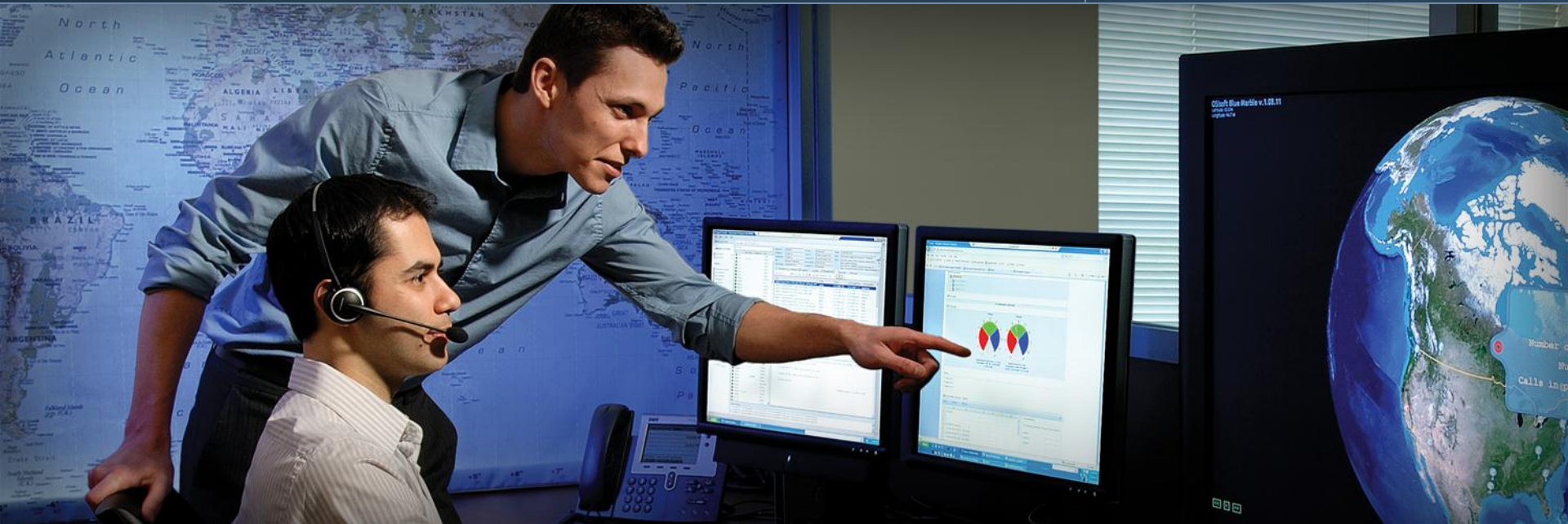




Regional Seminar Series
Bucharest, Romania



PI System Customer Use Cases Part 1 Oil & Gas / Power Generation

Athene Palace Hilton
Bucharest, Romania

25 November 2010

Zsolt A. Oros
Sales Account Manager, CEE
OSIsoft, LLC

Our footprint in Central Eastern Europe

Accepted by Local & Global Players



Logos surrounding the map:

- MAŽEIKIŲ NAFTA
- ORLEN
- Slovnaft
- MOL
- IES (MEMBER OF MOL GROUP)
- ROMPETROL
- LUKOIL
- Basell Orlen POLYOLEFINS
- HELLENIC PETROLEUM
- AS
- Enel
- VATTENFALL
- GDF SUEZ
- e-on Hungária
- mondi
- ТОПЛОФИКАЦИЯ РУСЬ
- ArcelorMittal
- USS

Why we are here today?



OSIsoft LLC. is the world leader in delivering the industry standard Enterprise Real-time Infrastructure to the Oil & Gas Industry

- 100% of the Global Top 5
- 90% of the Global Top 10
- 76% of the Global Top 25

E&P



42%

T&S



29%

LNG



18%

Refining



52%

Percentage [%] of Global Capacity using PI



PI System Use Cases

Oil & Gas Exploration & Production Examples

- *BP E&P*
- *ConocoPhillips North Sea*

Examples - Enterprise/Divisional Level (Global)

Upstream Asset Hierarchy



- OSIsoft's Asset Hierarchy linked (SharePoint Connections) to Microsoft MapPoint Web Services Web Part

Alerts Integrated to MapPoint

FP218

Examples - Enterprise/Divisional Level (Global)

Upstream Asset Hierarchy



- Drill Down and Update from MapPoint Web Services

The screenshot displays the 'Field Map' application interface. The top navigation bar includes 'Home', 'Documents and Lists', 'Site Settings', and 'Help', with 'Up To CWOil' on the right. The main content area is divided into three sections:

- My Lists:** A sidebar on the left containing 'Private Documents', 'Shared Documents', 'My Pictures', 'My Pages', 'PlatformView', 'Field Map', 'Compressor', and 'AssetTeam1'.
- Oil Fields:** A tree view showing a hierarchy of oil fields. Under 'Gulf Central', the 'Green Canyon' field is expanded to show a list of platforms: FP214, FP218 (highlighted), FP209, FP313, FP402, FP419, FP490, FP515, and 'MainPass'. Other fields include 'Gulf East' (Bermuda Triangle, Cuban Pass, Gulf Stream), 'Lund' (FP402, FP419, FP490, FP515), and 'Gulf West' (Red Canyon).
- Gulf of Mexico Operations:** A map view showing the Gulf of Mexico region. The map includes labels for 'Caillou Mound', 'Calumet Mound', and 'Gulf of Mexico'. A platform icon labeled 'FP218' is positioned on the map. The map features a grid with latitude and longitude coordinates (e.g., 27° 30', 27°, 26° 30', 91°, 90° 30', 90°, 89° 30', 89°) and a 'Microsoft MapPoint' logo in the top right corner.

Examples - Enterprise/Divisional Level (Global)

Platform View



- Navigating Data dictionary based Treeview down to the Platform View

The screenshot displays the PlatformView software interface. The top navigation bar includes 'Home', 'Documents and Lists', 'Site Settings', and 'Help'. The main window title is 'PlatformView' with a 'Modify Shared Page' dropdown. On the left, there are sections for 'My Lists' (Private Documents, Shared Documents, My Pictures) and 'My Pages' (PlatformView, Field Map, Compressor, AssetTeam1). Below this is an 'Equipment' treeview showing a hierarchy for 'FP214' (Compressor1, Compressor2, Pump 1, Separator 1, Pump 2, Compressor 3, Valve 1-4) and 'FP218' (Valve A). The main area is titled 'Platform Operations' and shows a detailed process flow diagram for 'GULF - FP212'. The diagram features a central distillation column with trays 12, 15, and 20. It includes various units such as 'LGO STRP', 'Gas Slop', 'Steam Gen', 'Decanted Oil Stripper', and 'Stm Gen'. Flow streams are labeled with temperatures (e.g., 92.90 DEG F) and flow rates (e.g., 92.90 BPD, 92.90 MBPD). A context menu is open over the diagram, listing options: Minimize, Close, Modify Shared Web Part, Export..., and a highlighted 'Launch Analysis Tool' button. The interface also shows a 'FEED FROM REACT' and '40# STEAM' input on the left, and an 'LGO to LIU' output on the right.

Examples - Enterprise/Divisional Level (Global)

Rich Client Interaction



- Experts can use rich client to change graphics structure

The screenshot displays the ProcessBook software interface. The main window shows a process flow diagram for 'MAIN COLUMN BOTTOM' with various streams and equipment. A secondary window, 'Web Part Page - Microsoft Internet Explorer', displays the 'PlatformView' website. The website includes a navigation menu with 'My Lists', 'My Pages', and 'Equipment'. The 'Equipment' list shows 'FP214' with sub-items like 'Compressor1', 'Compressor2', 'Pump 1', 'Separator 1', and 'Pump 2'. The main diagram shows a distillation column with a liquid level indicator and various input/output streams labeled with flow rates and temperatures. An orange callout bubble points to the diagram with the text: 'Process Analytics Tool – ProcessBook from OSIsoft'.

Examples - Enterprise/Divisional Level (Global)

Drill Down to the Platform Level



- Sharepoint technology allows combination of real-time and non real-time webparts

Address: <http://192.168.222.31/personal/msimmons/My%20Pages/Platform%20View.aspx?&OilFieldNum=1>

Home Documents and Lists Site Settings Help

Platform View

My Lists

- Private Documents
- Sharepoint
- My Lists
- Field Map
- Platform View
- AssetManager1
- Simulations
- Compressor

Platform Assets

- FP214
 - Compressor1
 - Compressor 2
 - Pump
 - Separator 1
 - Pump 2
 - Compressor 3
 - Valve 1
 - Valve 2
 - Valve 3
 - Valve 4
- FP218
 - Valve A
 - Valve B
- FP209
- FP313

FP212 Operations

FP212

GASOUT-FLOW	495.35
GASOUT-PRESS	0.52
GL-HDR-PRESS	0.1
GROSS-FLOW	0.16

Process Graphics for Platform

Maintenance Records

Type	Name	Modified By
📄	Maintenance_Record_C12663 NEW	Mike Simmons
📄	Maintenance_Record_C12553 NEW	Mike Simmons
📄	Maintenance_Record_C12563 NEW	Mike Simmons
📄	Maintenance_Record_C12565 NEW	Mike Simmons

