
Turning **insight** into **action**.

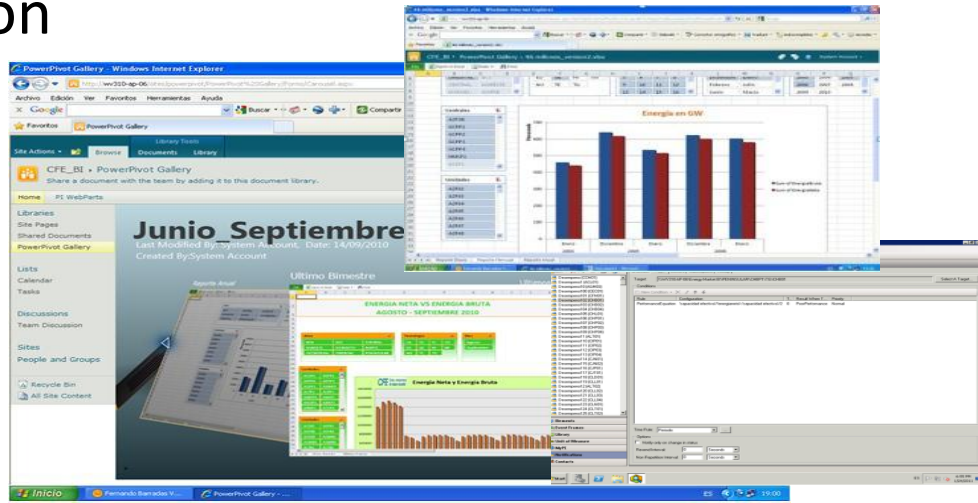
OSIsoft. USERS CONFERENCE 2011

# OSIsoft PI System and Microsoft Technology Enabling Business Intelligence for CFE-Mexico Energy Market

Presented by **Fernando Barradas, Comision Federal de Electricidad (CFE)**
**Centro Nacional de Control de la Energía (CENACE)**

# Agenda

- CFE - CENACE Organization
- Overview BI Project
- Description and Architecture
- Infrastructure Implementation
- Project Goals
- Current Status
- Benefits
- Conclusion



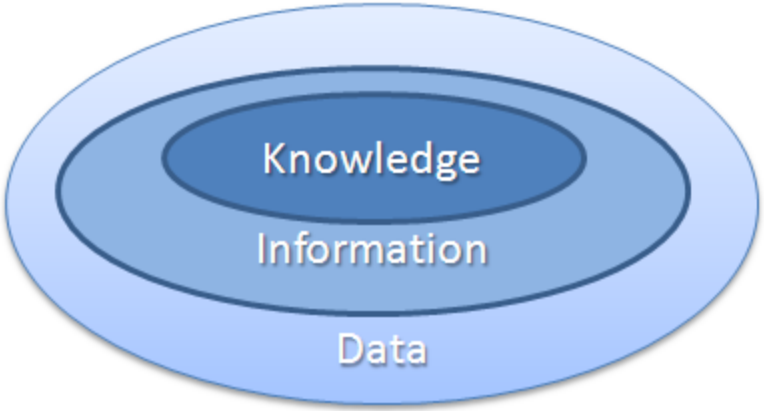
# CENACE (Centro Nacional de Control de Energía) Organization

**CENACE Organization information:**

- CFE has over 85,000 employees, including temporary and permanent
- CENACE has about 1,200 employees
  - CENAL (National Control Center)
  - 8 Control Areas
  - **34** Sub-Areas
- **779** Generation Units
- CFE Total Capacity: **52,945 MW**
- Peak Demand: **34,315 MW**(02/23/2011)
  **35,870 MW**(24/08/2010)

# What is Business Intelligence?

Business Intelligence is the ability to transform data into information and information into knowledge, so as to optimize the process of making business decisions



# CFE BI Project Vision

- CFE had no Business Intelligence (BI) applications in the information system infrastructure that is currently supported by OSIsoft Technology
- As BI applications are required to achieve rapid and sustained growth of CFE Energy Market
- Utilizing the real-time infrastructure provided by the OSIsoft PI System and Microsoft latest technology offerings

