Production Management using a PI System Infrastructure at EDP Produção

Presented by **Manuel Pio Silva**

EDP GROUP

Main brands worlwide

Renewables

edp renováveis

Brazil

Portugal

Spain

EDP worldwide

Renewables

EDPR-NA
Installed Capacity
3,667 MW
Electricity generated
10,146 GWh

EDPR-EU
Installed Capacity
4,283 MW
Electricity generated
9,527 GWh

EDPR-BR
Installed Capacity
84 MW
Electricity generated
230 GWh

Portugal

Installed Capacity
8,911 MW

Electricity
22,723 GWh generated
43,858 GWh distributed
5,718 thousand Customers

Gas
6,938 GWh distributed
224 thousand Customers

Spain

Installed Capacity
3,853 MW

Electricity
9,961 GWh generated
9,147 GWh distributed
1,118 thousand Customers

Gas
51.535 GWh distributed
796 thousand Customers

Brazil

Installed Capacity
2,157 MW

Electricity
8,360 GWh generated
25,880 GWh distributed
3,045 thousand Customers

* MW EBITDA

IF

SKIPPER

edp

SKIPPER

System, Knowledge, Information, Plant Performance & EnviRonment

- Building a global network of energy in multi-geography.

- A vector to achieve asset management strategy for generation in EDP Group.

SKIPPER

System, Knowledge, Information, Plant Performance & EnviRonment

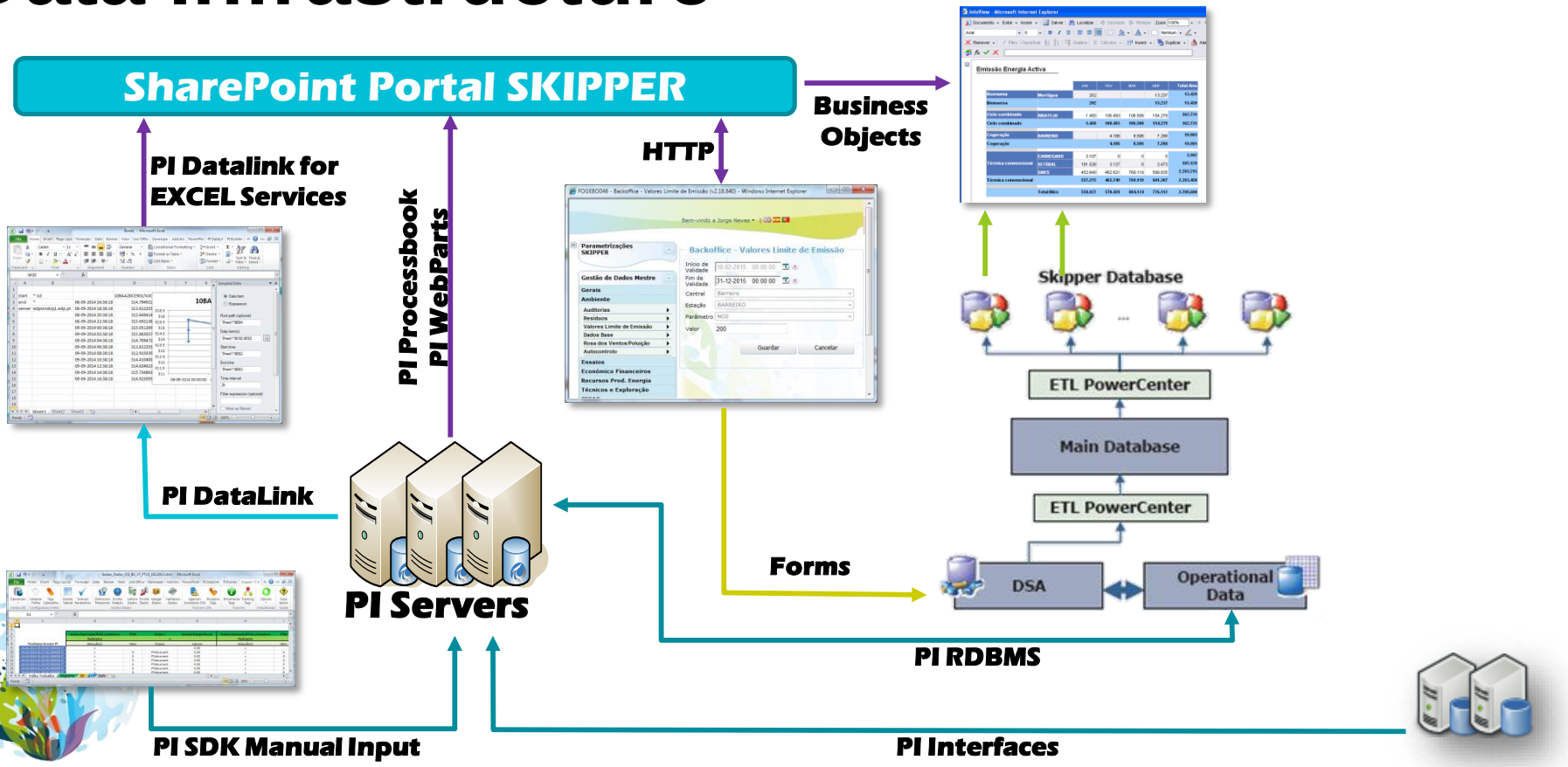
Business Challenge

- Provide an integrated information system to support management and monitoring of generation assets.
- Support to internationalization of EDP Group.
- Implement a plan to deal with future organizational challenges.
- Sharing of best practices and technology as well to retain knowledge.

Solution

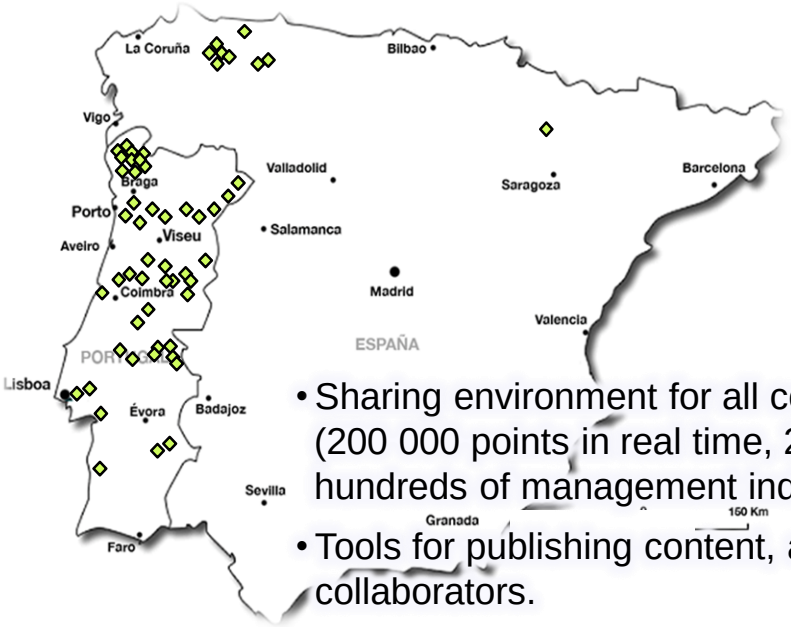
- Connection of different data sources - DCS, SCADA, energy meters to PI Systems.
- SharePoint portal with PI WebParts and PI DataLink for Excel Services.
- Relational databases for other sources and Business Intelligence.
- Business Objects (BO) reporting.

Data Infrastructure



SKIPPER

in Portugal, Spain and Brazil



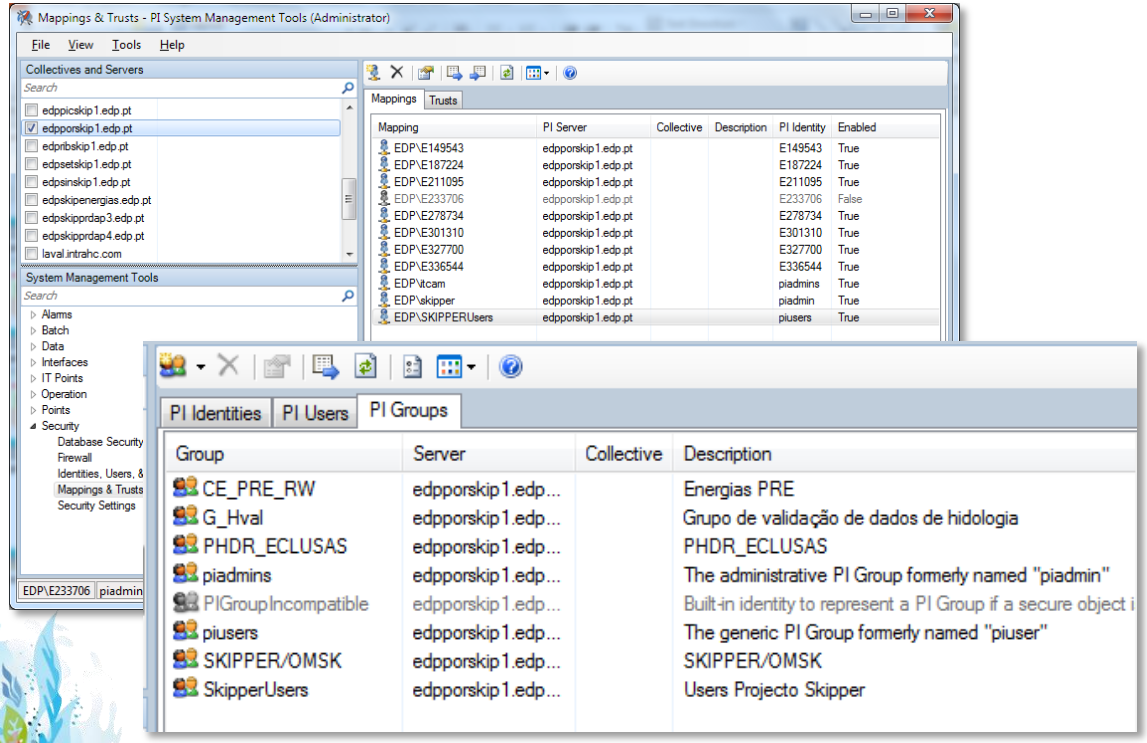
- Sharing environment for all company data (200 000 points in real time, 27 BO Universes with hundreds of management indicators).
- Tools for publishing content, available to all collaborators.
- A portal to share user-generated content. Thus it encourages emergence of critical business knowledge that was often owned by a single collaborator.
- Configuration tools, responsive in real time to new requirements for data collection.

