

Making the Smart Grid Real

A leader in SMART GRID Solutions with a unique mix of knowledge in protection, control, communication and metering technologies



Solutions born from experience and technological leadership



Intensive R&D

Agility

Flexibility





A technological leader

in Protection, Control, Communication & Metering technologies

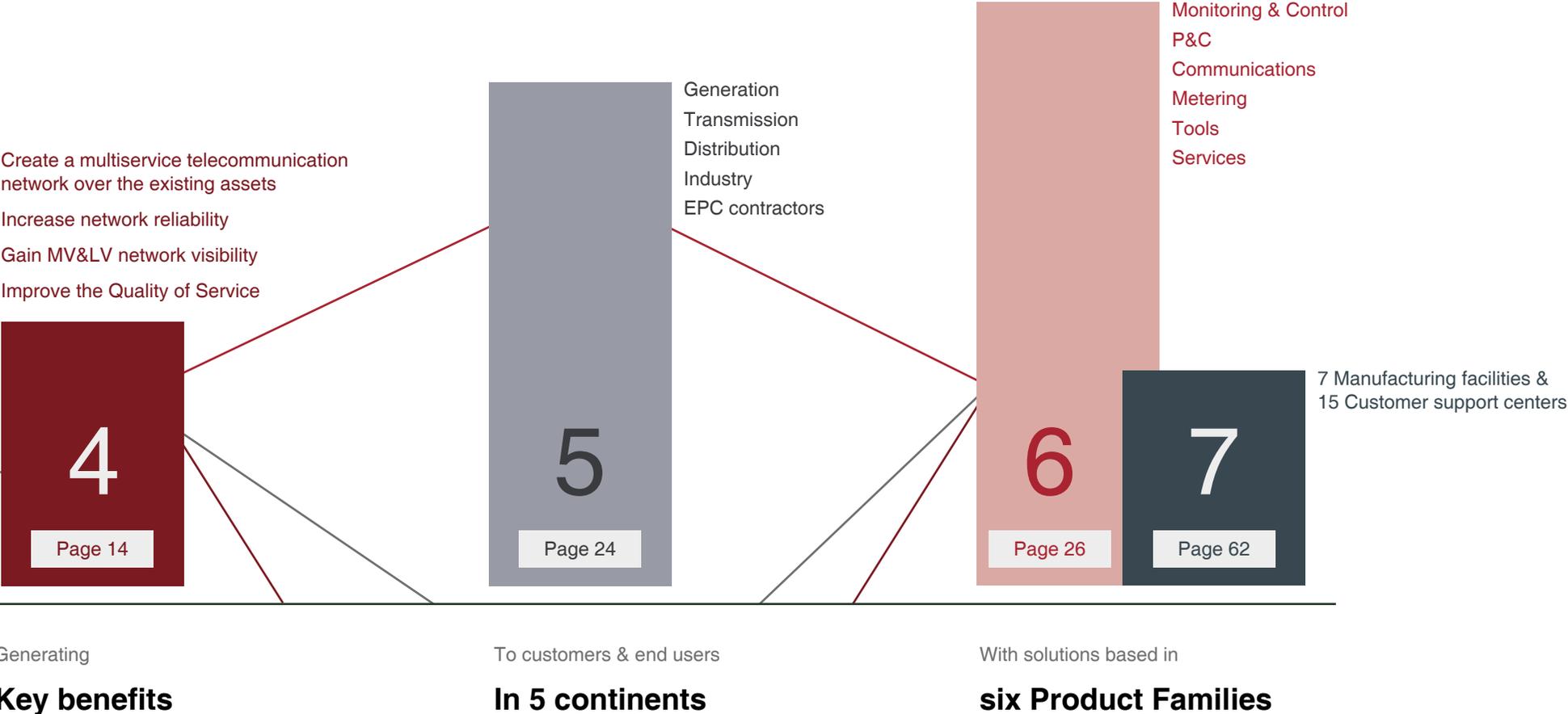
Innovating

to support customers in achieving their new business objectives with smart solutions and engineering services

With large field experience in complete solutions

for HV, MV & LV power systems

Enabling the evolution of TSOs & DSOs





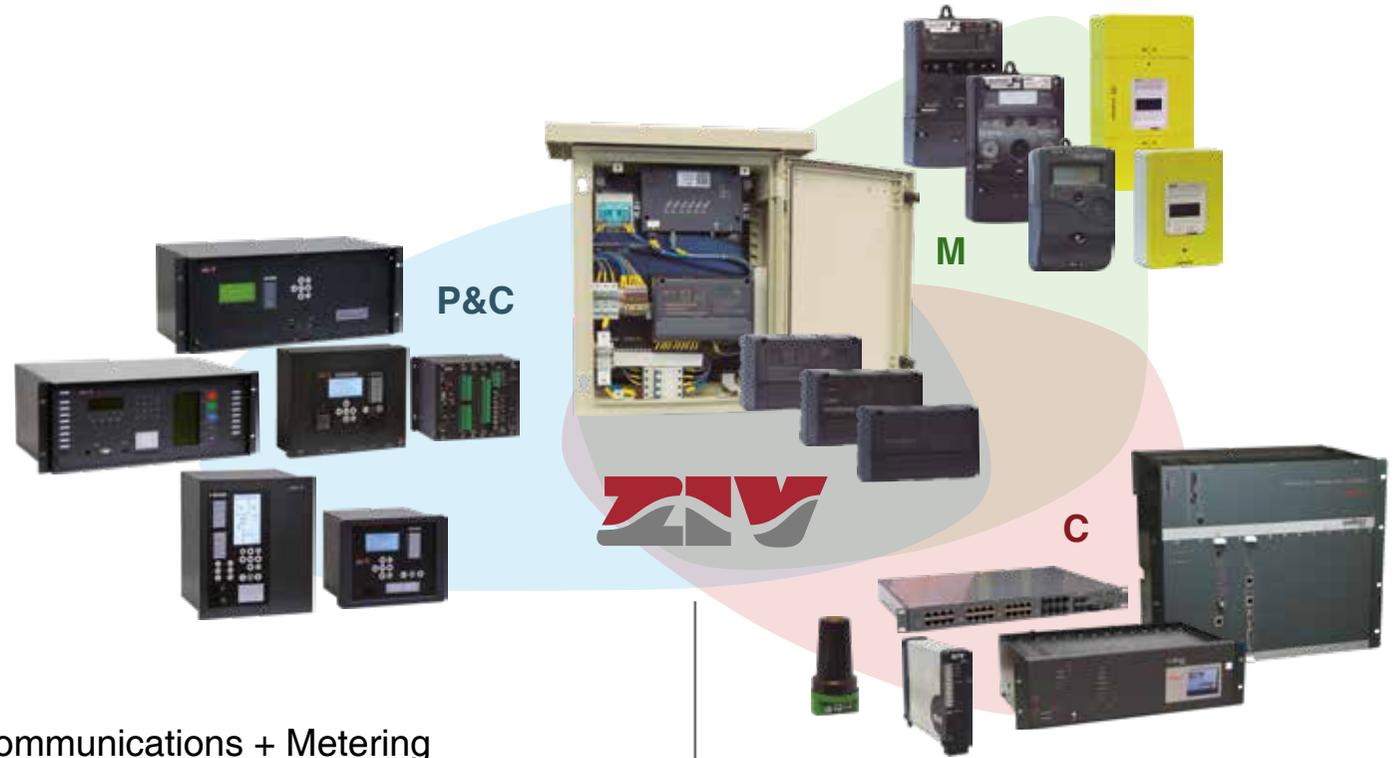
1 A technological leader

A unique company delivering integrated solutions for HV, MV & LV Systems

Providing greater selectivity, reliability and security to T&D networks

Helping to remove barriers in the deployment of Smart Grids

Enabling rural & urban AMI deployment



Σ Protection + Control + Communications + Metering

Contributing to the sustainability of energy networks



2 Innovating

to support customers in achieving their new business objectives with smart solutions and engineering services

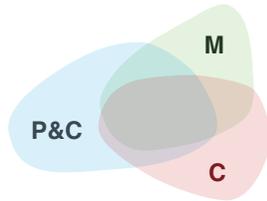


Solutions based on standards

ZIV participates as an active member of several technical fora and standards committees

An aerial photograph of a city at dusk. The sky is filled with dark, dramatic clouds, with a thin layer of orange and yellow light from the setting sun near the horizon. The city below is illuminated with lights, and a prominent, tall, dark skyscraper stands out in the center. A wide river flows through the city, and a complex highway interchange with multiple overpasses is visible in the foreground. The overall scene is a mix of urban development and natural elements like trees and hills in the background.

**3 With large field
experience in
complete solutions**



An extensive vision of the grid allows us to cover all needs:
from high tech devices
to full system integration

Substation Automation Systems

Distribution Automation Solutions

Metering Solutions

for HV, MV & LV Systems



Innovative, seamless and scalable systems for Substation and Distribution Automation

+ Supporting the full Digital Substation

Today, information flows constantly and in a great amount of Mbytes between protection relays, bay control units, substation gateways, etc... comprising the so-called **STATION BUS**.

Primary equipment, such as circuit breakers, CTs and VTs, will also be connected to this flow of information: the **PROCESS BUS**.

This is the new fully Digital Substation and ZIV is ready to support you with it.

