



OSIsoft®

UC2010

Real Time Information — Currency of the New Decade

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UC2010

Real Time Information — Currency of the New Decade



**Project: Real Time Fuel Management System for
Ecuadorian Power System (SICOMB)**

Speaker Name: Gonzalo Uquillas V.

Speaker Title: IT Director

Company: CENACE Quito-Ecuador. S.A.

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CENACE (Ecuadorian National Power Control Centre)

ISO responsible for coordinating the real time operation of the national power grid including ties with neighbouring countries of Colombia and Perú; It is also in charge of administration of the Wholesale Electricity Market in Ecuador, South America.

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It's a technical Nonprofit Corporation with strategic responsibilities for the country regarding:

- Operation of the Electrical System: corresponds to a highly specialized activity of extreme complexity, designed to secure supply of energy to the country. Includes synchronous operation of the electrical systems of Ecuador and Colombia.
- Administration of Wholesale electricity market transactions
- Technical and commercial Administration of electricity trading with Colombia and Perú.

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This is Ecuador



Population: 14 million people
Area: 220,000 Km2



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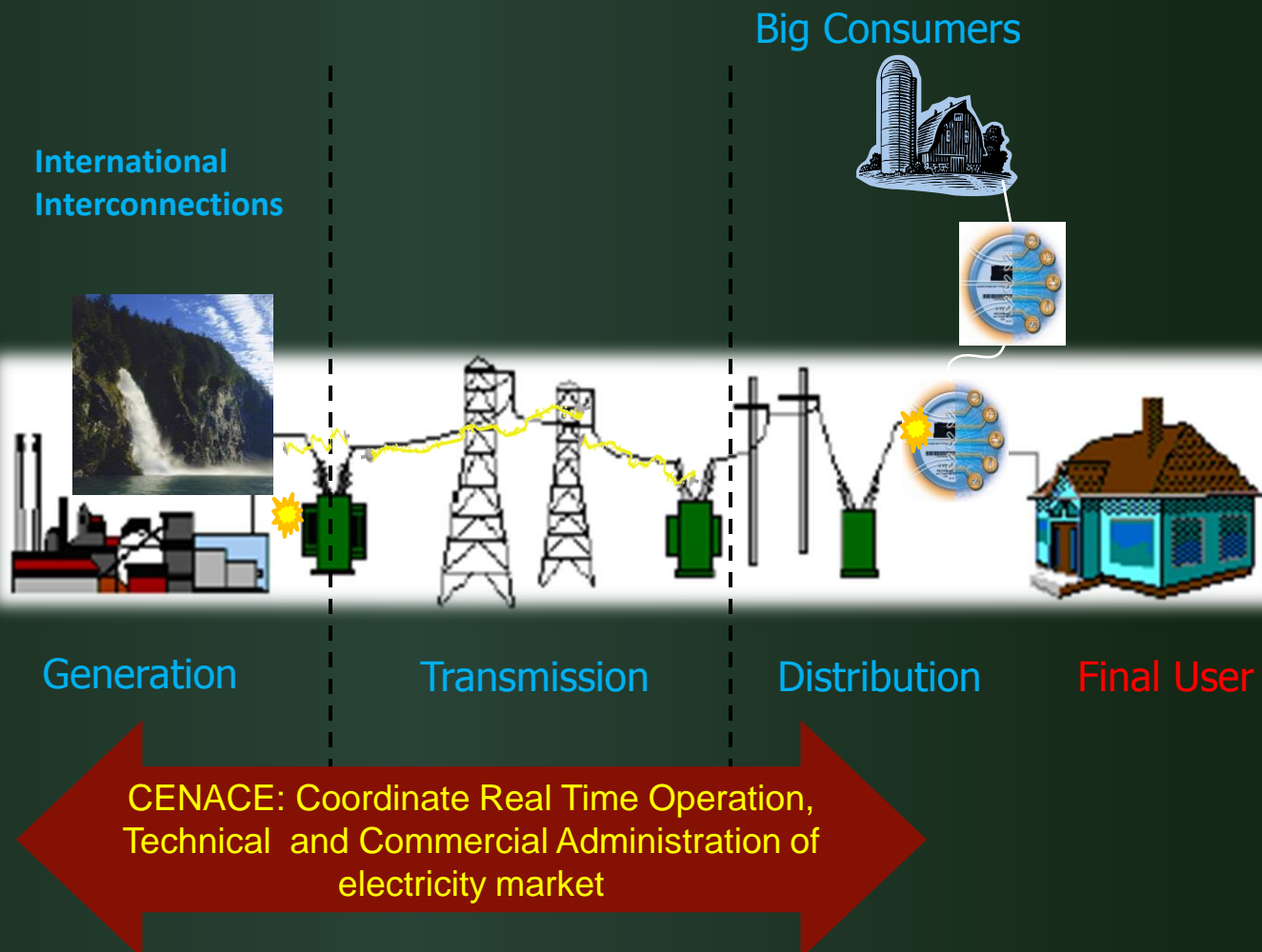
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Transformer capacity

