Drastically Reducing Specific Water and Energy In Large Industrial Complexes

Presented by **Osvaldo A. Bascur**

Global MMM Industry Principal

OSIsoft.

USERS CONFERENCE 2013

The Power of Data

THRIVING IN A WORLD OF CHANGE

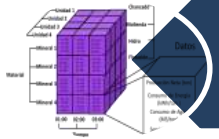
Agenda

Overview of the Large Industrial Complexes

Sustainability Strategies are good Business

Real Time Information Integration and Standardization

Endesa, Southern Peru, CAP Acero, ArcelorMittal (Dofasco, CSN)



Further work and Conclusions

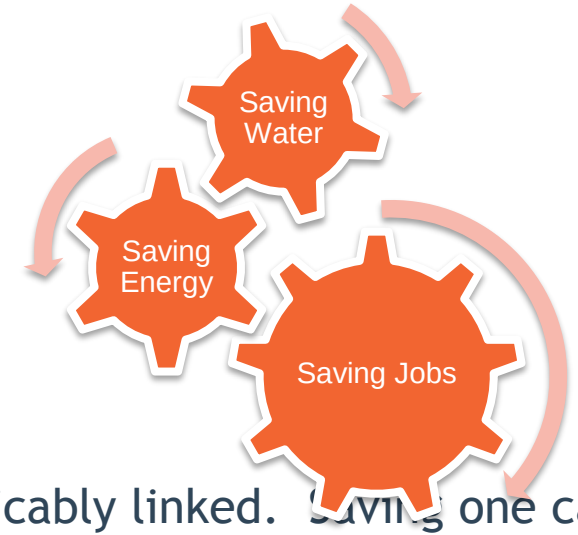
Overview of the Large Industrial Complexes

PI System in the Metals Industry

Sustainability & Energy/Water Nexus

Summary

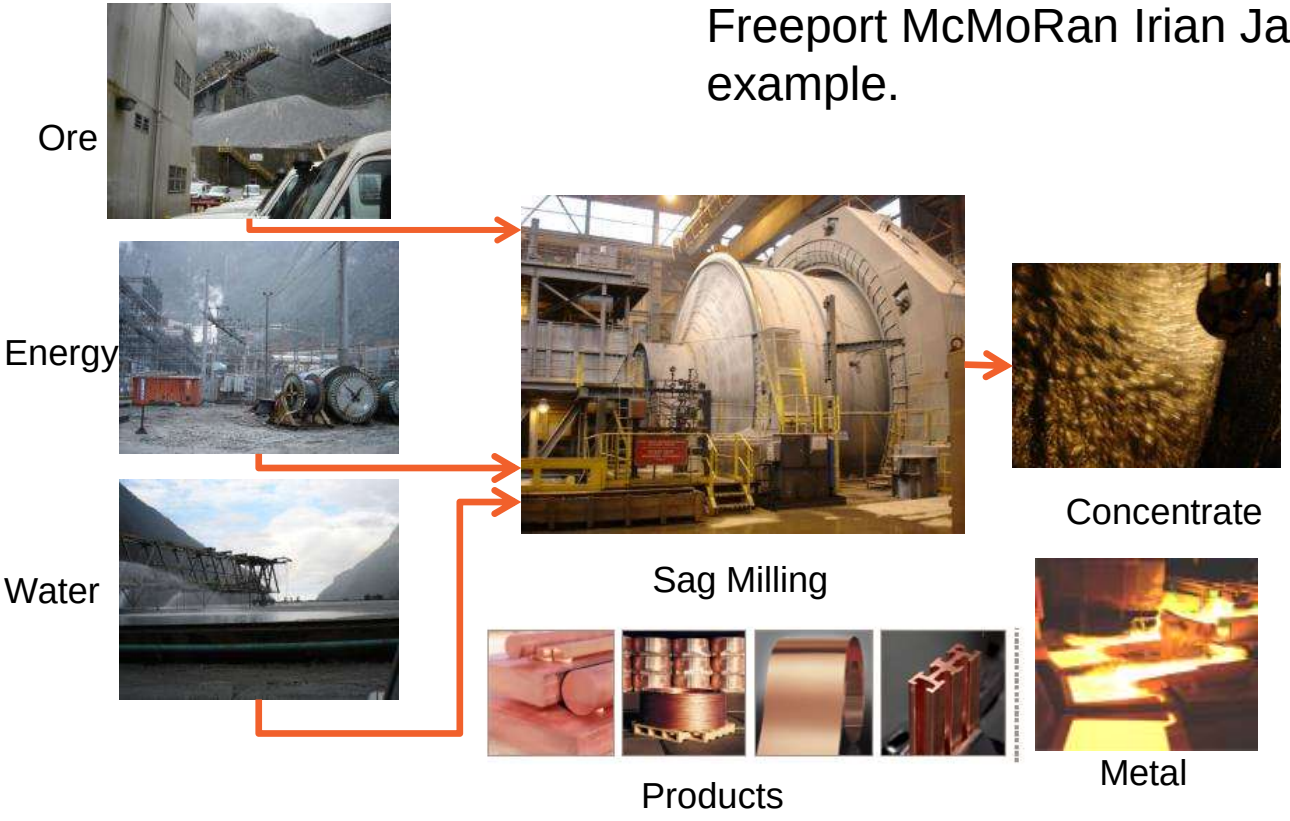
- Discuss observations and real examples from industry, utilities and public sector