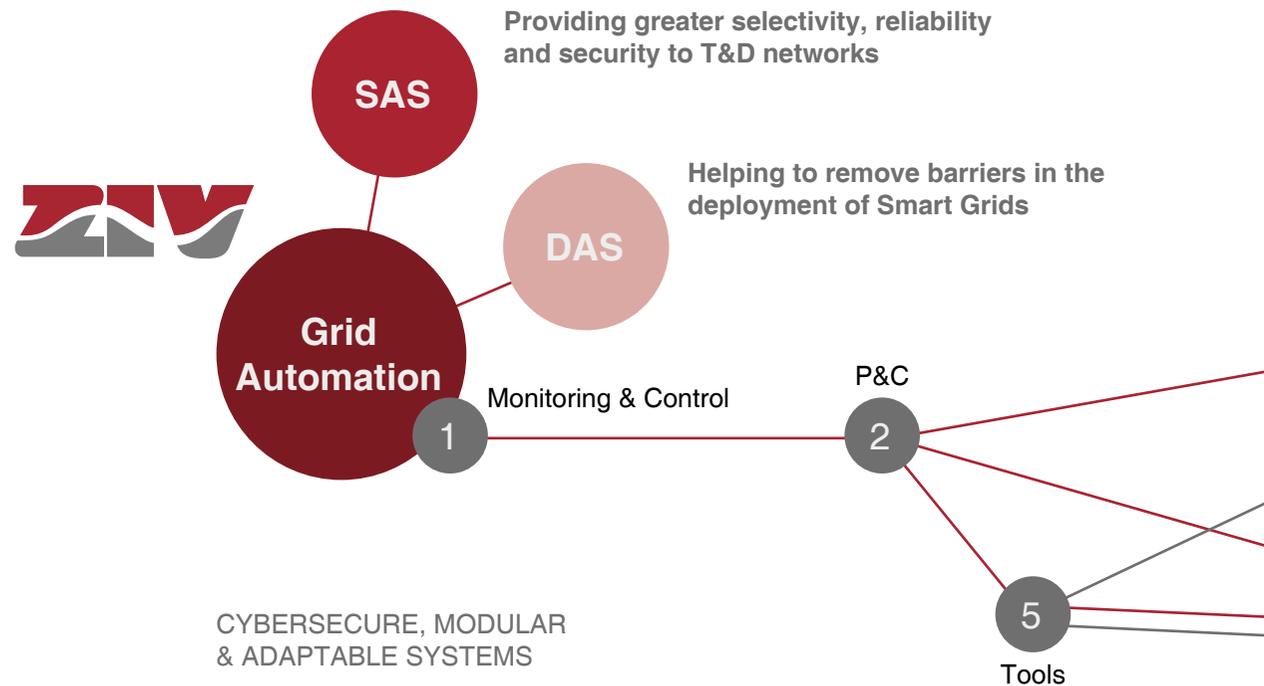
+ Working on Cybersecurity

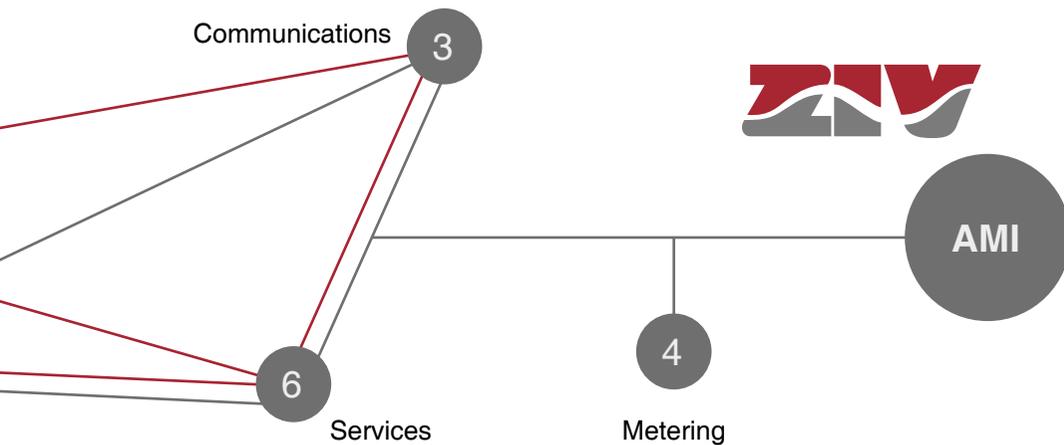
The wide and commonly accepted presence of internet-based technologies into the transmission systems has led to evident advantages in the assets management. But the communication standards running over TCP/IP represent a potential risk of fraudulent access to the IEDs in the network so **CYBERSECURITY** raises as a must and ZIV, aware of this new scenario, keeps working on it.

+ Researching on Synchrophasor systems

Continuous improvements in communication technologies and software tools enable utilities to use **SYNCHROPHASOR SYSTEMS** as the most effective and accurate way for the preventive detection of critical faults within the power network systems. ZIV plays an active role in this field participating in international working groups focused on this subject.

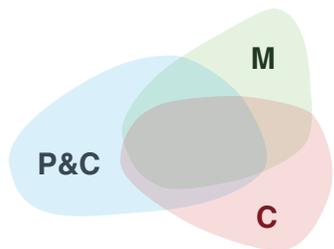
+ Improved MV and LV network automation solutions are necessary to face the constraints introduced by the increased amount of DER and new usages and to reduce energy losses and maintain or increase the quality of supply.





Metering Solutions

Enabling rural & urban AMI deployment



+ **SMART METERS** include many additional functionalities on top of metrology. Electromechanical meters were able to record the total consumed energy to date, without communication capability. Smart meters are able to discern energy consumption per intervals, generating load profiles which are the base for intelligent energy management and demand response mechanism implementation. It is a key element in the advent of the energy transition towards a low carbon society.

+ **Smart grids improve stability and security of electricity supply**, in a new scenario in which the grid no longer has a unidirectional flow from generation to transmission to distribution to consumption. Distributed generation and the explosion of renewables make the operation of the grid more complex. The smart grid provides the data and mechanisms in order to have an accurate picture of the energy flows and status of the grid in real time. Smart meters can be considered millions of low voltage grid monitors scattered along the grid which can provide high value data about asset status, such as transformers and lines.

Unlike traditional meters, smart meters allow customers to receive timely and accurate bills. In this way consumers are empowered to improve their efficiency, optimize their consumption patterns and finally to reduce their energy budget.

An aerial night photograph of the University of Minnesota campus. The image shows the iconic Campanile towers in the foreground, with the Old Campus building to the left and the University of Minnesota Tower in the background. The streets are illuminated with light trails from traffic, and the sky is a deep blue. A dark red semi-transparent box is overlaid on the bottom left corner, containing the text '4 Generating Key Benefits'.

4 Generating
Key Benefits

C + I + G + I benefits



Create

a multiservice telecommunication network over the existing assets

Increase

your network reliability with innovative & scalable systems + reduce the CAPEX

Gain

MV & LV network visibility

Improve

the Quality of Service

4.1 Create

a multiservice telecommunication network over the existing assets

The challenge

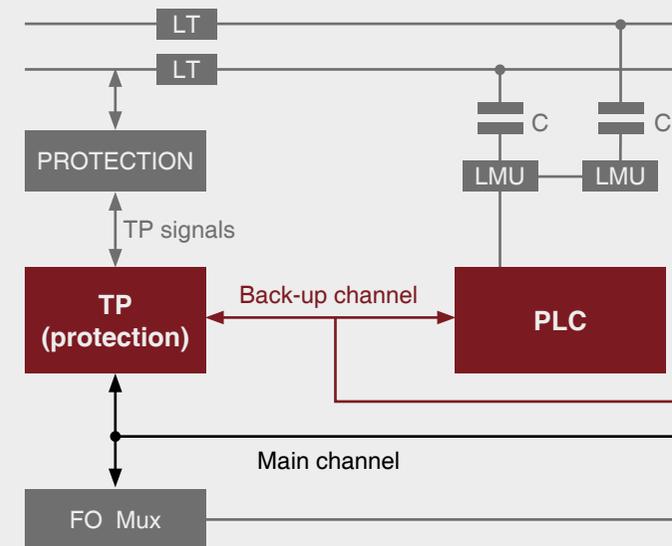
Communications between substations have to be secure and reliable. There are several critical services (data, voice, teleprotection) with different characteristics and requirements that must be transmitted efficiently through the available communication media. In order to meet the N+1 criteria for these critical services, both main and back-up channels have to be usually considered and it is quite common to use independent technologies for each one of these channels.

Telecom Engineering

The solution

ZIV has a wide experience in the execution of communication projects for substations including the use of different technologies (Fiber Optic, Power-Line Carrier, radio links, etc). One of the key added-values of ZIV for these communication solutions is that high-performance PLC terminals as well as extremely reliable teleprotection units are included in its portfolio.

ZIV PLC terminals allow to have back-up channels for both teleprotection and high speed data channels (maximum throughput up to 320kbit/s) including many different user interfaces (Serial and Ethernet). ZIV Teleprotection units can be used in any available communication media (SDH network, PLC links, single-mode or multi-mode fiber optic, IP networks, ...).



HV - Turnkey Telecommunications Project in Angola for TANESCO

Case study

A new power plant (Kinyerezi) was built in Tanzania by Jacobsen Elektro and ZIV was in charge of the **design, supply, commissioning and training of the complete telecommunication system** following TANESCO's standards.

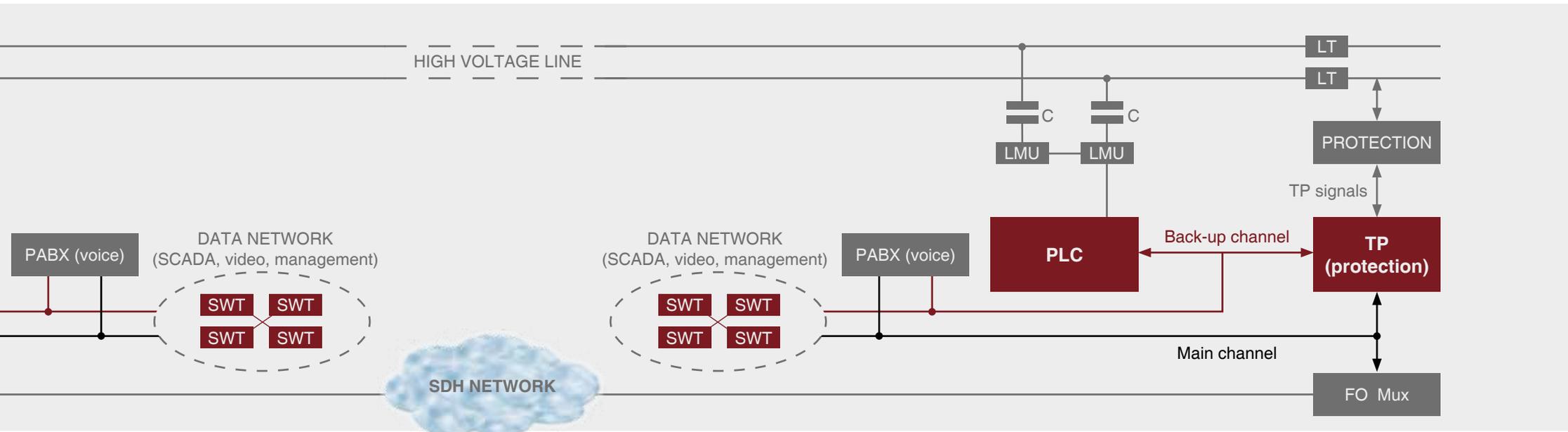
The project consisted not only in providing all the necessary new communication equipment for Kinyerezi but also in supplying/upgrading different equipment of other substations of TANESCO (Ubungo and FZII).