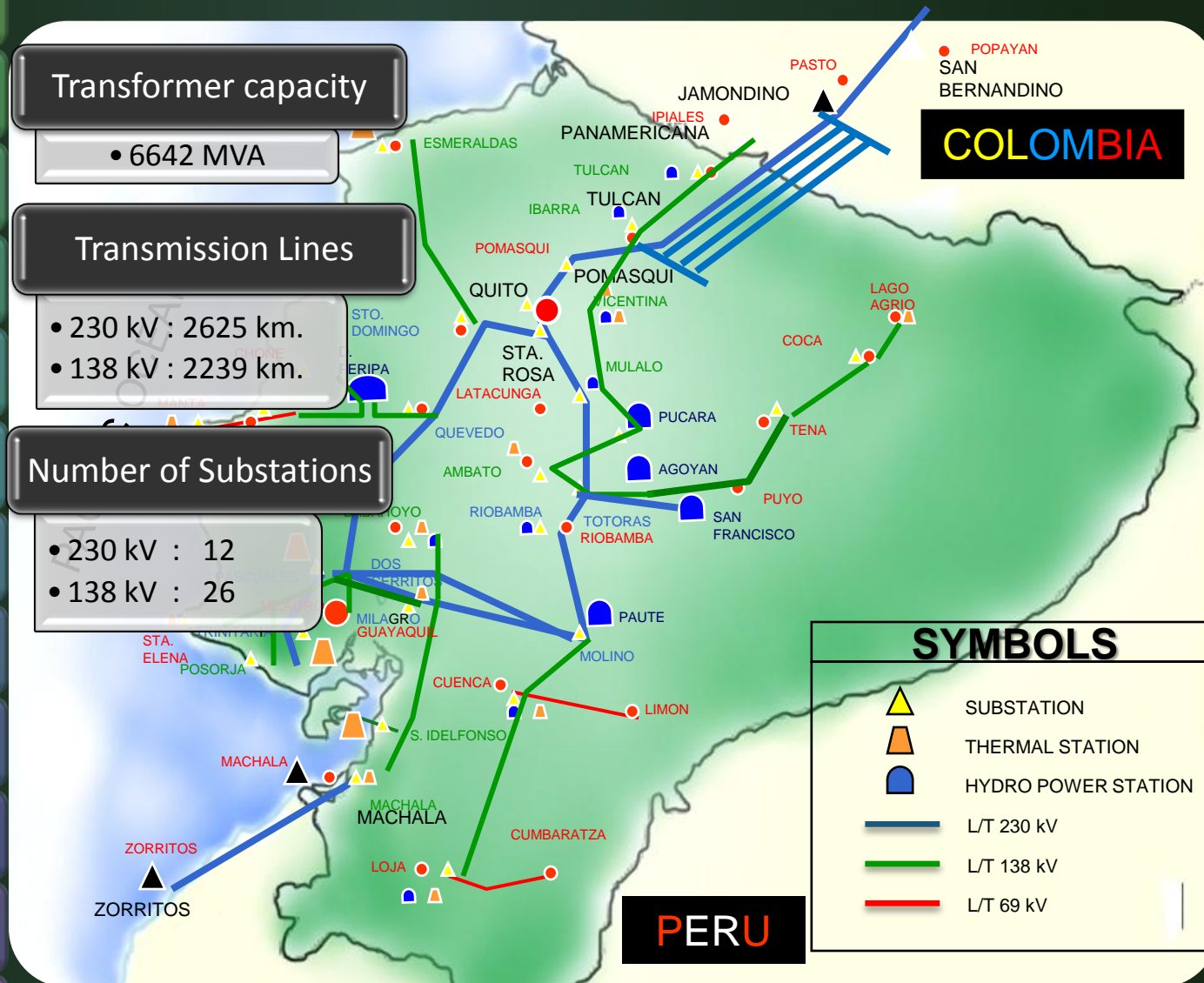
• 6642 MVA

Transmission Lines

• 230 kV : 2625 km.
• 138 kV : 2239 km.

Number of Substations

• 230 kV : 12
• 138 kV : 26



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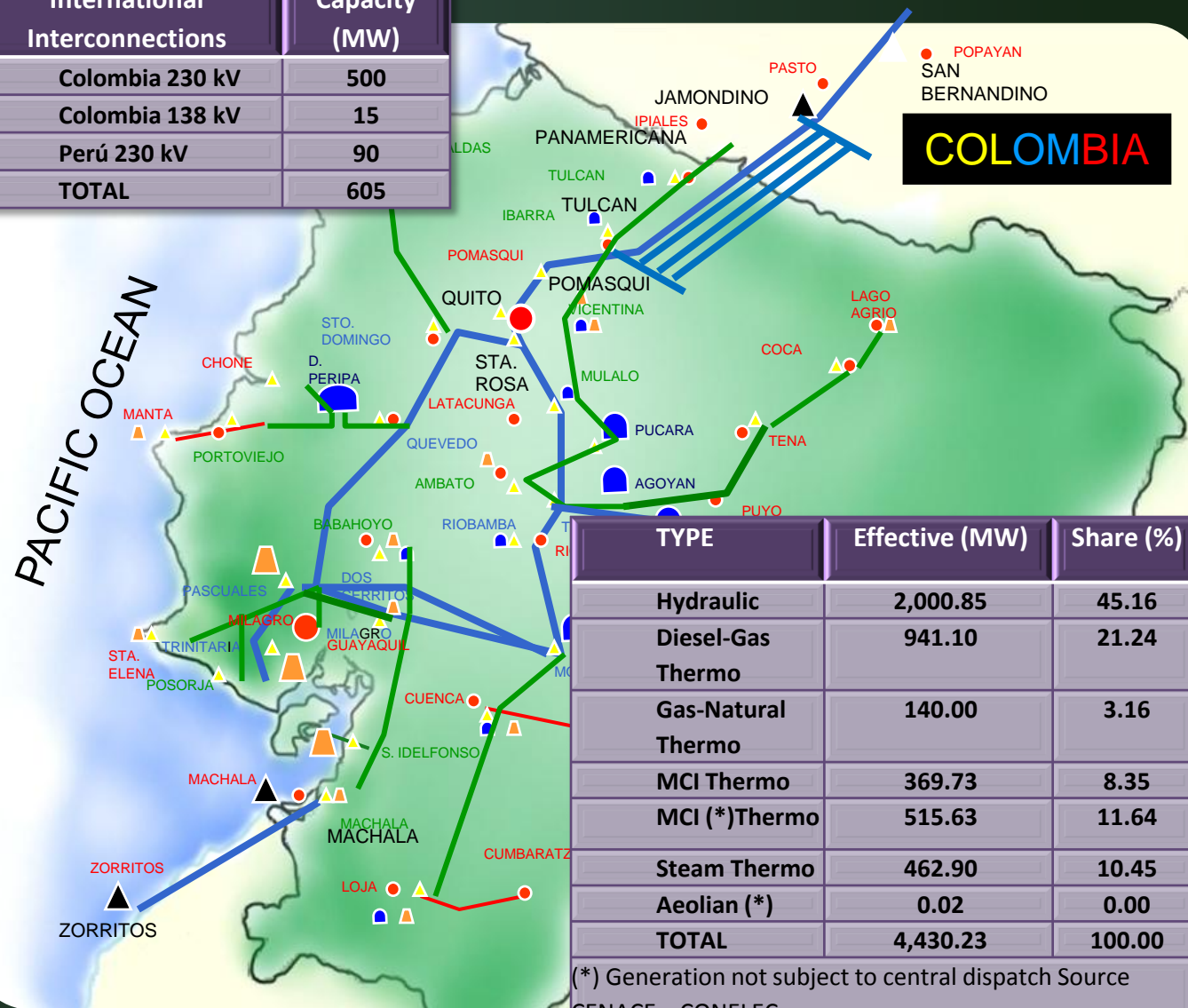
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International Interconnections	Capacity (MW)
Colombia 230 kV	500
Colombia 138 kV	15
Perú 230 kV	90
TOTAL	605



