eXPert

Green Energy Solutions

Product Overview, 2016

sdi
The power of automation
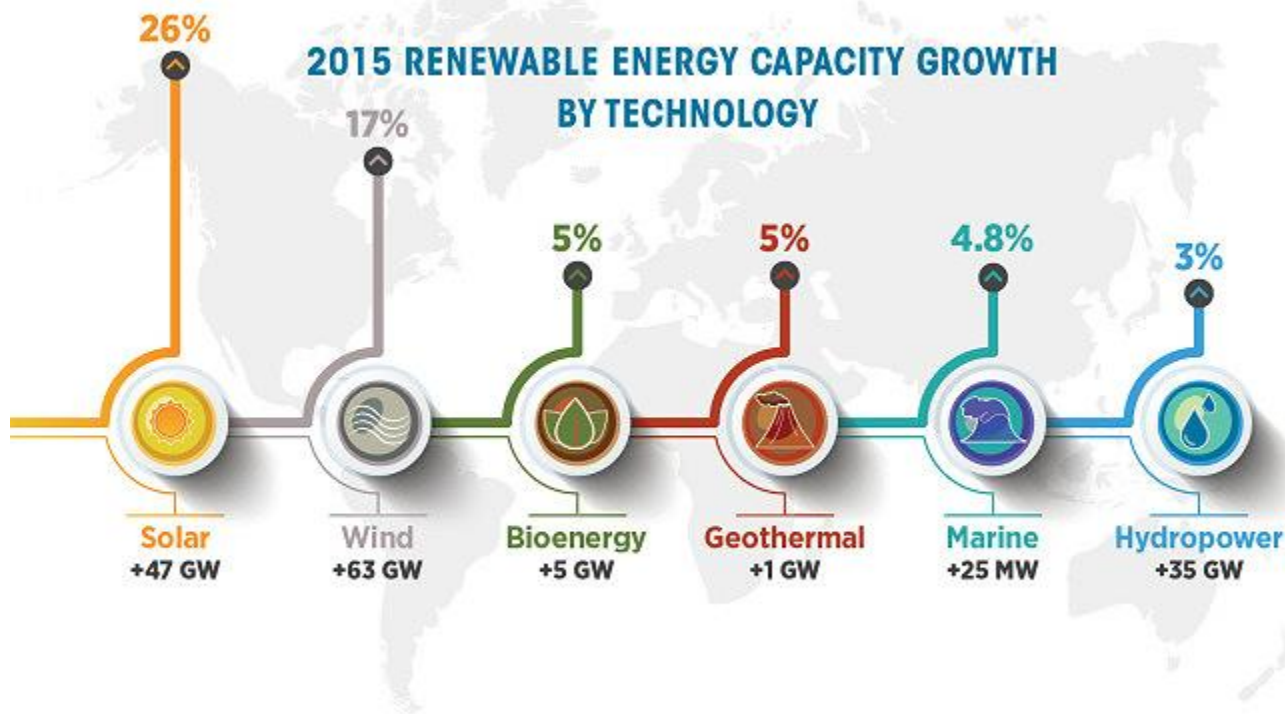
Renewables market growth scenario
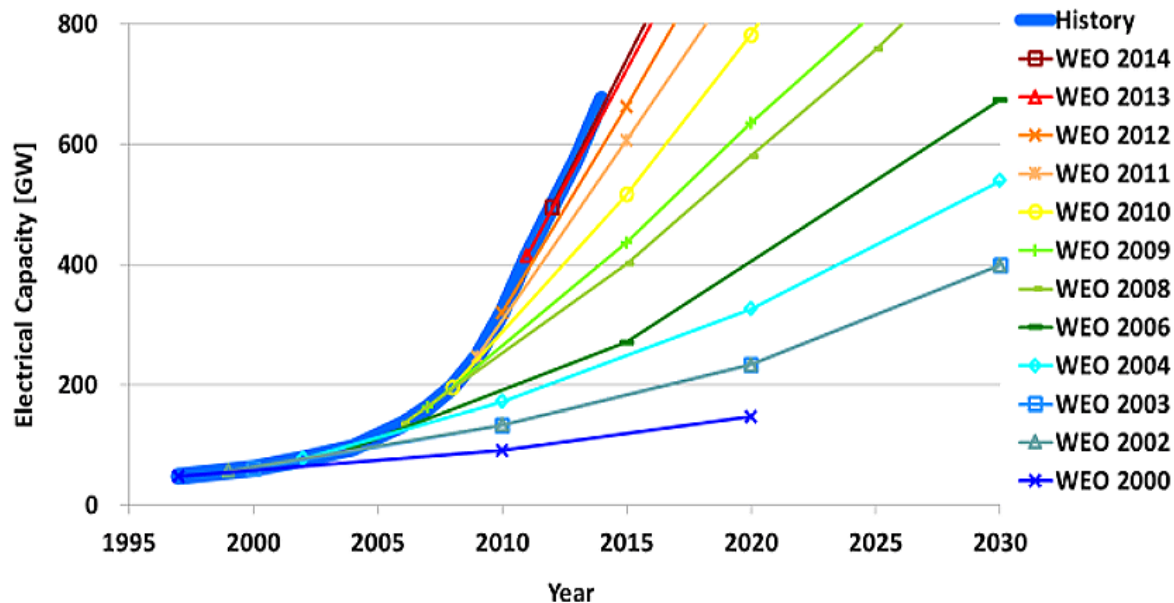
WEO 2015 outlook shows how the real growth trend has surpassed year by year any prevision