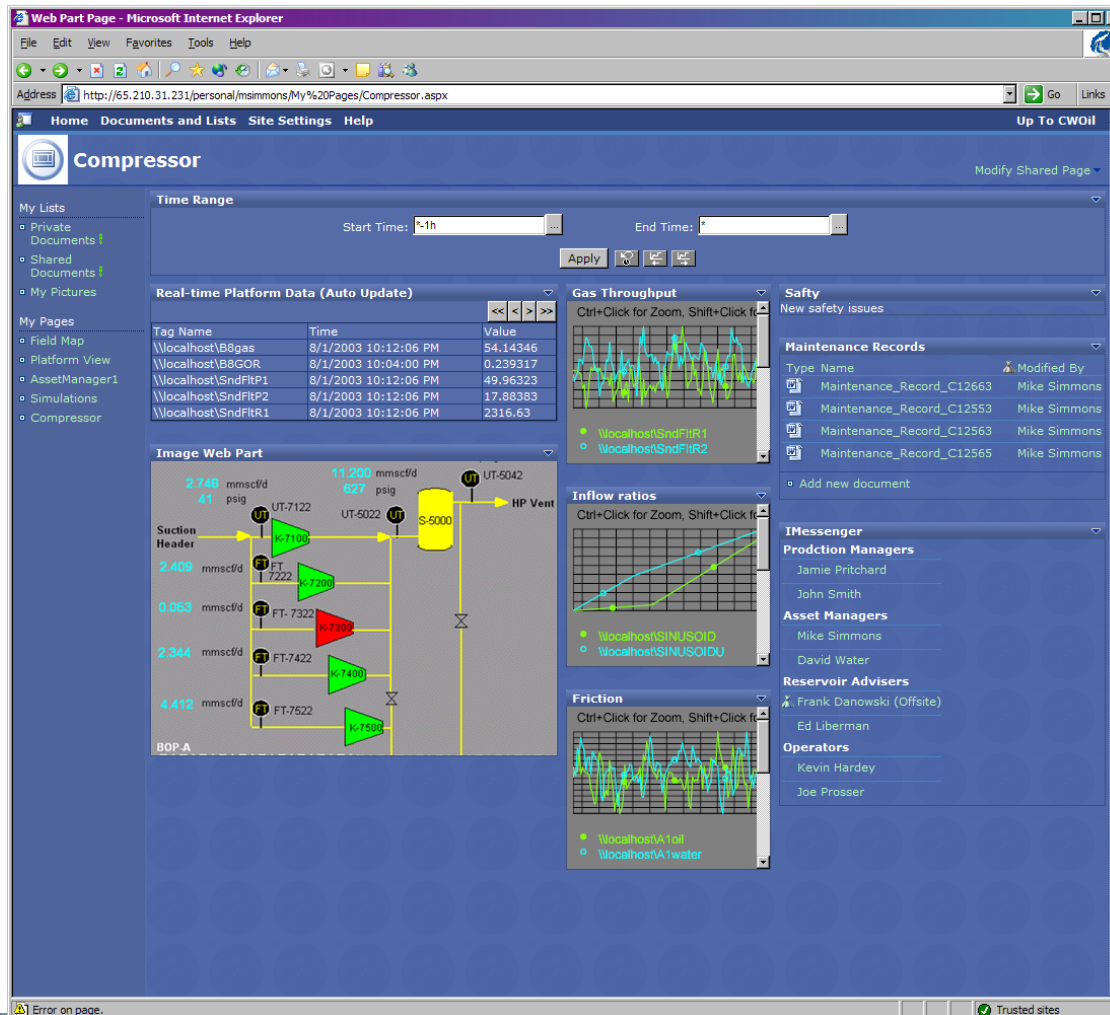
▢ Add new document

Examples - Enterprise/Divisional Level (Global)

Drill to Asset Level (Compressor 2)



- Data Directory allows to track history changes on asset level

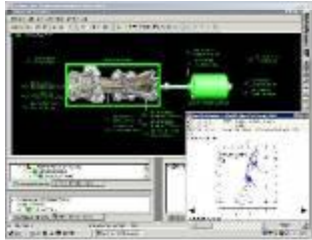


Example - BP Exploration & Production

Real-time Data - Usage in Different Contexts



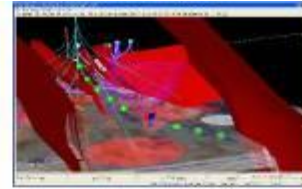
Rotating Equipment



Real-time Drilling



Drilling Visualization



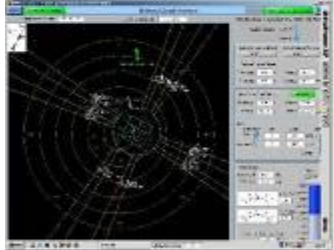
One Touch



Topsides Monitoring



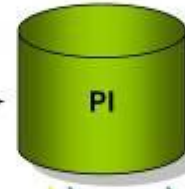
Integrated Marine Monitoring



Riser/Mooring Data

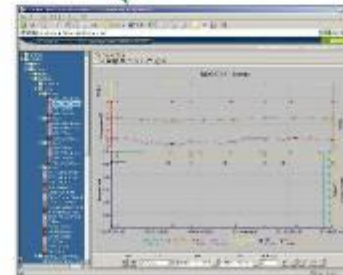


Subsea/Well Surveillance

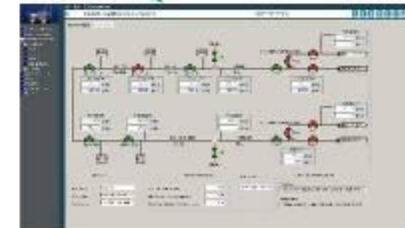


Fiber Optic Network

Process Net



AWS (Subsea)



Example - BP Exploration & Production

Crisis Management - Weather, Geo and Production Data



Legend Details

Hurricane: Ivan

Layers

- HURRICANE ANALYSIS
 - Eye/Path
 - Probability Regions
 - Phase
 - Comments
- PLATFORMS/ENGINEERING
 - Deepwater Platforms
 - Shelf Platforms
 - Pipelines
- HURRICANE IMPACT
 - Employee Residence
 - Offices
 - Fuel Terminals

Image Overlays

- NEXRAD Radar
- from Ad-Hoc list
- Weather
- Wind & Waves NW -GoM- 0 hr forecast
- Loop Currents
- Bathymetry

Within Impact Probability Zones Within Phase Regions Draw Your Own Query Region

71 assets returned [export to Excel](#)

Assets within Region	Type	People on Board
Horn Mountain	Platform	27
Marlin	Platform	39
Na Kika	Platform	NaN

- Onshore Remote Ops Support
- Replicated Offshore Data (Read-Only)
- 24/7 Video Conferencing
- Real-time Monitoring:
 - Topsides
 - Marine
 - Subsea
 - Drilling



Offshore Line of Sight



Virtual Team Meetings



Dedicated Onshore Team

Conoco-Phillips E&P - North Sea

Analysis Tools to Support Asset and Cross-Asset Collaboration



Production Analysis

Equipment Monitoring

The dashboard provides a comprehensive overview of production and equipment performance. Key components include:

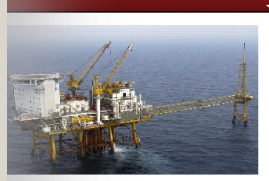
- Production Analysis:**
 - Greater Ekofisk Oil Production vs MPP:** A line chart showing production trends over a 24-hour period, with a current value of 332142.
 - Current Well Activities:** A table listing active wells and their production rates.
 - Asset Oil Production:** A table comparing current production against MPP and trend for Ekofisk, Eldfisk/Embla, and Tor assets.
 - Ekofisk Oil Production vs MPP:** A line chart for the Ekofisk asset.
 - Eldfisk / Embla Oil Production vs MPP:** A line chart for the Eldfisk/Embla asset.
 - Tor Oil Production vs MPP:** A line chart for the Tor asset.
- Equipment Monitoring:**
 - Peak Production By Platform:** A table showing peak production for EldA/Embla and EldB platforms.
 - Asset Water Injection:** A table showing water injection volumes for Ekofisk, Eldfisk/Embla, and Tor assets.
- Summary Metrics:**
 - Cumm Prod:** 93989 (indicated by a green upward arrow).
 - Cumm WI:** 165555 (indicated by a green upward arrow).
- Navigation & Settings:** A top navigation bar with tabs for HOME, PRODUCTION, INJECTION, TEST SEPARATORS, GRAPHICS, OVERVIEWS, and OTHER. A sidebar contains quick links to MyStream, Human Resources, and ConocoPhillips GIS.

Mission & Vision

VISION
Be at the forefront of Integrated Operations development and deployment and be regarded as thought leaders within the Oil & Gas industry

STRATEGY
Achieve the above Vision by:

- Building on the operating environment already established in Greater Ekofisk
- Sharing knowledge across established onshore centres and across operating units
- Using our challenging continuous improvement culture, tools and techniques to go beyond conventional thinking Working in partnership with government bodies, academic institutes, fellow oil and gas