A solution with main and back-up channel was considered for the transmission of all critical services (including teleprotection) using both fiber optics and Power-Line Carrier. Equipment supplied had the necessary interfaces to connect the new equipment as well as the old one.

The Benefit

All the required **services** (including voice, data and teleprotection) are **transmitted through two independent and reliable communication systems**.

The capacity of the supplied terminals highly exceeds the current requirements so **the customer will be able to include new services** with higher communication demand in the future.



4.2 Increase

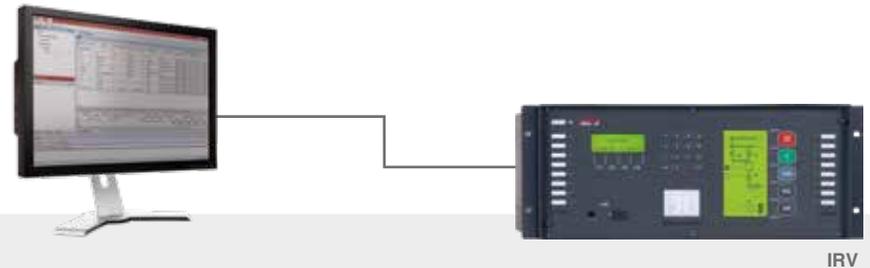
your network reliability with innovative & scalable systems + reduce the CAPEX

System Extension challenge

Assure a correct balance between the traditional P&C equipment and the state-of-the-art technology ensuring reliability and cost-effectiveness of the new extended substation.

The solution

Complete the new P&C equipment required for the new bays with additional **Bay Control Units** hardwired to the existing bays to integrate those within the new SAS.



Redundant System challenges:

Integrate legacy equipment with a modern SAS that provides full monitoring and control capabilities while maintaining the traditional requirements and philosophy of the ST operators.

Provide **C&R panels** that include both the conventional control operations based on selectors and switches and the new equipment. Keep consistency between both control systems by using **BCUs hardwired to the conventional mimic**.

Case studies

Extension of existing substation in Ecuador

CELEC EP 230/138/69kV
Santo Domingo SS

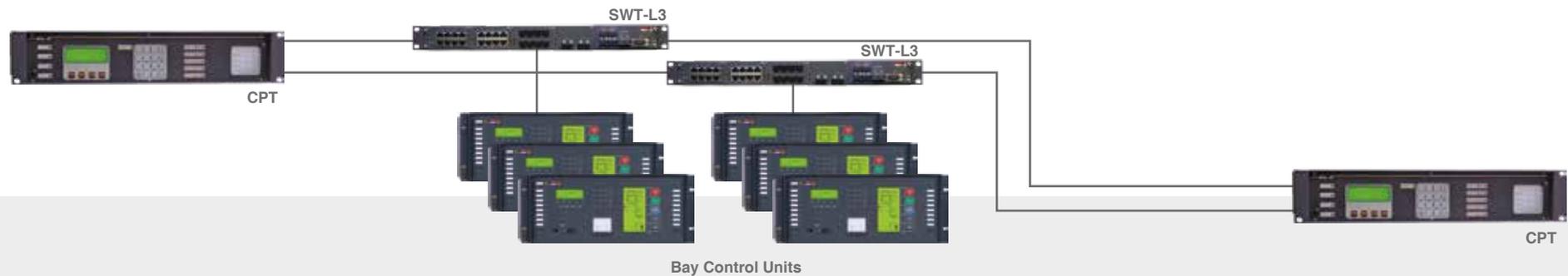
The extension works consisted in the addition of two HV lines and one transformer.

The automation scope included the supply of **C&R panels** for the new bays as well as a new **more powerful RTU** hardwired connected to the existing P&C equipment. In addition, the existing busbar protection was replaced by a new one of **low impedance type**.

The Benefit

The main goal of the project was **to have a single communication system with the SCADA integrating the existing and the new bays**. The key benefit for the customer was an overall increase of functionality, mainly related to the remote monitoring (measurements) and control (commands) from the dispatching center.

Today, Santo Domingo SS is a **future proof installation ready for further extensions** if required by the power networks conditions in Ecuador.



New substation in Kenya (Lamu Island)

KPLC 33/11kV Lamu SS

This new substation comprises a 33kV single busbar with two OHL and one transformer feeder plus a 11kV single busbar with six outgoing feeders.

The automation scope included the supply of **C&R panels** and a **Substation Central Unit** to communicate the substation with the dispatching center.

The main goal of the project was to provide a modern SAS together with a conventional control panel as required by the customer. With this arrangement, the substation staff can operate the substation under the same well-known procedures and the dispatching center team secures access for monitoring and command remotely.



4.3 Gain

MV & LV network visibility

The challenge

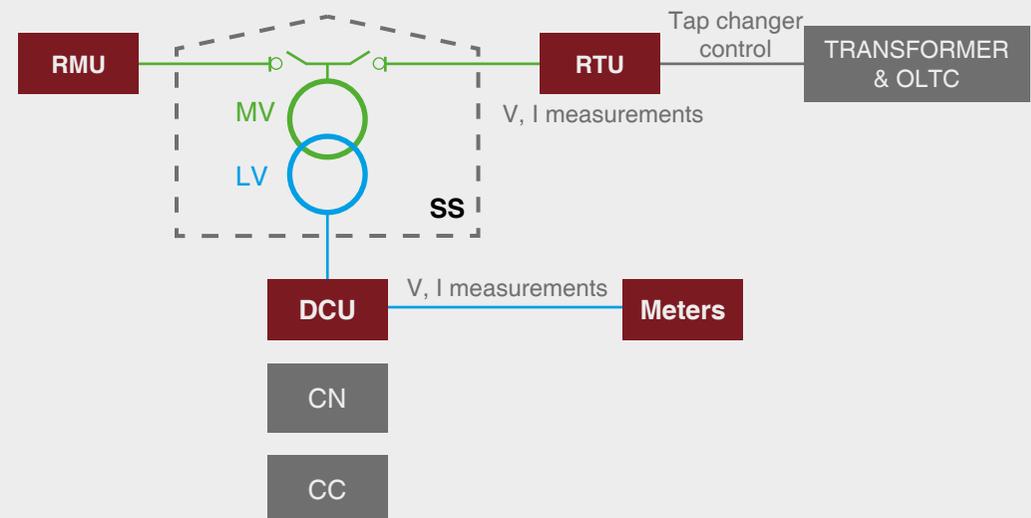
The introduction of advanced monitoring and control functions into the medium voltage distribution grid, required to achieve the data and capabilities demanded by the modern smart grid, requires specific technology developments. The distribution grid is vast, the number of equipment required is huge, and dependability, reliability, product cost and installation costs are key factors to take into account.

As a result of this, **new solutions are required in order to efficiently deploy smart grid functionality in the MV grid.**

The solution

MV automation solutions in RMUs, reclosers, transformers with tap changers with automated setpoints, fault pass detection units and advanced protection devices, sensors and communications, **are all part of the technology components which will be implemented in the MV grid to deploy the smart grid of the future.**

The LV grid will benefit from the millions of smart meters which become LV monitoring points generating big data that can be processed and analyzed to improve grid operation and optimize the efficiency to lower CO2 emissions.



Iberdrola's STAR project



A deep knowledge of the protection, control, metering & communication technologies involved is mandatory

Case study

Iberdrola's STAR project is a huge smart grid project consisting on the **massive deployment of smart equipment in different locations of medium and low voltage grids**. This involves millions of smart meters installed at low voltage end users, dozens of thousands of secondary substations equipped with AMI concentrators, RTUs, and communications integrated in RMUs.

The MV and LV supervision and operation are integrated in a single network inside the Secondary Substation. The information coming from the smart meters, LV and MV supervision is sent upwards in the network architecture up to the control center of the distribution company.

The amount of the information is enormous, **providing online and detailed knowledge of the whole MV and LV grids, from home users to Secondary Substations**.

The Benefit

These supervision systems offer an enormous amount of information to be integrated and processed in the corporate information systems of the distribution companies. LV network supervision solutions are a **cost-effective alternative to increase the distribution grid capacity due to better control and monitoring of the LV grid**.

Additionally, LV advanced supervision systems enable the implementation of advanced low voltage monitoring functionalities such as blowout fuses, fraud detection, feeders load unbalances and quality of supply assessment.

Thanks to the MV supervision systems, utilities can detect the faults and react much faster, which **reduces in a huge way the outage unavailability records**. The integration of the renewables in MV is also improved, as the online control of the level of the voltage allows to tune it on the tap changer in case of a change because of a renewable plant.

To sum up, the overall efficiency of the grid is increased both in terms of operation and in terms of performance and capacity.



4.4 Improve the Quality of Service

The challenge

To provide control systems that:

- **allow control of windfarms export** by the utilities in order to provide the necessary voltage support whilst respecting the networks voltage and thermal constraints.
- monitor analogue and digital values at specific points, and **make decisions on the network to determine if the connected distributed generation power stations are allowed to generate at full capacity or must be constrained.**

The solution

To provide ANM schemes, based on communications if required, with centralized or distributed architectures, to manage the power flow on the network.



Advanced Network Management Systems to Integrate Distributed Generation

Cauteen 110kV substation for ESBN in Ireland

Case study

Four substations connected together with a distributed ANM system to control the amount of the VAR exported parallel into the TSO (EIRGRID) as well as the DNO (ESB) systems.

Power flow control systems in more than 200 points in NPG (Northern power Grid) and WPD (West Power Districts) in the UK. Several locations where the power flow in Wind and Solar farms are connected to these two DNO systems.