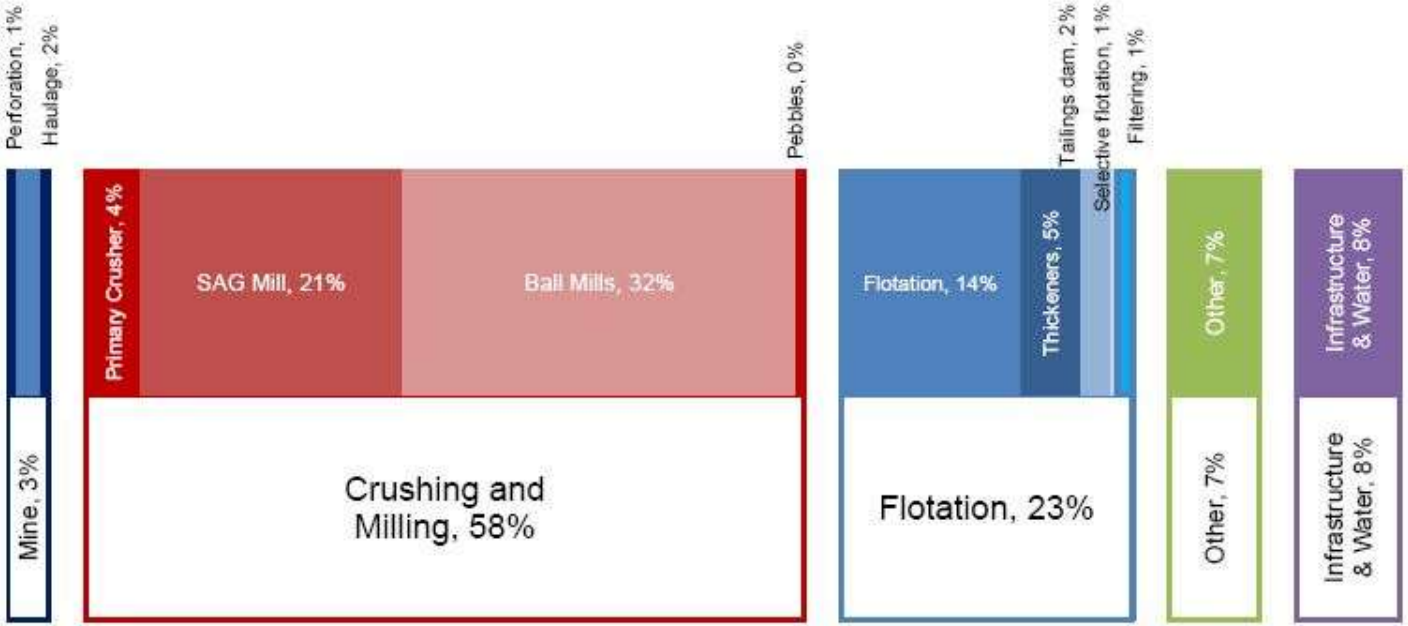
… Energy & Water are inextricably linked. Saving one can save the other. Saving both can save money, capacity, and jobs!

