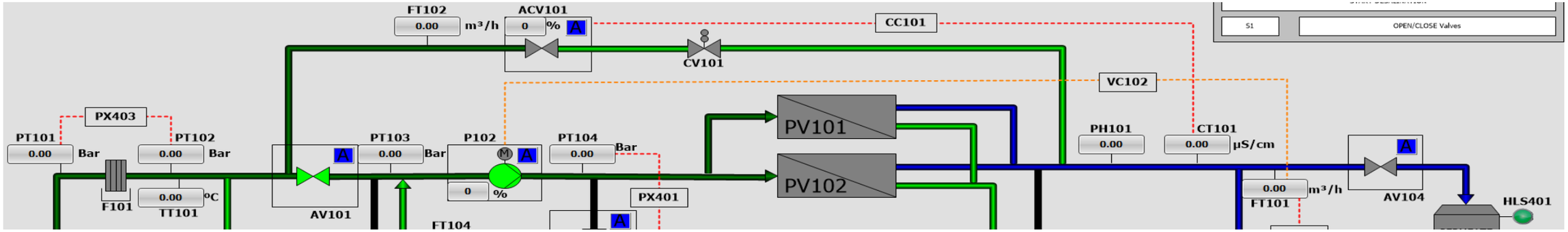
#	PROJECT	SUMMARY	SERVICES
1	**Turn-key refurbishment of 34.5kV GIS Substation and 2x50MVA Transformers, Kingdom of Saudi Arabia** 2015-2017 **BENEFICIARY:** Hadeed Steel Factory, SABIC E&PM **LOCAL PARTNER/ MAIN CONTRACTOR:** Expertise Contracting	➢ Replacement of 2x30/40MVA Siemens Transformers with 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	➢ Basic and detailed design ➢ Procurement, delivery, installation and commissioning of new Siemens transformers ➢ Procurement, delivery, installation and commissioning of new Siemens GIS switchgears ➢ Protection Relay coordination and configuration ➢ Automatic transfer switch functionality, interlocks and interconnection ➢ SCADA integration
2	**110/20kV Ciuperceni Substation, Romania** 2014 **BENEFICIARY:** Bester Generationes	Substation SCADA system and TSO and DSO integration.	➢ Engineering and Design ➢ Manufacturing and delivery of SCADA panels ➢ SCADA software development ➢ Protection Relay configuration
3	**SCADA Upgrade of 230/34,5/ 13,8/0,48 kV Main Substation 1 of Hadeed Steel Factory, SABIC E&PM, Kingdom of Saudi Arabia** 2015 **BENEFICIARY:** Siemens, Primetals **LOCAL PARTNER/ MAIN CONTRACTOR:** Expertise Contracting	MSS1 is the connection between Saudi Electricity Company and Hadeed Steel Factory, SABIC E&PM, with an installed power of approx. 700MVA, supplying two Arc furnaces and two Casters.	➢ SICAM PAS System Upgrade ➢ Integration of new Siemens Siprotec 4 Protection Relays into the Substation SCADA System on IEC 61850 protocol ➢ Integration into PAS CC SCADA HMI
4	**Automatic transfer scheme for the DC load at HVDC Melo Substation, Uruguay** 2015 **BENEFICIARY:** Alstom, Usinas y transmisiones Electicas (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.	➢ Solution Design ➢ Equipment supply ➢ PLC programming ➢ Communication network development ➢ HMI interface ➢ Commissioning

Recent References

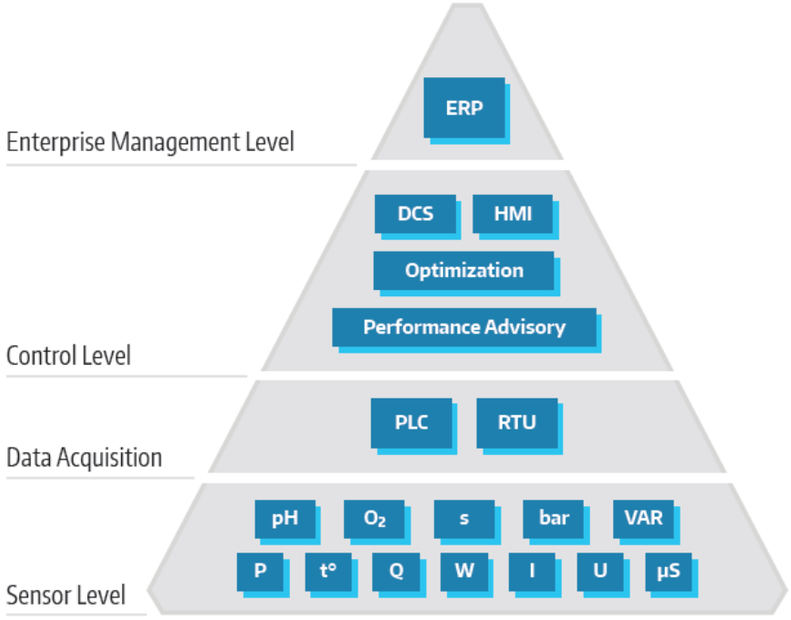
Substation Automation & Protection Systems – Engineering and Consultancy

#	PROJECT	SUMMARY	SERVICES
1	**Protection Coordination Study for Hadeed Steel Factory, SABIC E&PM, Kingdom of Saudi Arabia** 2014-2015 **BENEFICIARY:** Hadeed Steel Factory, SABIC E&PM **LOCAL PARTNER/ MAIN CONTRACTOR:** 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.	➢ Review Circuit Breaker & Fuse Applications ➢ Review device size or settings to meet system protection requirements ➢ Recommendation of trip device settings for low voltage breakers ➢ Recommendation of trip settings for medium and high voltage relays ➢ Time current curves used to graphically illustrate selectivity between devices ➢ Report of system coordination & recommendation ➢ ETAP model ➢ Soft & Hardcopy document result of system coordination & recommendation
2	**Arc Flash Hazard Study Analysis for SABTANK Industrial Port, Jubail Kingdom of Saudi Arabia** 2016 **BENEFICIARY:** SABTANK **LOCAL PARTNER/ MAIN CONTRACTOR:** 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.	➢ On site data collection ➢ Documentation inventory ➢ As built documentation ➢ ETAP Network modelling ➢ Arch Flash Hazard Analysis ➢ Protection Coordination Study
3	**Tap Changer optimization for MSS2 Substation of Hadeed Steel Factory, SABIC E&PM, Kingdom of Saudi Arabia** 2015-2016 **BENEFICIARY:** Hadeed Steel Factory, SABIC E&PM **LOCAL PARTNER/ MAIN CONTRACTOR:** 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.	➢ On site data collection ➢ ETAP Network modelling ➢ Tap Changer study ➢ Recommendation for new tap changer settings for each transformer

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 assignement
- 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