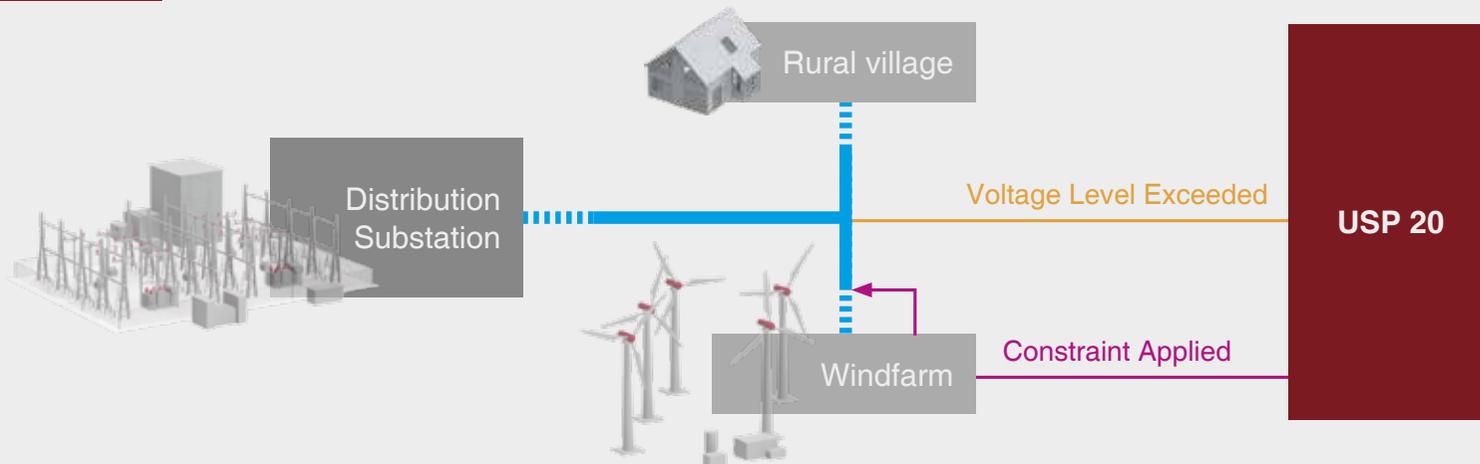
The Benefit

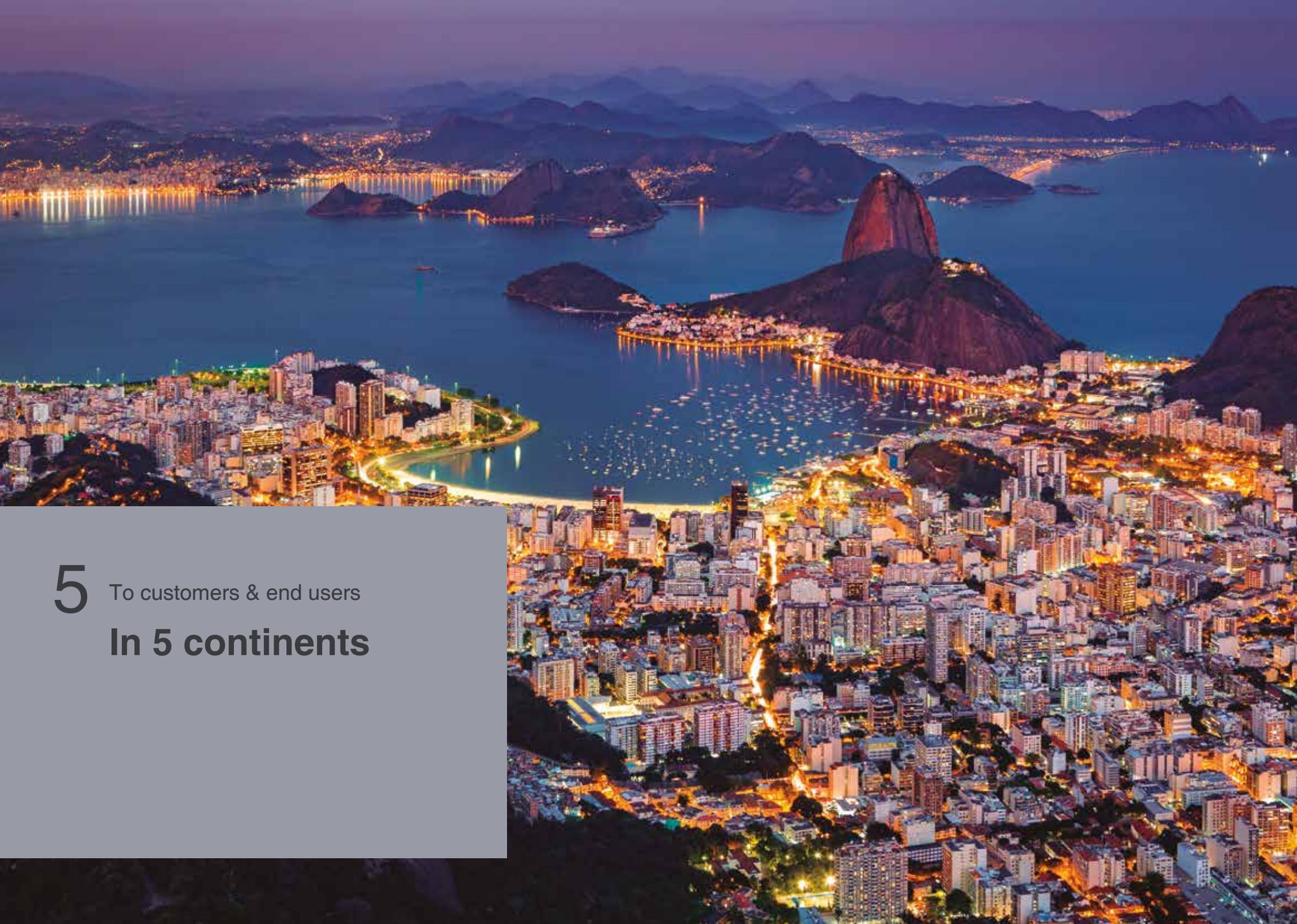
The described system has allowed our Customer to **accelerate the integration of Distributed Generation site into their distribution network** whilst managing the impact that this additional generation has on network operations.



USP 20

Distributed Generation Integration





5 To customers & end users
In 5 continents



7 Manufacturing facilities & 15 Customer support centers

Generation

Transmission

Distribution

Industry

EPC contractors

NORTH AMERICA

Chicago (USA)
Paris (FRA)
Ryhad (SAU)

Niteroi (BRA)
Dublin (IRL)

LATAM

Mexico (MEX)
Newcastle (GBR)

EUROPE

Zamudio (ESP)
Singapore (SGP)

Barcelona (ESP)
Dubai (ARE)

AFRICA

Madrid (ESP)
Bangalore (IND)

ASIA

Grenoble (FRA)
Yakarta (IDN)



6 With solutions based in
six Product Families

Tested in the Smart Grid Lab & IEC 61850 Interoperability Laboratory

Monitoring & Control

Automation RTUs and supervision devices for HV, MV & LV Systems



P&C

Full range of Protection Relays



Communications

Power Line Carrier & Teleprotection Systems, Networking Solutions for Primary & Secondary Substations, MV Communications over PLC, Sensors, Couplers & Filters



Smart Meters, DCUs, Smart Grid Cabinets & EV Charging Stations



User friendly Software for AMI & Substation Automation Systems



Engineering Services, System Integration and Training

6.1

6.2

6.3

6.4

6.5

6.6

Intensive R&D

Agility

Flexibility

Metering

Tools

Services

6.1 - Monitoring & Control

Transmission Automation

Compact & Modular RTU / Gateways



6.2 - Protection & Control

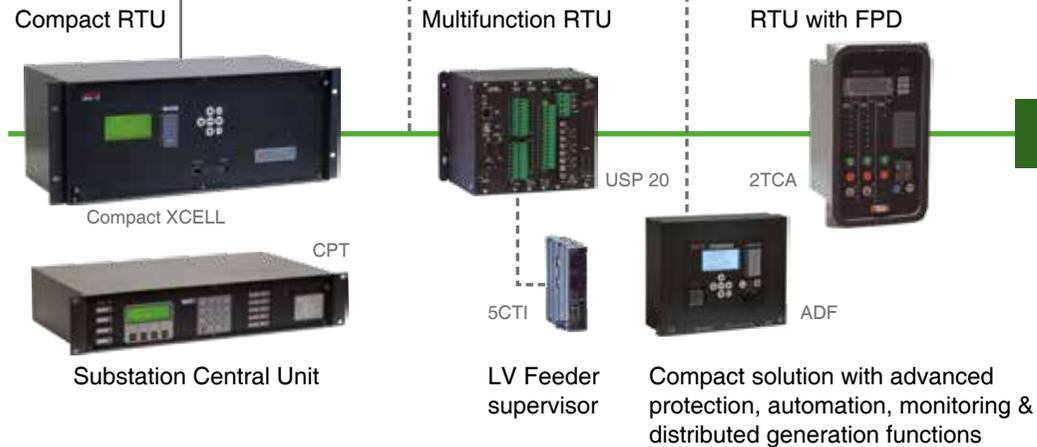
Modular, Adaptable & Cibersecure relays for HV Systems



Distribution Substation

Renewables Monitoring

Secondary Subst. Automation



Distribution & Industry

Full protection functions with several hardware options



Compact multifunction protections



6.5 - AMI tools + Substation Automation tool

6.3 - Communications

HV Telecommunications

Power Line Carrier + Teleprotection Systems



+ Line Matching Units
+ Accessories

Substation Networking

+ Diffuser / Concentrator
+ Real Time Router
+ Substation Switch



Secondary Substation Networking

Compact
SWT



SWT

Comms Node,
Modems



DRA

Routers



EMR

Comms over MV / LV PLC

MV PLC Equipment



ZBP

+ Filters / Sensors / Couplers



6.4 - Metering

Smart Meters & AMI

+ Single & Three phase meters over PLC & LTE & Radio

+ Industrial & High
precision meters

LV



5CTL



5CTD



5CTM



5CTA



5CTA-ESMR5



5CTE



5CTD



5CTD-E2F

New
Industrial Smart Meter

Data Concentrator Units

4GWC



Gateway



4CCT

DCU + DCU with cellular
comms integrated

4TGB



+ AMI cabinets
indoor / outdoor

PRV-M



PRV-B



PRV-VP



Fast & Standard recharge. stations
Wall box & Stand Alone Units
For Private & Public services