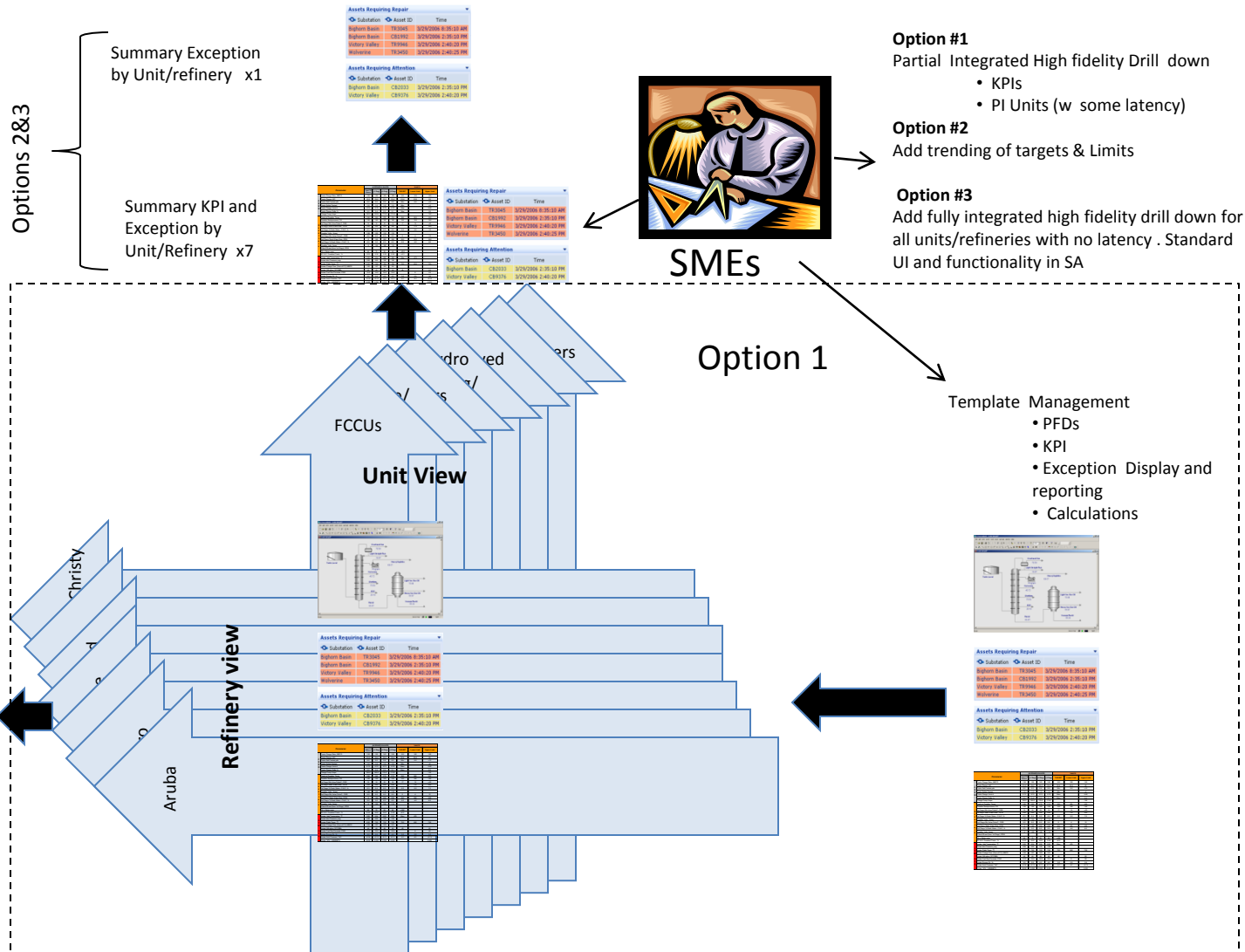
	01-Nov-04	02-Nov-04	03-Nov-04	12 Mo Total
IONS				
0.022	0.024	0.023	0.019	5.362
0.013	0.014	0.014	0.012	3.632
0.001	0.001	0.001	0.000	0.204
0.000	0.000	0.000	0.000	0.000
1.977	2.059	2.165	1.966	626.578
0.010	0.009	0.009	0.006	6.409
0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.598
0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000
0.003	0.003	0.003	0.003	0.587
343	0.906	0.899	0.888	367.955
IONS				
0.095	0.092	0.090	0.090	24.288
0.095	0.095	0.095	0.093	46.375
0.008	0.010	0.008	0.005	2.390
0.000	0.000	0.000	0.000	0.000
0.781	0.746	0.746	0.746	245.757
0.000	0.000	0.000	0.000	77.656
0.000	0.000	0.000	0.000	0.000
0.003	0.003	0.003	0.003	0.587
343	0.906	0.899	0.888	367.955
PM10 EMISSIONS				
0.014	0.014	0.015	0.015	3.905
0.000	0.000	0.000	0.000	0.006
0.000	0.000	0.001	0.001	0.750
0.383	0.383	0.386	0.382	46.821
0.000	0.000	0.000	0.000	2.272
0.000	0.000	0.000	0.000	0.000
0.198	0.198	0.201	0.197	53.655

Example - Enterprise Level SMEs Continuously Monitoring KPIs by Refinery, by Processes



Critical Success factors:

1. Scalability
2. Ease of Use
3. Organization
4. Flexibility
5. Interoperability
6. Simplicity
7. Self Sufficiency



Options 2&3
Summary Exception by Refineries/Unit x1
Summary KPI and Exception by Refinery/Unit x15



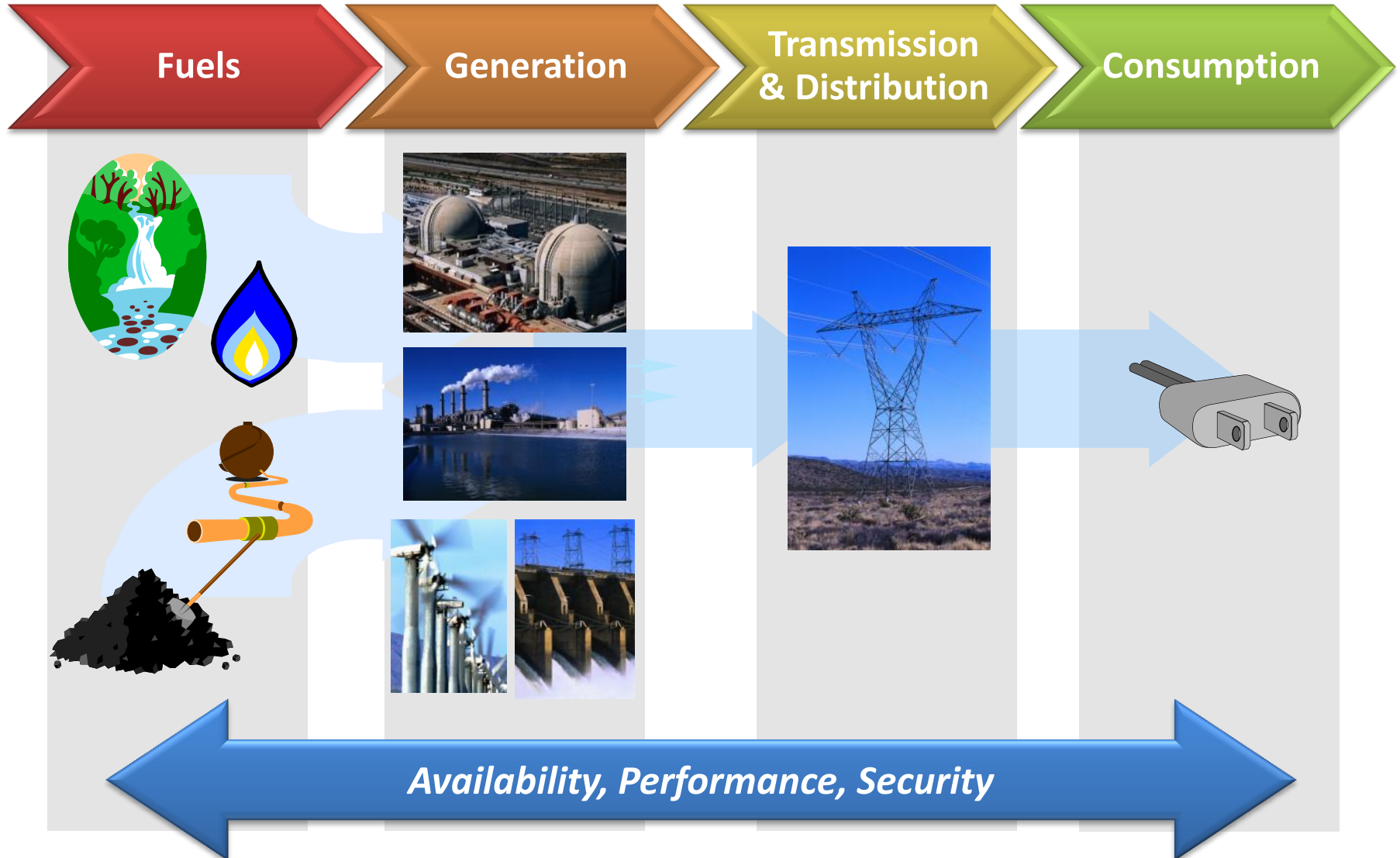
VALERO ENERGY CORPORATION



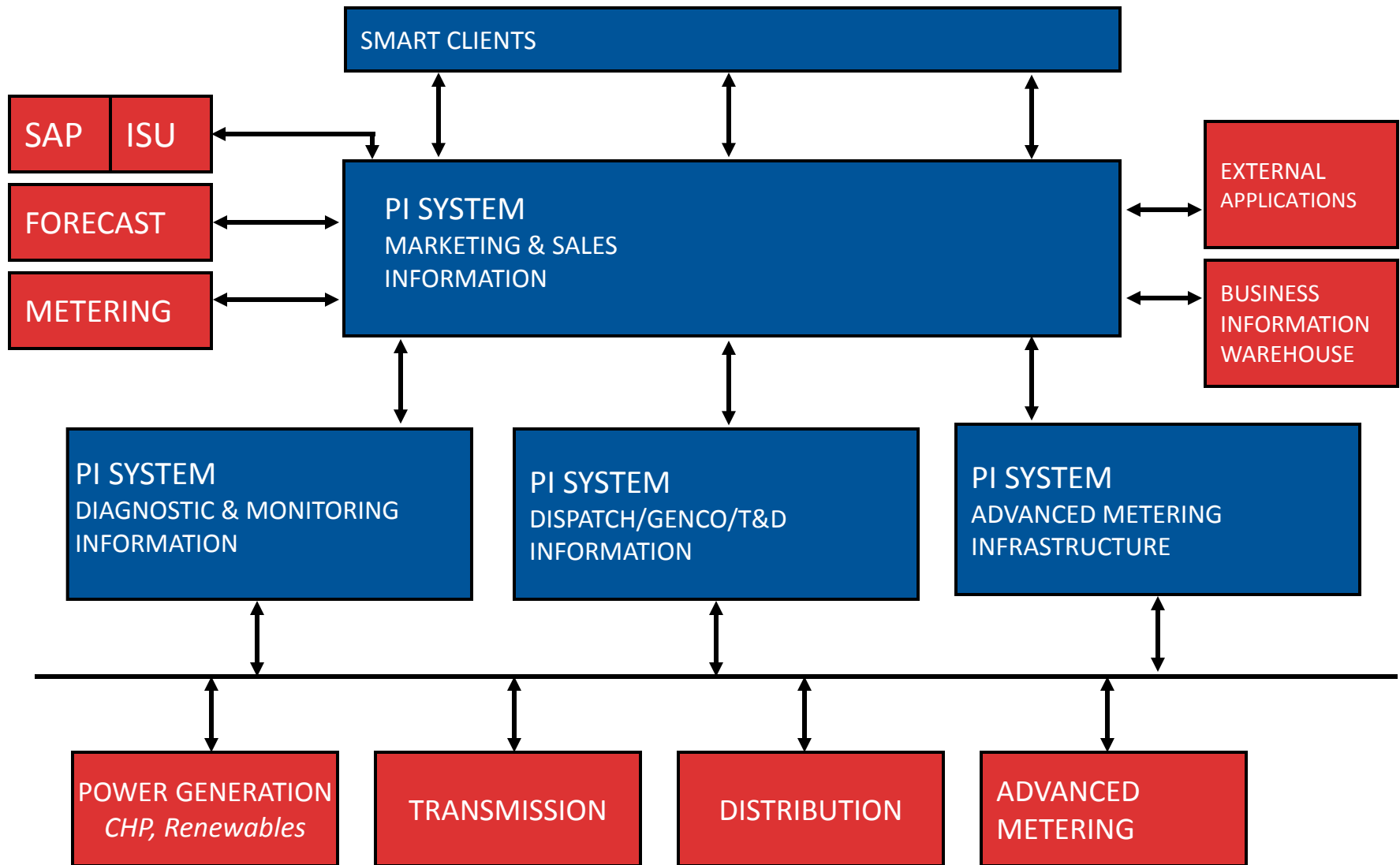
PI System Use Cases

Power Generation

PI System used in the whole supply chain



Logical Fit - Electricity Value Chain



- ***Tangible***

- Increased Operational Efficiency
- Improved Availability and Reliability of Production Assets (equipment, unit, plant)
- Better Decision Making due to the availability of actionable information in real-time
- Asset Portfolio (Fleet) Management
- Risk and Environmental Management