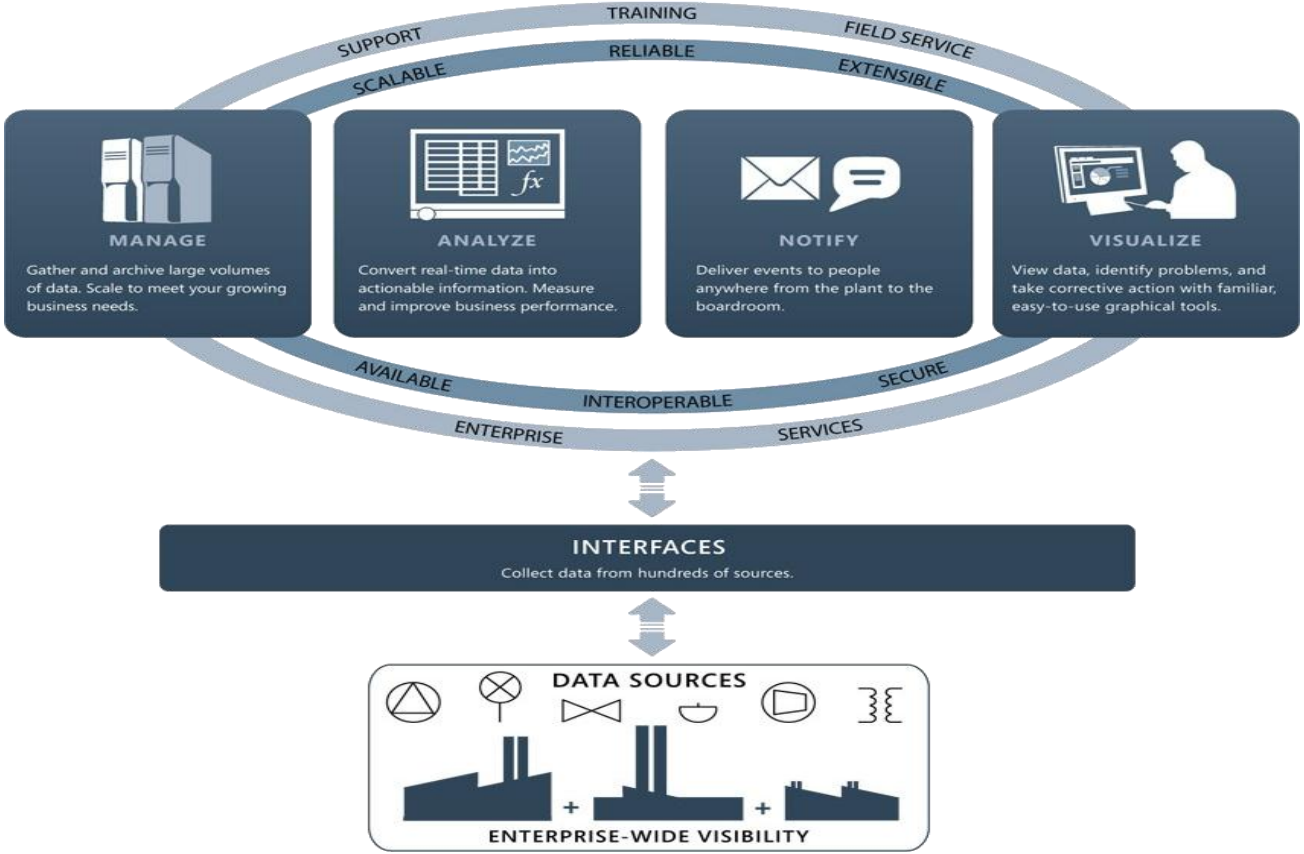
# Project Description

- With the latest OSIsoft and Microsoft technology, to build an environment for BI Applications to manage and analyze the generation energy resources and the cost
- Since the software is new, CFE can also provide feedback to OSIsoft and Microsoft
- The application deployment plan
  - Personal BI installed locally for the client, including Excel 2010, PowerPivot for Excel 2010, and PI OLEDB Enterprise 2010
  - Group BI in SharePoint 2010 web environment with PI WebParts 2010 and PowerPivot

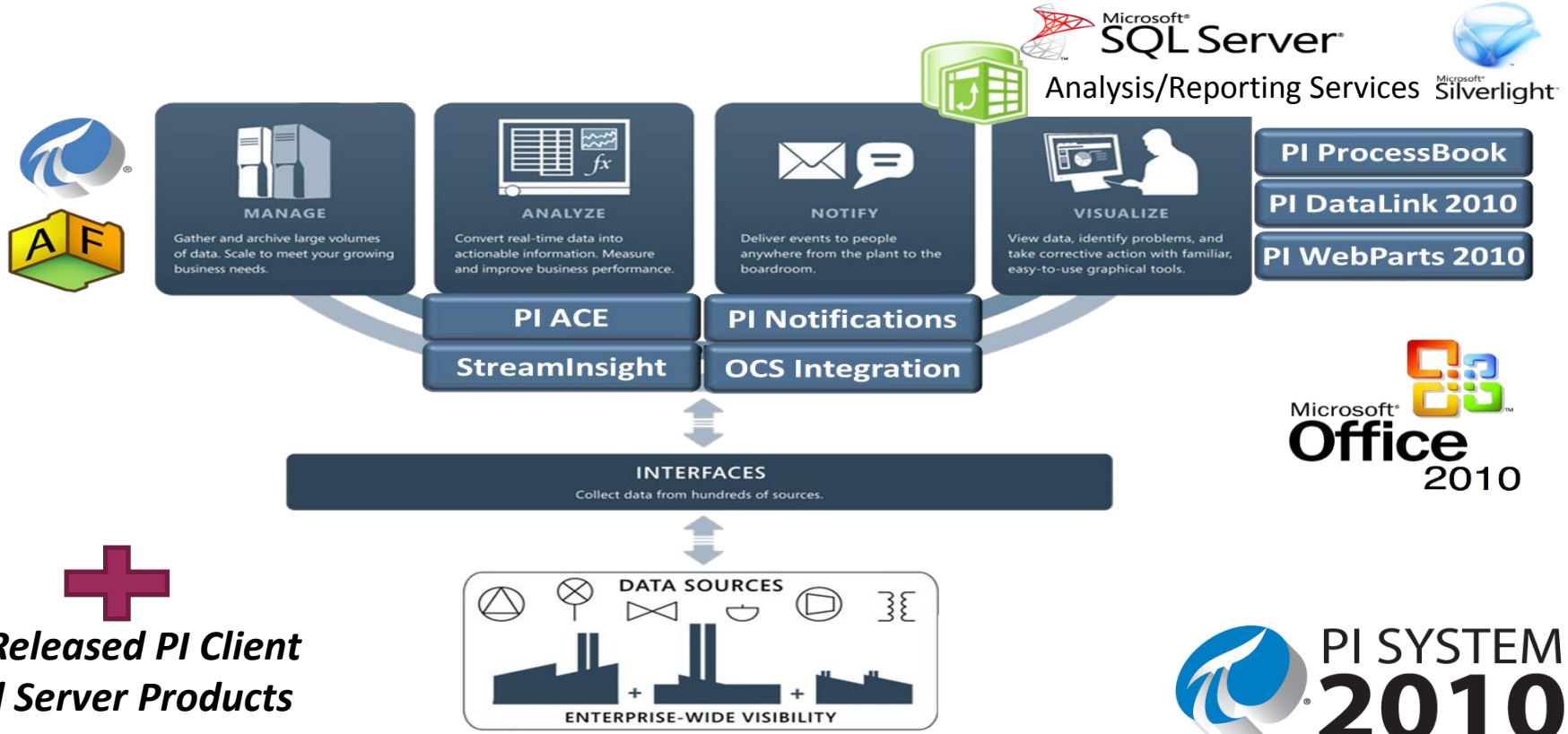
# Software Infrastructure

- Windows Server 2008 R2
- SQL Server 2008 R2 Ent.
- SQL PowerPivot Instance
- SQL Reporting Services
- SharePoint 2010 (Farm)
- PI AF
- PI Notifications
- PI OLEDB Enterprise
- PI WebParts 2010
- PI RDBMS