Broad range of DCUs for urban & rural AMI

+ EV charging stations

6.6 - Engineering Services + System Integration + Training



6.1 Monitoring & Control

Substation Central Units

Stand Alone Bay Control Units

Advanced Network Manager

MV Supervision & Automation

LV Supervision systems

**Solutions available for all kind of system architectures:
centralized, distributed or combined**

Modular & Compact RTUs

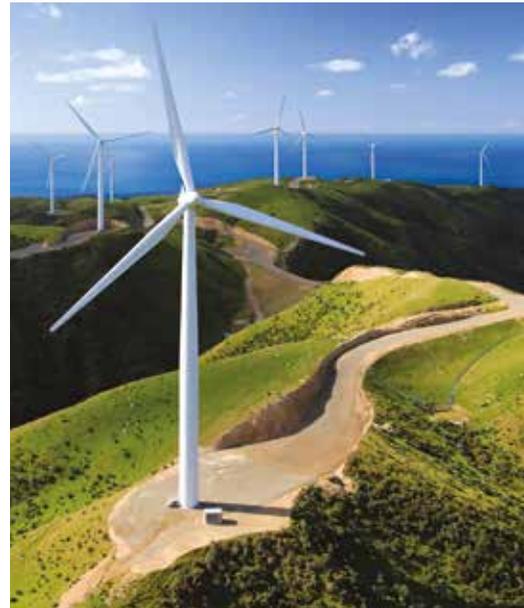
Make possible the integration of centralized & distributed systems in one device

ZIV ANM systems

Accelerate the integration of Distributed Generation sites onto their distribution network whilst managing the impact that this additional generation has on network operations

ZIV Supervision systems

A first step to deploy a LV management system able to bring the operation paradigms of HV/MV networks to LV



Substation Central Units

XCELL Modular & Compact RTU

Advanced substation automation platform designed specifically for HV and MV substations. Its state-of-the-art technology provides real-time access to hardwired devices (IEC 61850 / native protocols). This makes it ideally suited for new substations or upgrade and integration of existing substations.



CPT Compact RTU

This device can operate as a Substation Central Unit or as a RTU, enabling in both cases the communications and data management among the protection, control and metering IEDs within a substation. When installed in IEC61850-based substations, the CPT can be configured as a client or server depending on the specific requirements of the project.

Stand Alone Bay Control Units

Smart Bay Control Unit

A highly flexible bay control unit designed for installation either in switchgear LV compartments or in C&R panels.

This BCU includes high-density I/O, analog inputs as well as a full color graphic display for local command. A single unit can control multiple bays through its multi-graphic feature.

MCV Bay Control Unit

A compact BCU featuring analog and digital I/Os and heavy-duty output contacts for direct actuation on the CB trip and close coils.



RTV Voltage Regulator

Powerful AVR to control the tap changer of the transformer and handle several transformers in parallel.



PRN Oscillo Recorder

Stand-alone analog and digital recorder featuring selectable sampling rate of up to 384 samples per cycle.



SCT Trip Coil Supervision Relay

Advanced TCS relay featuring independent monitoring per pole with CB open and close.

Advanced Network Manager

ANM

Adaptive Real-Time network control monitors network status and manages network constraints in realtime. It offers control for every level of the distribution network by monitoring both generation and load.

It controls active devices like on-load distribution transformers, voltage regulators, capacitor banks and generation control systems to manage thermal constraints, voltage optimisation, export power constraints, Connection Point supervision functions and grid management services.

ANC

The ANC Controller is installed at the grid connection point, monitoring the connection parameters against user defined constraint levels and regulatory limits. If the voltage level rises too high or the generation levels exceed the defined thresholds, the controller constrains the generation until network voltage, thermal levels and generation output are within acceptable levels. The number of constraints is selectable. The System can operate in full automatic mode, local manual mode or by telecontrol or can integrate as part of a larger ANM scheme. It will default to a fail safe mode in the event of any failure scenarios.

Communications Interfaces

The ANC controller is capable of being integrated with existing SCADA systems using IEC-870-5-101 , IEC870-5-104 and DNP3 protocols. Other protocols are available on request. The ANC controller is also capable of integrating with existing substation RTUs and IEDs using a variety of industry standard protocols. The ANC Controller can be fully controlled remotely by the SCADA system. The automation functions can be enabled and disabled remotely and the individual constraints can be applied or removed as required by the SCADA Operator.

Windfarm Interface

The ANC Controller can interface with the Windfarm Controller in a number of different ways depending on the connections agreement. The interface can use relay contacts for stepped constraint levels or a 4-20mA control signal for linear control and greater flexibility.

Integrated Operator Interface

The integrated operator interface provides the ability to control the constraint scheme locally through manual mode selection.

Network Quality Monitoring

The ANC Controller incorporates highly accurate power quality monitoring capabilities which allow the controller accurately monitor the network voltages at the connection point as well as the power flow, system frequency and frequency on a phase by phase basis.



ANM & ANC controller

USP 20

MV Supervision & Automation

TCA RTU with FPD functionality

TCA controllers implement MV supervision and automation functions for secondary substations switchgears in underground power grids, as well as for disconnection devices and reclosers in overhead power lines. They implement bidirectional fault pass detection based on ANSI protection functions.

Modular 2TCA provides telecontrol and fault pass detection for up to 3LxP RMU.

Front panel buttons for local operation.

Standard telecontrol protocols: IEC 60870-5-104 and DNP 3.0. Advanced protection functions.

Modular chassis. Up to 48 DI and 8 DO and analog V, I inputs for three lines. Secure Web page and Ethernet ports and LV supervision integration.



Compact TCA



Modular 2TCA

ADF (RGDM)

Compact RTU with advanced protection, automation, monitoring and distributed generation functions

Designed for MV secondary substations with different grounding method (grounded grids, ground isolated grids or compensated via Petersen coil).



ADF

Supervision systems that enable LV Network visibility

USP 20 Multipurpose RTU

Telecontrol, FPD, MV and LV supervision in a modular device

USP remote controller is the advanced multipurpose RTU generation with fault pass detection functionality.

Its modular design facilitates the automation of different MV facilities (modern compact RMU, overhead interrupters, reclosers), where a more flexible and powerful solution is needed.

In addition to standard protocols and features, it supports a larger number of inputs/outputs.

As an option an HMI/front panel is offered.

Modular chassis. 5 and 8 slots models, Serial and Ethernet ports, Protocol Gateway function (IEC 101/104, DNP 3.0, Modbus).



4SLV Supervision node

Advanced low voltage supervision

Head of the feeder LV supervisor meters (5CTIs) connected by RS485 bus.

Communication with up to 16 LV feeder supervision units.

Low voltage Distribution Transformer supervision function performed by an internal three-phase energy meter.

PRIME LINE DETECTION algorithm which gives an up to date LV circuit topology, mapping each end customer meter to the LV feeder and phase in which it is connected.

5CTI Advanced feeder supervisor

Complete LV supervision functionality for a LV feeder

Compatible with 4SLV or USP 20 supervisor nodes (connecting 5CTI supervisors through RS485 isolated port). Independent case model and built-in model in low voltage fuse panels.

ZIV LV monitoring systems allow greater installation of domestic Photovoltaic Generation on the LV network by automatically controlling the voltage on the LV network to meet regulatory requirements and defer other network reinforcement works.

Integrated and coordinated voltage control system can be deployed at distribution substations to provide more refined management of voltages on the LV systems to support the connection of increased low carbon technology.

The functionality of existing technologies such as an LV monitoring system and an on load tapchanger can be enhanced by the addition of a substation controller equipped with a control algorithm.



6.2 P & C

OHL/Cable

Breaker

Busbar

Capacitor Bank

Transformer

Feeder

**Full range of protection functions with
several hardware options**

A new generation of Adaptable & Interoperable Protection & Control IEDs
backed up with the experience
of more than 20 years in P&C

ZIV full range of protection relays

Are the perfect match for the extension of existing substations

+ New protection & control suite

Modular, Adaptable & Cybersecure relays for HV Systems; Compact Multifunction Protections for MV Systems & Self Powered relays

+ One tool for all IEDs & Systems

ZIV e-NET tool: Logics, Configuration & Communications



Full range of protection relays

ZIV, a leading relay and SAS supplier

Our powerful in-house R&D gives ZIV a leading position as a worldwide relay designer and manufacturer.

Our offering covers a broad range of comprehensive solutions ranging from management tools to products and systems for application in Transmission and Distribution power networks.

We are committed to balance the reliability and the cost-effectiveness during the installation lifetime by conceiving solutions that combine the spirit and philosophy of the traditional P&C equipment with the state-of-the-art technology.

In the following pages you will find our complete portfolio of P&C equipment widely installed by many customers worldwide. Besides, we introduce **e-Net**, a suite of fully interoperable and flexible P&C solutions.



MAIN FUNCTION		IEC 61850	Protection	Control	Graphic HMI
OHL / CABLE PROTECTION					
ZLV	Distance	✓	✓	✓	✓
DLX	Differential	✓	✓	✓	
BUSBAR PROTECTION					
DBC+DBP	Differential	✓	✓		
DBC+DRV/DCV	Differential	✓	✓	✓	✓
TRANSFORMER PROTECTION					
IDV	Differential	✓	✓	✓	✓
IDX	Differential	✓	✓	✓	
FEEDER PROTECTION					
IRV O/C	Multifunction	✓	✓	✓	✓
IRX O/C	Multifunction	✓	✓	✓	
CAP. BANK PROTECTION					
BCV	O/C + unbalance + switching logic	✓	✓	✓	✓
BREAKER					
IRV	Breaker protection	✓	✓	✓	✓

Protection & Control

OHL / Cable

ZLV Distance Protection

Selective, fast and reliable protection in overhead lines and cables.



ZLV

DLX Line Differential Protection

Complete and Flexible Protection for Overhead and Underground Lines.

Breaker

IRV Breaker Protection

Control and backup protection for breakers in EHV and HV systems.



IRV

Busbar

DBC Differential

Distributed Low-impedance Busbar Differential + Breaker Failure Protection (Central Unit).

DBP Differential

Distributed Low-impedance Busbar Differential + Breaker Failure Protection (Bay Unit).

DRV Multifunction & Differential

Multifunction Protection & Control Unit and Distributed. Low-impedance Busbar Differential + Breaker Failure Protection (Bay Unit).

DCV Capacitor Bank Multifunction & Differential

Capacitor Bank Protection & Control Unit and Distributed. Low-impedance Busbar Differential + Breaker Failure Protection (Bay Unit).

Capacitor Bank

BCV Capacitor Bank Protection

Multifunction Capacitor Bank Protection & Control Unit.