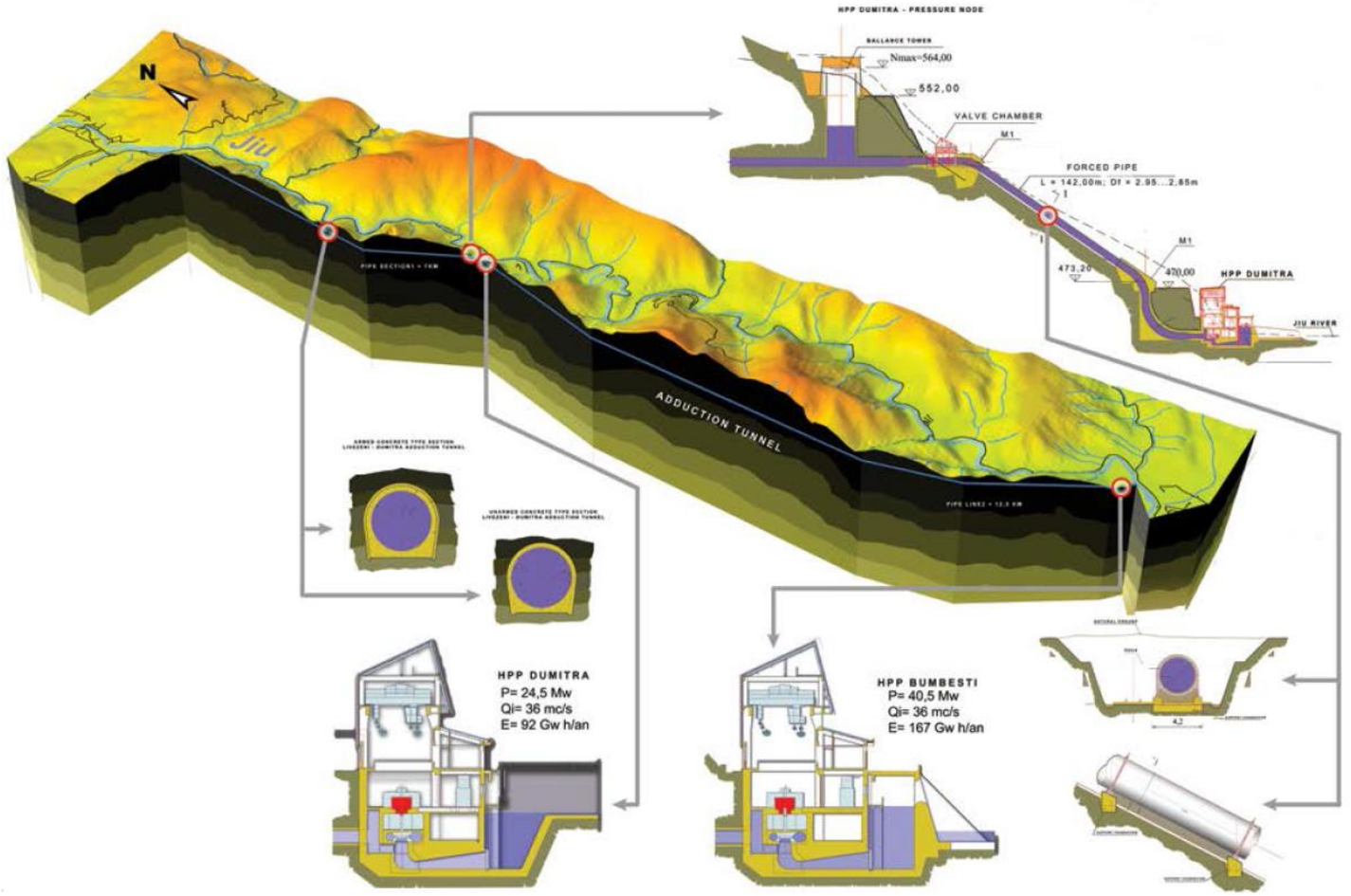
Complete SCADA & Protection system for the hydropower development of Jiu River

Project Summary

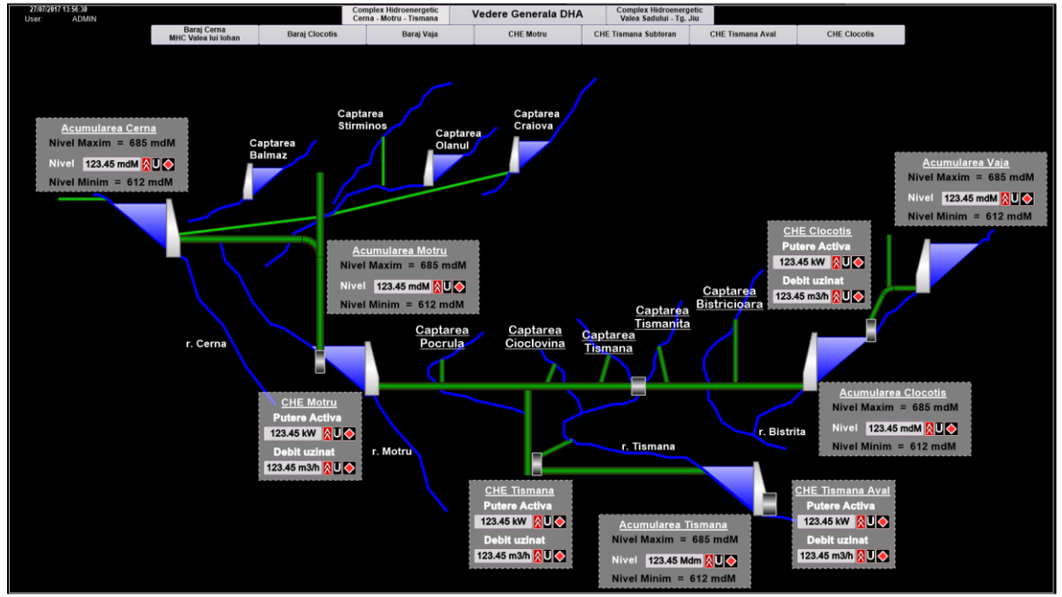
- Dumitra HPP – 3 x Vertical Francis Turbines
- Bumbesti HPP – 3 x Vertical Francis Turbines
- Livezeni Dam and MHPP
- Regional Dispatch Center (DHA Tg Jiu)

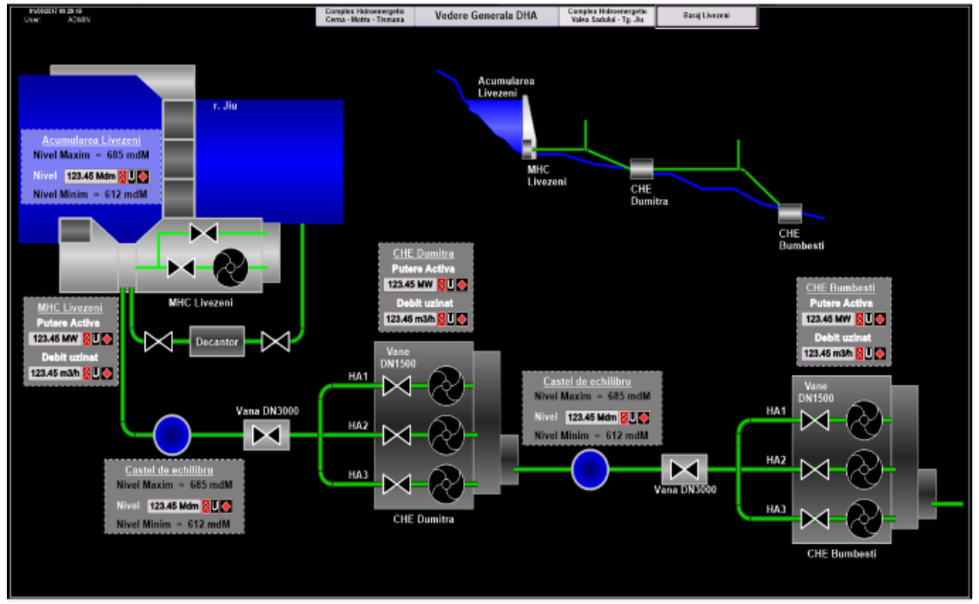
Services

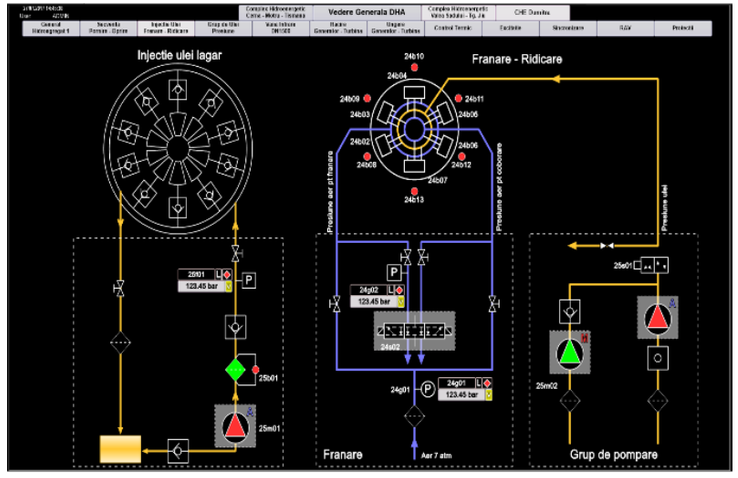
- Basic and detailed engineering
- Automation equipment supply
- Electrical Protection Supply
- Livezeni Dam Installations supply
- PLC Programming
- Protection relay configuration
- Communication network development
- SCADA Software development
- Installation, testing and commissioning