- Overall market growth underestimated by experts

- European financial incentives decrement caused by government spending review

- Non-EU countries continue pushing on green energy sector

Growth by Technology

2015 RENEWABLE ENERGY CAPACITY GROWTH BY TECHNOLOGY

26% — Solar +47 GW
17% — Wind +63 GW
5% — Bioenergy +5 GW
5% — Geothermal +1 GW
4.8% — Marine +25 MW
3% — Hydropower +35 GW

Many challenges… even more opportunities

Tendencies to investment reduction lead our focus on:

Cost Reduction

- Increase cross-compatibility of control solutions among different plants
- Improve scalability to allow gradual investment
- Reduce maintenance, non-availability and downtimes

Performance Optimization

- Produce the optimum amount at the right time integrating Energy Storage technology
- Increase control and monitoring features
- Maximize the performance with advanced Real-Time control system

ROI Maximization

- Increase ROI by rising the production value of the assets
- Reduce OPEX with a smart plant control and monitoring system
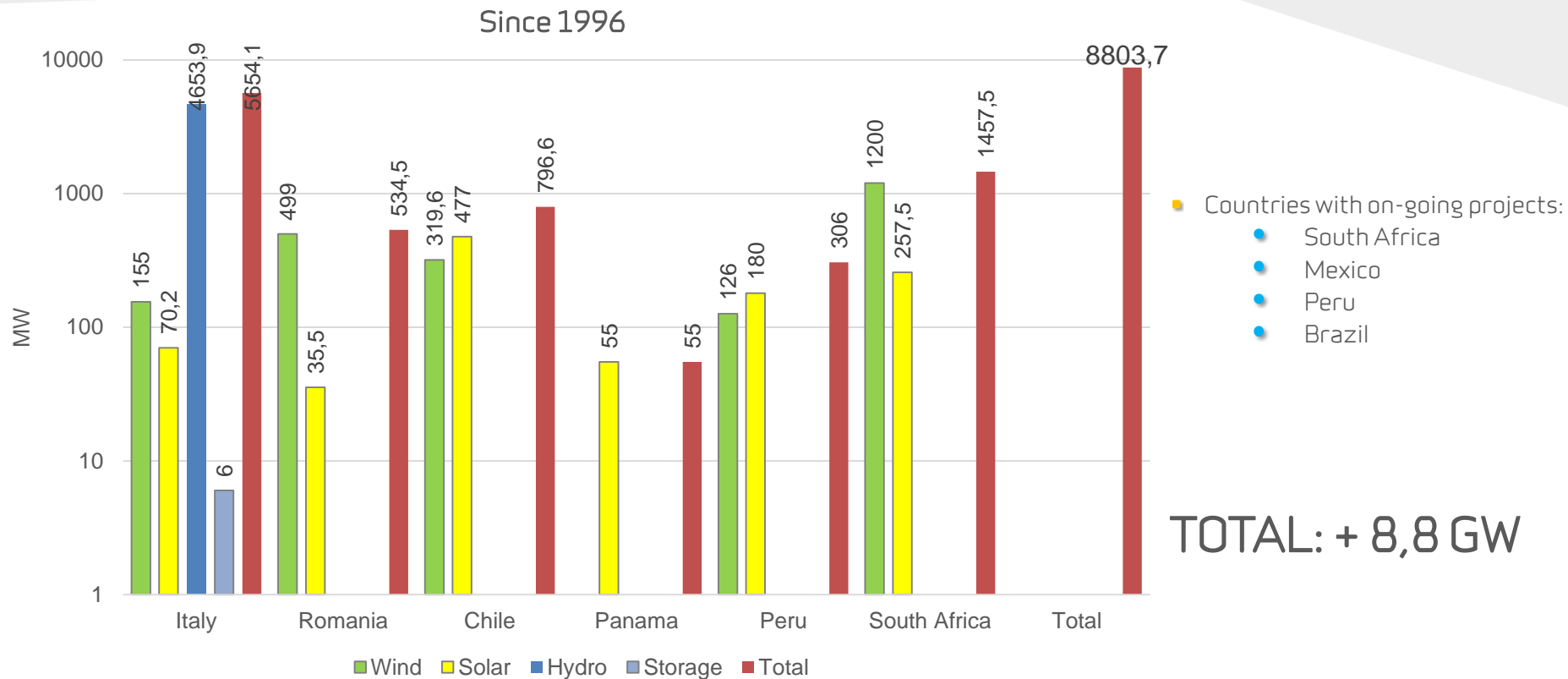- Reduce CAPEX by implementing predictive maintenance