How are you managing your Ore Types, Energy, Water and Metals Recoveries?

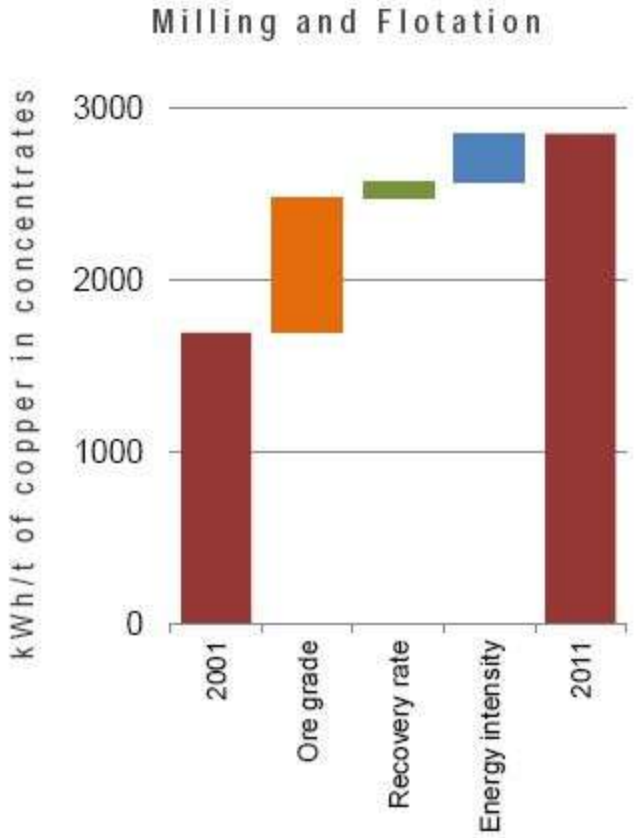
Freeport McMoRan Irian Java example.

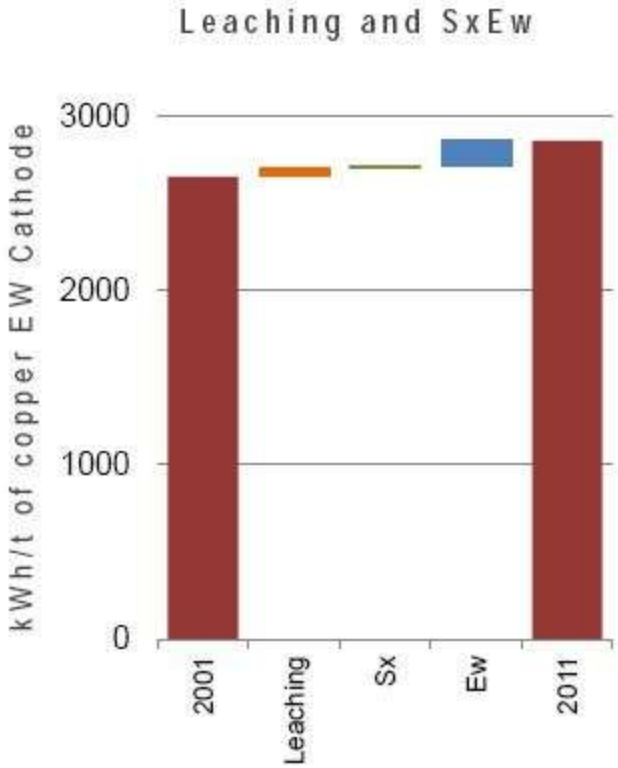


Electricity consumption in copper concentration (%)