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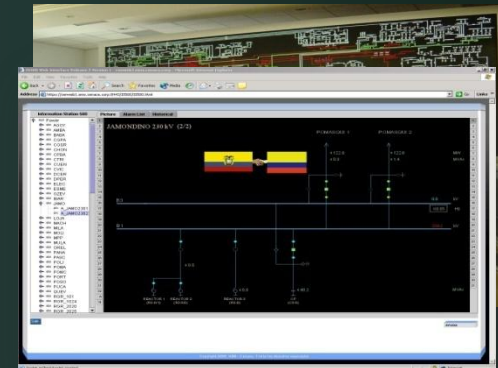
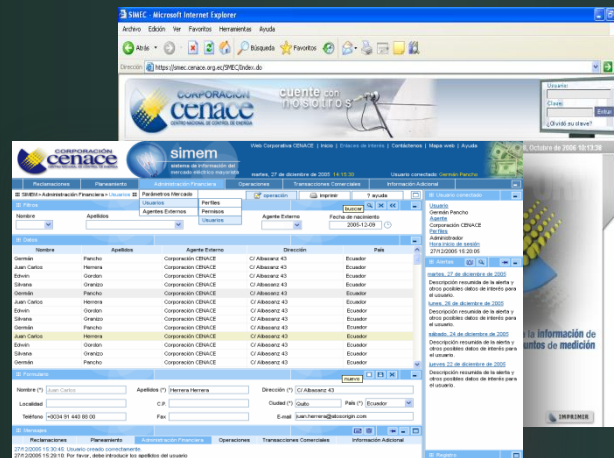
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CENACE provides information services for Ecuadorian power utilities using state of the art IT systems to accomplish the process of:

- Energy Operational Planning Long, Medium and Short Term (Economic Dispatch)(ePSR)
- Real Time Operation of the Ecuador National Interconnected System (EMS)
- Business Administration: Metering, Pricing, Settling (SIMEC, SIMEM)

<https://smec.cenace.org.ec/SMEC/Index.do>
www.cenace.org.ec

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Currently **28 thermo power stations are in operation** in Ecuador, belonging to 20 companies, 7 are private and 13 state owned, of which 14 have a larger fuel storage capacity to 200,000 gallons.

Actually no Real Time Accurate Integrated Information is available at CENACE regarding:

- Fuel Inventory at local sites
- Fuel Volume consumptions of thermal power stations

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Thermal power companies use the following fuel types:

- Diesel 2
- Fuel Oil 4
- Fuel Oil 6
- Low Octane Naptha



Fuel Storage infrastructure capacity for thermal generation totals: **19** million gallons of fuel oil, **7.7** million gallons of diesel and **1.9** million gallons of naptha.

The supply of fuel is running via:

- Pipelines
- Ship-tanks
- Land transfers by car-tanks



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- The effective power of thermal unit generation in the interconnected national power system (S.N.I.) in Ecuador is **2,083.70 MW**, accounting for **48%** of the total effective power available. The guarantee of continuous electricity supply in the country depends highly on the availability of thermal generation and the reliable supply of fuel for its operation.



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- This generation uses as a primary fuel supply the one provided by PETROCOMERCIAL (state owned fuel company). Currently, private and public sector thermal generation companies pick up the fuel required for operation from PETROCOMERCIAL refineries, mainly by sea.
- Among other factors, to consider in order to assure reliable fuel supply is the time needed to load the fuel in storage tanks, each generator takes up to four days, which in turn creates a high risk of unavailability of thermal generating units.



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The fuel volume control for thermal power stations is performed using gauging and manual measuring procedures. In general, the existing equipment is obsolete and does not transmit the measurement of fuel to a centralized data acquisition and processing system .

It should be noted that thermoelectric power plants receive subsidized fuel for electricity generation and there is no automatic system to verify that this fuel is used for the purpose mentioned before.

300 million US dollars are spent yearly by the Ecuadorian power stations in fuel consumption for electricity generation.



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Therefore, there is an urgent need for the implementation of a real time information system for management and control of fuel use in the power sector that can fulfill the following objectives:

Provide Telemetry of:

- Inventory of fuel per unit, power station, company, fuel type
- Measurement of fuel consumption
- Calculation of performance per unit (kwh/gallon)

To control the use of fuel received by thermal power plants, to improve planning and supply of fuel requirements in order to avoid the unavailability of thermal power stations for electricity generation, a few times black outs have occurred due to lack of fuel or logistic problems in fuel supply chain; and to audit fuel consumption operations.

Provide “on line” information for use in business transactions (billing) with PETROCOMERCIAL



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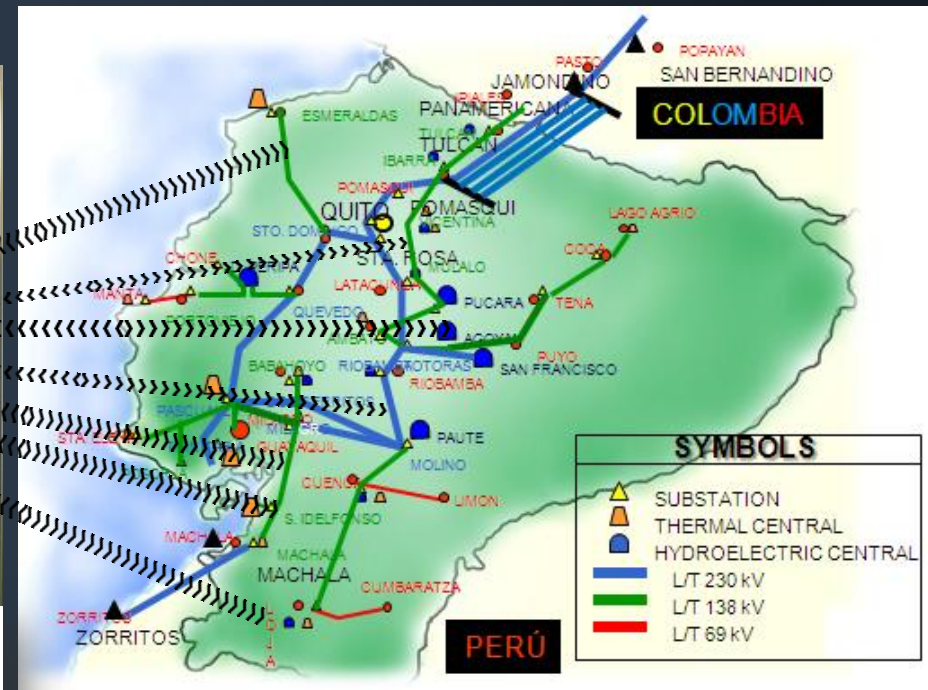
PI System Architecture

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The fuel measurement system to be developed should enable the implementation and/or complementation of the local measurement infrastructure and data acquisition of fuel inventories and consumption, at the power stations premises all around the country, and transmit them to CENACE, for processing and presentation.

There are currently available a few thermal power stations with the equipment necessary to perform the measurement of fuel inventories, and only 5% of the stations transmits this information to CENACE (the real-time system EMS).