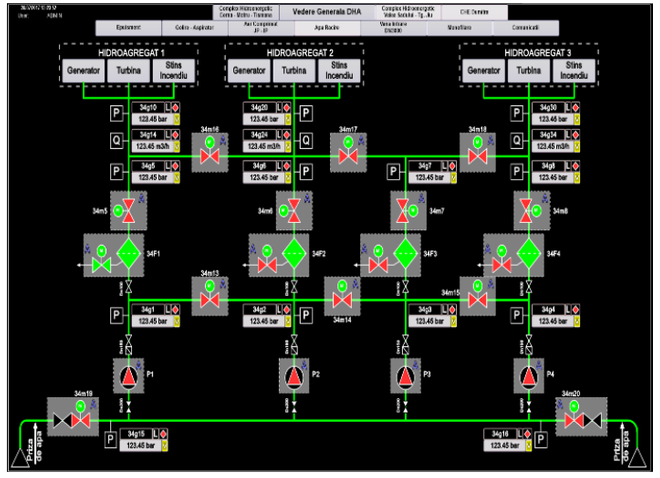


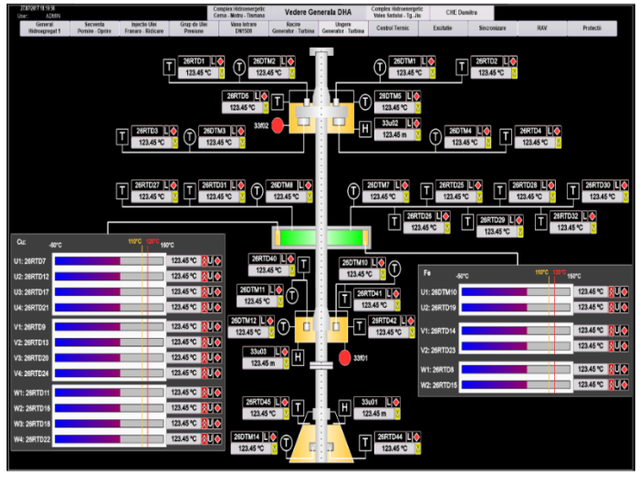
Complete SCADA & Protection system for the hydropower development of Jiu River











EPC for PV power plants

No.	Name of the plant	Installed power (kW)	Complete EPC	
			Plant	Grid
1	Scanteiesti	500	X	MV
2	Urziceni	238	X	MV
3	Carei	360	X	MV
4	Valea Vinului	826	X	MV
5	Piatra Olt	999	X	MV
6	Telesti	267	X	MV
7	Tiream	199	X	MV
8	Grindu	36	X	Off grid
9	Fetesti	150	X	Off grid
10	Mineri	400	X	Own consp.
11	Chiscani	1740	X	MV

- Total portfolio of projects: **5715 kWp / 5.715 MWp**

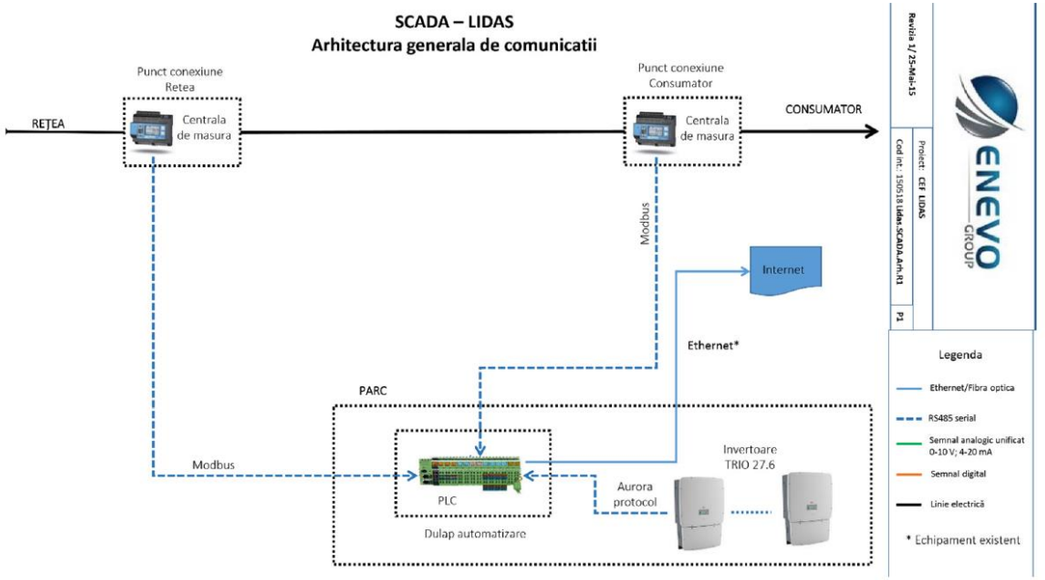
Mineri PV power plant, Tulcea – 400 kWp for own consumption

Project Summary

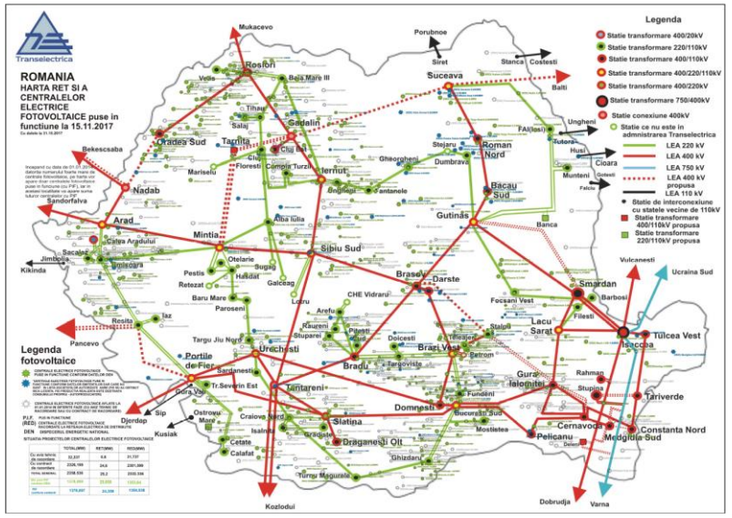
- Total project duration 2 months;
- Equipment from Phoenix Contact,
- Protocols used: IEC 60870-5-101, IEC 60870-5-104, Modbus, DNP 3.0

Enevo Scope of Works

- Architecture and design of the SCADA control software for the PV plant, MV/LV transformer station integration, implementation of the closed control loop for own consumption only;
- Design and Installation of the Security System
- Control Algorithm for maintaining zero injection in the grid



SCADA for PV power plants



No.	Name of the plant	Installed power	Scada system			Integrated in a dispatch center	
		(MW)	Plant	Station	Control loop	Yes	No
1	Aricesti	27		X			X
2	Arina	9		X			X
3	Ciuperceni	56		X			X
4	Mozaceni	14	X	X	X		X
5	Onesti	18	X	X	X	X	
6	Crevedia	10			X		X
7	Lukoil	9	X	X		X	
8	Baltesti	3.5	X	X		X	
9	Vieru	7	X	X	X	X	
10	ACV	4.9	X	X		X	
11	Salcuta 1&2	5	X	X		X	
12	Ciocanesti	2	X	X		X	
13	Racari	2.5			X		X
14	Tartasesti	2.5			X		X
15	Harman	7	X	X	X	X	
16	Chiscani	1.74	X	X	X		X
17	Mineri	0.4	X	X	X		X

- Total portfolio of projects: **179 MWp;**
- Portfolio of dispatch centers: Transenergo (+100MW), Alpiq (+45MW), Monsson;
- The SCADA solution developed by ENEVO GROUP was used in **13 % of the total photovoltaic installed power in Romania;**