Transformer

IDV, IDX Differential Protection

For 2 or 3-winding transformer, auto-transformer, motor, generator or reactor.



IDV

Feeder

IRV Overcurrent multifunction

High-density I/O and graphical display for GIS bays.

IRX Overcurrent multifunction

Compact solution perfect for installation in LV compartments.



IRX

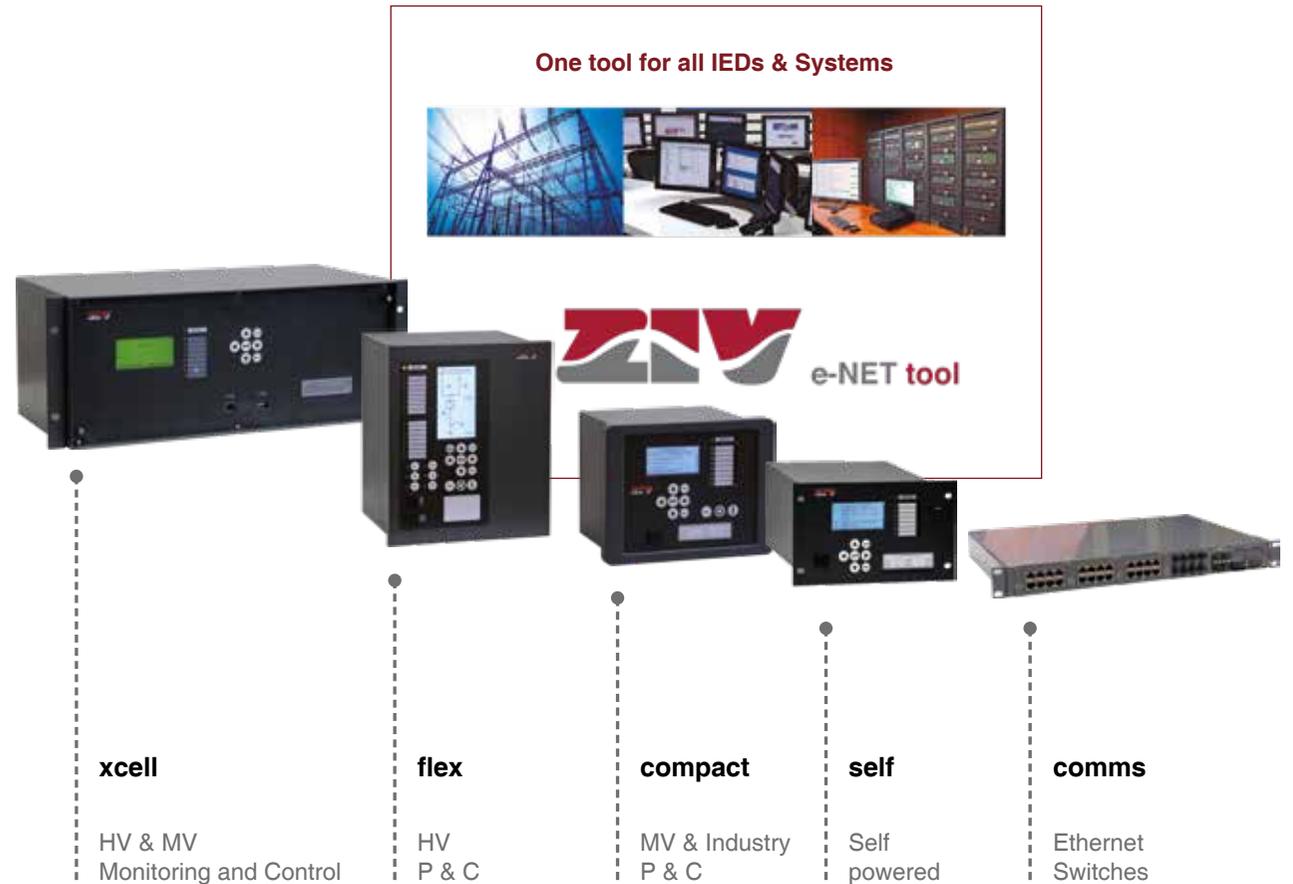
The new generation of Protection & Control IEDs

**ZIV presents e-NET suite,
a complete suite of P&C solutions
for reliable power transmission &
distribution systems**

**Interoperable and adaptable solutions
for HV & MV networks**

Wide range of applications:

- Lines
- Transformers
- Busbars and breakers
- Feeders
- Motors
- Bay control applications
- Grid automation



IRF

Relays for HV Power Systems

Adaptable, Modular & Cybersecures

Hardware options configurable with software functions.

Up to **40 analog** inputs, 180 digital inputs & 70 digital outputs.

Transducer inputs cards available.

Communications protocols: DNP3, MODBUS, IEC 61850 (Ed. 1 & 2).

Configurable mimic HMI (optional).

Time synchronization: IRIG-B, 1588, SNTP & **Redundancy** protocols: PRP, HSR, RSTP.



 e-NET flex

IRL

Compact Multifunction Protections for MV Power Systems & Industry

Protection system for Grounded or Ungrounded schemes

Broad range of applications:

- MV feeders.
- Machine bays.
- Back-up in HV lines.

Powerful built-in control logic module.

Optimized & compact relay.



 e-NET compact

IRS

Self-powered relays

Multifunction Overcurrent and Earth-Fault protection

Energized either directly from main CTs, AC auxiliary voltage or through the USB front port

Common applications are:

- Ring Main Units (RMUs) in Industrial and Secondary Substations
- Retrofitting projects
- Back-up in HV/MV transformers



 e-NET self

6.3 Communications

Power Line Carrier Systems

Teleprotection Systems

LMUs & Accessories for PLC

Networking Solutions

Communications over PLC

Couplers, Sensors & Filters

**Reliable, adaptable and flexible
solutions for multiple environment**

Data transport for services in/to EHV / HV / MV Secondary Substations

Over 50 years of experience in telecommunications for the electrical market

Power Line Carrier Systems

ensure that the process of data gathering is as reliable and economically efficient as possible

Engineering telecom services

facilitate the integration of complete Substation Automation services providing key support to EPCs and final customers

MV & LV communication solutions

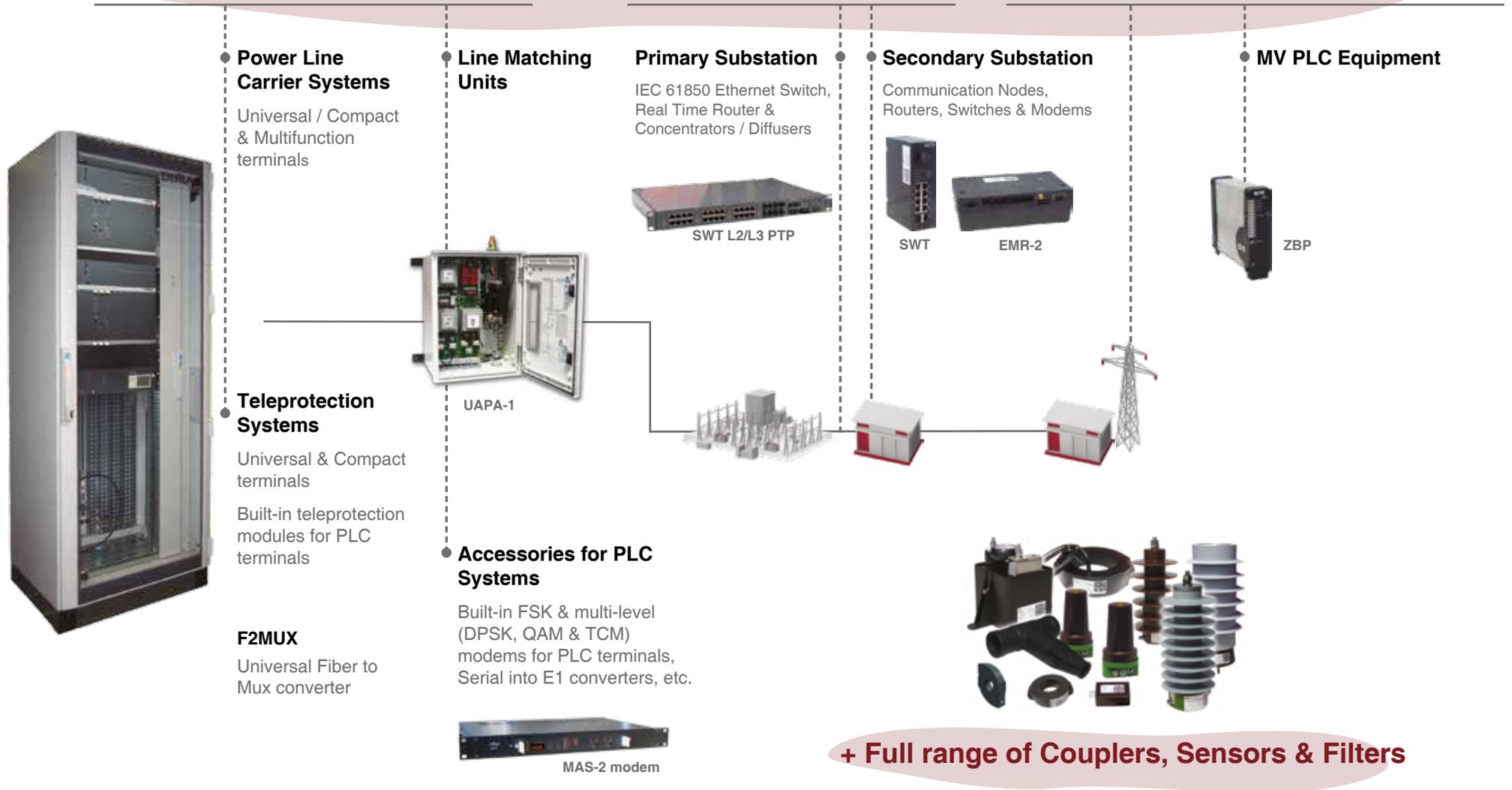
enable smart grid deployment, providing the means to gather power quality information



Telecommunications over HV lines

Networking Solutions

Communications over MV & LV PLC



Telecommunications over HV lines

POWER LINE CARRIER SYSTEMS		ANALOG	DIGITAL
OPU-1	Universal Terminal	✓	✓
OPC-2	Multi-Function Platform	✓	
OPL-1/OPL-1T	Compact Terminal	✓	
TELEPROTECTION SYSTEMS		ANALOG	DIGITAL
TPU-1	Universal Terminal	✓	✓
CTP-1	Compact Terminal	✓	✓
ABIT & CDIT	modules for Power Line Carrier Systems	✓	
F2MUX	Universal Fiber to MUX converter		✓
LINE MATCHING UNITS & ACCESSORIES		OUTDOOR	INDOOR
UAPA-1	High-Pass / Band-Pass Unit with integrated Hybrid Circuit	✓	
UAMC	Compact Band-Pass Unit with integrated Hybrid Circuit	✓	
UAM-4	Band-Pass Unit with low impedance tuning	✓	
CHD-4	Differential Hybrid Circuit	✓	
HPFA	Differential Hybrid Circuit		✓
CIAV-1	Attenuator	✓	



OPU-1



TPU-1



F2MUX



UAM-4

HPFA

Power Line Carrier Systems have proven to be the most reliable communication media, even when natural disasters happen, thanks to its robustness and the reliability of the electronic equipment that has been designed for extremely long life

ZIV's wide experience and extense product range for Power Line Carrier (PLC) and Teleprotection applications enable easy adaptation to power utility requirements.