- ***Intangible***

- Organization Improvement
 - » Enable people to focus on business
 - » Using right people with the right skills at the right place (reengineering roles & responsibilities)
 - » CoE, Specialists, Eliminating tribal knowledge
- Knowledge Management
 - » Information and Knowledge capture, storage, and visualization supporting workflow and decision making optimization, HR, and Safety initiatives
 - » Implementation of best practices

European Power Generation Customers



ABB Energie
ABB Power Plant Controls
AES Thames
Air Liquide
AKZO

Alcan Power UK
Alcoa

Alstom Power
British Energy
British Nuclear Fuels
BP Gas & Power
Eastern Group - UK
EDF

Electricidad de Portugal
Electricity Authority of Cyprus
Endesa Generacion
ENEL

Energetyka Cieszyńska
Energy Management
Energy Moscow
Energy Northwest
Enfield Energy Centre
Enron Power
Energy

E-ON UK Plc.
E-ON Italy
EPON
EPZ
Eskom
Essent
Eugene Water & Electric Board
Euratom
European Gas Turbines
Ever Power
EWSA
EZH - Holland
Fluor Daniel
Forschungszentrum Karlsruhe
Gainesville Regional Utility
GEC Alstom
GE Drive Systems
GE Industrial Systems
GE Power Systems
Genesis Power
Hyder
IASE
Iberdrola
IES Utilities

NRG Morris
PG&E Generating
AES Power Corporation Tisza
Power Pool of Alberta
PowerGas
PowerGen
PP&L
Premier Power
PSE&G
Public Power Corporation
RWE Energie
Scottish Hydro
Scottish Power
Scottish & Southern Energy
Söderenergi
Soluziona
Stadtwerke Cottbus
Stadtwerke Luedenscheid
Stadtwerke München
TransAlta Energy
Transener
UNI-MAR Enerji
Vattenfall
VEAG
Yorkshire Electricity



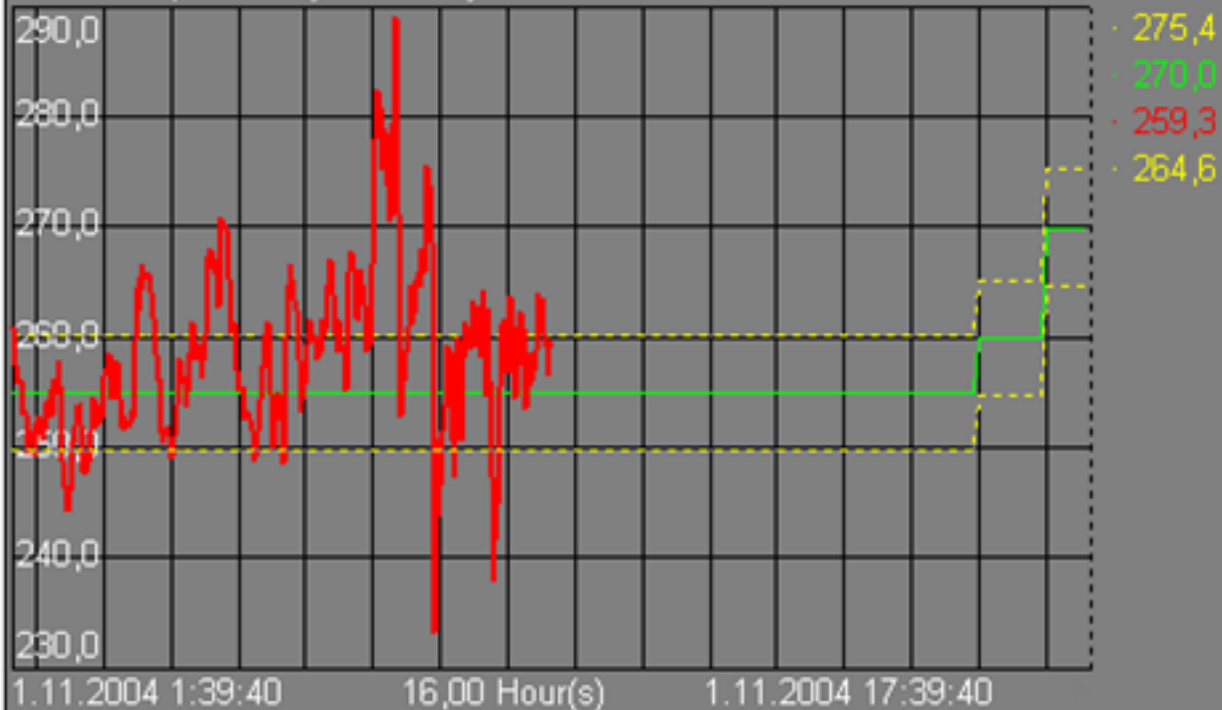


Generation Examples Thermal

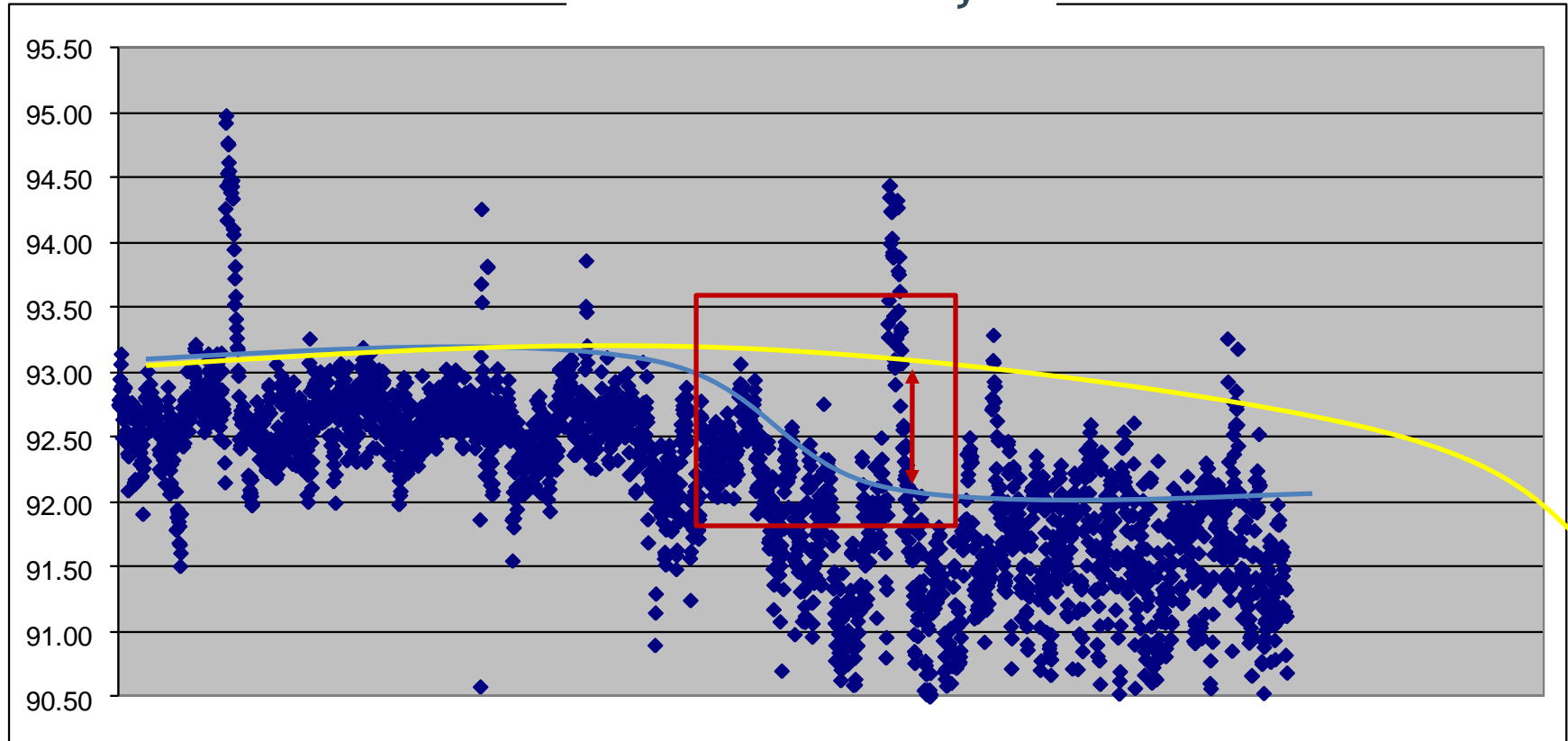
Godzinowy plan produkcji

Plan	255,0 MWh	$P_{\text{akt. netto}}$	256,9 MW	$P_{\text{akt. brutto}}$	300,6 MW
Wypr.	171,2 MWh	P_{progn}	247,5 MW	Potrz. wł.	14,9 MW