Our value - Ahead on Renewables way

- <u>Flexibility & Integration at first place</u>: we can provide standard solutions with high level of customizability that meet every control, monitoring and remote control needs

- <u>Field-proven reliability</u>: our solutions count hundreds of applications in energy field and other high critical systems, with more than 8,8 GW of Green Energy installed capacity in the last 10 years

- <u>Our commitment in development</u>: we invest everyday in improving our solutions, thus creating a strong relationship with the customer

- <u>Valuable data, everywhere</u>: we can provide the information you need on every device, anytime

Green Energy capacity managed per Country


Since 1996

Italy: Wind 155, Solar 70,2, Hydro 4653,9, Storage 6, Total 5654,1
Romania: Wind 499, Solar 35,5, Total 534,5
Chile: Wind 319,6, Solar 477, Total 796,6
Panama: Solar 55, Total 55
Peru: Wind 126, Solar 180, Total 306
South Africa: Wind 1200, Solar 257,5, Total 1457,5
Total: 8803,7

Legend: Wind, Solar, Hydro, Storage, Total

MW

Countries with on-going projects:
- South Africa
- Mexico
- Peru
- Brazil

TOTAL: + 8,8 GW

2016 – s.d.i. automazione industriale S.p.A
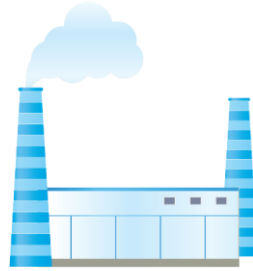
eXPert Green Energy Solutions

- The latest evolution of our **eXPert integrated SCADA/HMI platform** designed specifically for control, monitoring and remote control of renewable plants
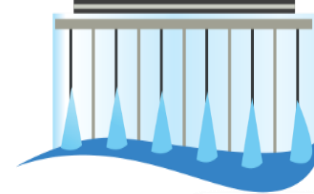
Wind
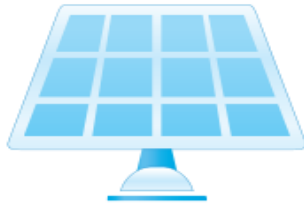
Solar

Geothermal

Hydro

Storage

… also in Energy Storage systems

- Overcome the unpredictability of Wind and Solar generation with Energy Storage technology management

  - Interface between EMS (Energy Management Systems), SCADA system, Networking and Security systems

  - Increase Smart Grids application feasibility

  - Control & Telecontrol:
    - Local & remote set point regulation
    - Storage system intervention strategies

  - Supervision:
    - Data collecting & display from plant and storage system
    - Weather and production forecasts

Main Features

- With **eXPert Green Energy Solutions** you can:

  - **Be Flexible**: you can adapt the configuration to every pre-exhistent technology. Most widely adopted communication protocols are supported

  - **Be Integrated**: completely integrated SCADA/HMI solution to interface every level of the plant, from field to ERP

  - **Be Reliable**: native redundancy management allows uninterrupted level of service

  - **Be Portable**: eXPert GES Dashboard can be accessed via Web Server on Desktop PC, Smartphone and Tablets. Standard web browsers are supported
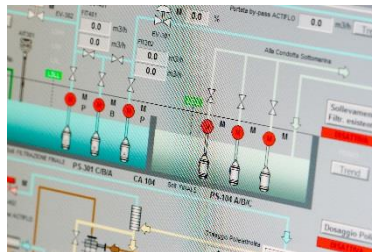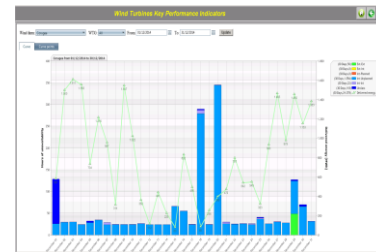
A lot of needs. One solution