Portal

A work environment

- Provides an accessible way to the underlying data of the activity of the company in an environment that allows sharing best practices and technologies and the collaboration between people.
- Giving life to data, transforming it into information to enhance competitive advantages.
- Organize and add sense to the data in order to make it understandable.
- Allow to identify, locate and ease access to knowledge assets (organizational memory).
- Increase the creation of new paradigma, leading to the formation of competitive advantages.

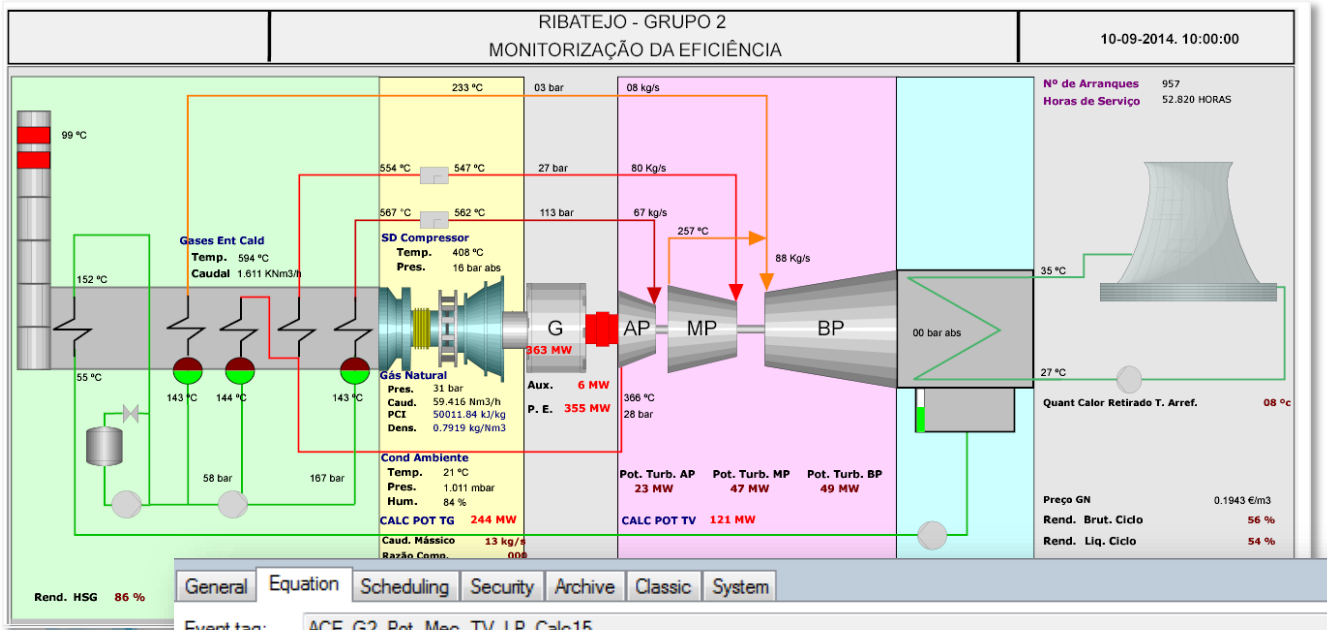
PI Security Model

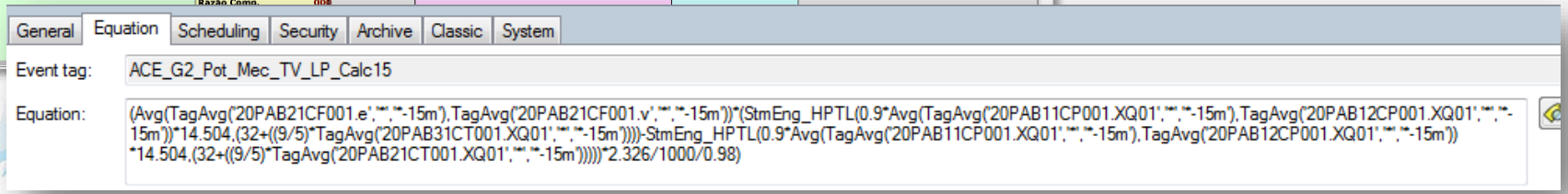


A mixed environment based in Windows Active Directory security, PI Users and PI Groups, for compatibility and easy accommodate the exceptions.

APPLICATIONS

Monitoring

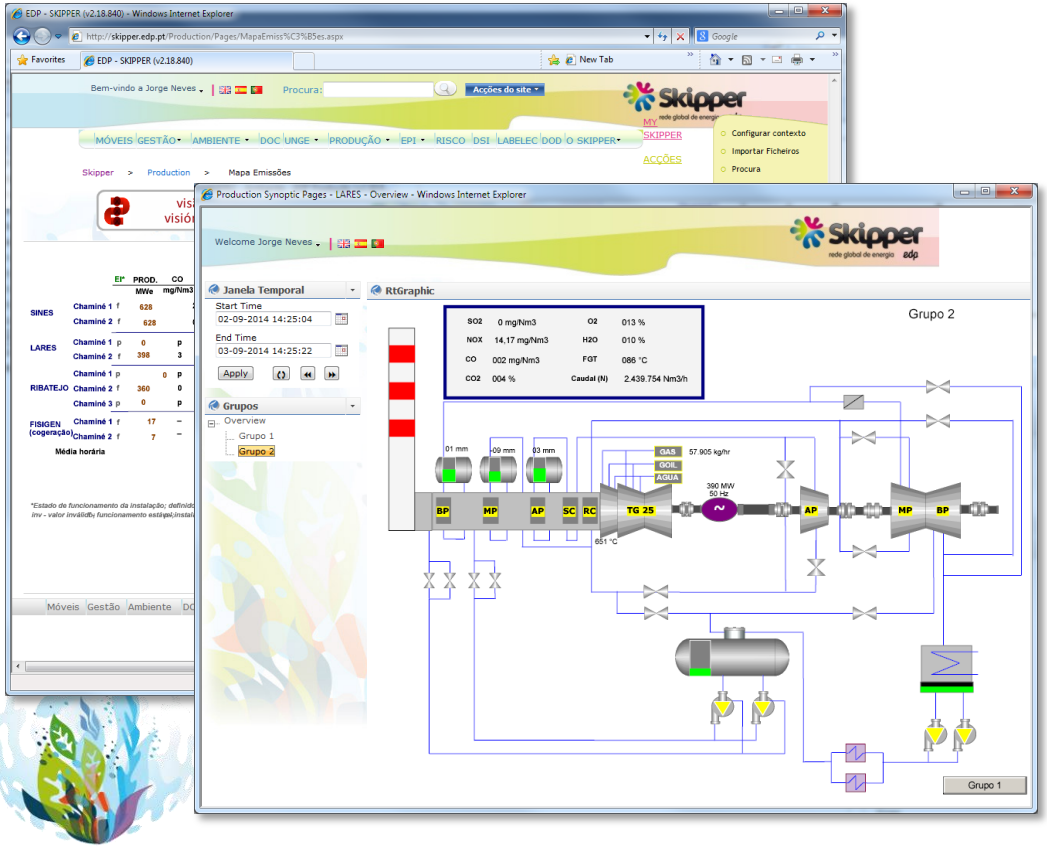




A set of displays with raw and a calculated data.

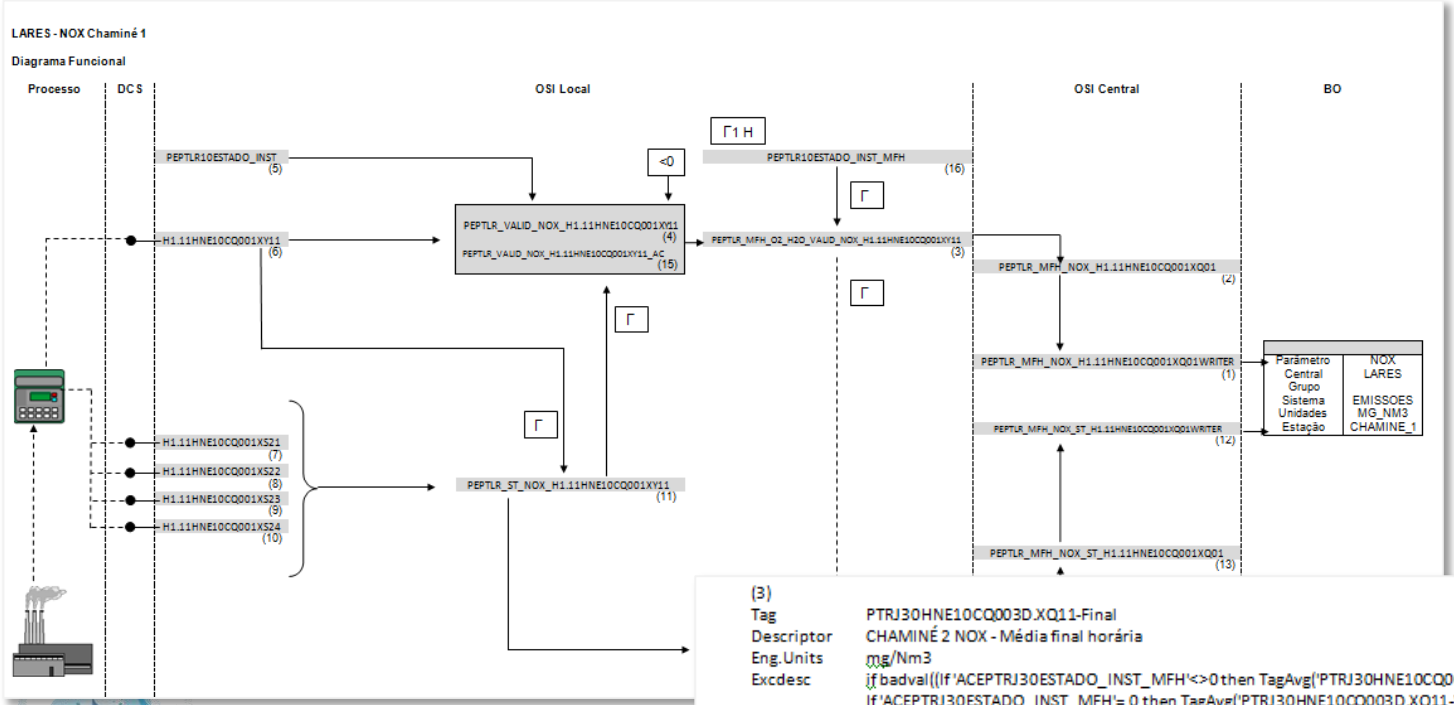
Intensive use of Performance Equations and Steam Functions to monitor the efficiency of turbo-groups, boilers and other machines with special importance in thermodynamic performance.