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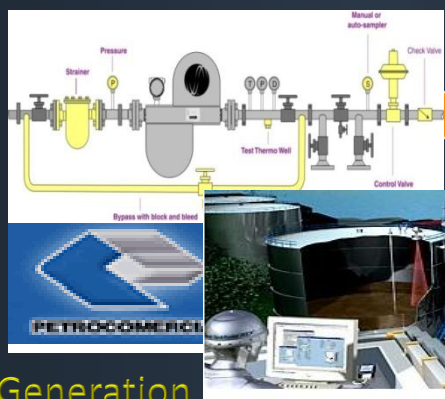
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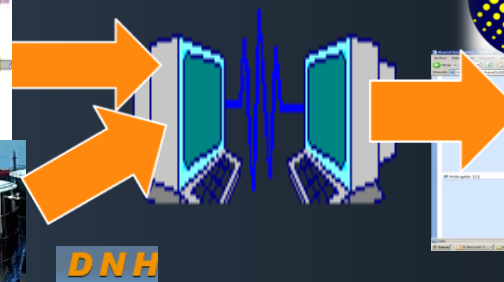
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- With the execution of this project the aim is to cover 100% of measurements of fuel implemented and transmitted to CENACE.
- Once the information with measurements of fuel of thermal power plants becomes available, CENACE will integrate them with a software application developed to process this information and presentation through the respective website and thus accessible to users of the following organizations: DNH, PETROCOMERCIAL, Ministry of Mines and Petroleum, Ministry of Electricity and Renewable Energy, Ministry for Coordination of Strategic Sectors, CONELEC.



Generation Companies



DNH



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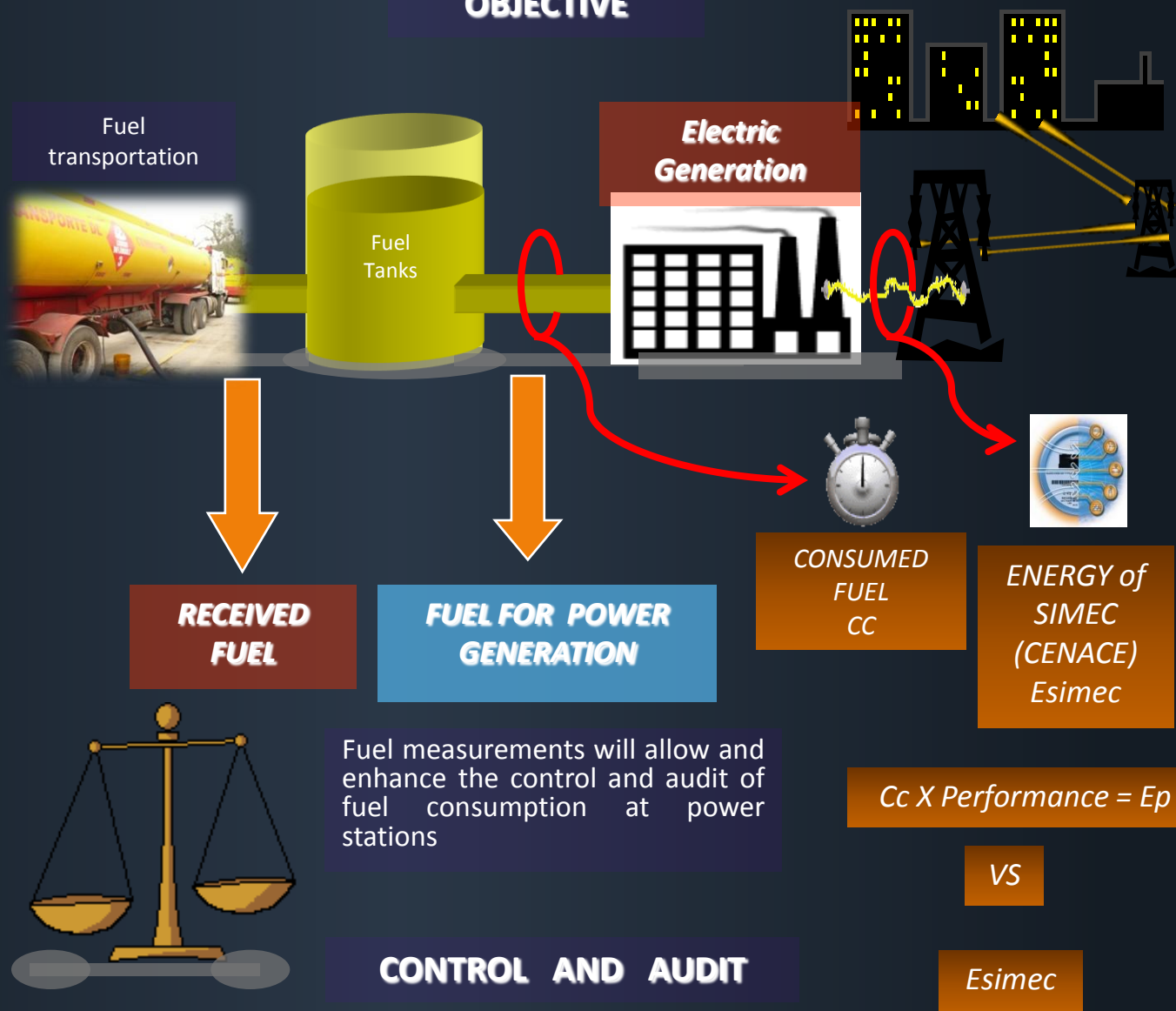
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OBJECTIVE



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Considering the good experience gained with the **use of PI product included in the EMS system of CENACE**, we began a pilot project to verify the potential of OSIsoft products to meet the requirements of this new fuel metering application in CENACE.

This test was performed with successful results, therefore a service agreement was signed with OSIsoft in order to acquire the necessary SW platform to process fuel information in a PI Server and publish it through a web server.