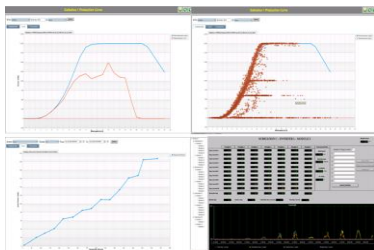eXPert Green Energy Solutions can assist you with:
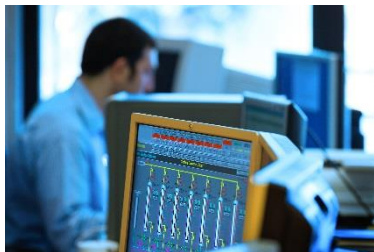
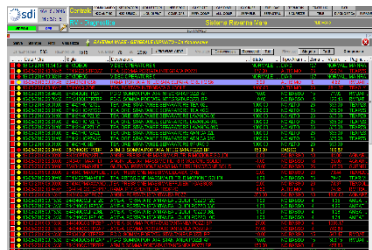Real-Time Process Control & Automation
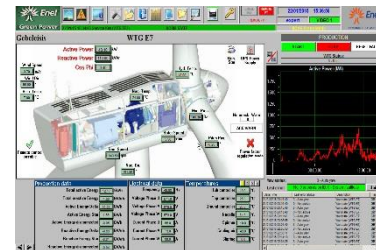

High Performance HMI features

Smart Data Analytics & Custom KPI
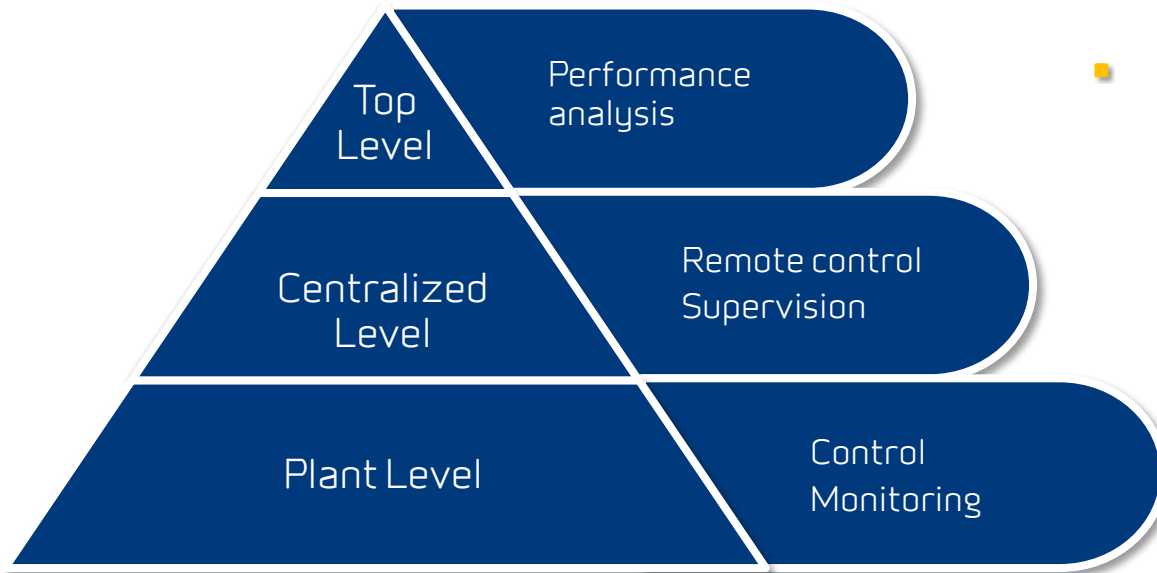

Configurable Reports and Trends

Effective Alarm Management

Asset Management

Advanced Integration

- eXPert GES Studio
- eXPert GES Remote Control Room
- eXPert GES Plant SCADA / HMI

Top Level — Performance analysis

Centralized Level — Remote control Supervision

Plant Level — Control Monitoring

Plant Level SCADA / HMI solution key features:

Run Time

- I/O management
- Redundancy management
- Connectivity
- Soft PLC functions
- Remote alarming management
- IEC 61131-3 automation logics execution
- Main supported protocols:
  - MODBUS
  - IEC 60870-5-101
  - IEC 60870-5-104
  - IEC 60870-5-103
  - IEC 61850, MMS-UCA2
  - OPC / OPC UA
  - DNP3.0