Environment



- Provide the tools for the management of environmental data - atmospheric emissions, air quality, water consumption and wastewater.
- Consolidation of environmental data.
- Automatic data validation based on operation of the facility and state of the measuring instrument.
- Manual data validation using (in house) developed applications on PI SDK.
- Automatic integration of data on an Oracle database for reports with Business Objects (BO).

Environment

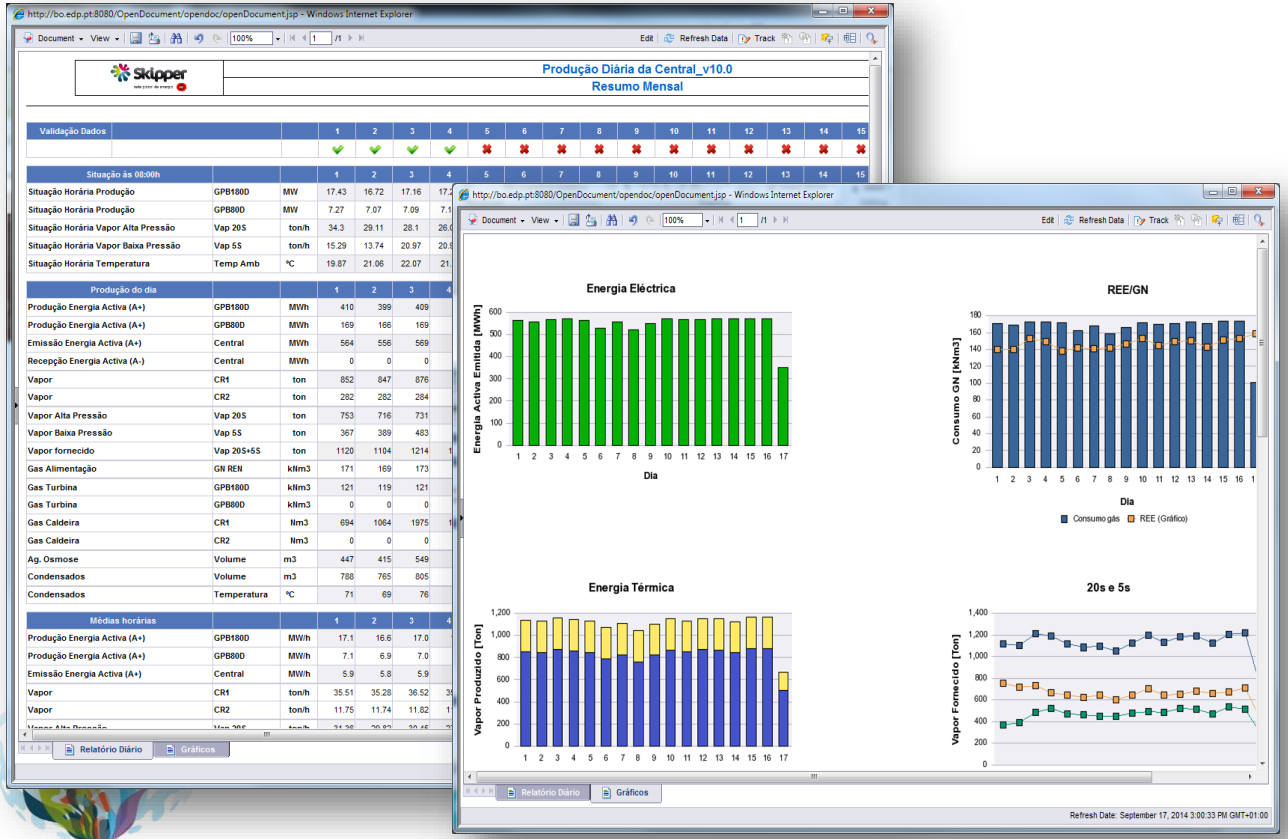


(3)

Tag	PTRJ30HNE10CQ003D.XQ11-Final
Descriptor	CHAMINÉ 2 NOX - Média final horária
Eng.Units	mg/Nm3
Excdesc	if badval((If 'ACEPTRJ30ESTADO_INST_MFH'<>0 then TagAvg('PTRJ30HNE10CQ003D.XQ11-ValidosHor','*-1h','*') else If 'ACEPTRJ30ESTADO_INST_MFH'= 0 then TagAvg('PTRJ30HNE10CQ003D.XQ11-ValidosHor_AC','*-1h','*') else "No Sample")=1 then "No Sample" else If 'ACEPTRJ30ESTADO_INST_MFH'<>0 then TagAvg('PTRJ30HNE10CQ003D.XQ11-ValidosHor','*-1h','*') else If 'ACEPTRJ30ESTADO_INST_MFH'= 0 then TagAvg('PTRJ30HNE10CQ003D.XQ11-ValidosHor_AC','*-1h','*') else "No Sample"
Observações	Event=ACEPTRJ30ESTADO_INST_MFH Calcula a média horária dos valores validados de NOx de acordo com o estado da instalação assumido

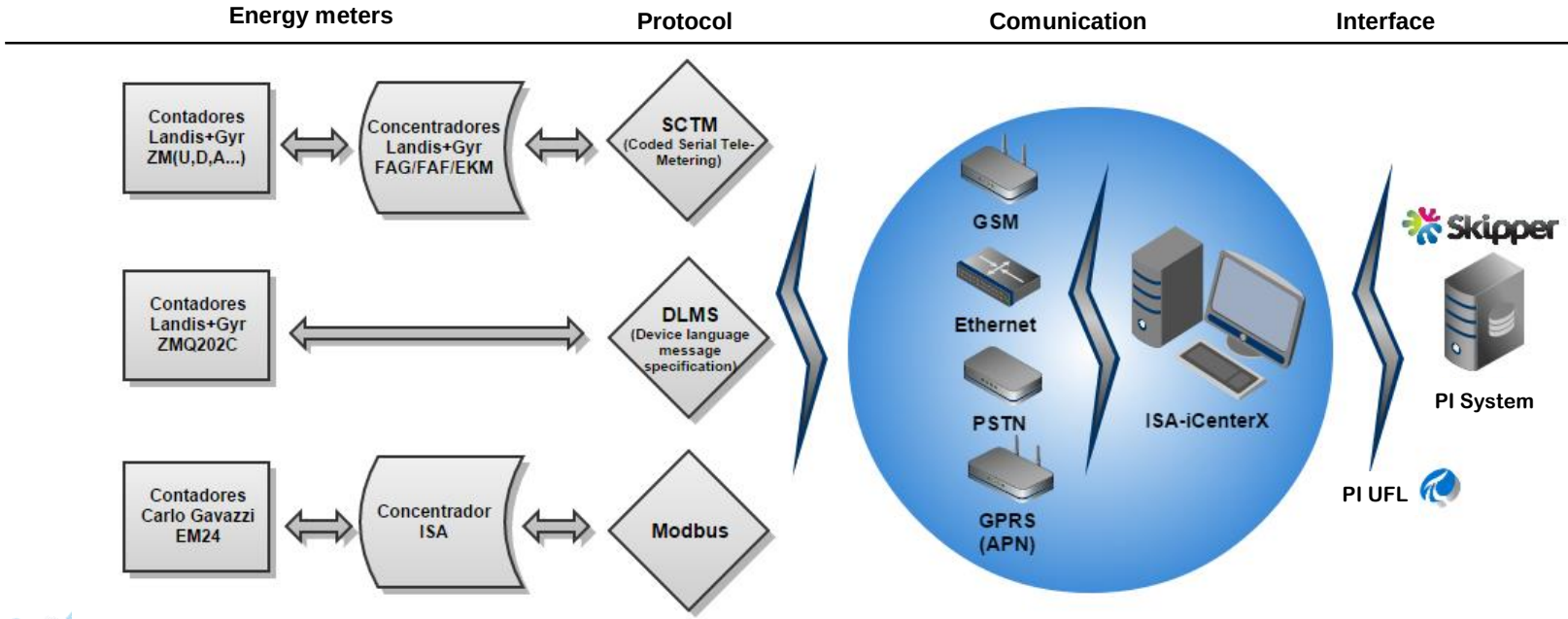
Automatic acquisition, calculation, validation and integration of environmental data for reporting.

BO Reporting



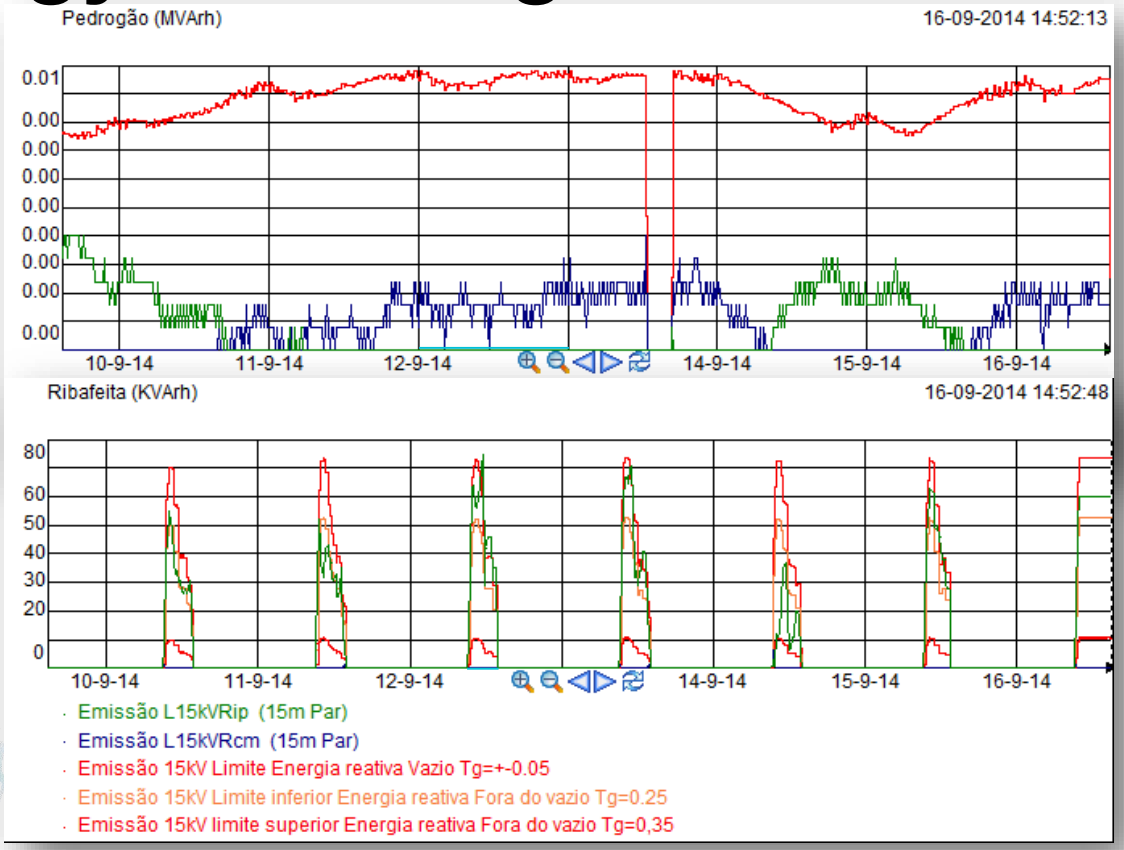
Reporting with Business Objects for data integrated from OSIsoft PI Server database and relational data from other sources.