Digital, Analog and Universal **Power Line Carrier** terminals for HV lines.

Stand alone Analog, Digital and Universal **Teleprotections**.

Teleprotections for the **interconnection of distributed energy resources** such as wind farms, solar plants, biomass plants and others.

Dedicated PLC for teleprotection applications with the advantage of **using 2 kHz band**.

Built-in Teleprotection, as an optional module in the PLC terminals.

Telecontrol (Scada) **modems**.

Primary Substation Solutions

SWT IEC 61850 Ethernet Switch

Flexibility in optical fiber ports for transmitting services from distribution substations. L2 + L3 capabilities.



SWT L2/L3 PTP

NRTR Real Time Router

It allows to build meshed networks over a wide range of interfaces and media.



NRTR

CIC Concentrator / Diffuser

Serial device server for Electrical Substations. Easy integration of up to 9 serial devices into an IP network.



CIC

4CCN Concentrator / Diffuser

4/8/12/16 or 20 plastic/glass optical fiber interfaces.

Secondary Substation Solutions

SWT Switch

IEC 61850 small-size Ethernet switch that fulfills all the required functions to set up a reliable network within a Secondary Substation.

DRA-2 Universal Communication Node

Provides service to the equipment in the DTC, such as AMR meter reading concentrators, Remote Telecontrol Units, protections, fault circuit indicators, etc.

Base interfaces: 6 Fast Ethernet ports, 2 Gigabit Ethernet SFP bays (optical fiber) & 1 service console.

Additional interfaces: cellular (GPRS/UMTS), cable modem (DOCSIS/EuroDOCSIS 1.0/1.1/2.0), PLC over MV (HPLV Broadband PLC).

EMR-2 Compact WAN router

For harsh industrial conditions, exceeding the stringent levels of isolation, immunity and protection.

4UMMG GSM/GPRS & 3G family modems

SIP-2 Versatile router

Able to operate as a WAN router or as a serial to IP encapsulation device for easy integration of Non-IP serial devices into a secure IP network.



SWT



DRA-2



EMR-2

Communications Over PLC

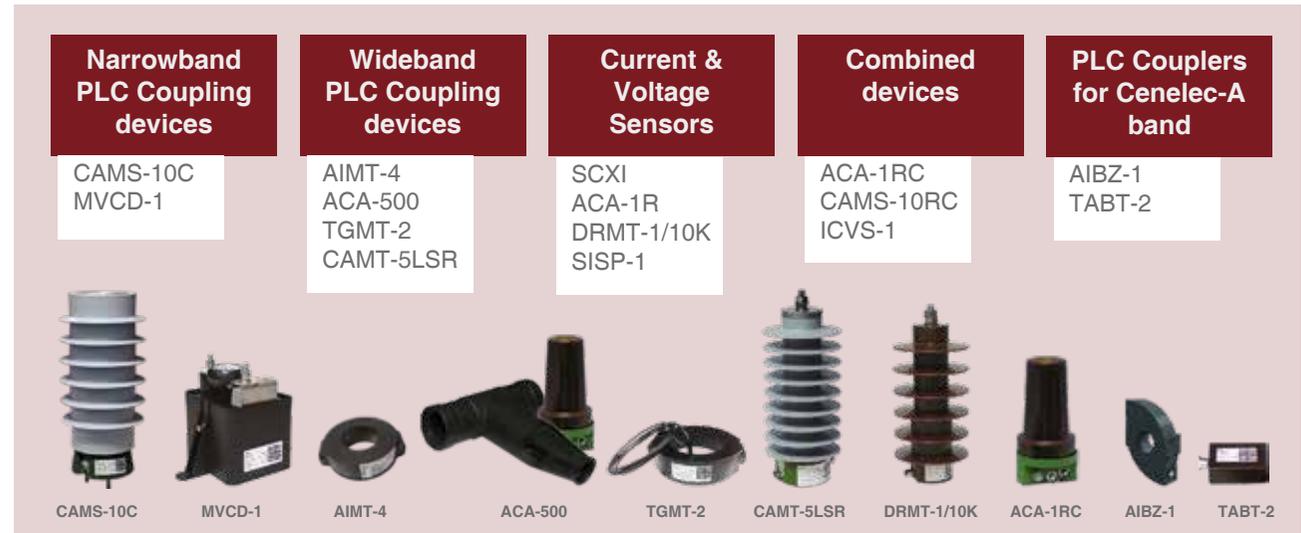
ZBP MV PLC Equipment

The best choice for transmitting data at high speed between Distribution Transformer Centers, in mid-distance levels.



ZBP

+ Full range of Couplers, Sensors & Filters required for the deployment of smart devices in MV & LV networks



PLC Couplers

Couplers are necessary to communicate the DTC electronic devices using Powerline Communications (PLC) technology. Couplers match the impedance between the PLC modem and the MV cable and, at the same time, protect the electronic equipment from transients and provide electrical insulation against MV power frequency.

ZIV offers a full range of capacitive and inductive couplers to inject the HF signals generated by the PLC equipment. Transmission is performed between phase and ground or through the earth connection of the underground cable shields.

Combined devices: measuring and coupling functions in a stand-alone device.

Sensors

Sensors provide reliable current, voltage, and phase angle values to automation and monitoring equipment and fault circuit indicators.

ZIV offers different types of sensors specially designed for distribution system current and voltage acquisition.

Resistive voltage sensors are in direct contact with the MV conductors and, therefore, they are subject to all applicable industry safety standards depending on voltage level and installation.

Filters

FBBP family is specially designed to mitigate interferences in the CENELEC-A EN 50065 frequency band (PRIME, G3, Meters & More).

Low pass or tuned blocking filter (filter impedance does not affect normal meter operation).

Single-phase, with or without neutral connection, and three-phase models.

20, 40 and 65 A (others upon request).

Models with different connection terminals.

For further information, please check www.ziv.es or ZIV **Sensors and PLC Couplers for MV and LV Smart Grids** brochure and ZIV **FBBP Family of Filters** brochure

6.4 Metering Solutions

Smart Meters

Industrial Meters

High Precision Meters

Data Concentrator Units

Cabinets

EV Charging Stations

Global leader in Urban + Rural Solutions

By 2020, millions of households will be able to work out where they can save energy, cut their bills and therefore do their bit for the environment

No more estimations

We produce **Smart meters** for the benefit of consumers and DSOs generating hundreds of direct & indirect jobs in our communities

100% ZIV's technology

Our agile manufacturing system is based on the subcontracting of non value added processes based on product specifications developed in ZIV

EV charging stations ready for slow and fast charging

By 2024 EV market is expected to grow from 2.6 million vehicle sales in 2015 to over 6.0 million



Smart Meters

ZIV Smart meters use standardized protocols and are equipped with a range of useful extra functions that can benefit consumers and utilities, enabling accurate billing, remote reading, demand-side management and remote services

Key features:

- Bidirectional communication.
- Robust automated meter reading (AMR) solutions.
- Energy measurement.
- Load profile and Time of Use (TOU) features.
- Data reading.
- Configuration setting changes.
- Date synchronization.
- Operation of the built-in breaker.
- Configurable with ZIV's AMI tools.
- Tamper detection.

Smart meters Over PLC & LTE & Radio

Open Standards with ZIV technology

Single & Three phase meters



5CTD

5CTM

PRIME models



5CTL

LINKY G3 models



5CTA-ESMR5

LTE model

5CTA

Radio model

Industrial Meters

5CTD Industrial Meter

VT and CT operated polyphase meter.

Bidirectional active & reactive energy measuring, load profile recording, Time of Use (TOU) tariffs, maximum demand.

Bidirectional communications are possible by means of the IEC60870-5-102 open protocol which enables not only meter reading but also configuration changes, synchronization, etc.



5CTD

VT and CT operated polyphase meter

High precision Meters

5CTE Three-phase electronic meter

High precision meter for grid measures, large end user frontier points, and any other type of frontier at which high accuracy measurement of generated, consumed or exchanged energy between the different parties involved is required.

Energy measurement, load profile and Time of Use (TOU) features, as well as local and remote communication capabilities.



5CTE

Three-phase electronic meter

Data Concentrator Units

ZIV DCUs include an advanced low voltage supervisor and Powerline Communication (PLC) controller with network monitoring functions, in addition to remote smart meter management functions

Smart meter management

The main function of a Data Concentrator Unit (DCU) is to continuously poll the metering devices connected to the same secondary substation where it is connected.

The retrieved meter data is stored in the DCU and periodically sent to the Management System.

ZIV DCU model implements identification and removal of meters (plug and play), supervision and control, synchronization of meters, programmable tasks, and many other functions.

PLC communications controller

They implement protocols widely accepted in smart metering such as DLMS to carry readings and web services to communicate with the utility MDM frontend.

DCUs

Network monitoring

The low voltage supervision function is performed by an internal three-phase energy meter, monitoring the secondary of the distribution transformer.

4CCT offers easy interaction with this meter, similar to the other meters in the network.

Other functionalities

Remote firmware upgrade, WEB/CLI configuration, connection to ZIV AMI MANAGER debugging tool, NTP synchronization, hardware watchdog, SNMP management, access control.