# PI System Architecture

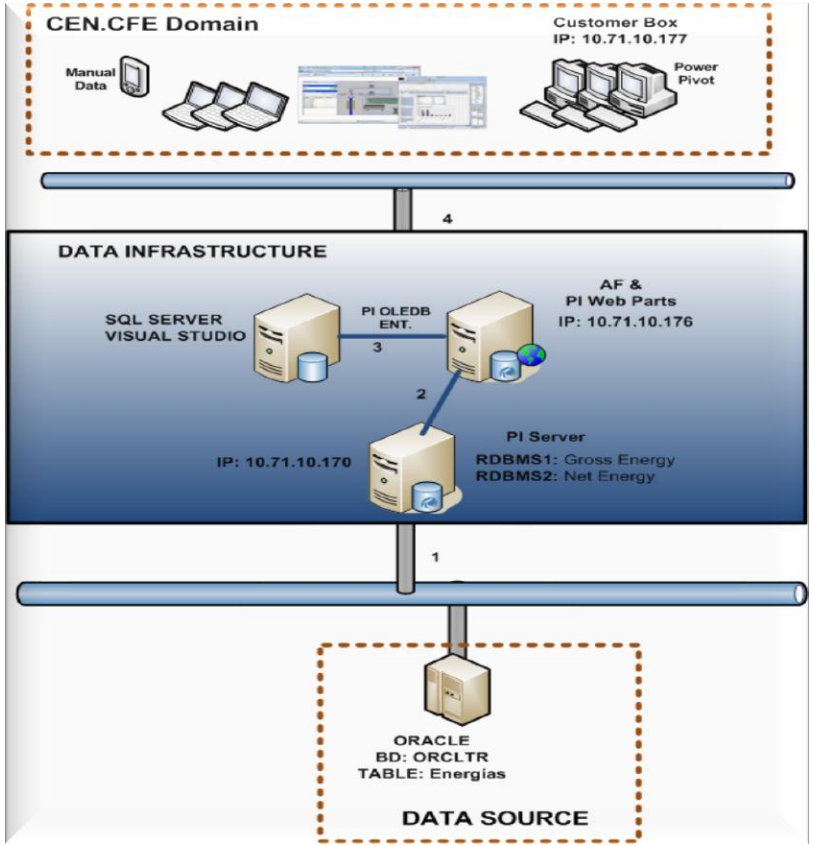


# PI System Architecture



# OSIsoft/Microsoft Integration

# BI Architecture



# Project Implementation Goals

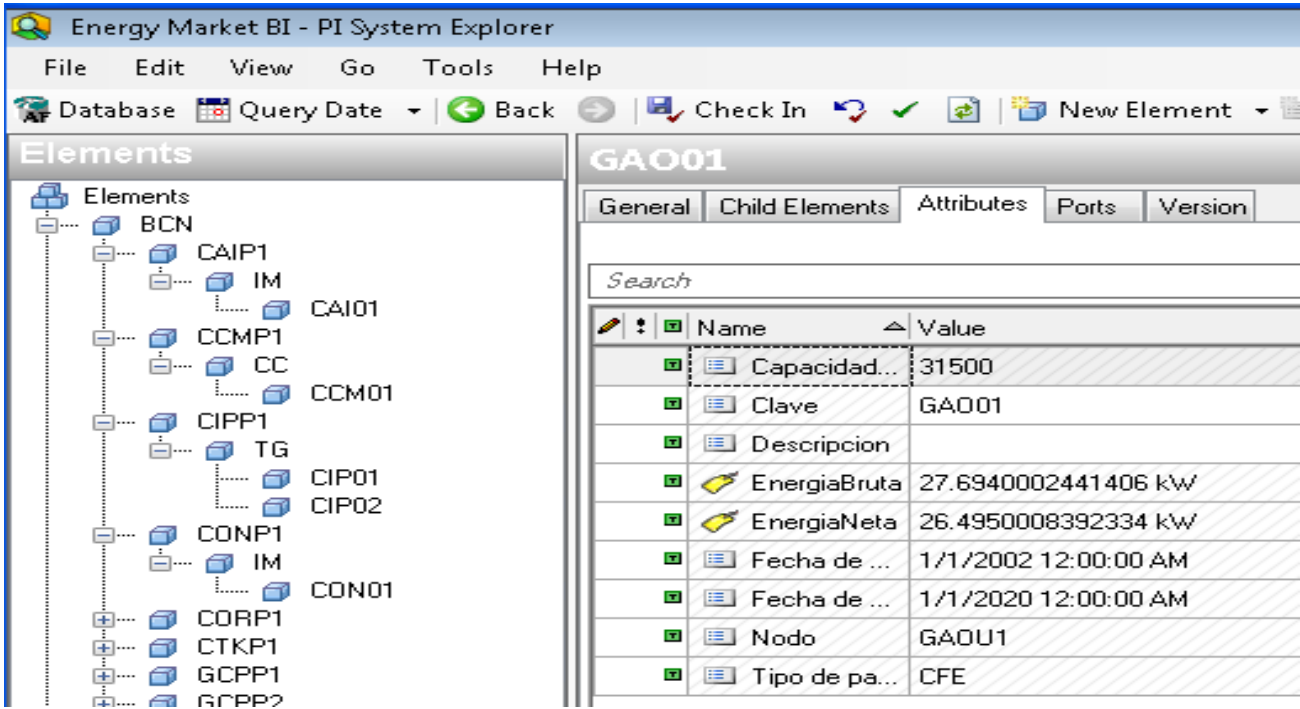
- Installation of the infrastructure of the development environment for the BI Applications
- Connect the PI System 2010 with the different sources of information to provide real time data to the BI Applications
- Construction of PI AF hierarchical structure for the BI Applications
- Configuration of all the products needed for the visualization of the BI Applications, personal and by group (Office 2010, SharePoint 2010, PI WebParts 2010)
- Configuration of PI Notifications for the notification of business rules
- Configuration of a SharePoint 2010 site with PowerPivot and PI WebParts 2010