Energy metering



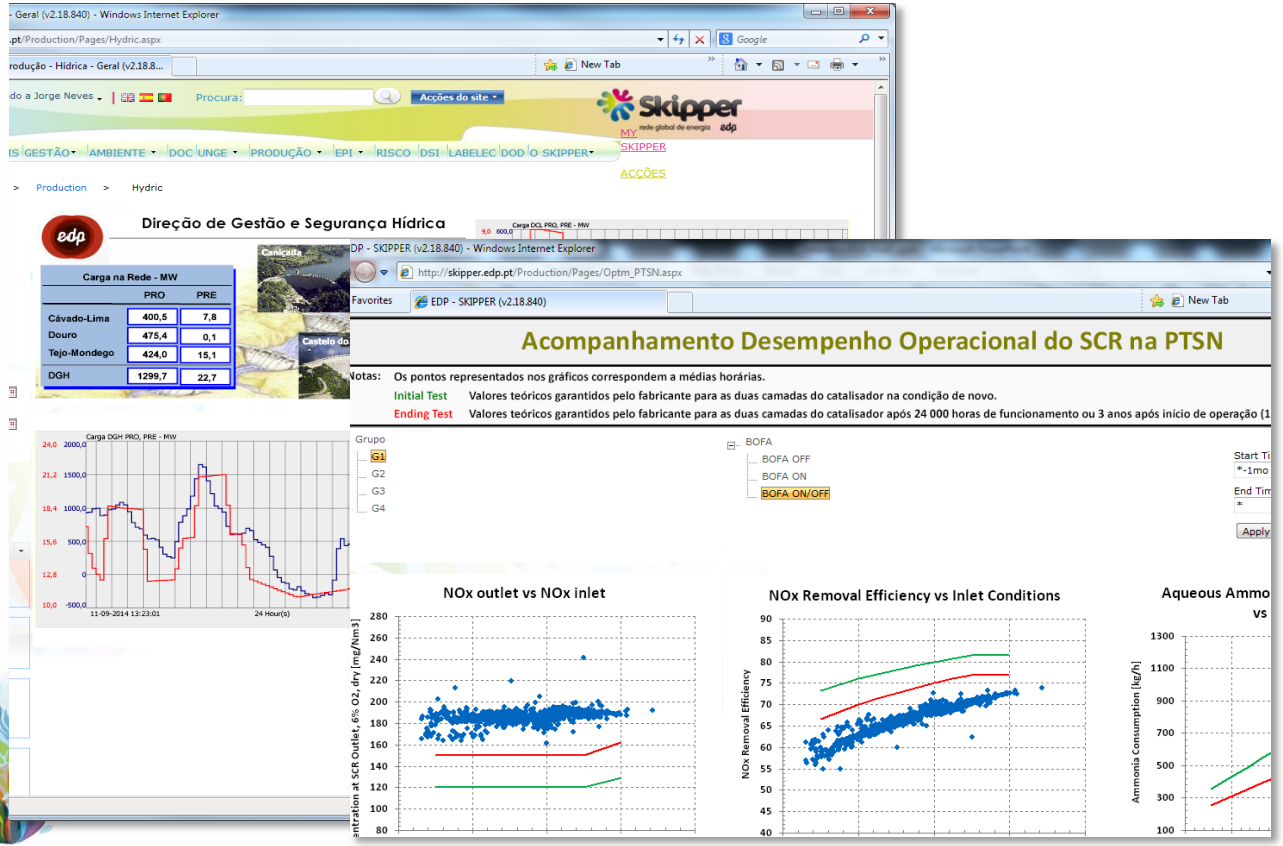
Power Plants	Metering points	Nº of Tags
65	456	10533

Energy metering



- Cost control of the production process.
- Optimization of operation in order to energy efficiency – control of reactive power.
- Billing control.
- Identifying areas for improvement.

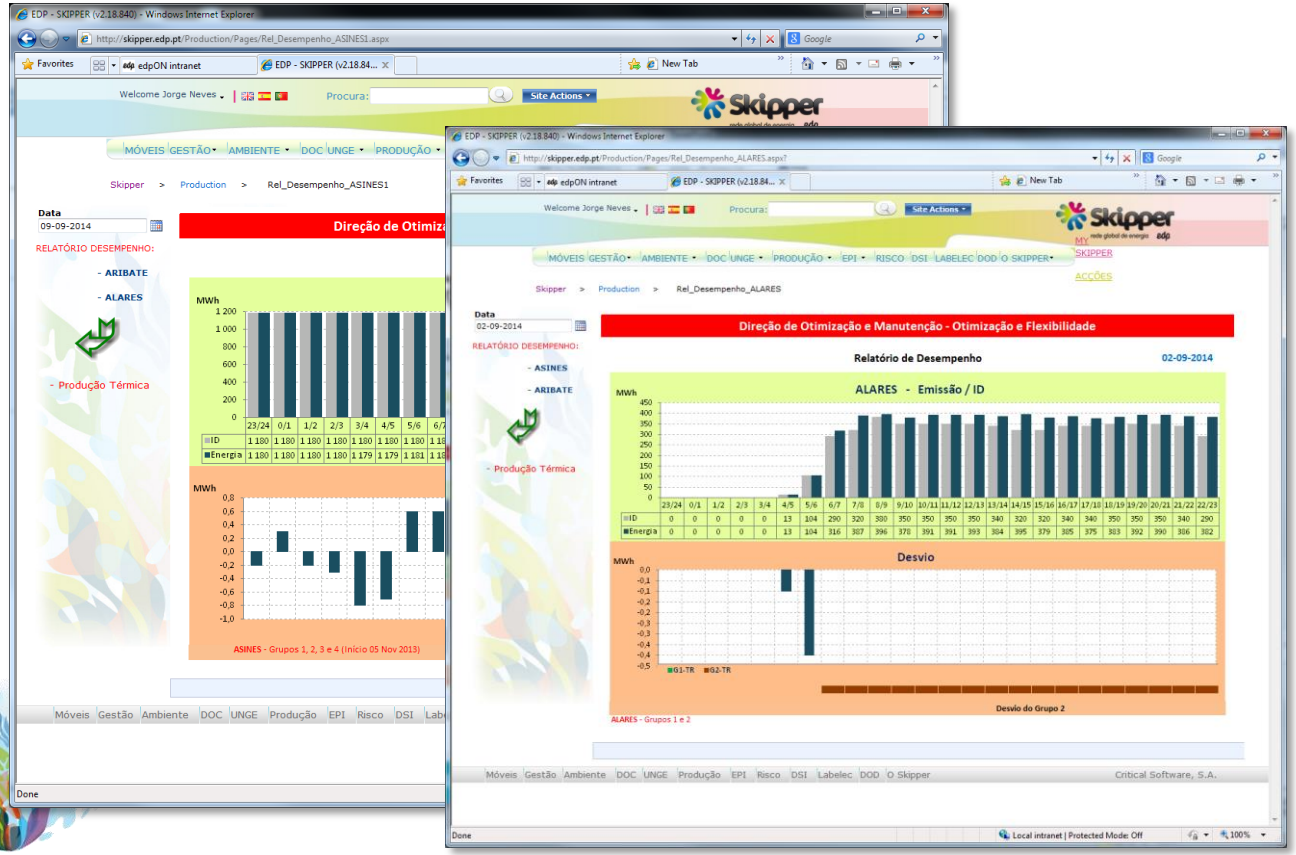
Operation analysis



Optimizing the operating processes and optimizing performance in power generation plants.