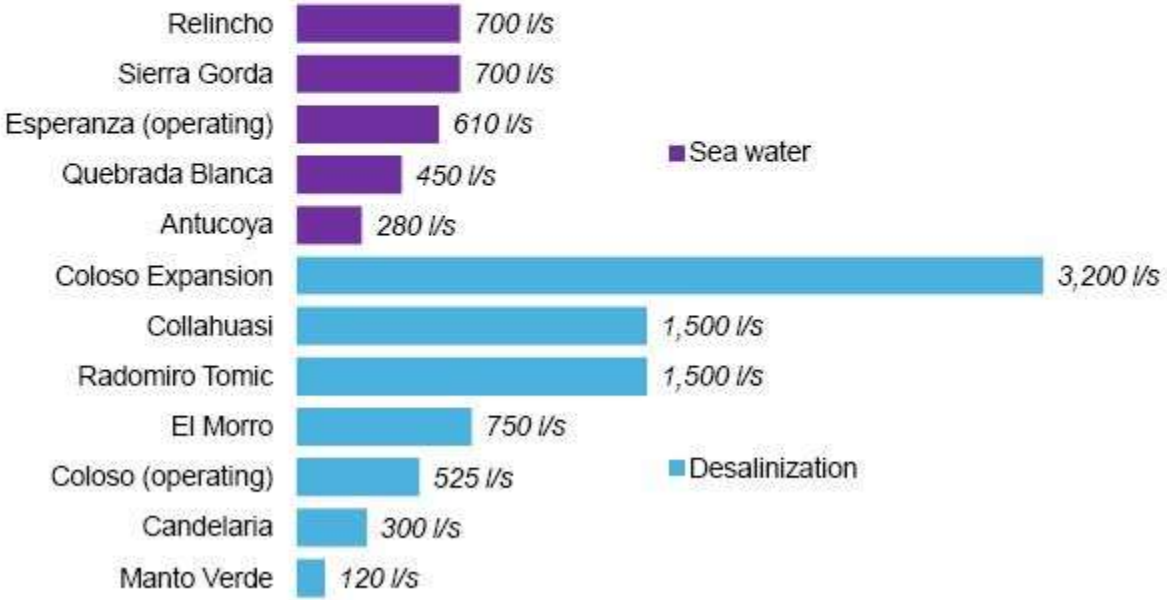


Intensity of electricity consumption





Water supply projects to desalinate and pump water could require an additional 5.4 TWh per year



Mine to Metals Products

Microsoft

Corporate

PI Visualization and Collaboration

PI Analytics and Notifications

OSIsoft.