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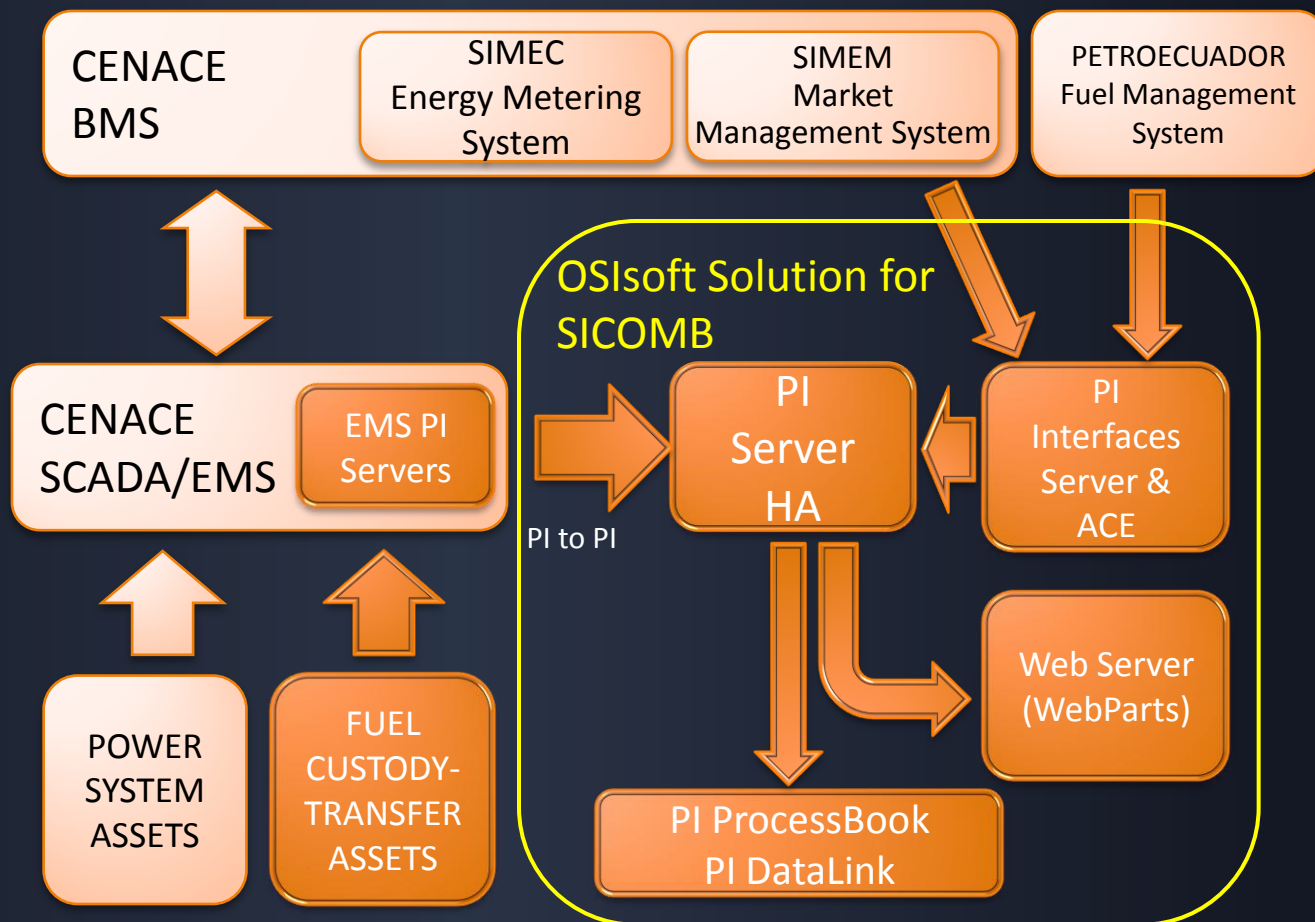
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OSIsoft helps CENACE improve the Electric Power Plants Fuel Storage and Consumption Audit and Performance, aiding Ecuador's Energy Management



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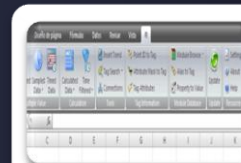
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The OSIsoft tools used in the development of SICOMB project are among others as follows:



PI ProcessBook



PI Datalink

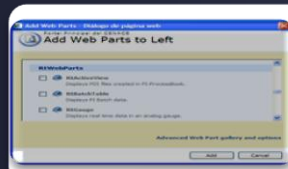


PI ACE



PI-SDK

For reports building and presentation RtReports and PI WebParts are used in addition to MS SharePoint



PI WebParts



RtReports



SharePoint

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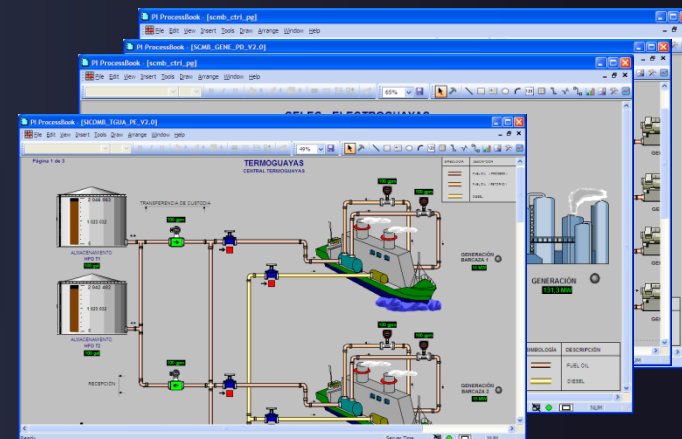
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PI ProcessBook



PI ProcessBook makes possible to display real-time and historical data available in the PI System.

These displays show the information through the use of PI WebParts of OSIsoft within MS SharePoint .

Fast built up and presentation of dynamic displays and data related to fuel storage and consumption.

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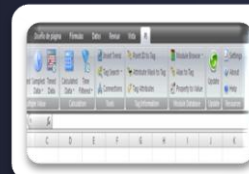
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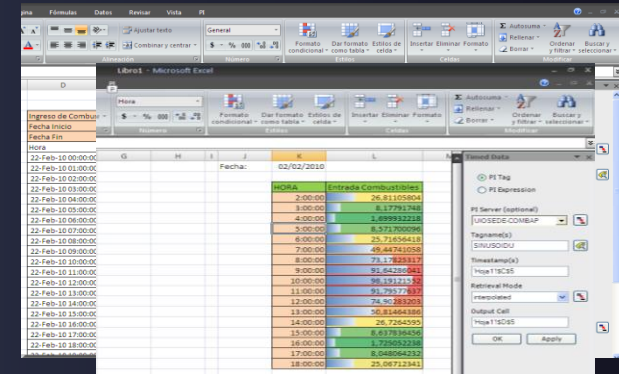
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PI DataLink



PI DataLink establishes a direct connection between the OSIsoft PI System and Microsoft Excel, with this tool we design and built reports for fuel stocks and thermal generation performance to be published in SharePoint.

The most important benefits of PI DataLink are:

- Easy and fast reports definition.
- PI DataLink and Excel connection is powerful and enhances the use of several functions.
- The PI DataLink tools allows to perform a large number of calculations within a short period of time.

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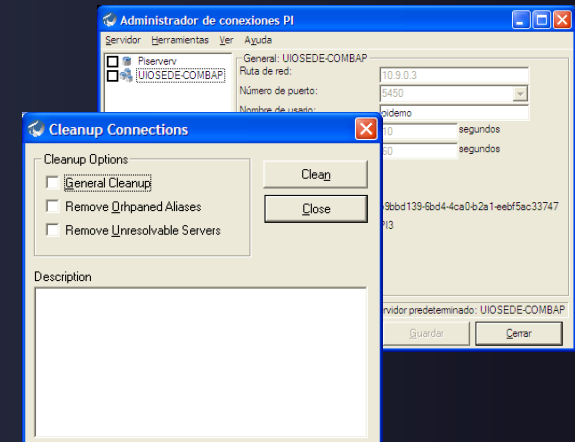
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PI-SDK



The PI Software Development Kit (PI-SDK) is a programming tool providing access to PI servers.