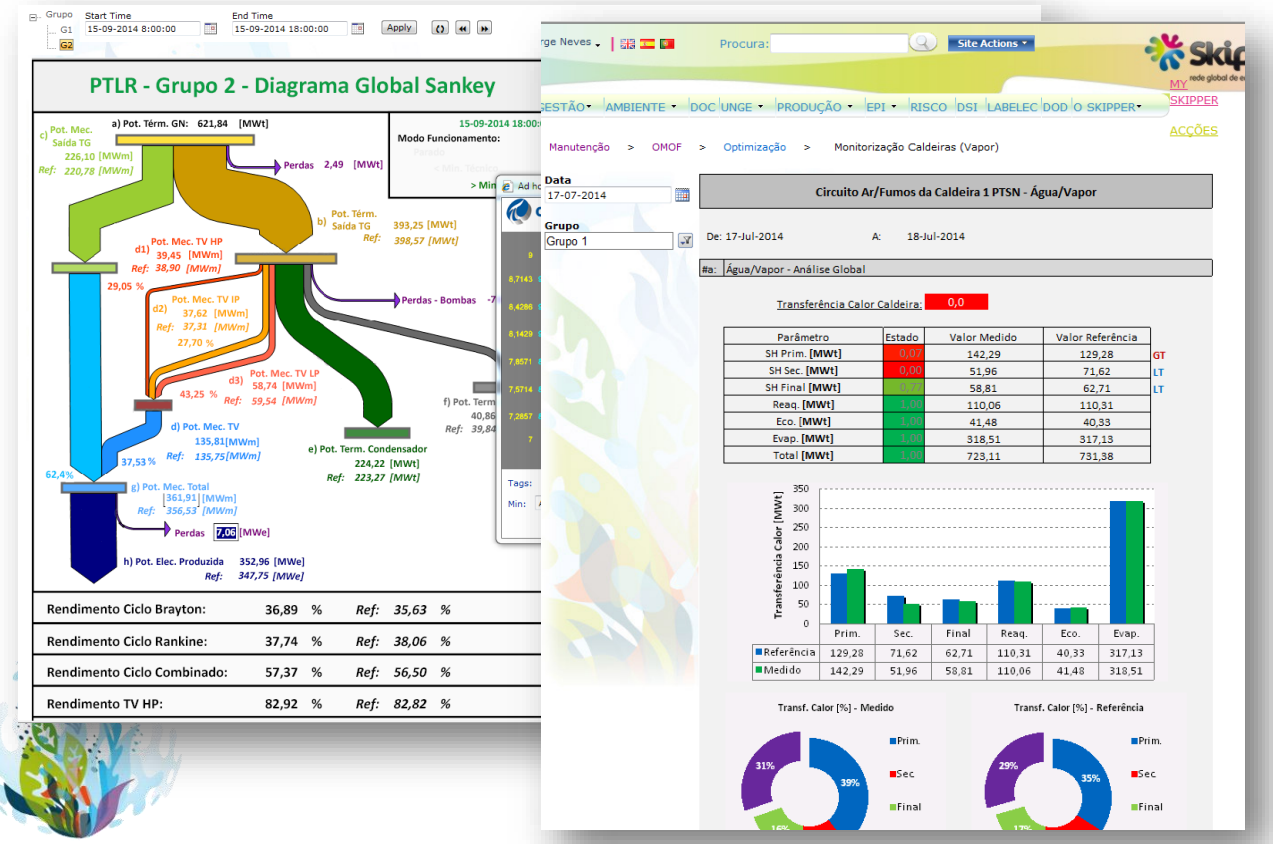
Analysis of operational and critical variables.

Performance



Analyzing performance of generation versus demand.

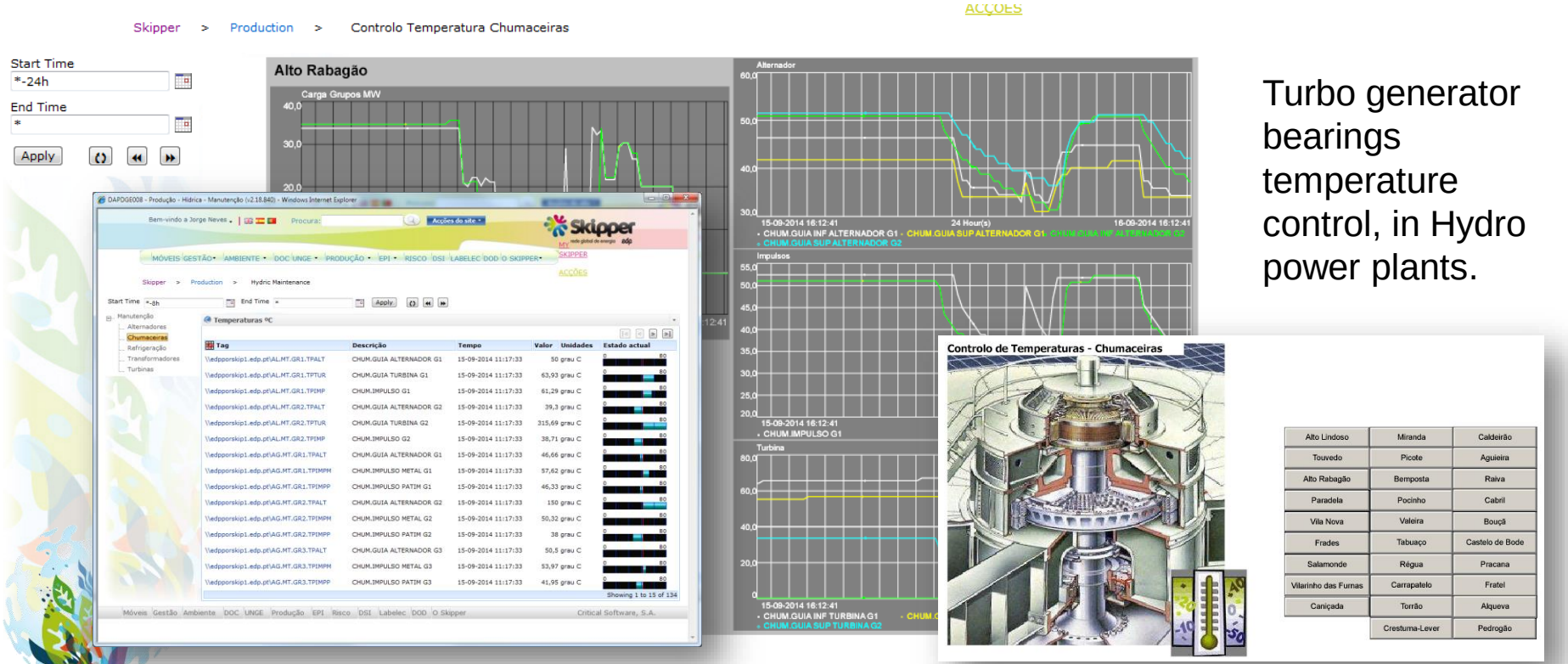
Maintenance



Examples of applications for maintenance:

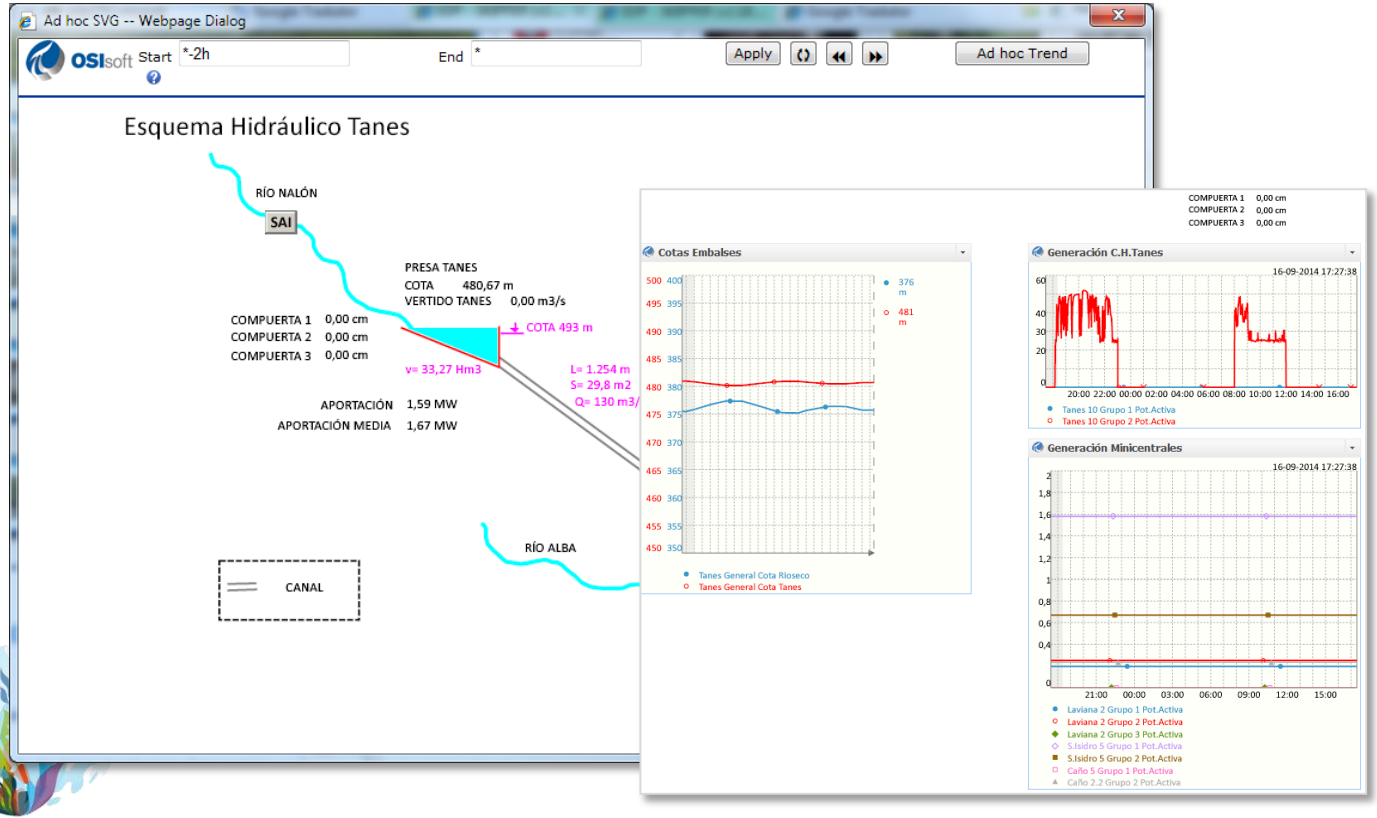
- Thermodynamic cycle to control the degradation of operation.
- Air and flue gas cycle control.
- Water and steam cycle control.