4GWC

Specially designed to gather data in low density areas



4TGB

Pole Mounted Smart Metering Data Concentrator with cellular communications integrated



4CCT

Urban DCU for high density areas

Cabinets

Indoor & Outdoor cabinets + Systems integration



EV Charging Stations

Fast & Standard recharging stations

Wall box & Stand Alone Units

For Private & Public services



PRV-M



PRV-B



PRV-VP

6.5 Tools

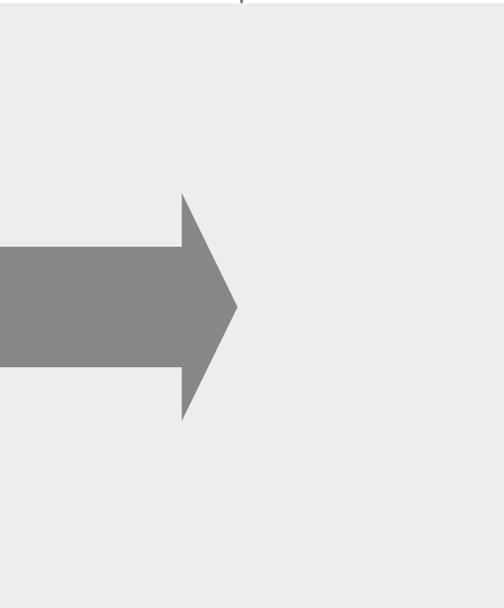
AMI tools

Substation Automation tool



Updated suite of user friendly software tools

for protection, control, communication and metering systems

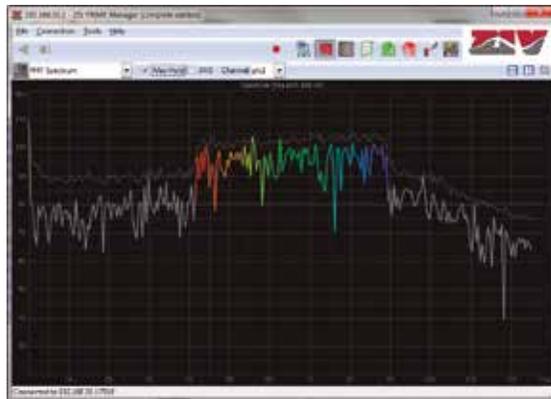


AMI tools

ZIV AMI MANAGER

A specific application for monitoring and managing a LV PLC network

Retrieval and monitoring of information about the physical medium, such as the frequency spectrum, the MAC frames and the Topology of the PLC network.



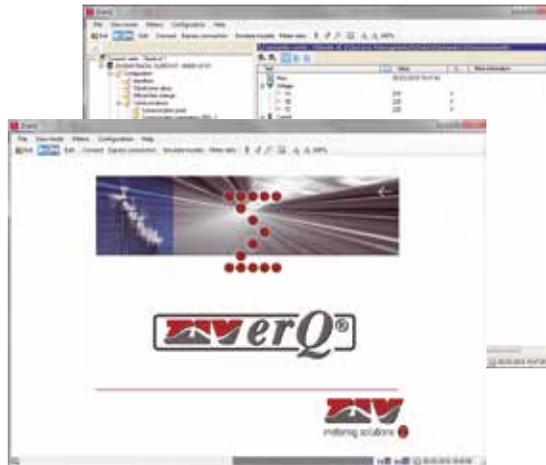
ZIVERQ

A multi-computer, multiprotocol and multi-connection program, suitable for all the meters developed by ZIV

Retrieval, sending and storage of settings, and metering logs.

Firmware updating.

Execution of other actions: synchronization, outputs, internal breakers, etc.



4PBN

PRIME communications device for detection and debugging noise and other communications parameters in PRIME networks

Different configurable functions: Base node and Service node.

Single-phase PLC PRIME signal injection.

Serial and Ethernet ports.

Data can be sent to ZIV AMI MANAGER tool for further noise, RF and frame analysis.



Substation Automation tool

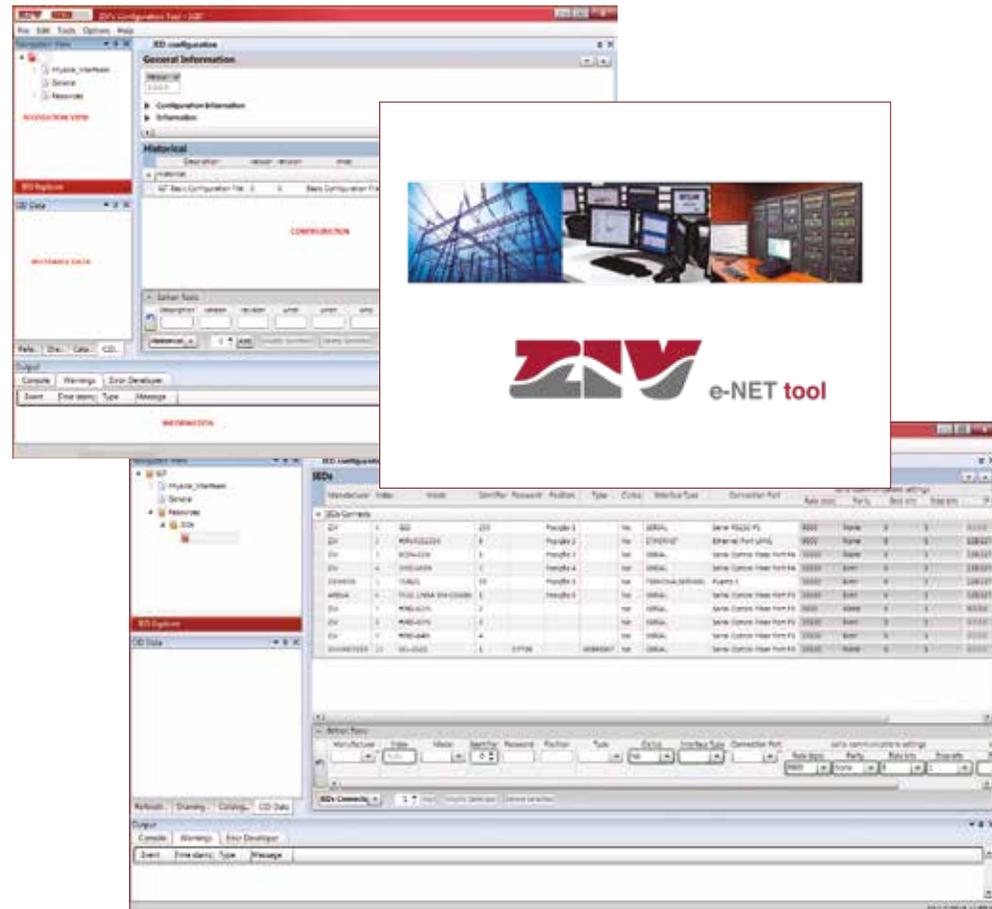
ZIV e-NET TOOL

One tool for all IEDs & Systems:

Intelligent Electronic Devices (IEDs)
Substation Central Units (RTUs)
Switches
Terminal Servers
Merging Units
RIO modules

Key features:

Multiprotocol (IEC 61850, DNP3, IEC 101/104, Modbus)
Graphic Interface (drag & drop mode)
Graphic Editor for Logics (IEC 31131, function block diagram)
Project mode /stand alone mode
Partial insertion of elements
Automatic mapping of user signals
Third-party IEDs integration



6.6 Services

Technical studies

System Integration &
Commissioning

Training

Our Customer support centers provide engineering services

based on experience and latest technology to optimize the cost and resources of every single project

Application

There is growing need in the electric power industry of supporting engineering services because companies have smaller engineering staffs and increasingly complex requirements

Support

ZIV brings industry-experienced engineers to every project, industry experts able to cooperate with utility experts to place technology at the service of customer goals

Cooperation

ZIV application and commissioning engineers team up to pursue best practices and customer satisfaction in every single project, adapting the solution to the particular requirements



ZIV is an international global solution provider with a full range of in-house developed products and engineering services capable of accomplishing any project all over the world

Cost-effective services based on:

Well experienced protection, automation, metering and communication engineers.

A full range of products with in-house developed technology.

Dedicated R&D team and Application engineers to fully support the products.

A total commitment to customer satisfaction.



Technical studies

- Project feasibility
- Consultancy services
- Protection coordination studies and settings calculation
- Protection audits
- Incident analysis

System Integration & Commissioning services

- On site pre-project review (site survey)
- SAS and communication architecture design
- Detailed electrical engineering project
- Control logic engineering
- C&R panels manufacturing
- Factory acceptance tests
- Installation and cabling
- Site acceptance tests
- Commissioning
- As-built documentation



Training

The **key** to properly **apply** and **maintain** the new technologies for **each specific case**

Seminars and Training Courses have been a tradition at ZIV since its establishment

We combine both high level of knowledge and expertise, together with practical workshops, to address the new challenges in the field of Substation & Distribution Automation.

Topics:

- Introduction to Protection and Control Systems
- Introduction to Communications in Power Utilities
- Introduction to IEC 61850 standard
- ZIV Equipment Configuration and Management

7 Manufacturing facilities



+ 15 Customer support centers

Zamudio (ESP)

Barcelona (ESP)

Madrid (ESP)

Grenoble (FRA)

Paris (FRA)

Dublin (IRL)

Newcastle (GBR)

Niteroi (BRA)

Bangalore (IND)

Ryhad (SAU)

Chicago (USA)

Singapore (SGP)

Dubai (ARE)

Mexico (MEX)

Yakarta (IDN)

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Quality solutions to make the Smart Grid Real

Declaration of Quality, Environment and Health & Safety Policy

ZIV aims to be increasingly efficient, offer better products and services and achieve the highest levels of customer satisfaction.

ZIV is committed to providing safe and healthy working conditions to its employees worldwide.

All team members are highly compromised to supply their customers with products and services exceeding the market standards on quality and features while providing useful innovations.

Such spirit is reflected in annual plans with defined actions along with the required control procedures and metrics to follow up. The loyalty to this commitment is the path to achieve total quality in all our activities, to secure market leadership, and to attain the profitability that guarantees the future of the company.

ZIV is committed to comply with environmental legal requirements and regulations, plus additional self imposed requirements related to our specific operations.

ZIV team of professionals has a permanent spirit of collaboration and commitment to continuous improvement, as expressed in the Company Policies



ER-0636/1998



GA-2008/0460



SST-0087/2013



Enabling the evolution of TSOs & DSOs