Data Management

- Historian features
- ETL function
- RDBMS management (Oracle native integration)
- Custom report & trend
- Disaster Recovery

Engineering Station

- Automation logics design
- HMI graphic configuration
- Trend & report configuration
- Object configuration
- Layout configuration
- Redundancy configuration management
- Active Directory integration
- Network, I/O tags, plant configuration

HMI

- High performance graphic design
- Alarm management
- Video wall support
- Multiple graphic layouts available
- Calculated KPI display
- Active Directory integration
- Network, I/O tags, plant configuration
- Web interface

Sdi is a certified Oracle Gold Partner:

ORACLE Gold Partner

eXPert GES Master SCADA / Control Room

- Centralized Level SCADA / Control Room solution key features:

Remote Control

- Centralized control of local Plant SCADA systems
- Remote I/O devices management
- Remote RTU control and monitoring features
- Global production output control

Control Room

- Complete control room supply, from operator workspace to process overview video walls
- Advanced supervision features
- Alarm display and reclassification
- Global and plant-specific reports & trends display

HMI

- High performance graphic design
- Alarm monitoring
- Video wall support
- Multiple graphic layouts available
- Calculated KPI display
- Active Directory integration
- Remote plant objects configuration
- Web interface

eXPert GES Studio

- Performance analysis solution key features:

  - Live data analytics
  - Asset management
  - User settable trends and reports
  - Predictive maintenance
  - Alarm analysis
  - Big Data management
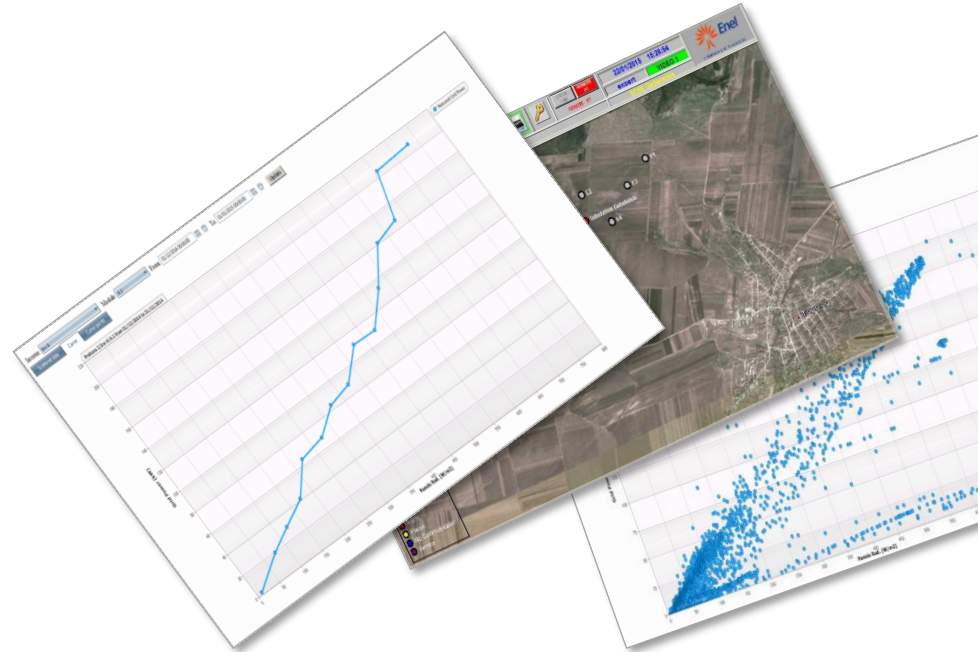
eXPert STAR DualBus Controller
Key points

- **Native Redundancy** : highest level of reliability for CPU, I/O boards and power supply

- **Communication** : from field acquisition to control nodes

- **Management** : field commands, set points, control loops, SOE...

- **Execution** : programmable logics, control blocks and regulation functions

- **Customization** : expandibility granted with the optional boards for additional I/O, power supply, communication, PRP/HSR

- **PPC and TSO interface functions** : the controller acts as Power Plant Controller and direct interface with Transmission System Operators

microSTAR compact RTU
Key points

- **Stand alone** : compact field data acquisition solution, supplied fully assembled an pre-configured for the integration with the main system

- **Data acquisition** : gathering data from field devices such as instruments, meteo stations etc.

- **Communication** : data transfert to main system via IEC 60870.5.101 - 104 protocol

Thank you for your attention

eXPert Green Energy Solutions