Maintenance



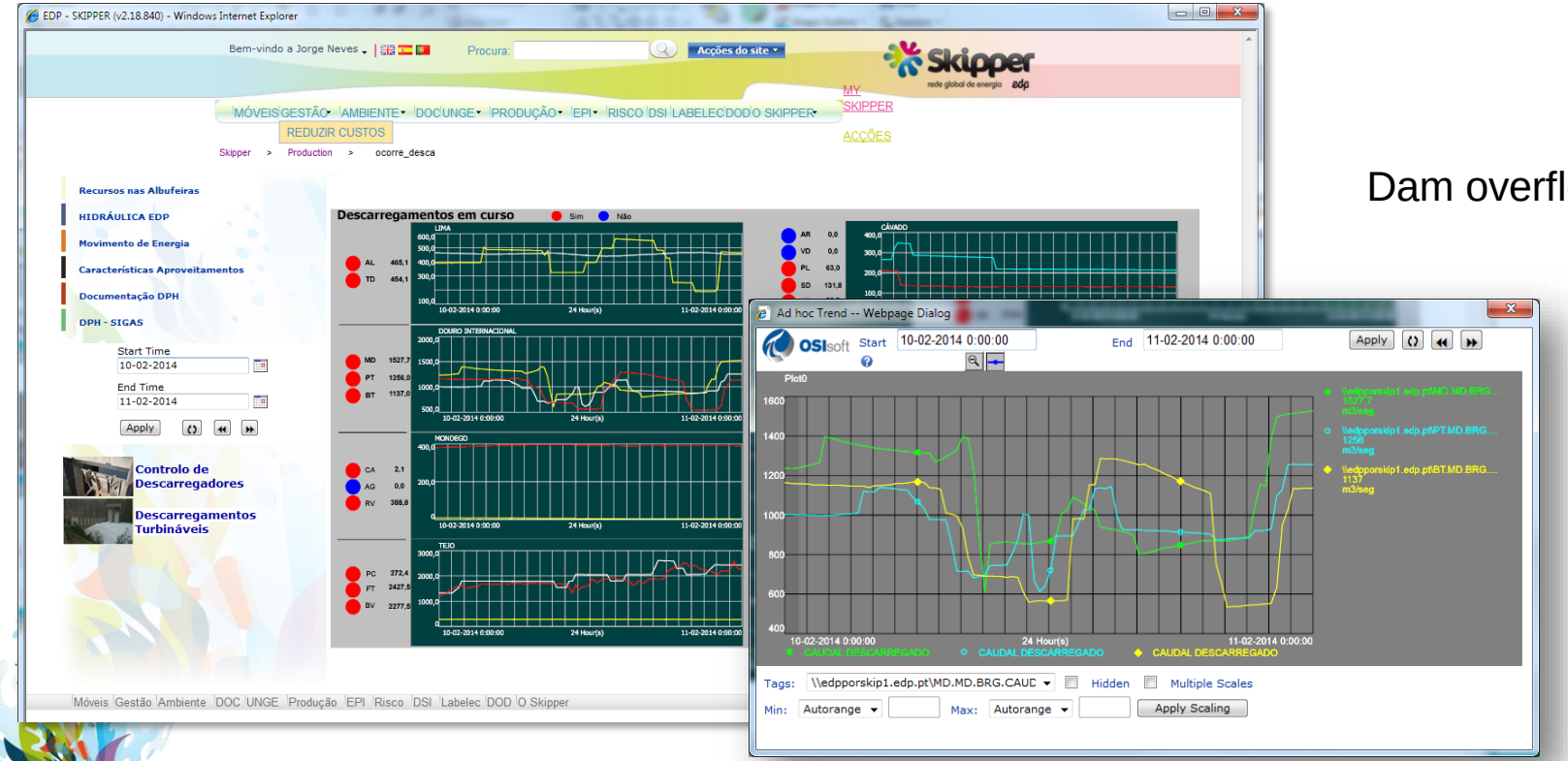
Turbo generator bearings temperature control, in Hydro power plants.

Operation



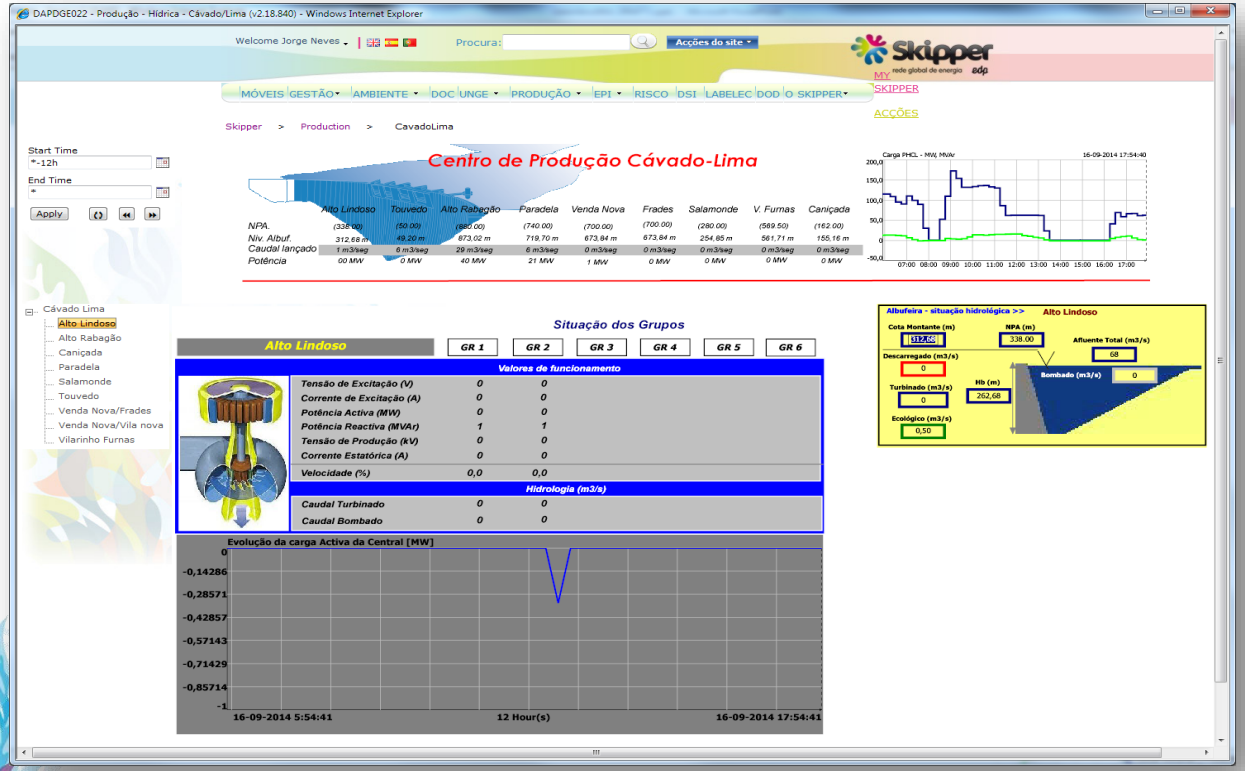
Hydraulic and production control in hydro power plants.

Operation



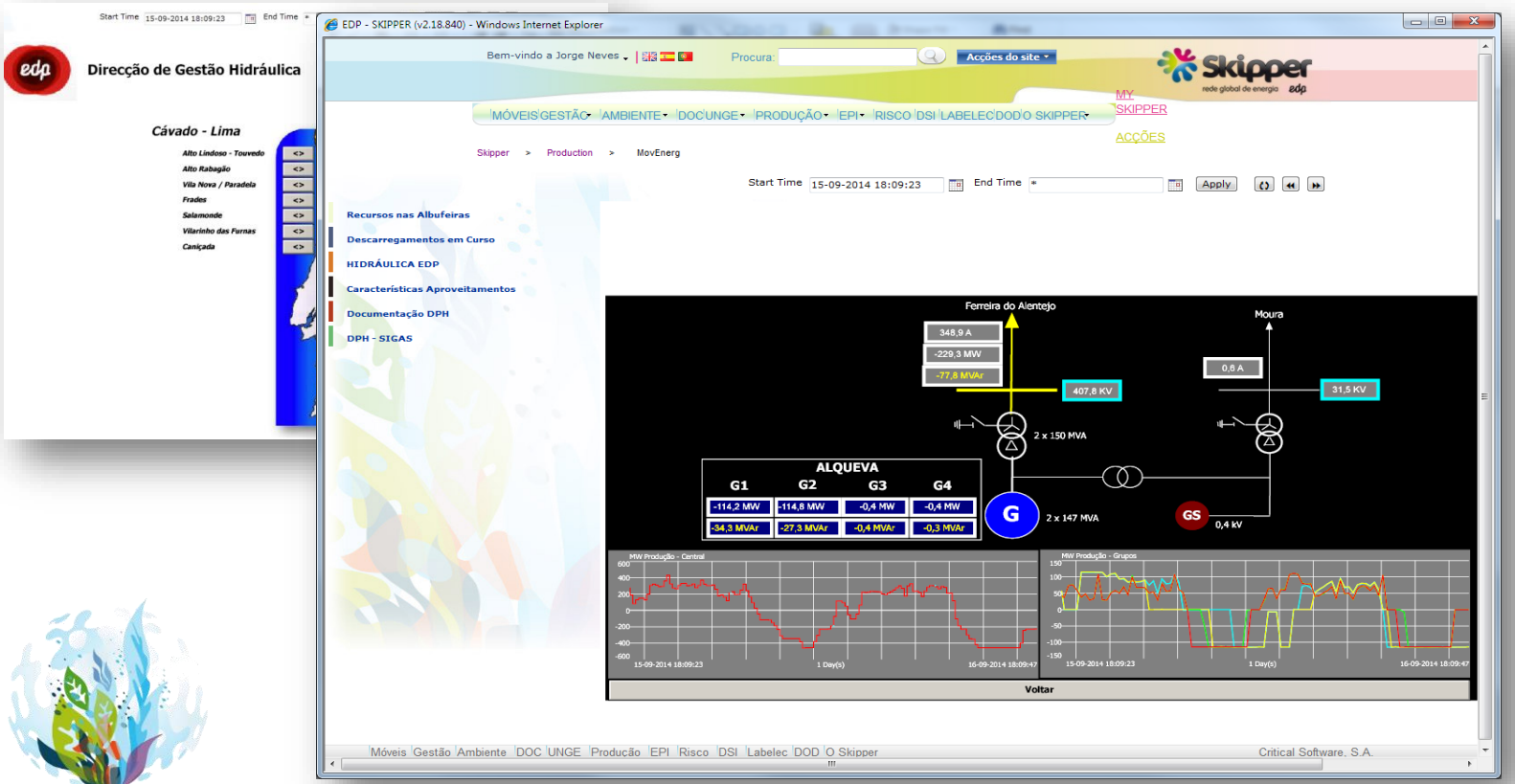
Dam overflow control.