# Current Status

- Development of:
  - PI AF Hierarchy
  - PowerPivot reports and uploads those reports in SharePoint Site Gallery
  - PI WebParts in SharePoint
  - Business Rules with PI Notifications
  - Displays in PI ProcessBook

- Currently Oracle data is sent to the PI Server through RDBMS
- With this information data dictionary hierarchy structure was created in the PI System
- The information is sent to a SQL then imported to PowerPivot

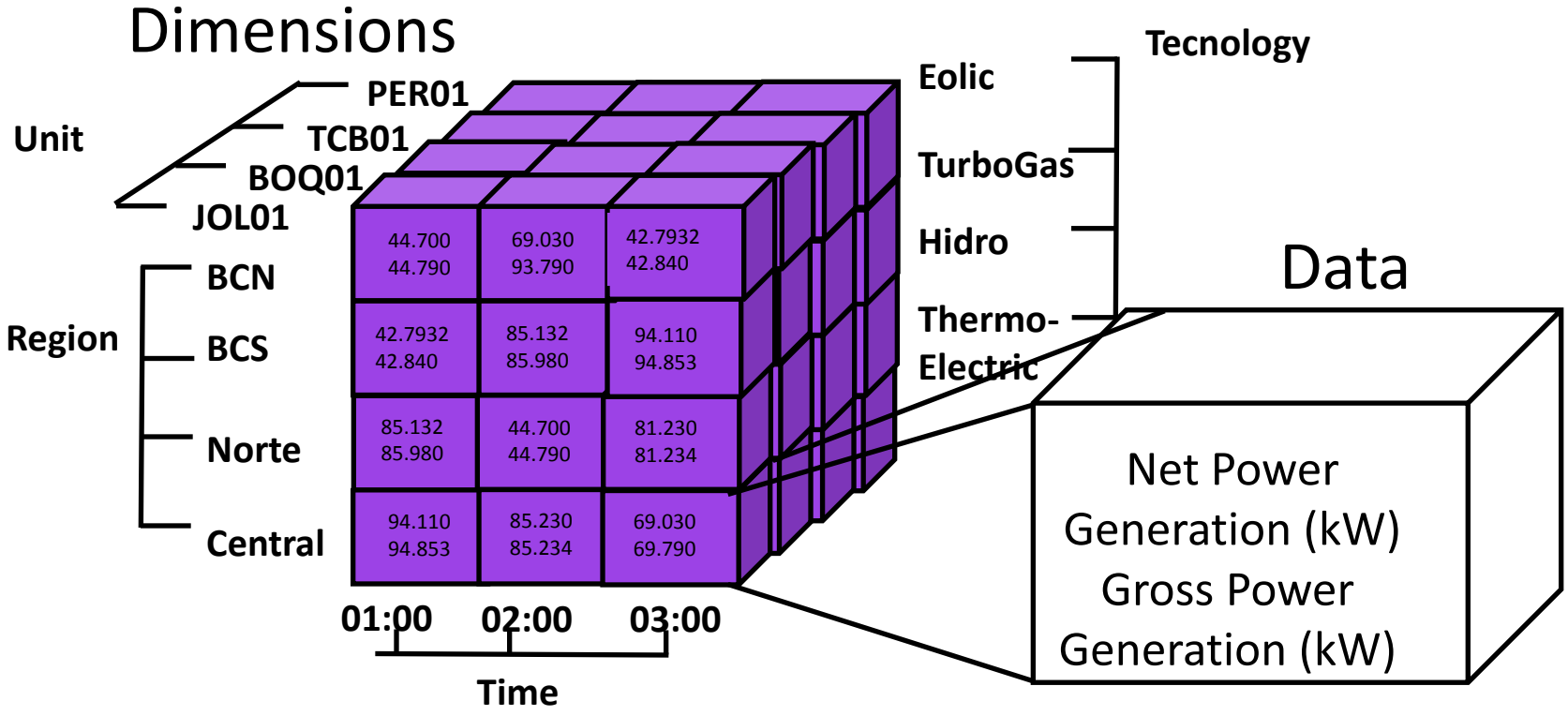
# PI AF Hierarchy




**Built Complete Hierarchy**

**For Area, Central, Type of Generation Unit**

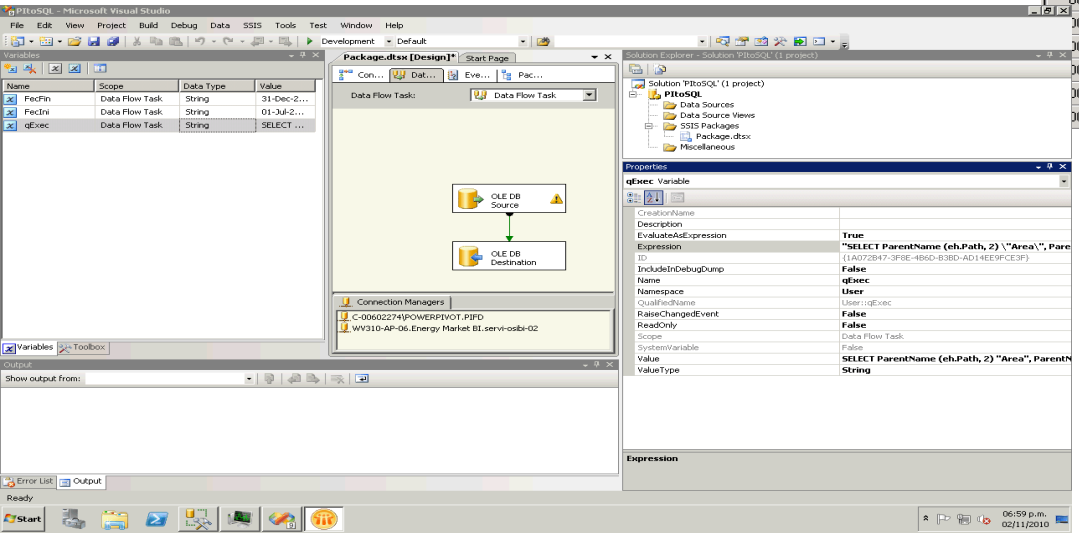
# Cube Structure



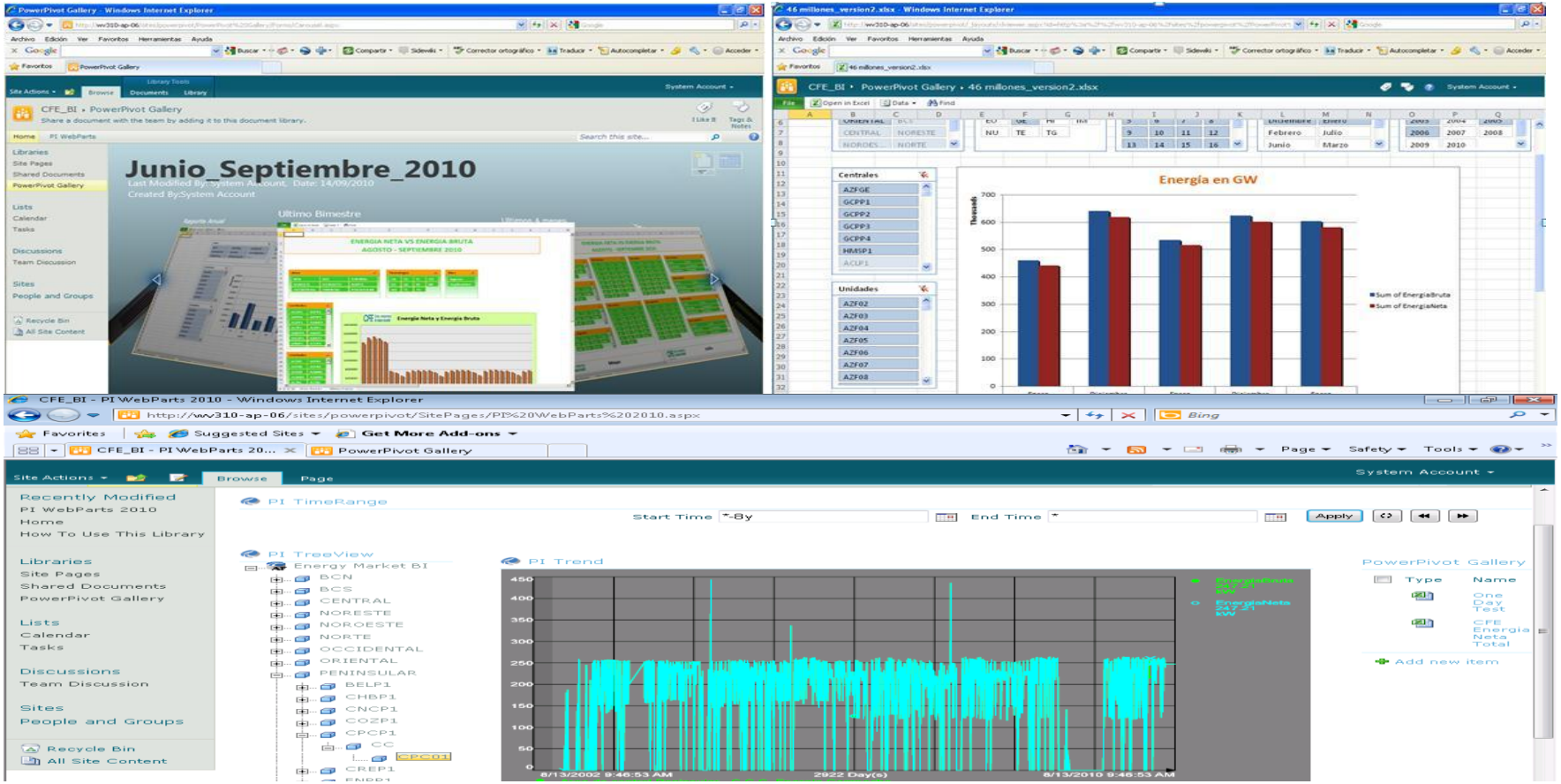
# PI OLEDB Enterprise 2010 / PI SQL Commander Visual Studio 2008