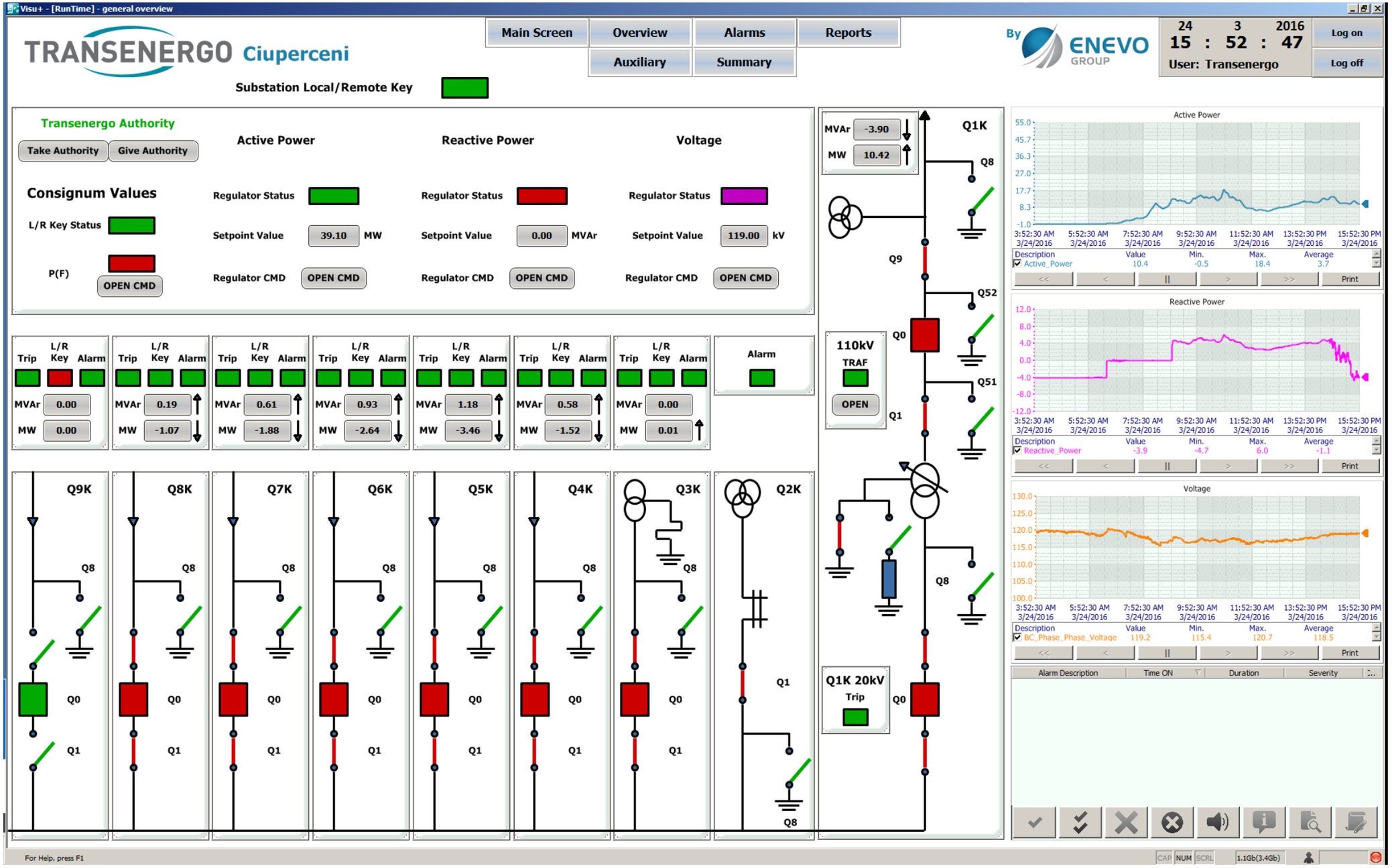
Transenergo Dispatch center

Project Summary

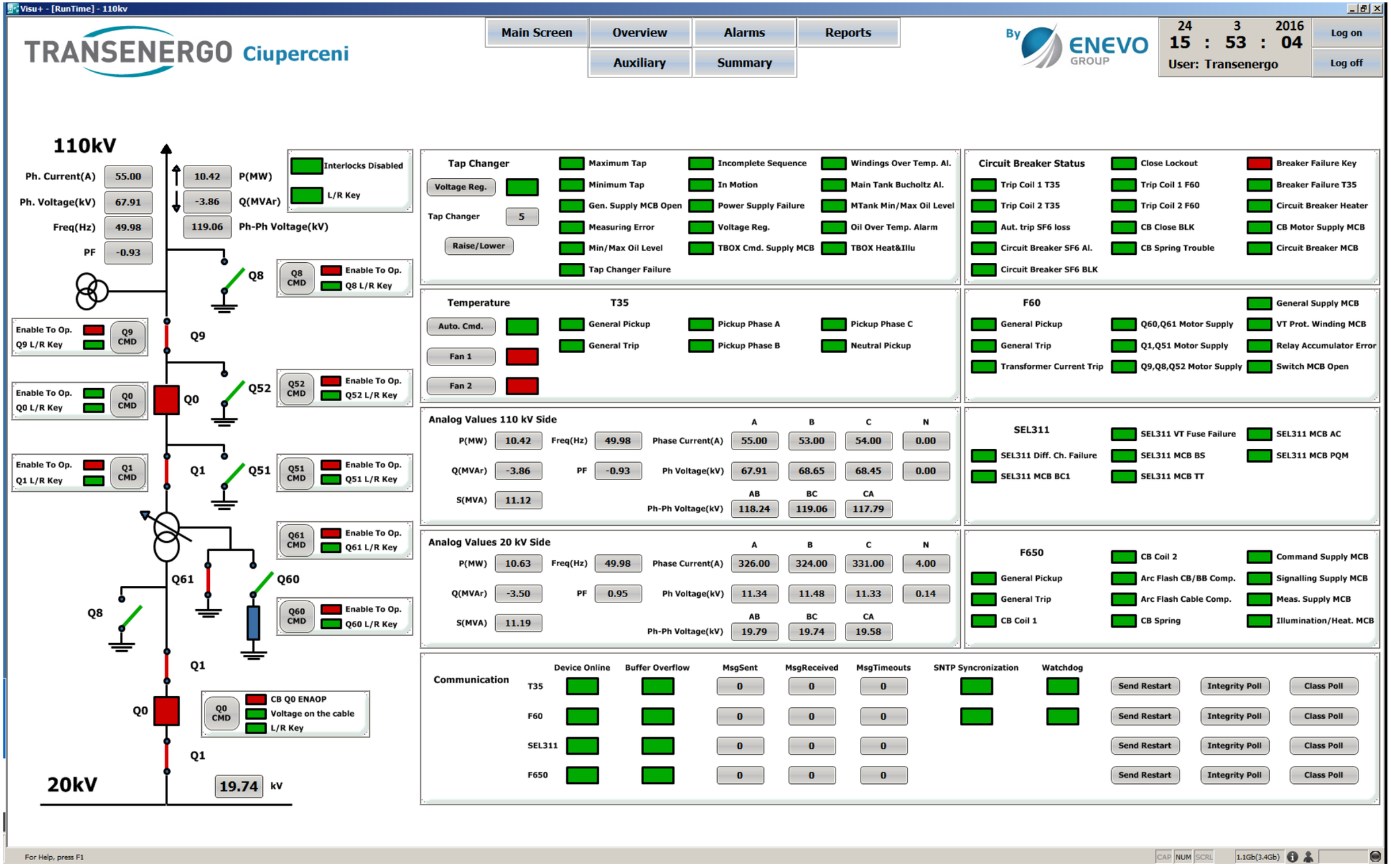
- Turn-key development of renewables dispatch center integrated with the EMS-SCADA System of Transelectrica.
- +100 MW Installed power dispatched
- 110/20 kV Ciuperceni Substation integrated
- 7 x 20kV grid connection points integrated
- More than 60.000 Data Points Gathered
- Equipment from Phoenix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