Operation



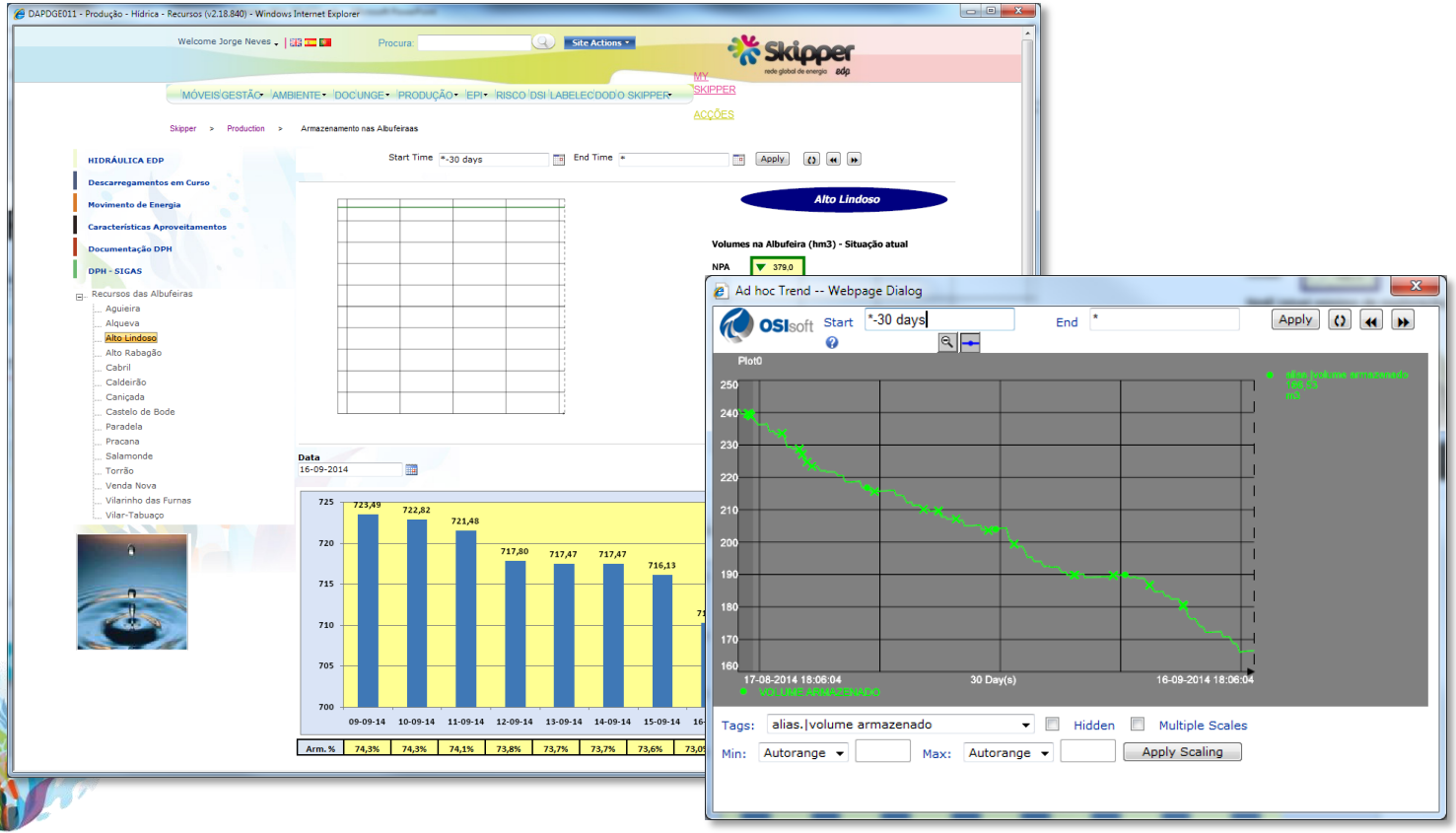
Hydro systems monitoring.

Operation



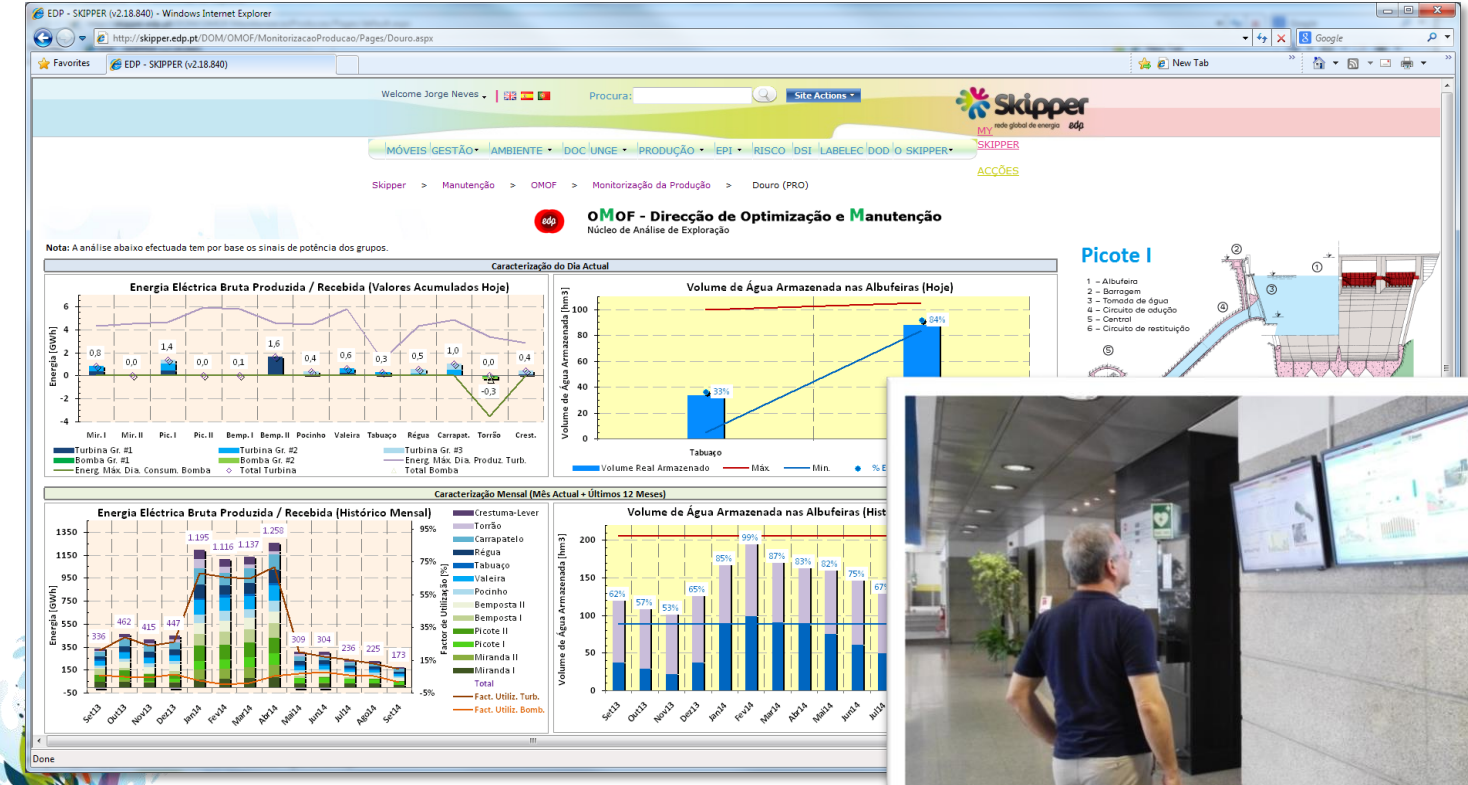
Monitoring the energy flow in hydro systems.

Operation



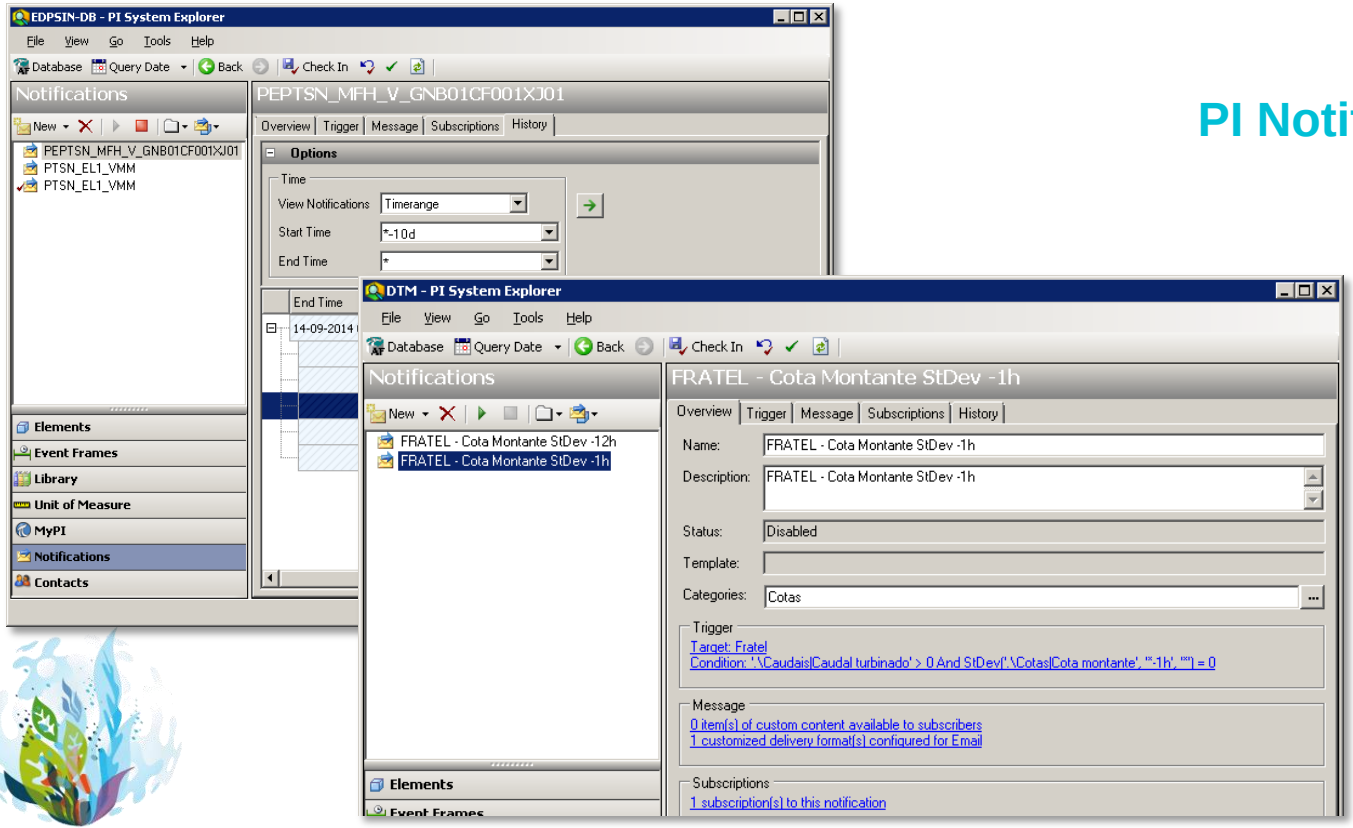
Controlling and monitoring dams' capacity.