Result | Message

| | Area | Centrales | Tecnologia | Unidades | Time | EnergiaBruta | EnergiaNeta |
|---|---|---|---|---|---|---|---|
| 000683 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 11:00... | 32.00500106811... | 32.00500106811... |
| 000684 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 12:00... | 32.00999832153... | 32.00999832153... |
| 000685 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 1:00:... | 32.00299835205... | 32.00299835205... |
| 000686 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 2:00:... | 32.00600051879... | 32.00600051879... |
| 000687 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 3:00:... | 31.73200035095... | 31.73200035095... |
| 000688 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 4:00:... | 31.92900085449... | 31.92900085449... |
| 000689 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 5:00:... | 31.91399955749... | 31.91399955749... |
| 000690 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 6:00:... | 31.77199935913... | 31.77199935913... |
| 000691 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 7:00:... | 32.02199935913... | 32.02199935913... |
| 000692 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 8:00:... | 32.02000045776... | 32.02000045776... |
| 000693 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 9:00:... | 30.72800064086... | 30.72800064086... |
| 000694 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 10:00... | 0.025000000372... | 0 |
| 000695 | CENTRAL | ATEP1 | TG | ATE01 | 6/26/2010 11:00... | 0.071999996900... | 0 |
| 000696 | CENTRAL | ATEP1 | TG | ATE01 | 6/27/2010 12:00... | 0.119999997317... | 0 |
| 000697 | CENTRAL | ATEP1 | TG | ATE01 | 6/27/2010 1:00:... | 0.167999997735... | 0 |
| 000698 | CENTRAL | ATEP1 | TG | ATE01 | 6/27/2010 2:00:... | 0.216000005602... | 0 |