Services

- 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



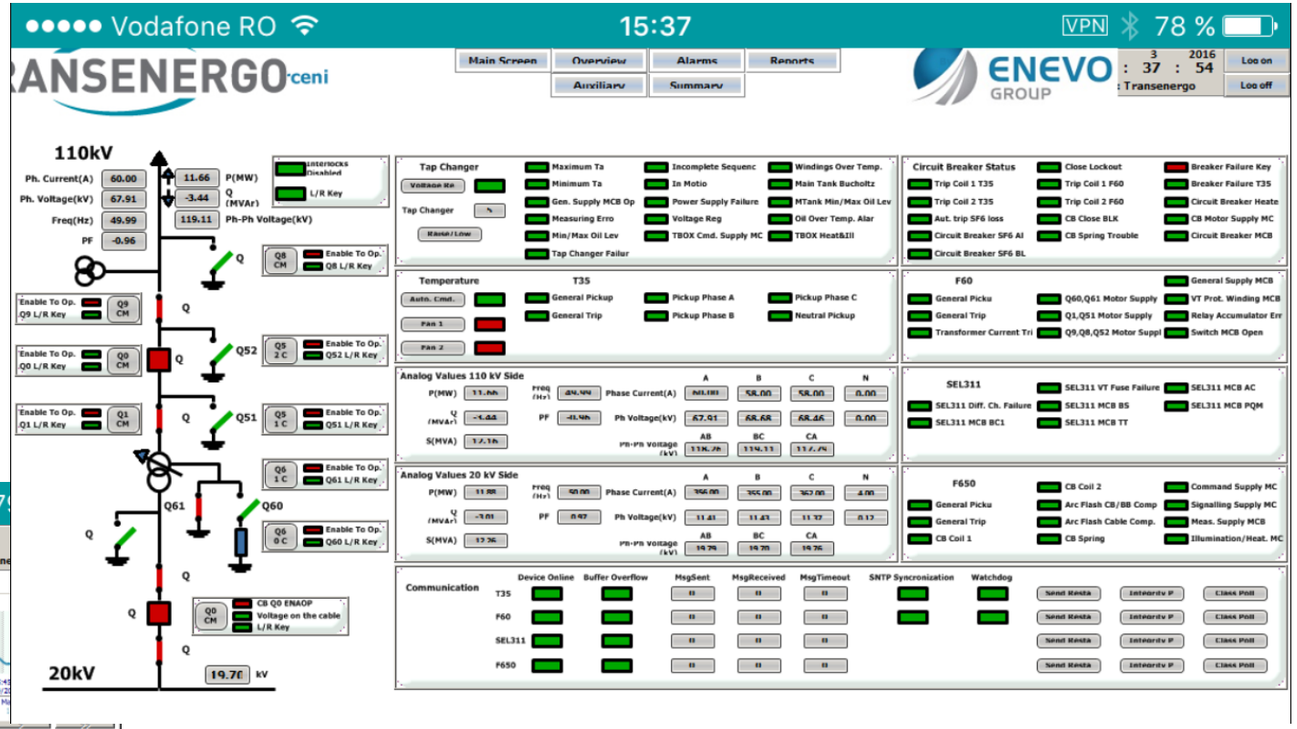
Substation SCADA Screen

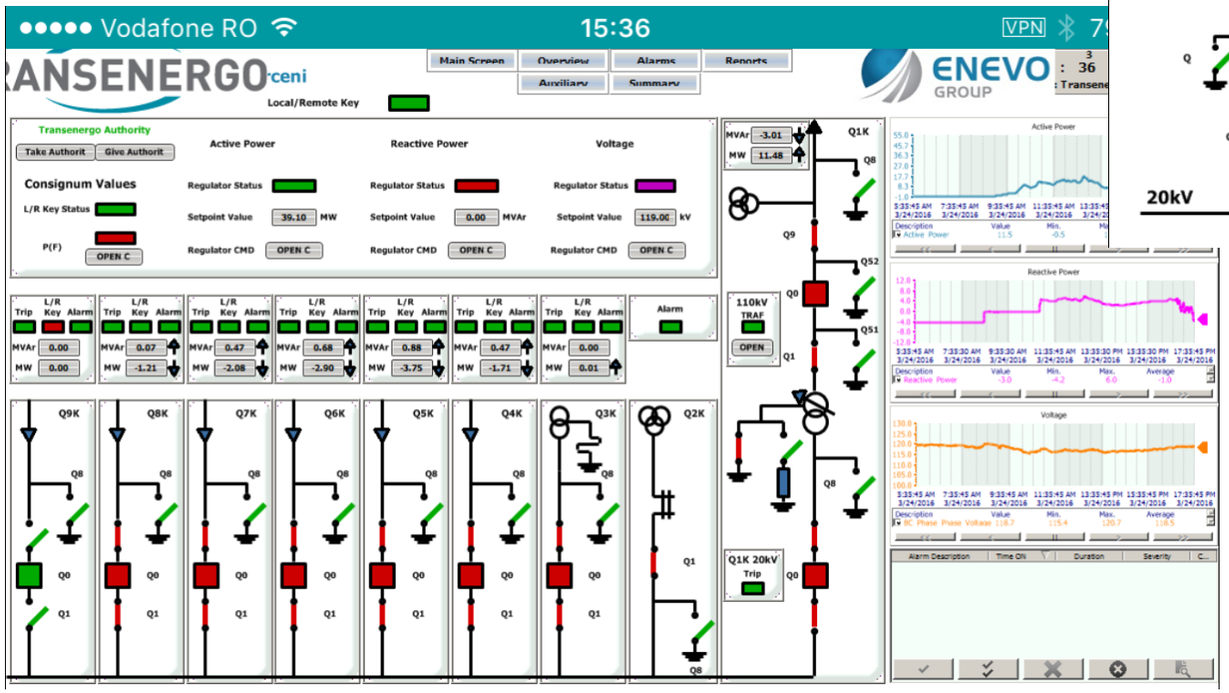


ENEVO GROUP

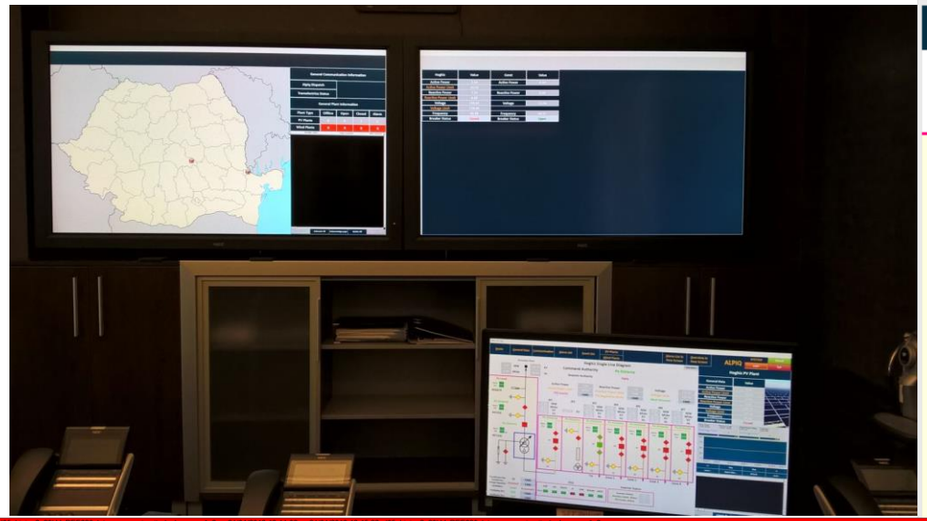
Substation SCADA Screen

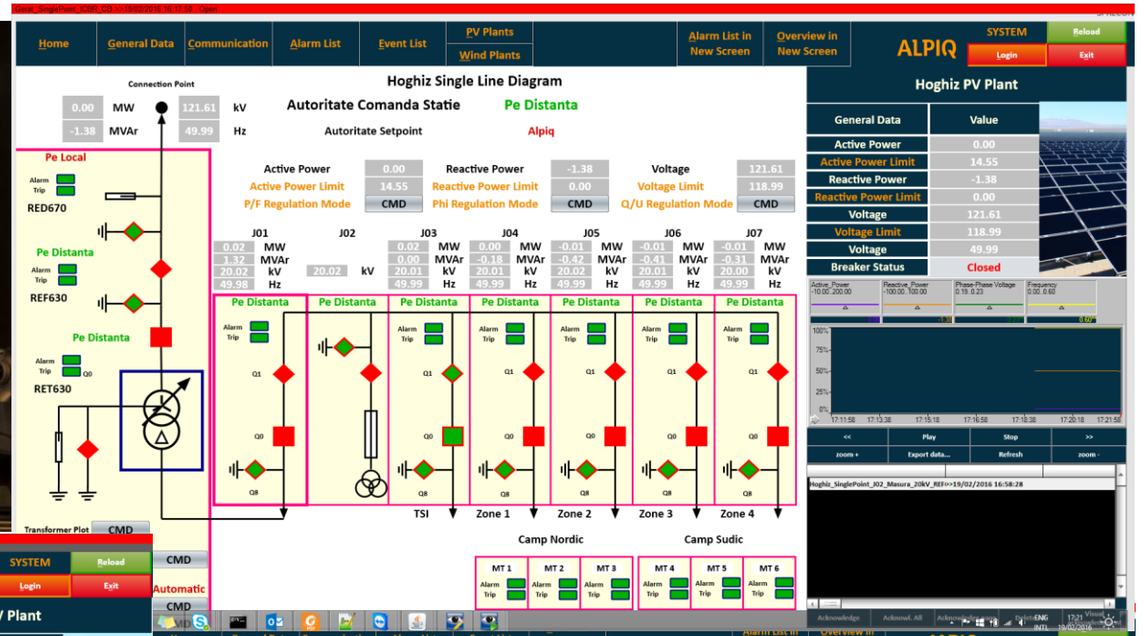
Mobile solution for energy dispaching

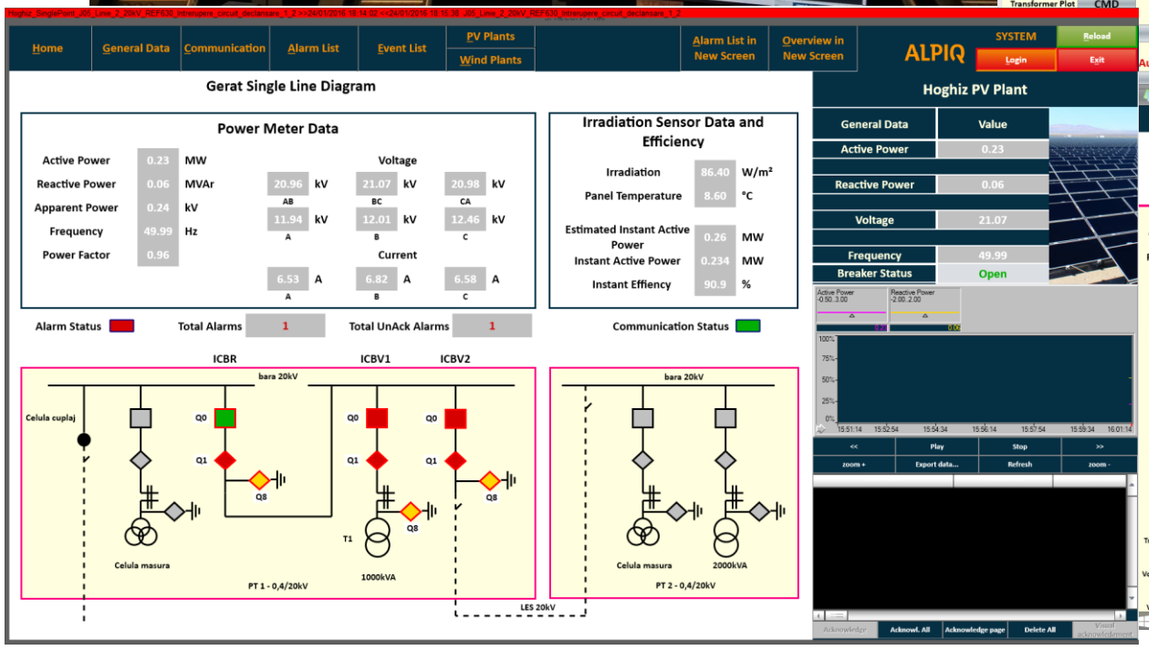


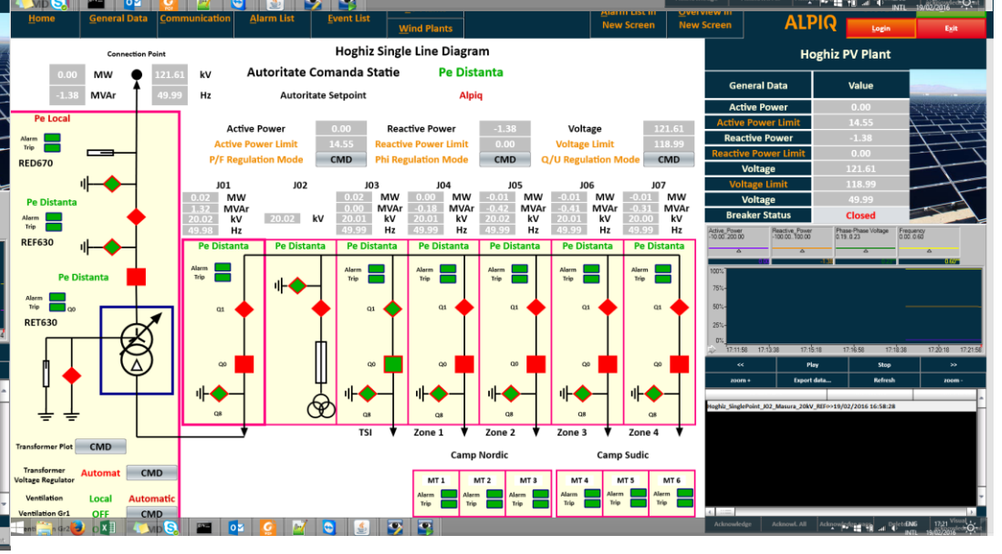


Alpiq Dispatch center

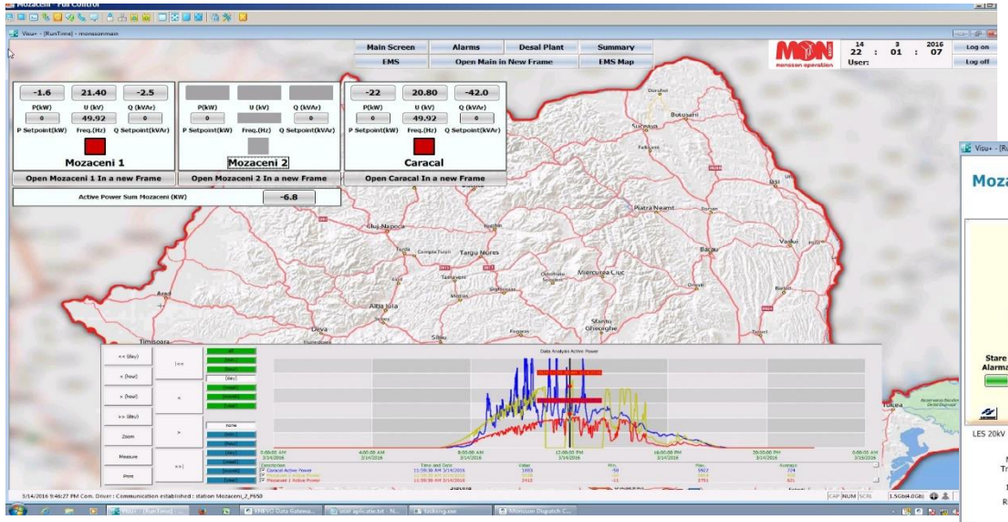


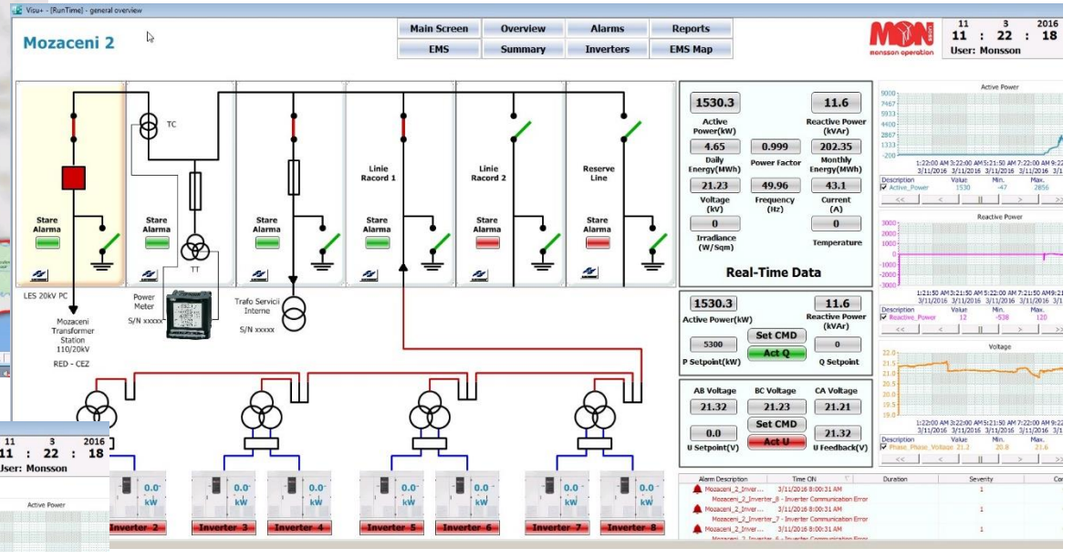


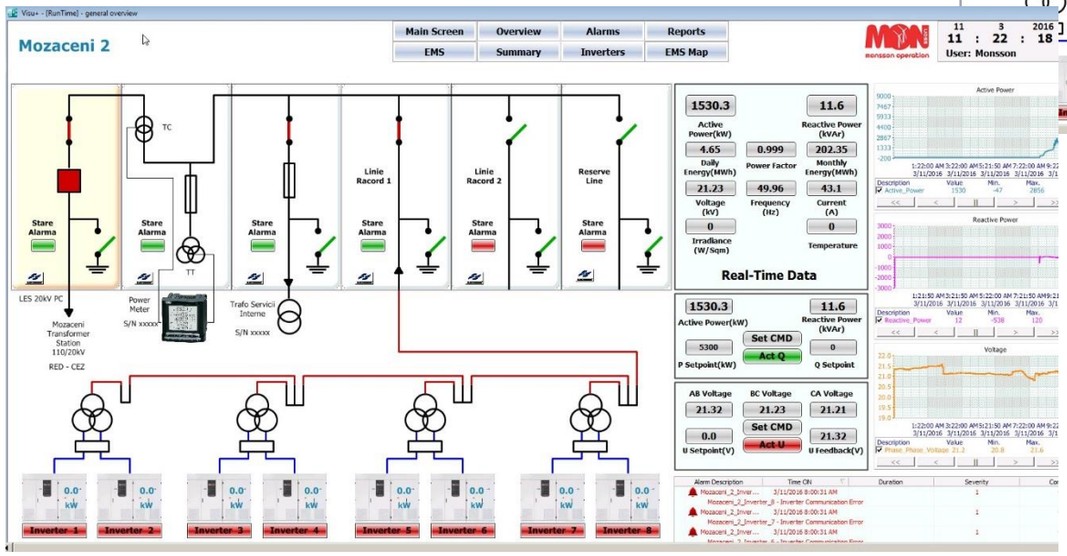




Monsson Dispatch center







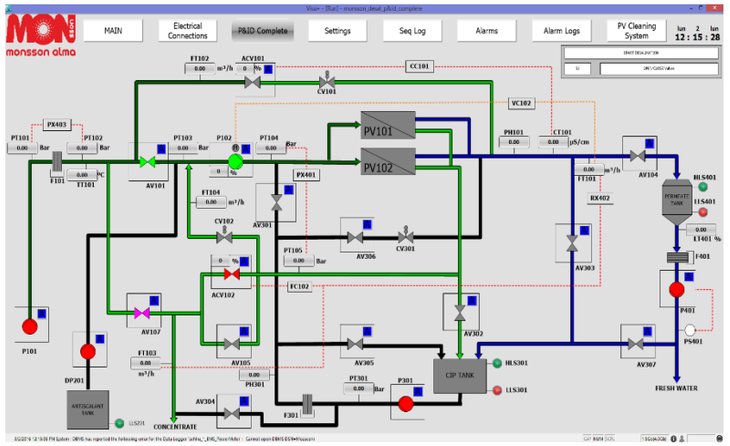
Distributed Control System for autonomous desalination plant, Qatar, Mena region

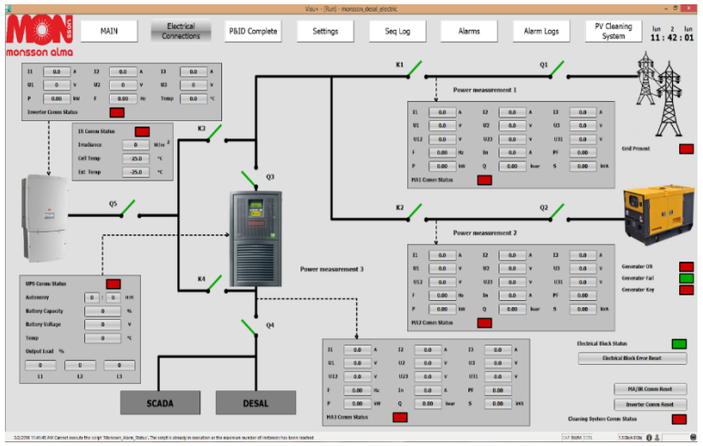
Project Summary

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

Services

- Functional Design Specification, PID and SCADA design