PI SDK libraries were used to develop, in Visual Basic, the software application necessary to validate the data consistency of field process data.

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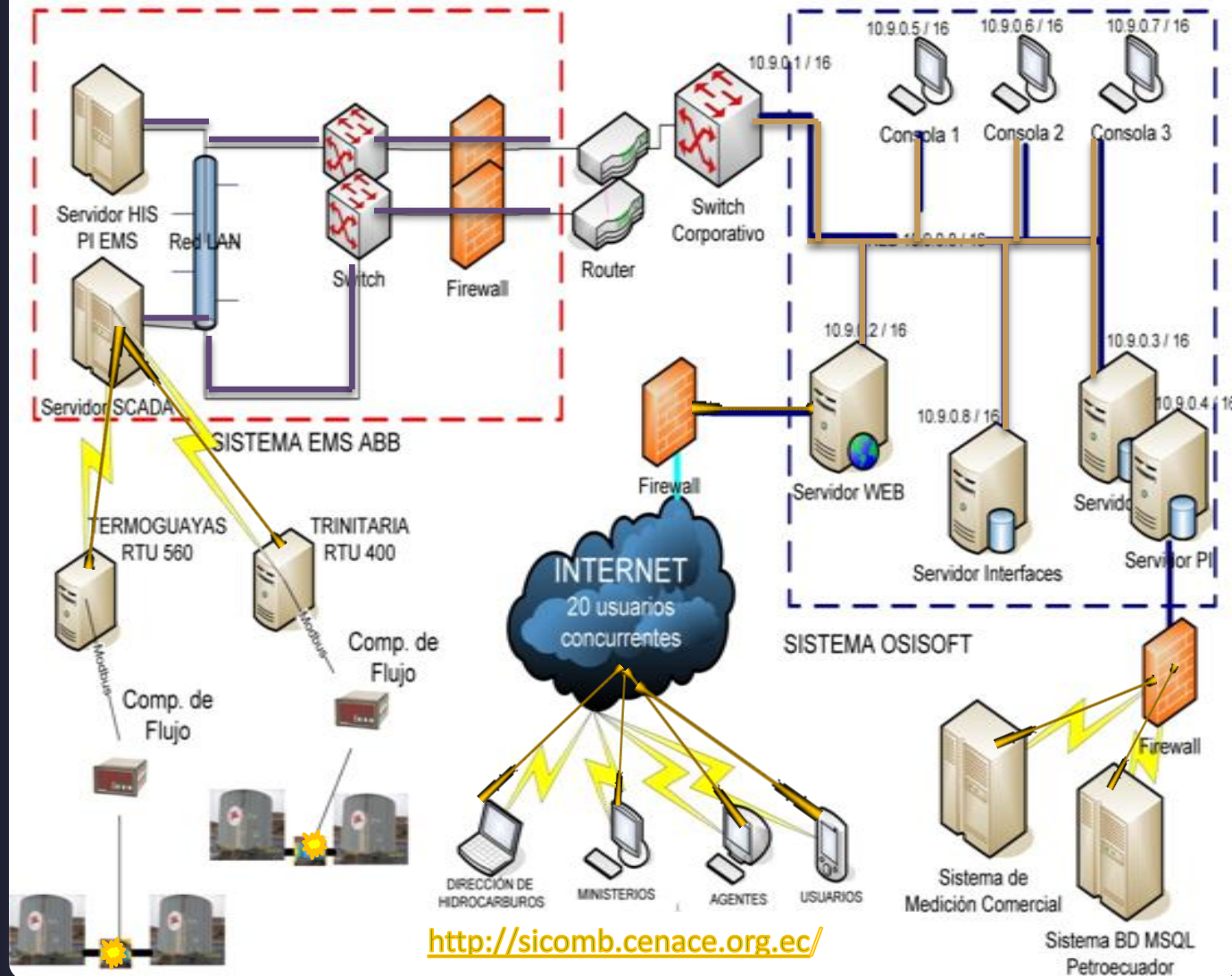
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SICOMB PROJECT ARCHITECTURE



<http://sicomb.cenace.org.ec/>

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Documentos compartidos - StockCombustibleTrinitaria_Frame - Windows Internet Explorer

http://sicomb.cenace.org.ec/sicomb/celec/Documentos%20compartidos/Reportes/StockCombustibleTrinitaria_Frame.aspx

Portal Principal del CENACE

CELEC

Portal Principal del CENACE > SICOMB > Sistema de Control de Combustibles del CENACE > Pruebas de Diseño

Portal Principal del CENACE > SICOMB - Sistema de Gestión y Control del Uso de Combustibles en el Sector Eléctrico > CELEC > Documentos compartidos > Reportes > StockCombustibleTrinitaria_Frame

Stock de Combustibles de Trinitaria

Enlaces Trinitaria

- Diagrama General de Procesos
- Diagrama Detallado de Procesos
- Stock de Combustibles Trinitaria
- Rendimientos Trinitaria
- Electroguayas
- Agregar nuevo vínculo

Stock de Combustibles (galones)

Central Trinitaria

Fecha 17-Mar-10

Hora	Fuel Oil				Diesel
	Tanque Almacenamiento 1	Tanque Diario A	Tanque Diario B	Total	Tanque Almacenamiento 2
01	76	76	76	228	68
02	76	76	76	228	68
03	76	76	76	228	68
04	76	76	76	228	68
05	76	76	76	228	68
06	76	76	76	228	68
07	76	76	76	228	68
08	76	76	76	228	68
09	76	76	76	228	68
10	76	76	76	228	68



Availability of accurate fuel information for energy planning processes and optimization of real-time operations