Siekierki - plan mocy netto i wykonanie



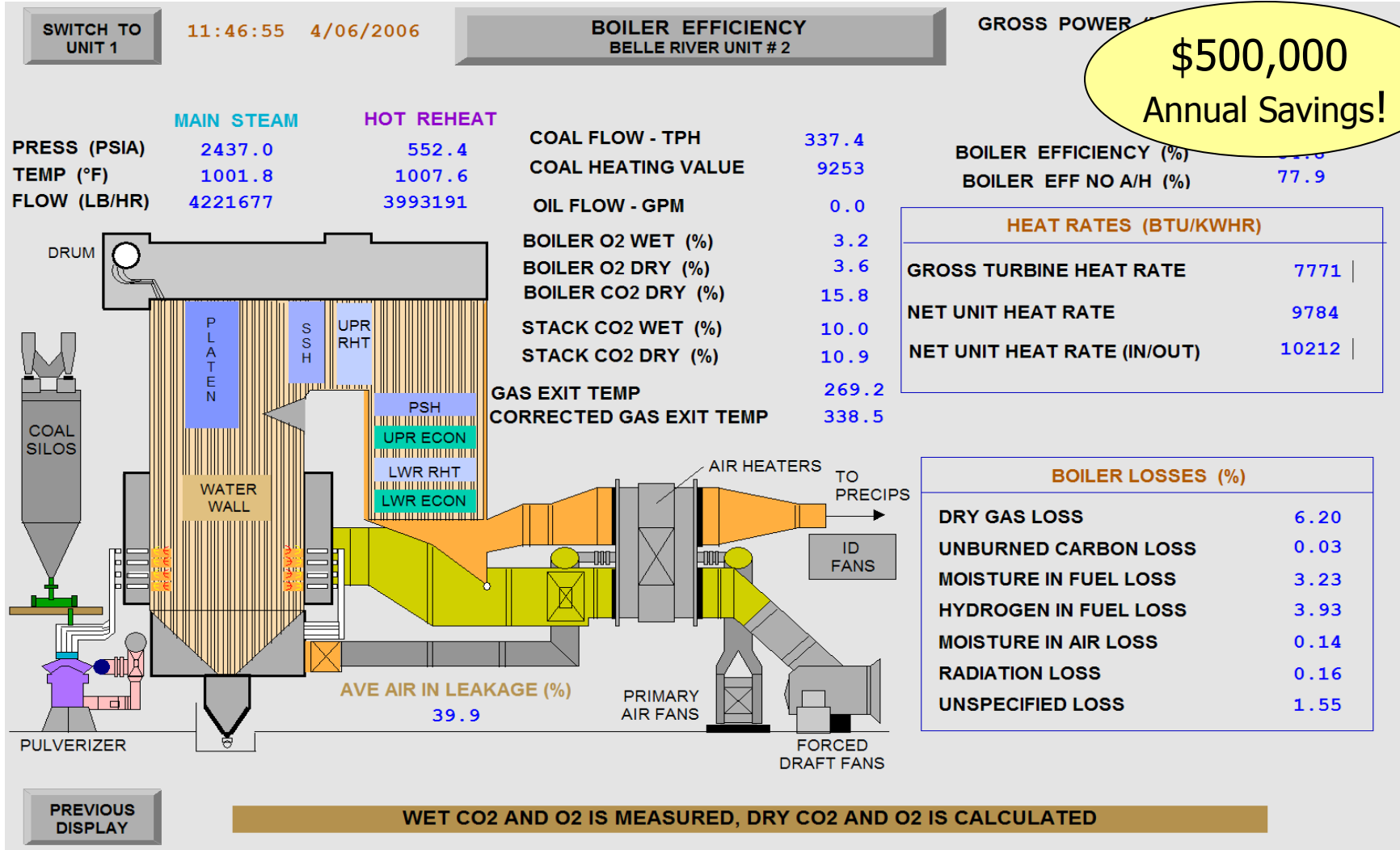
Boiler efficiency

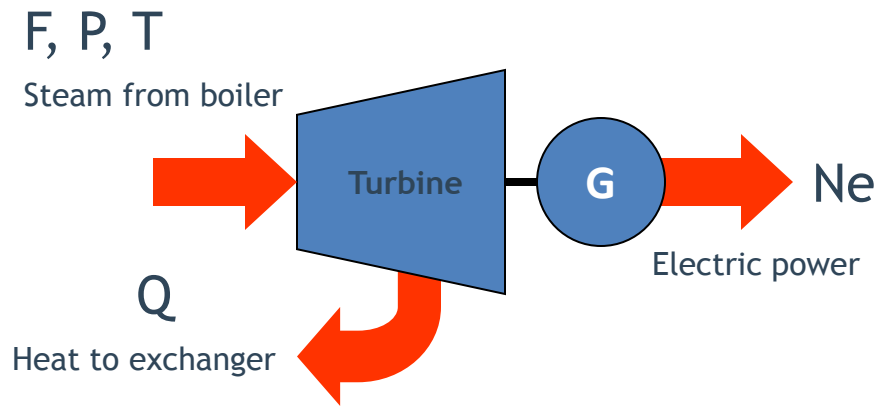


Example: Boiler efficiency during the run period

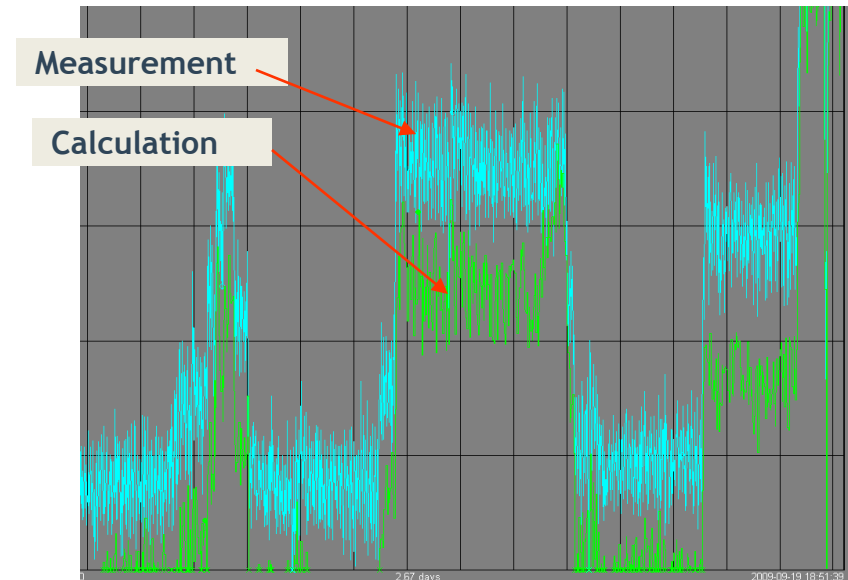
Benefit: 300 000 EUR yearly

Thermal Performance Calculation Engine





$$Ne = f(F, P, T, Q)$$



Example:

Power generation process model

Benefit:

Know-how preserving and sharing

- **Background Information on Iberdrola:**
 - » Power Generation, Transmission&Distribution
 - » Global Operations, one of the biggest in the world
 - » World Leader in Renewables

- **Drivers:**

- One Combined Cycle 2GTx1ST
 - » ≈ 350 M€ Investment
 - » Gas Prices / Equipment Prices Increasing
 - » Environmental concerns increasing

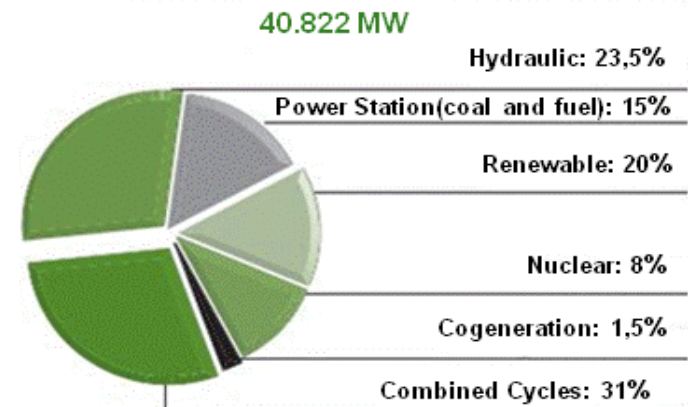
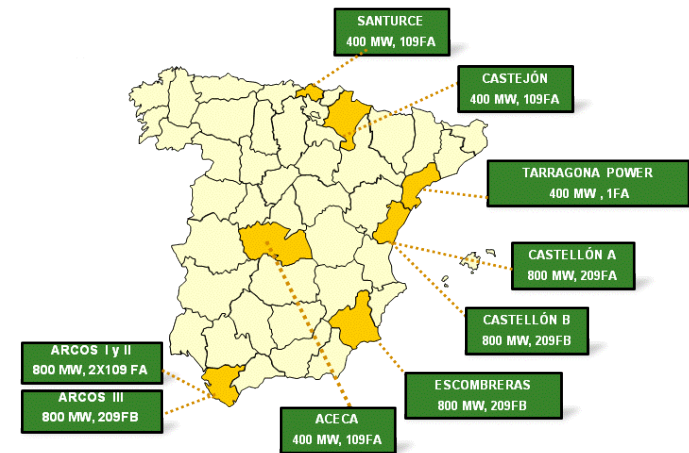
⇒ **Optimization IS A MUST**

- **History:**

- CMDS: Monitoring, Diagnostics and Simulation Center built in 2002
 - » Technology Center for the CC Fleet (O&M)

- **Current Status:**

- » Renewables Integrated (WINDCore)
- » Coal-fired plants underway



Technology Center for Combined Cycles since 2002



MAIN GOALS

- Maximize efficiency, availability and reliability
- Support power plants to:
 - OPERATE & MAINTAIN in an optimum way
 - Minimize costs
 - Unify technology management



POWER PLANTS O&M OPTIMISATION

ADDITIONAL BENEFITS

- Common O&M model for all stations : Fleet approach
- O&M on-site and on-line support
- Share operational experiences and best practices
- Center of Excellence
- Reduce OEM dependency