- DCS System development
- Hybrid Power Supply Control Algorithm
- Dispatch integration
- Custom hardware development





References

Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
1	**Complete SCADA and protection system for the hydropower development on the Livezeni-Bumbesti sector of the Jiu river, Romania.** 2016-2018 **MAIN CONTRATOR:** Romelectro **BENEFICIARY:** Hidroelectrica	Dumitra HPP (24,5MW), Bumbesti HPP (54MW) and the Microhidroplant of the Livezeni Dam (260kW) are part of the same hydropower development on the Jiu River. 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).	➢ Basic and detailed engineering ➢ Equipment supply ➢ Installation, Testing and Commissioning ➢ PLC programming ➢ Protection Relay configuration ➢ Communication network development ➢ SCADA software development ➢ Technical assistance ➢ SCADA integration of all equipment related to the automation systems of the HPPs
2	**Transenergo Dispatch Center** 2014-2015 – turn-key Ongoing – maintenance and technical assistance **BENEFICIARY:** 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	➢ Solution Design ➢ Hardware delivery and configuration ➢ Telecom infrastructure and cyber security ➢ SCADA Software Development ➢ Control algorithm ➢ Custom software for data analysis and production reports ➢ New plants integration ➢ 24/7 on-call technical assistance and system maintenance
3	**Alpiq Dispatch Center** 2015–2016 – turn-key 2015–2025 – maintenance and technical assistance **BENEFICIARY:** 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	➢ Solution Design ➢ Hardware delivery and configuration ➢ Telecom infrastructure and cyber security ➢ SCADA Software Development ➢ Control algorithm ➢ Custom software for data analysis and production reports ➢ New plants integration ➢ 24/7 on-call technical assistance and system maintenance