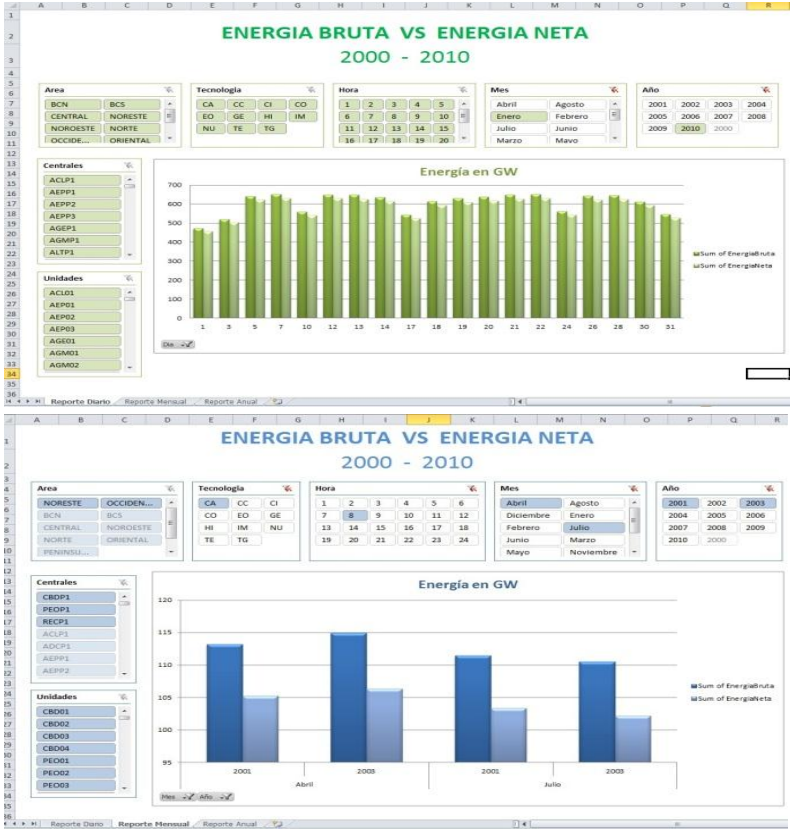


# SharePoint Site Implementation

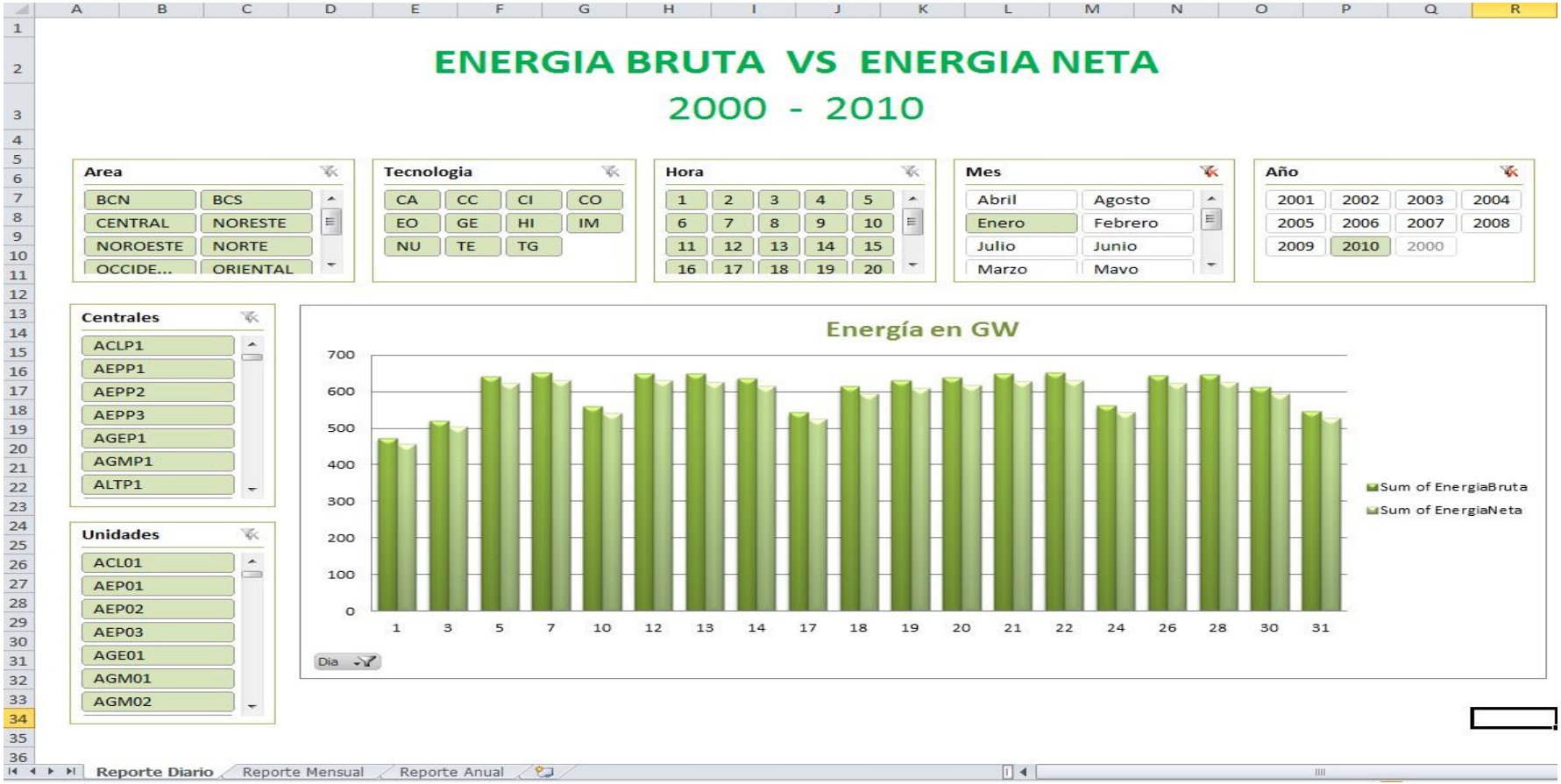


# End Users PowerPivot Reports

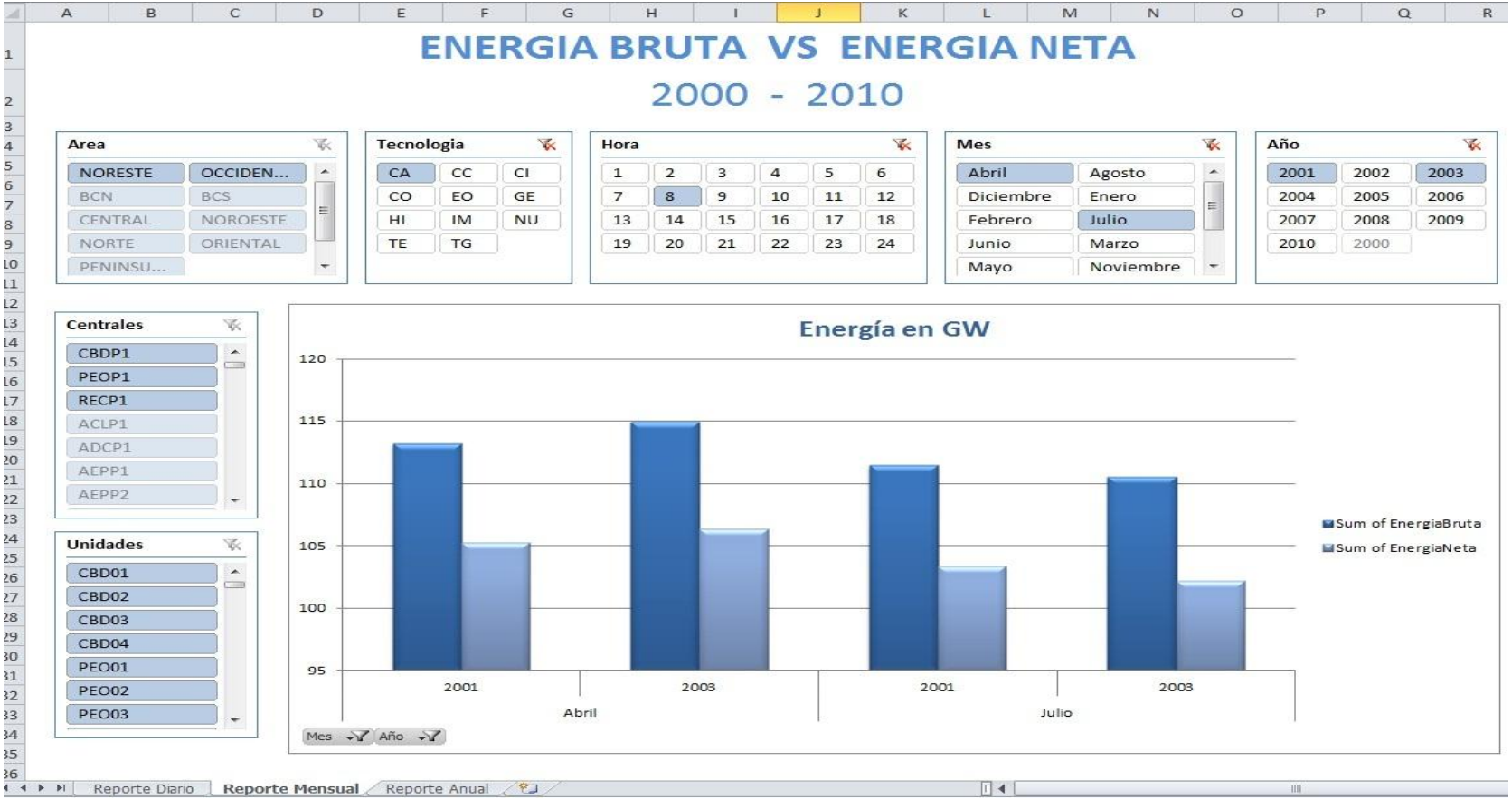
- Internet Explorer 8
- Silverlight
- Office 2010
- PowerPivot for Office 2010
- PI SQL Commander
- PI System Explorer 2010
- PI DataLink 2010