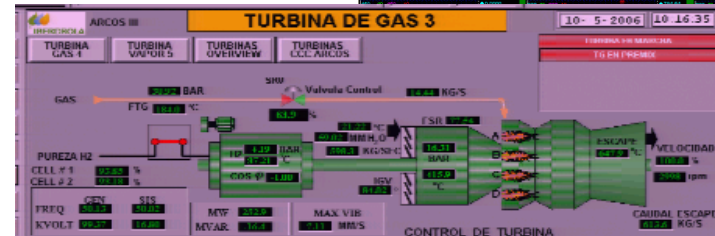
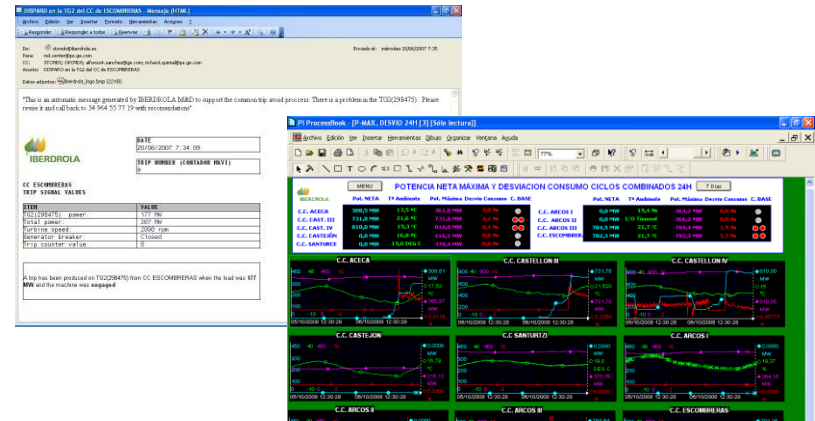
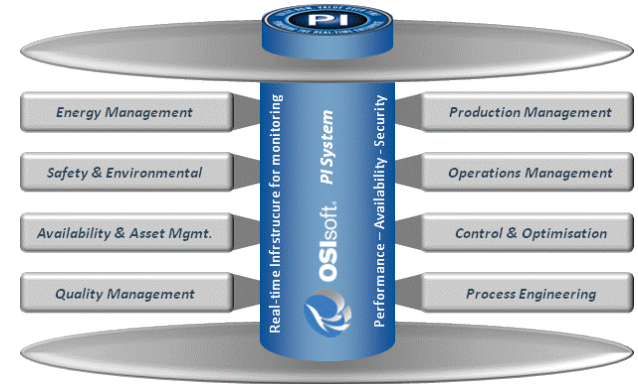


Iberdrola Case Study - CMDS

PI System is the foundation for CMDS



- Applications Developed Over Time
 - Performance Tracking
 - Contract Tracking
 - System Advisor
 - AEM (Advanced Equipment Monitoring)
 - IT Doctor
 - GE M&D Connection
 - SAP Connection (PM & BW Module)
 - EMS Connection (Dispatching Center)
 - Daily Inspections
 - Others.....



- 6 years PI System experience over Combined Cycle Technology:
 - Quick ROI \approx 1-2 years
 - Increasing efficiency \rightarrow 1%-2%
 - Increasing availability \rightarrow 0,1%-0,5%
- Easily exportable to another business
- Opening the platform for all users = A lot of value
- Focus on business drivers - Business Agility
- Event based monitoring
- Success requires collaboration between operations, maintenance and engineering



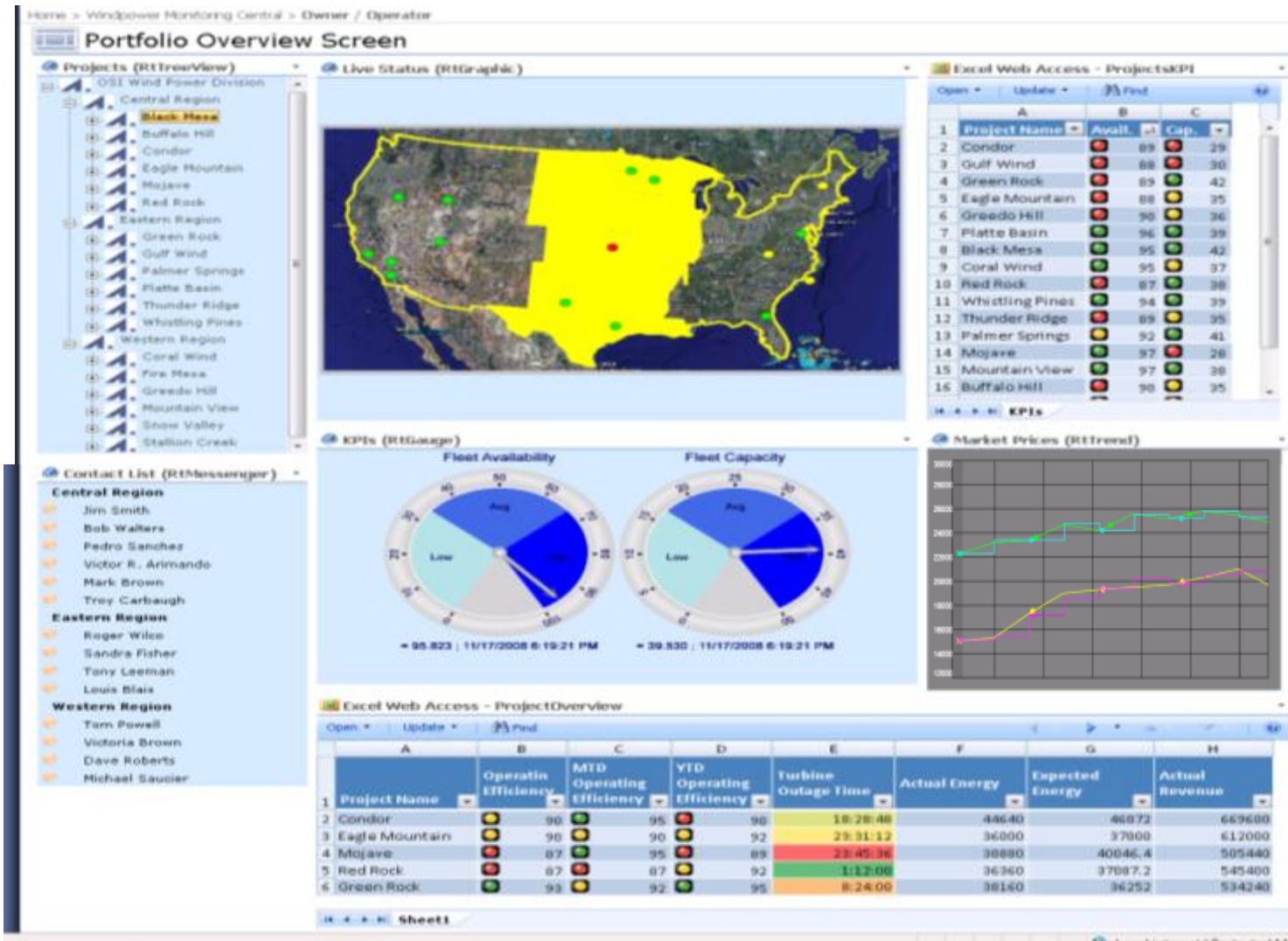


Generation Examples Renewables

- O&M centers for monitoring the renewables
- **Vattenfall Vindkraft**
 - World's largest offshore wind farm
 - Commissioned in summer 2010
 - 100 turbines in operation
 - 341 turbines expected



Portfolio Overview



Home > Windpower Monitoring Central > Owner / Operator

Project

Time Selector (RTTimeRange)

Start Time: 11/1/2008 9:08:00 PM

End Time: 7

Real-Time Operations (RTGraphic)

Real-time Operations (RTValues)

Descriptor	Value
WTG Apparent Power - kVA	1381.1
Turbine 02 Bearing A Temp.	39.163
Turbine 02 Bearing B Temp.	57.475
Turbine 02 Bearing Shaft Temp.	19
Turbine 02 Blade 1, Actual Value	6.4789E-02
Turbine 02 Blade 1, Set Value	-0.43136
Turbine 02 Blade 2, Actual Value	-0.24375
Turbine 02 Blade 2, Set Value	-0.43136
Turbine 02 Blade 3, Actual Value	-0.30863
Turbine 02 Blade 3, Set Value	-0.43136

Showing 1 to 10 of 57

Assets Browser (RTTreeView)

- OSI Wind Power Division
 - Central Region
 - Black Mesa
 - WTG 01
 - WTG 02**
 - WTG 03
 - WTG 04
 - WTG 05
 - WTG 06
 - WTG 07
 - WTG 08
 - WTG 09
 - WTG 10
 - Buffalo Hill
 - Condor
 - Eagle Mountain
 - Mojave
 - Red Rock
 - Eastern Region
 - Western Region

Contact List (RTMessenger)

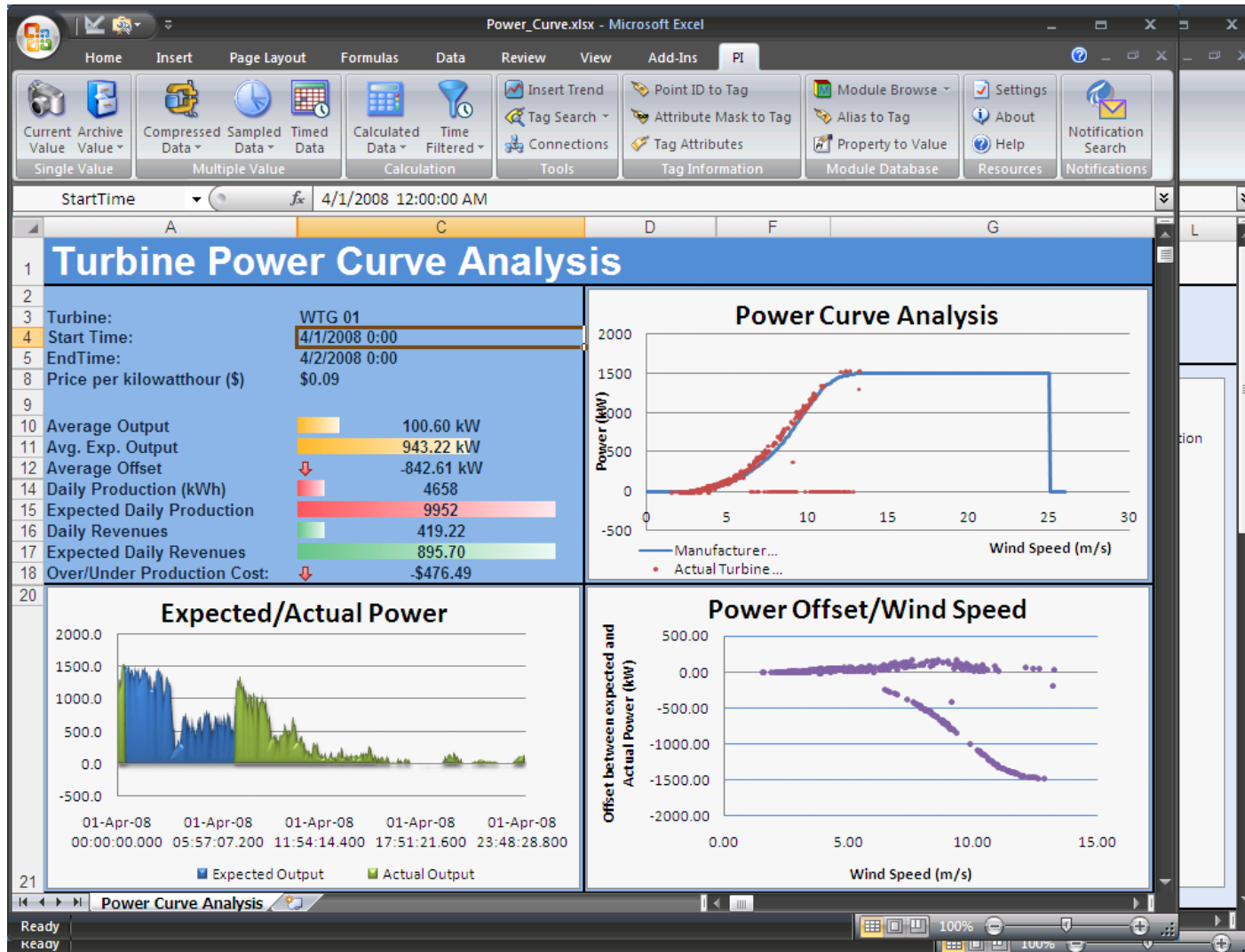
- Central Region**
 - Jim Smith
 - Bob Walters
 - Pedro Sanchez
- Eastern Region**
 - Roger Wilco
 - Sandra Fisher
 - Tony Loeman
- Western Region**
 - Tom Powell
 - Victoria Brown