References

Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
4	**Extension of Monsson Dispatch Center** 2015–2016 **BENEFICIARY:** Monsson Alma	New SCADA solution for the integration of existing EMS and dispatched plants	➢ Solution design ➢ SCADA software development
5	**Lukoil 9 MW PV Plant inside Petrotel Refinery** 2014 **BENEFICIARY:** 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	➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active and reactive power control algorithm ➢ Reconfiguration of existing equipment for plant integration with Transelectrica ➢ Installation of GE D400 Substation Gateway ➢ Integration of the plant controller with the refinery DCS
6	**Distributed Control System (DCS) for autonomous desalination plant, Qatar** 2015 **BENEFICIARY:** Monsson Alma	➢ Reverse osmosis desalination plant in Qatar ➢ Powered by a hybrid electrical system with grid, PV modules, UPS and Diesel Generator	➢ Functional Design Specification, PID and SCADA design ➢ DCS System development ➢ Hybrid Power Supply Control Algorithm ➢ Dispatch integration ➢ Custom hardware development
7	**Power Factor Solution for Main Substation 2 (MSS2), Hadeed Steel Factory, SABIC E&PM, Jubail, Kingdom of Saudi Arabia** 2015-2017 **BENEFICIARY:** Hadeed Steel Factory, SABIC E&PM **LOCAL PARTNER/ MAIN CONTRACTOR:** Expertise Contracting	Improve to 0.95 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.	➢ On field data collection and system dimensioning ➢ Basic and detailed design ➢ Manufacturing, delivery, installation and commissioning of the capacitor bank panels and additional switchgears ➢ SCADA integration ➢ Protection Relays configuration

References

Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
8	**Onesti 18 MW PV Plant, Romania** 2014-2016 **BENEFICIARY:** 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, General Electric ➢ Devices monitored: SunGrow Inverters, Schneider Measurements Units, ABB & GE Protection Relays, Sensors and transducers	➢ 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, General Electric ➢ Devices monitored: SunGrow Inverters, Schneider Measurements Units, ABB & GE Protection Relays, Sensors and transducers
9	**Mozaceni 9+4 MW PV Plant, Romania** 2014-2015 **BENEFICIARY:** 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, General Electric ➢ Devices monitored: AEG Protect PV, GE Protection relays, power meters	➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active & reactive power and voltage control algorithm ➢ Delivery of 20 kV Substation ➢ IEC 61850 SCADA integration in 110/20kV Mozaceni Substation
10	**Vieru 7MW PV Plant, Romania** 2014 **BENEFICIARY:** 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	➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active & reactive power control algorithm ➢ Manufacturing, delivery and integration of power factor correction (PFC) system
11	**Salcuta 2,5+2,5 MW PV Plant, Romania** 2014 **BENEFICIARY:** Transenergo	➢ Turn-key SCADA solution ➢ More than 12.000 points collected ➢ 2 x 20kV grid connection points integrated ➢ Protocols used: Modbus, IEC 104, Aurora ➢ Equipment used: Phoenix Contact, Schneider, General Electric, National Instruments ➢ Devices monitored: Power One Inverters, Phoenix Contact Measurements Units,	➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active & reactive power control algorithm ➢ Manufacturing, delivery and integration of power factor correction (PFC) system

References

Process Control & Electrical Automation

#	PROJECT	SUMMARY	SERVICES
12	**Ciocanesti 2 MW PV Plant, Romania** 2014 **BENEFICIARY:** 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, General Electric, National Instruments ➢ Devices monitored: Power One Inverters, Schneider Measurements Units, Schneider Protection Relays	➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active & reactive power control algorithm ➢ Manufacturing, delivery and integration of power factor correction (PFC) system
13	**Crevedia 3+3+1,5+2,5 MW PV Plant, Romania** 2014 **BENEFICIARY:** Sun Partners	➢ Upgrading the existing SCADA system with active and reactive power control functionality	➢ Solution Design ➢ Active & reactive power control algorithm ➢ Custom hardware & software development for Aurora protocol gateway
14	**36MW Vestas Windfarm Projects, Romania** 2014-2015 **BENEFICIARY:** Direct Network Solutions	➢ Integration of 5 Wind Power plants into the PET Constanta Dispatch Center	➢ Solution Design ➢ SCADA software development
15	**Harman 7 MW PV Plant, Romania** 2014 **BENEFICIARY:** 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	➢ Solution Design ➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active & reactive power control algorithm
16	**ACV 4,9 MW PV Plant, Romania** 2014 **BENEFICIARY:** 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, ABB Protection relays, power meters, sensors and transducers	➢ Solution Design ➢ Manufacturing and delivery of SCADA panels ➢ Hardware configuration ➢ SCADA Software Development ➢ Active & reactive power control algorithm

IT, Telecom & Cyber Security

- High level and low level Design
- Turn-key redundant VPN Solutions
- Network monitoring and support
- Database development, administration and security
- Data loss prevention
- Security information and event management
- ITIL and ISO 27001 compliancy
- Equipment used: Cisco, Fortinet, Checkpoint, GE, Fujitsu, Ruggedcom, HP, Dell, Supermicro etc.

Putting IT altogether

Information technology

- Hardware: all x86 compatible server architectures
- OS: Windows (Server and Client), Linux (CentOS and Ubuntu)
- Database: MySQL, MariaDB, PostgreSQL, Microsoft SQL
- Directory: Microsoft Active Directory, OpenLDAP
- DNS: Microsft DNS, PowerDNS
- Programming / scripting: Powershell, PHP, Python, Java, regex
- Log collection: logstash, syslog-ng, syslogd
- Virtualization: VMware ESX, vSphere, vCloud Director
- Storage: Netapp, FreeNAS

Telecommunication

- Hardware: Cisco, Juniper, Mikrotik
- Platform series: Cisco 19XX/29XX, Cisco 7200/7600, Cisco ASR, Catalyst 6500, Juniper MX series (240-960), Cisco Nexus, Juniper PTX & 2020, various Mikrotik platforms
- OS: IOS, IOS-XR, NX-OS, JunOS, Router OS
- Technologies & protocols: IS-IS, OSPF, RIP, EIGRP, BGP, MPLS, Carrier Ethernet, SDH, DMVPN

Cyber Security

- Hardware: Cisco, Fortigate
- OS: Cisco IOS, FortiOS
- Analytics & reporting: FortiAnalyzer, ELK (Elasticsearch, Kibana & Logstash)
- SIEM: FortiSIEM
- Traffic analysis: nmap, tcpdump, Darktrace
- Network discovery & analysis: Nexpose
- Vulnerability & malware testing: Metasploit

References

IT, Telecom & Cyber Security

#	PROJECT	SUMMARY	SERVICES
1	**Telecom infrastructure for Dispatch Centers** **2014-2016** **BENEFICIARY:** Transenergo, Alpiq Romindustries, Monsson Alma, PET Communications	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. Equipment used: Cisco, Fortinet, Checkpoint, GE, Fujitsu, Ruggedcom, HP, Dell, Supermicro etc.	➢ High level and low level Design ➢ Turn-key redundant VPN Solutions ➢ Network monitoring and support ➢ Database development, administration and security ➢ Data loss prevention ➢ Security information and event management ➢ ITIL and ISO 27001 compliancy

Engineering & Consulting

#	PROJECT	SUMMARY	SERVICES
1	**Complete refurbishment of Topolog river MHPPs, Romania** 2014-2016 **BENEFICIARY:** 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.	➢ Feasibility study ➢ Basic and detailed engineering ➢ Technical assessment of equipment and constructions ➢ Execution details ➢ Permits and authorizations
2	**Protection Coordination Study for Hadeed Steel Factory, SABIC E&PM, Kingdom of Saudi Arabia** 2014-2015 **BENEFICIARY:** Hadeed Steel Factory, SABIC E&PM **LOCAL PARTNER/ MAIN CONTRACTOR:** 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.	➢ Review Circuit Breaker & Fuse Applications ➢ Review device size or settings to meet system protection requirements ➢ Recommendation of trip device settings for low voltage breakers ➢ Recommendation of trip settings for medium and high voltage relays ➢ Time current curves used to graphically illustrate selectivity between devices ➢ Report of system coordination & recommendation ➢ ETAP model ➢ Soft & Hardcopy document result of system coordination & recommendation

Thank you for your attention!

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