Control and auditing of fuel use in power sector

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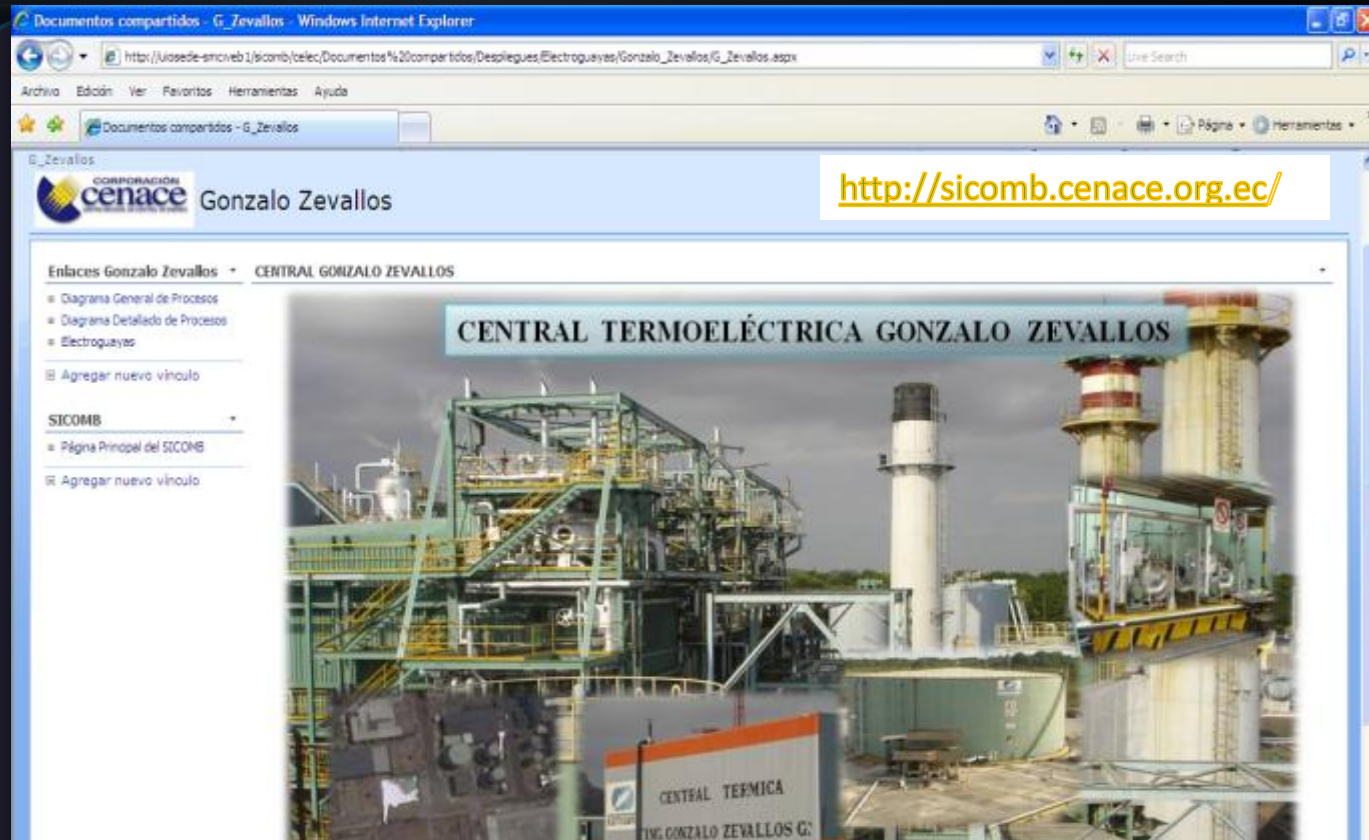
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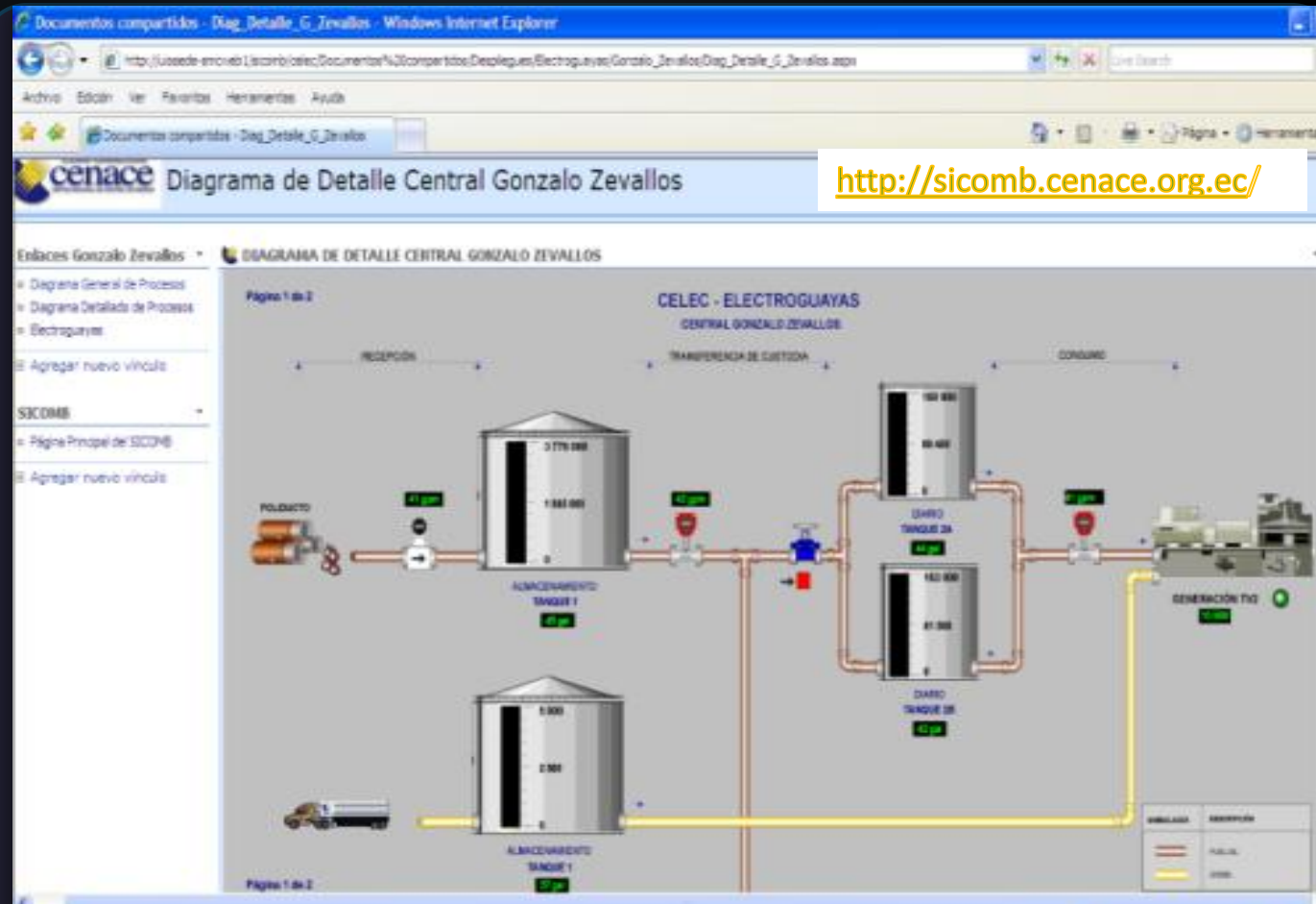


Verification of production costs declared by thermal power plants, through measurements of actual performances of the units



Availability of local measurement fuel systems at each thermo power station

Future Plans



Valuable fuel information will be available for thermoelectric companies, DNH, PETROCOMERCIAL, Ministry of Mines and Energy, Ministry of Electricity and Renewable Energy, Ministry Coordinator of the Strategic Sectors, CONELEC.