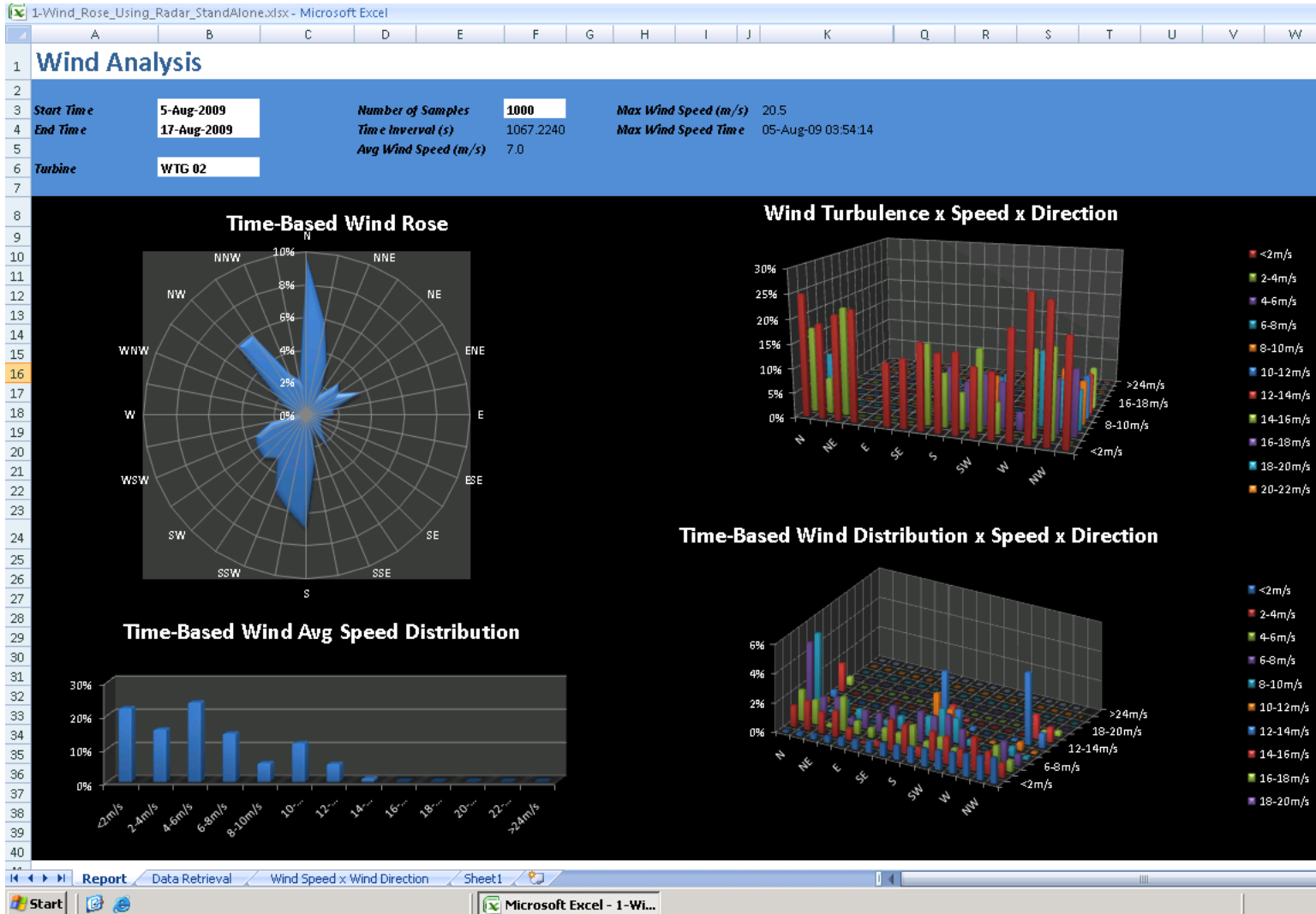
MTD Generation (RTTrend)

Monthly Expected vs. Delivered Power

Work Orders (RTTable)

WorkorderID	Owner	CreationTime	ResolutionTime	Unit	Manufacturer	Project	Status
1331	Bob Walters	10/13/2008 12:23:45 PM	10/14/2008 12:23:45 PM	WTG 02	Clipper	Mojave	Resolved
1336	Tom Powell	10/17/2008 12:23:45 PM	10/18/2008 12:23:45 PM	WTG 02	Vestas	Coral Wind	Resolved
1337	Roger Wilco	10/18/2008 12:23:45 PM	10/18/2008 12:23:45 PM	WTG 02	Rapower	Green Rock	Resolved
1350	Jim Smith	11/9/2008 12:23:45 PM	11/10/2008 12:23:45 PM	WTG 02	GE	Black Mesa	Pending





BChydro Case Study - OI System Overview



- ***Background Information on BChydro:***
 - » BChydro is third largest utility in Canada
 - » Predominantly a hydro electric utility with 10,000 MW of installed hydro generation capacity
 - » 7 largest generating stations with 38 turbines make up 8,850 MW
- ***Drivers:***
 - » Water use and generation optimization
 - » Keep the plants running (O&M)
- ***History:***
 - » PI has been used since 1996. PI used first as a firewall to the Energy Management SCADA system.
 - » In 1999 PI used to support Generation Operations
 - Generating Stations (the power generated in MW)
 - Resource Management (water availability and generation optimization)
- ***Current Situation:***
 - » PI is the foundation for B.C.Hydro's Operational Information (OI) System



BChydro Case Study - OI System

Operations Executive Overviews



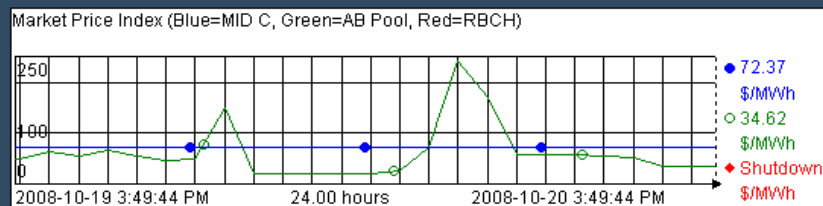
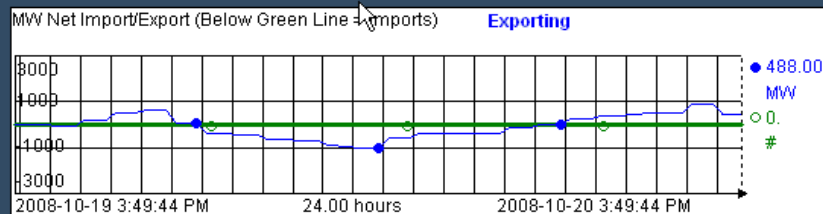
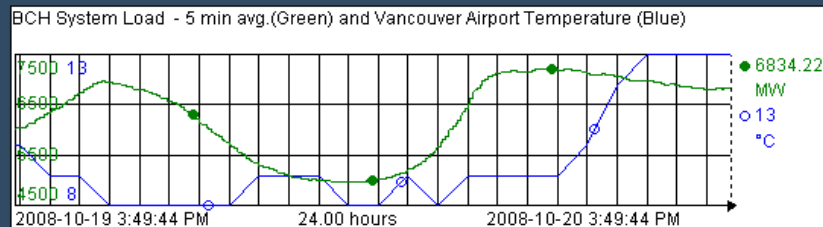
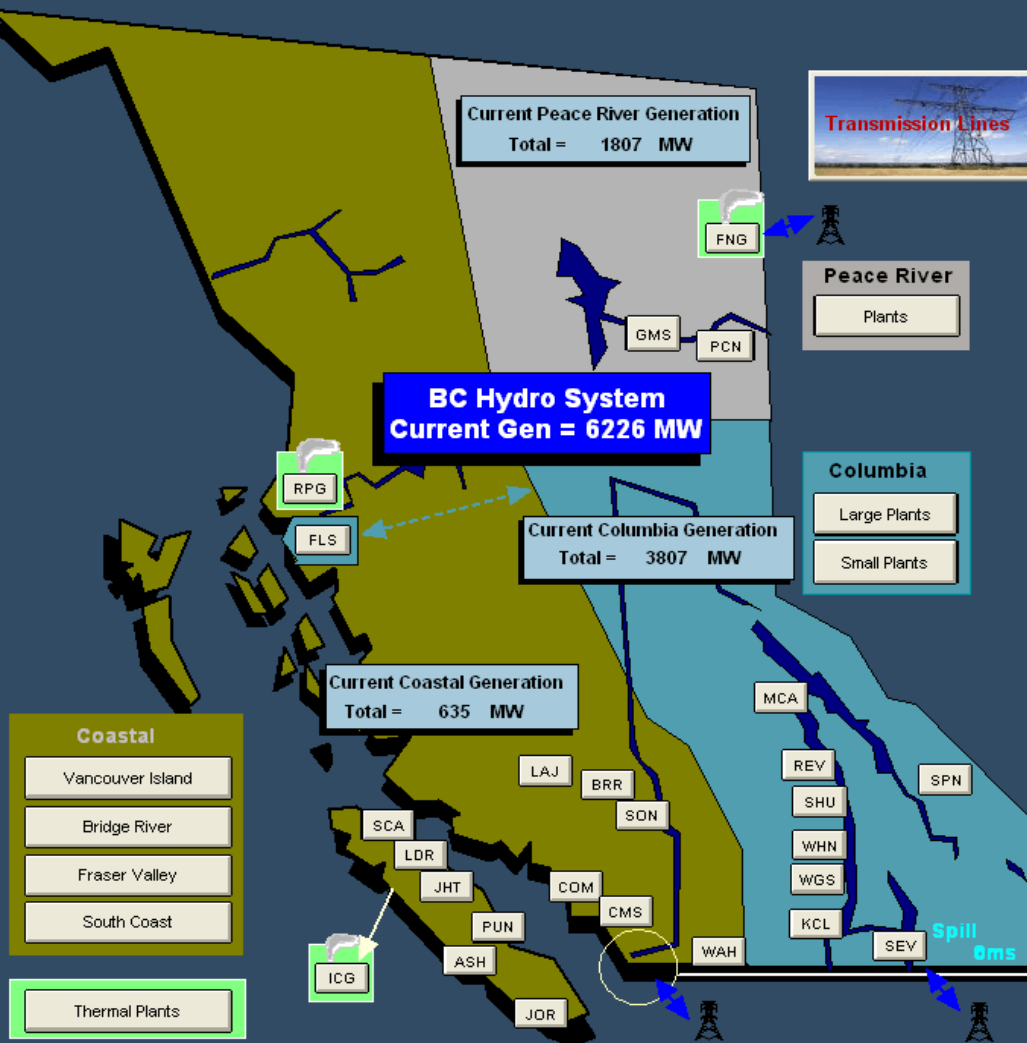
BC Hydro - Generation Overview (Home Page)