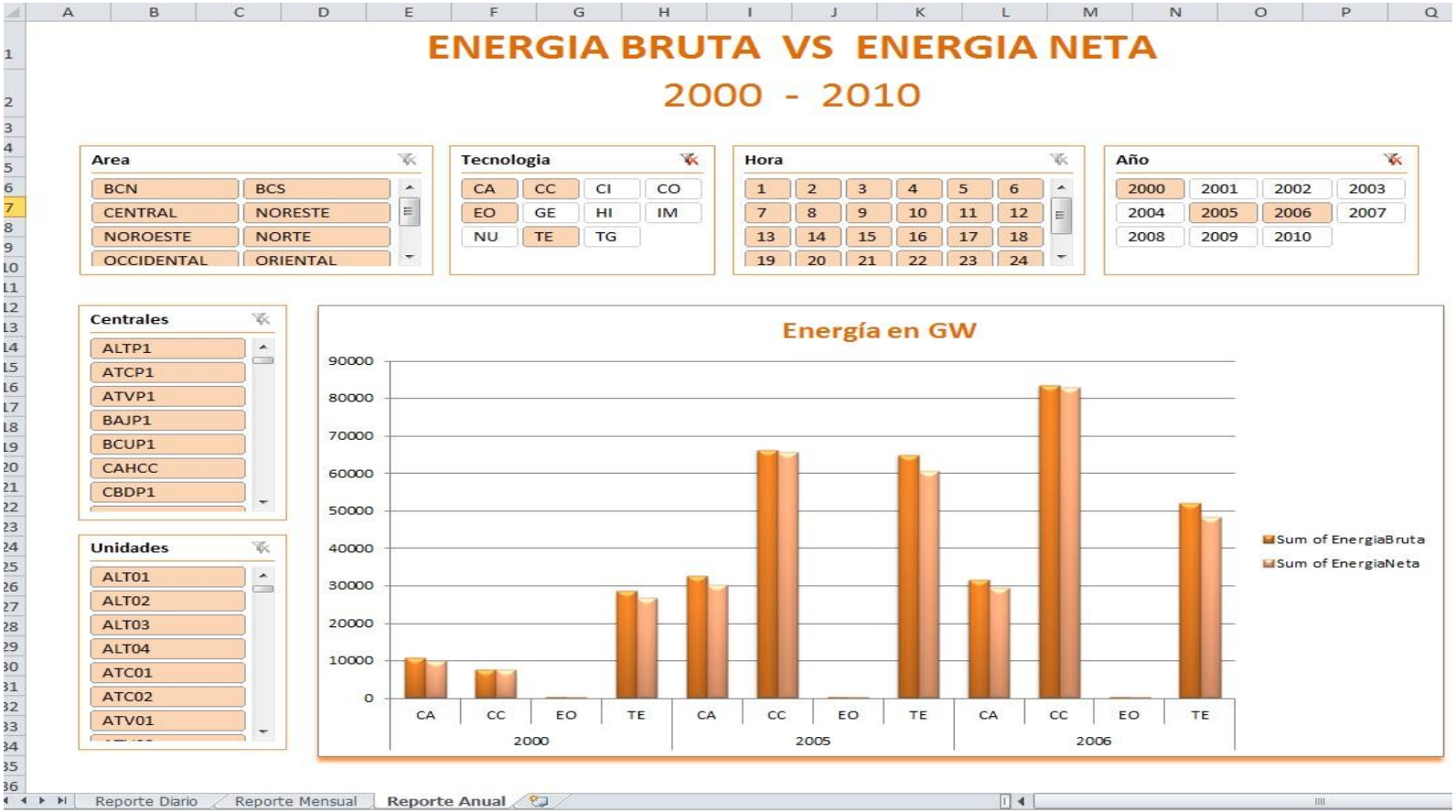
# Report Generation



# Report Generation



# Report Generation



# Case Study Publication

A case study was published on Microsoft's website on Aug. 4, 2010

http://www.microsoft.com/casestudies/Microsoft-Sharepoint-Server-2010/Comisi-n-Federal-de-Electricidad-CFE/Mexico-s-Electrical-Utility-Sees-Saving-Millions-of-Dollars-through-Collaborative-BI/4000007996

# Intangible Benefits

- To provide the users with a single channel to operate comprehensive information brought from different data sources
- Users can generate their own reports and analyze data
- Users can publish their own reports
- Users can download reports to the local machines for their own further analysis
- Have a common repository for all reports
- Provide analysis in time
- Provide the mass data storage but with excellent response time (in seconds)

# Tangible Benefits

- Providing business awareness
- Incorporating business process knowledge
- $$$$$ SAVINGS:
  - 11,520,000 $MX pesos per unit per day
  - 42,048,000 $MX pesos a year if operation availability of one unit improved by 1%

**Marginal Cost (CM) - Cost Integral (CI) * 24 hours/day * Max. Efficiency Generating Unit**

**Taking Petacalco Unit 7 (U7 PEO) with maximum efficiency of 640 MW**

- The marginal cost is taken from a marginal unit that may be changing for 24 hrs a day
- For first time the marginal unit was 1320 $MX pesos and PEO U7 was generating 548 $MX pesos

**CM (1320) - CI (548) = 772**

- To repeat for the remaining 23 hrs with marginals divided by 24 units per day, average CM – CI = 750

**750 * 24 * 640 = 11,520,000 $MX pesos**

By improving availability of one generating unit by 1% of the year (3.65 days), the savings:

**42,048,000.00 $MXN (aprox. 3,446,557.00 $USD) ***CFE has 779 generation units*****

# Summary

- Great collaboration with OSIsoft and Microsoft in Business Intelligence solutions for the electric energy market process optimization
- System was quickly built and functional in production environment at CFE CENACE
- Successful demonstration of latest OSIsoft and Microsoft technologies for developing BI applications

# Thank you

Turning **insight** into **action**.