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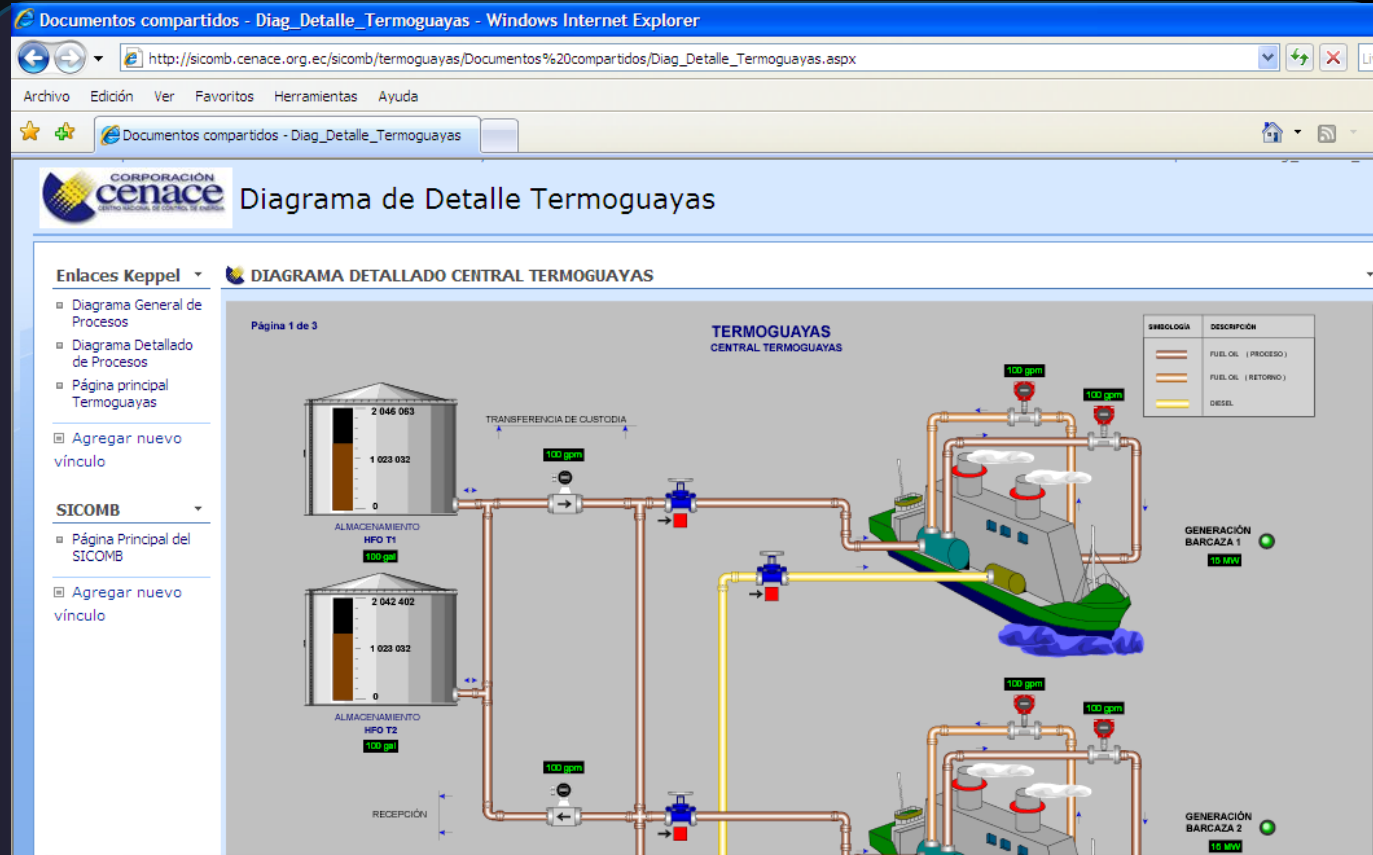
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Through this Information System (SICOMB) monitoring of fuel consumption of electric power generation provided by PETROCOMERCIAL can be performed. A check of the existing stock at fuel storage tanks will enable the responsible agencies to ensure timely availability of fuel oil to avoid problems of unavailability of electricity generation by lack of fuel, which will benefit the people of Ecuador.

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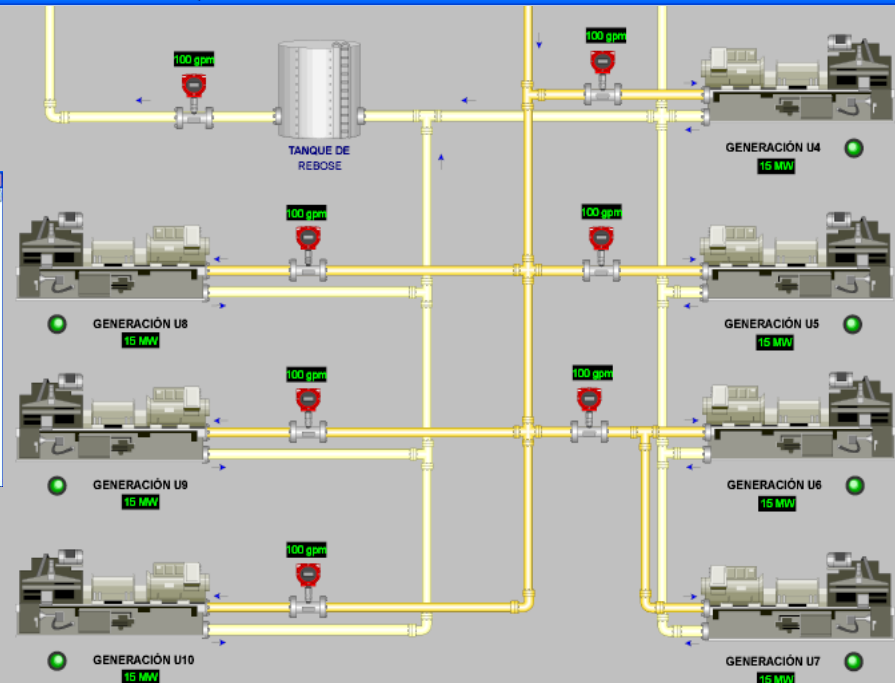
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Catamayo Power Station



SÍMBOLOGÍA	DESCRIPCIÓN
	DESEL
	DESEL RETORNO

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With the implementation of Real Time Integrated Measurement Systems with appropriate levels of accuracy, economic benefits will be directly reflected in each transfer of fuel. For example:

A company for an undertaking carrying 200,000 gallons of fuel a day, assuming a price of one dollar per gallon, the benefits are in the order \$ 2 million per year, allowing the recovery of the investment within one year

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1. Use the available fuel real time information to expedite the process of invoicing and payment reconciliation of fuel transactions.
2. Use of existing and complementary OSIsoft platform to perform real time follow up of utilities energy quality regulatory standards compliance.





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