Information



An infrastructure and a multitude of applications and presentations, flexible enough to target (almost) any audience.

Alarms

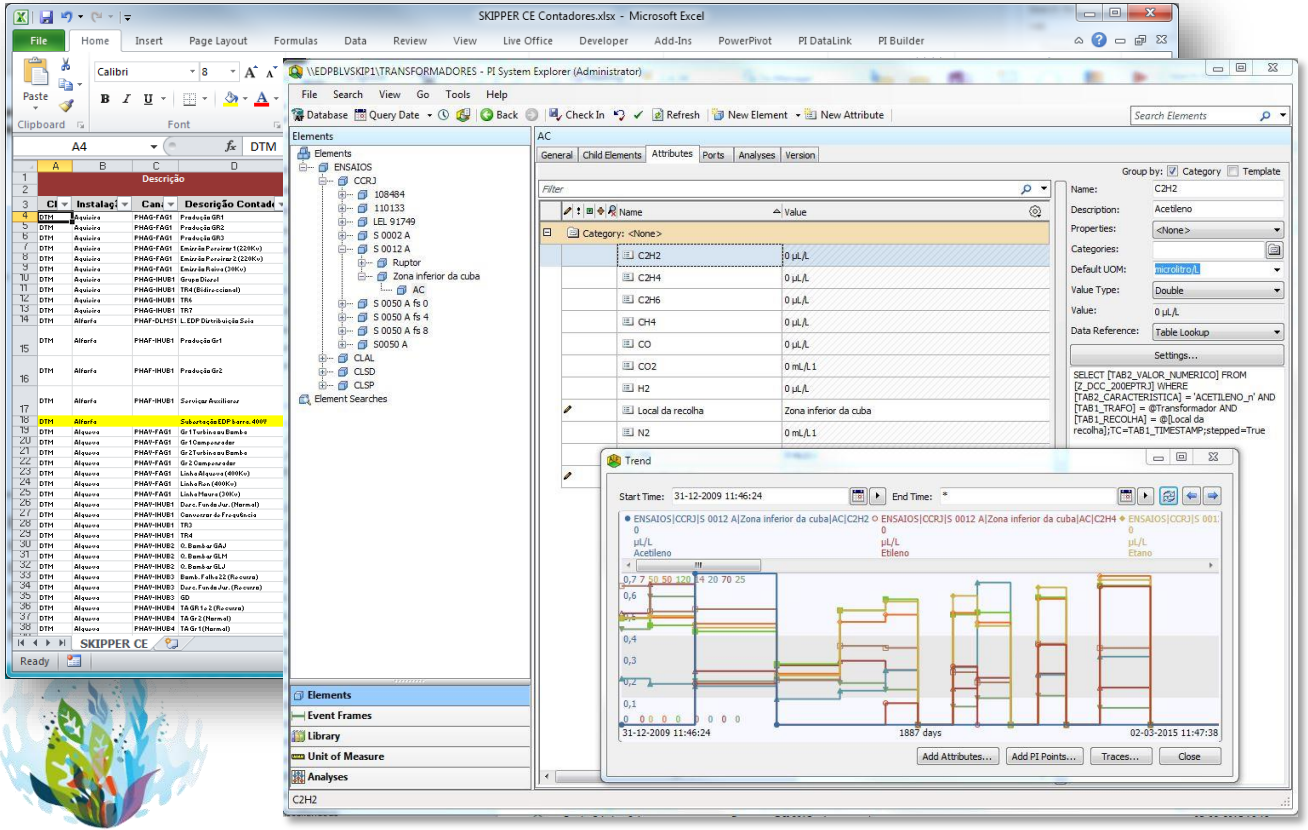


PI Notifications

Alarms configured for information on events at the plant or in the operation of OSIsoft PI System.

The events are sent to the selected users by email.

Work in progress



Designing data structures in PI AF for information on the energy metering and power transformers analysis.

Link to ORACLE databases and PI Tags.

Static and dynamic information available.

CONCLUSION

(and something more…)

SKIPPER

System, Knowledge, Information, Plant Performance & EnviRonment

Business Challenge

- Provide an integrated information system to support management and monitoring of generation assets.
- Support to internationalization of EDP Group.
- Implement a plan to deal with future organizational challenges.
- Sharing of best practices and technology as well to retain knowledge.

Solution

- Connection of different data sources - DCS, SCADA, energy meters to PI Systems.
- SharePoint portal with PI WebParts and PI DataLink for Excel Services.
- Relational databases for other sources and Business Intelligence.
- Business Objects (BO) reporting.

SKIPPER

System, Knowledge, Information, Plant Performance & EnviRonment

Benefits

- Automation in data acquisition, validation and consolidation.
- Online access to industrial process data.
- Sustainable decision to replace discontinued data acquisition systems by systems with improved performance.
- New operation paradigm:
  - Reduction of reactive power in hydro production centers;
  - Better thermal cycle performance with control of flue gas/air splitters in boilers;
  - Easier access to dam overflow control and dam capacity by users;
  - Easier connection between technical data and economics.
- Data source for maintenance KPIs.
- Open data for open minds brings better knowledge of our assets.

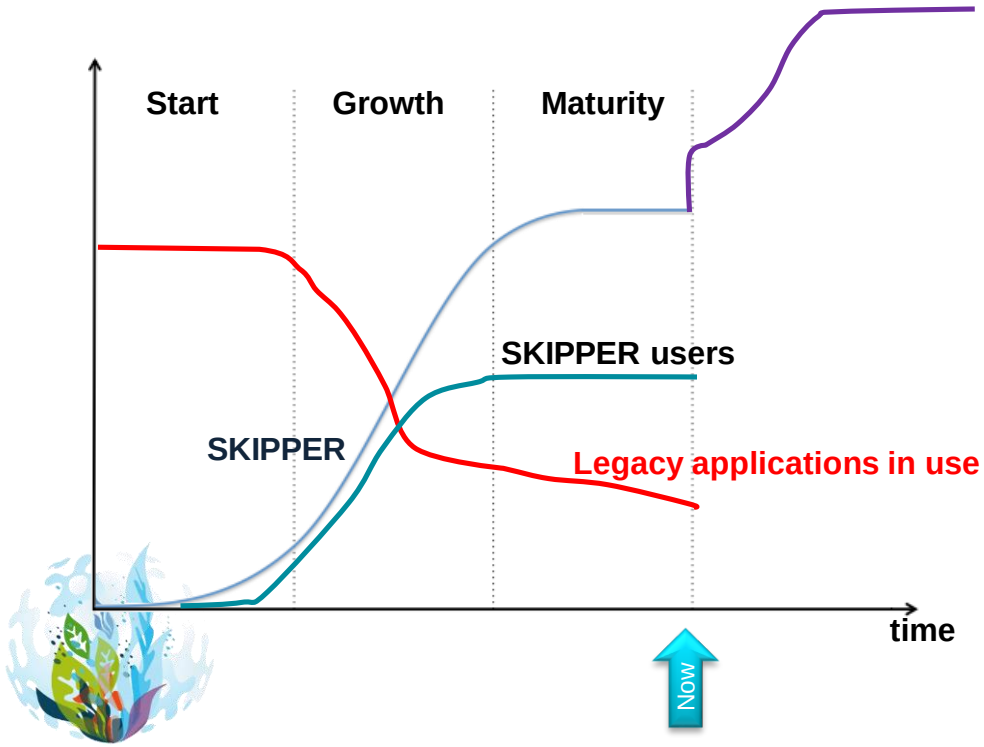
SKIPPER

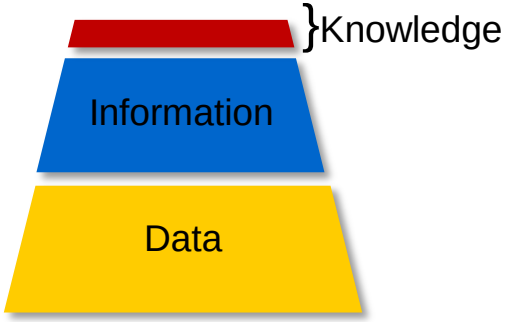
System, Knowledge, Information, Plant Performance & EnviRonment

Results

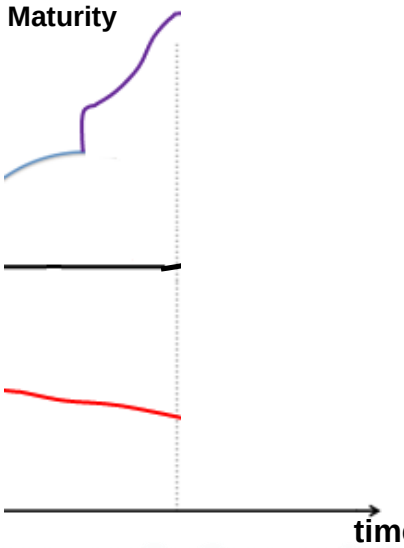
- Accessibility to data and knowledge sharing without technological, organizational or geographical barriers.
- Putting the focus on assets' knowledge with the potential to create value by eliminating monopolies in data access.
- Evolve from a vertical organization to a networked organization.
- Obtain, maintain and analyze data from all units of EDP Produção.
- Optimize efficiency's management of existing assets.

Life cycle





Future

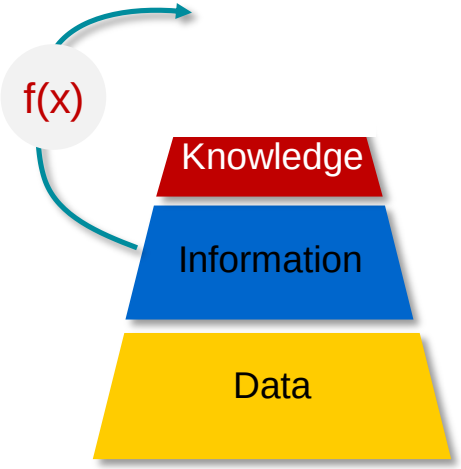


New challenges

New uncertainties

New risk evaluation

New learning curve



- End legacy applications and also manual data entry and integrate applications with same functionalities;
- Increase the number of SKIPPER users in maintenance areas;
- Predictive analytics;
- Optimization of access and sharing knowledge;
- Establishing algorithms to transform the current information into knowledge.

Manuel Pio Silva

- manuelpio.silva@edp.pt
- Eng. @ EDP Gestão da Produção de Energia, S. A.

THANK YOU

Brought to you by OSIsoft.