2008-08-08

OI Manager

Close All Overview Displays

Show Unit Info



US Exchange Rate = 0.83500
Vancouver Airport Temp. = 13 C

Links:

- [Daily Operating Reports](#)
- [Safety Incident Reports](#)
- [Environmental Incident Reports](#)
- [Generation Management Reports](#)
- [Generation Web Page](#)
- [AECM Tracking Report](#)
- [SmartSignal](#)

BCH Gen	+ FBC Gen	- Alcan Xfer	+ Sm IPP's	+ Lg IPP's (ALH, ICG)	≈	BCH Load	+ FBC Load	+ NWPP Static	+ Dynamic	[Imbalance]
6226 MW	+ 644 MW	- 241 MW	+ 537 MW	+ 405 MW	≈	6875 MW	+ 576 MW	+ 488 MW	+ 116 MW	-14 MW

Help

BChydro Case Study - OI System

Unit Detail View



SEV - Freshet

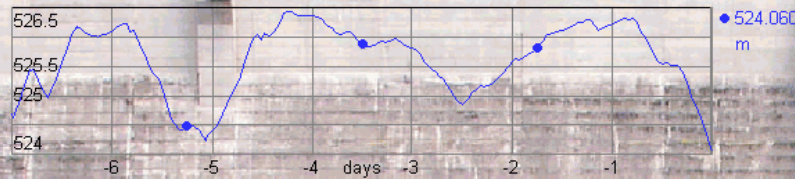
Flows greater than 1416 QM³/s require staffing standby.

SEV Q Total **1400 m³/s** (Total River Flow)
SPOG Q Total **0 m³/s** (Total Spill Flow)
SEV Turbine Total **1398 m³/s**

Tavis Forebay Level

2007-04-02 1:29:16 PM

Stevens **524.00 m**
Tavis **524.06 m**



0.01 ft 0.01 ft 0.00 ft 0.01 ft 0.02 ft

1 2 3 4 5

Unit	U01	U02	U03	U04
Open	97 % open	100 % open	100 % open	88 % open
MW	182 MW	185 MW	183 MW	189 MW

(Boundary Generation **773 MW**)

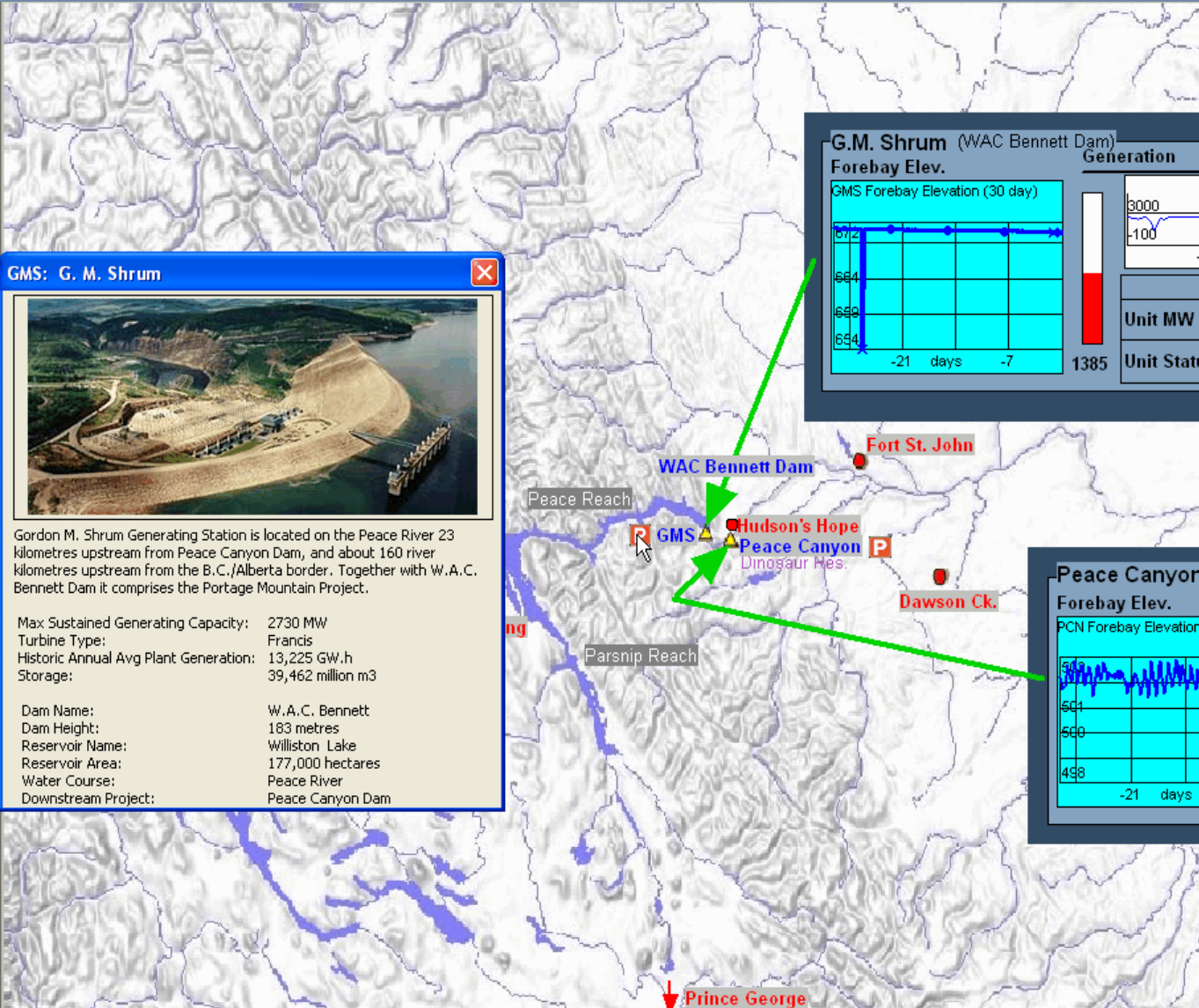
2006-11-24

Close

SEV Menu

BChydro Case Study - OI System

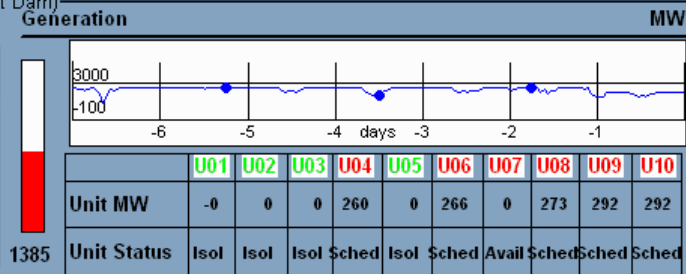
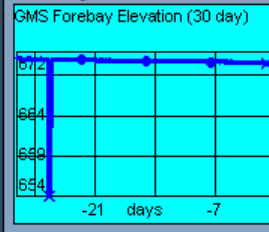
Executive Overviews for Non Operational Executives



Peace River Generation

Home
Total MW 1807
2007-08-01

G.M. Shrum (WAC Bennett Dam)



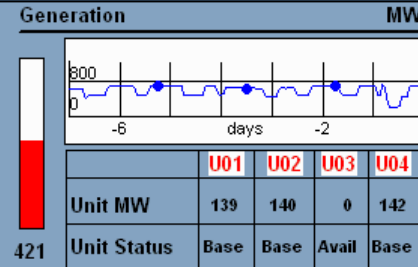
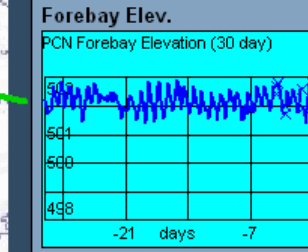
GMS: G. M. Shrum



Gordon M. Shrum Generating Station is located on the Peace River 23 kilometres upstream from Peace Canyon Dam, and about 160 river kilometres upstream from the B.C./Alberta border. Together with W.A.C. Bennett Dam it comprises the Portage Mountain Project.

Max Sustained Generating Capacity:	2730 MW
Turbine Type:	Francis
Historic Annual Avg Plant Generation:	13,225 GW.h
Storage:	39,462 million m3
Dam Name:	W.A.C. Bennett
Dam Height:	183 metres
Reservoir Name:	Williston Lake
Reservoir Area:	177,000 hectares
Water Course:	Peace River
Downstream Project:	Peace Canyon Dam

Peace Canyon



Unit Status Legend:
Red = In Service or Available for Service
Green = Not available for Service
P Plant Information



Thank you

© Copyright 2010 OSIsoft, LLC.

777 Davis St., Suite 250 San Leandro, CA 94577