PI Server and Data Services

Jigsaw

MODULAR

ROSEMOUNT Analytical

TECNOMATIX

FANUC

FISHER

Honeywell

ABB

EMERSON

Delta V

Yokogawa

TOSHIBA

Honeywell

Bailey

Rockwell Automation

Integration: Rio Tinto Kennecott Utah Copper

Energy and Water Tracking

Mining

Mineral Processin

Metallurgical

Products

Energy **Assets** **Reagents** **Environmental**

INTEGRATE- FIND – ANALYZE- DELIVER-VISUALIZE

Sustainability Strategies are good business
Basic Guidelines

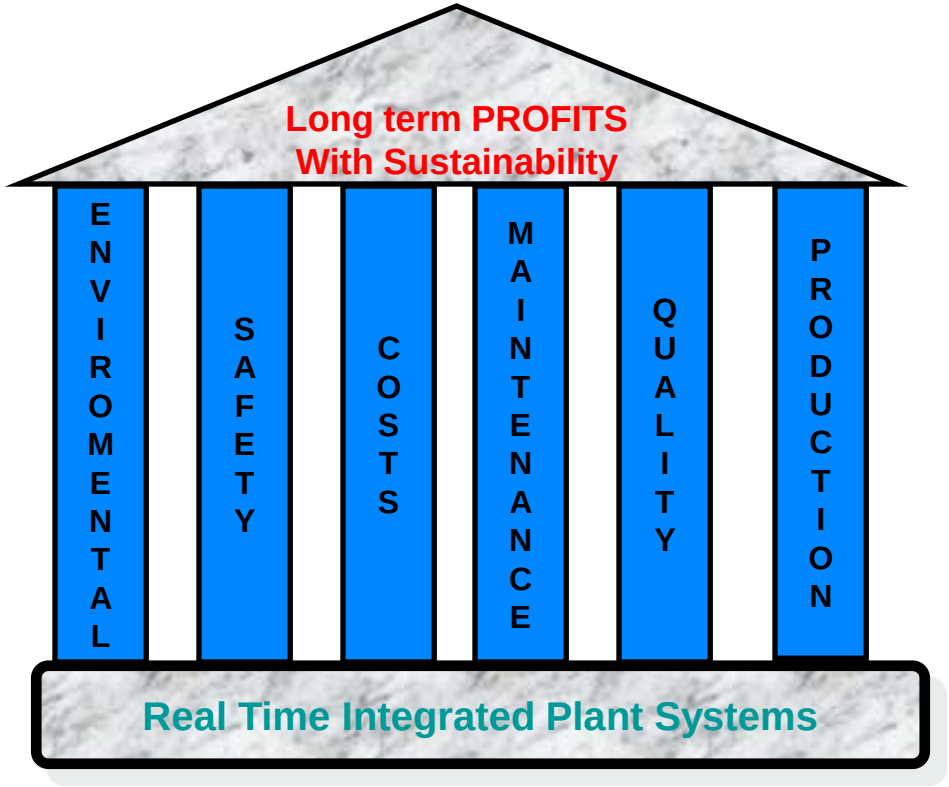
Overall Integrated Industrial Effectiveness

Results

Opportunities $

Mr. Porter
Shared VALUE
Strategy for
SUSTAINABILITY

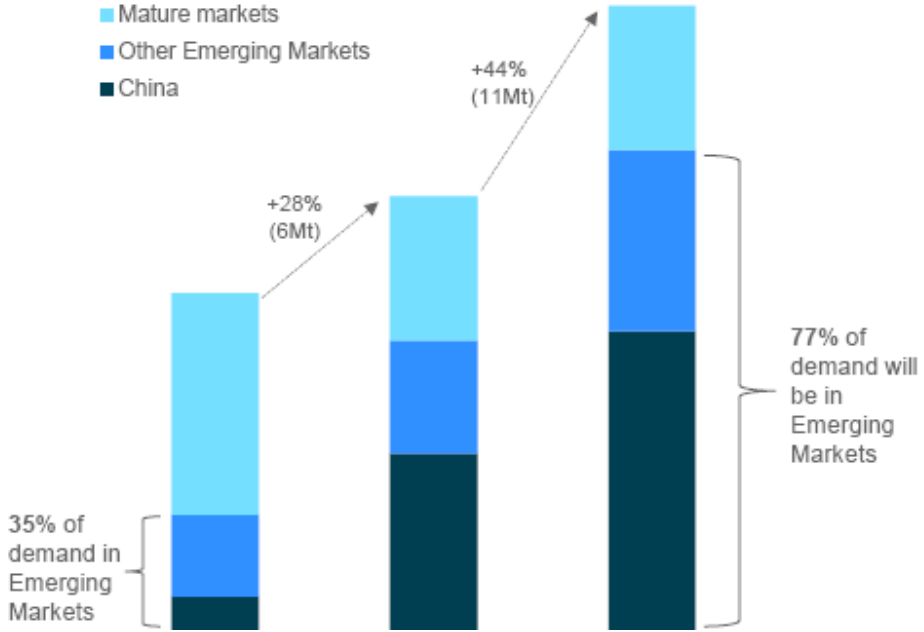
Systems



Rio Tinto

Emerging market growth will create an additional 11Mtpa of demand by 2024

Copper semis demand (Mt)

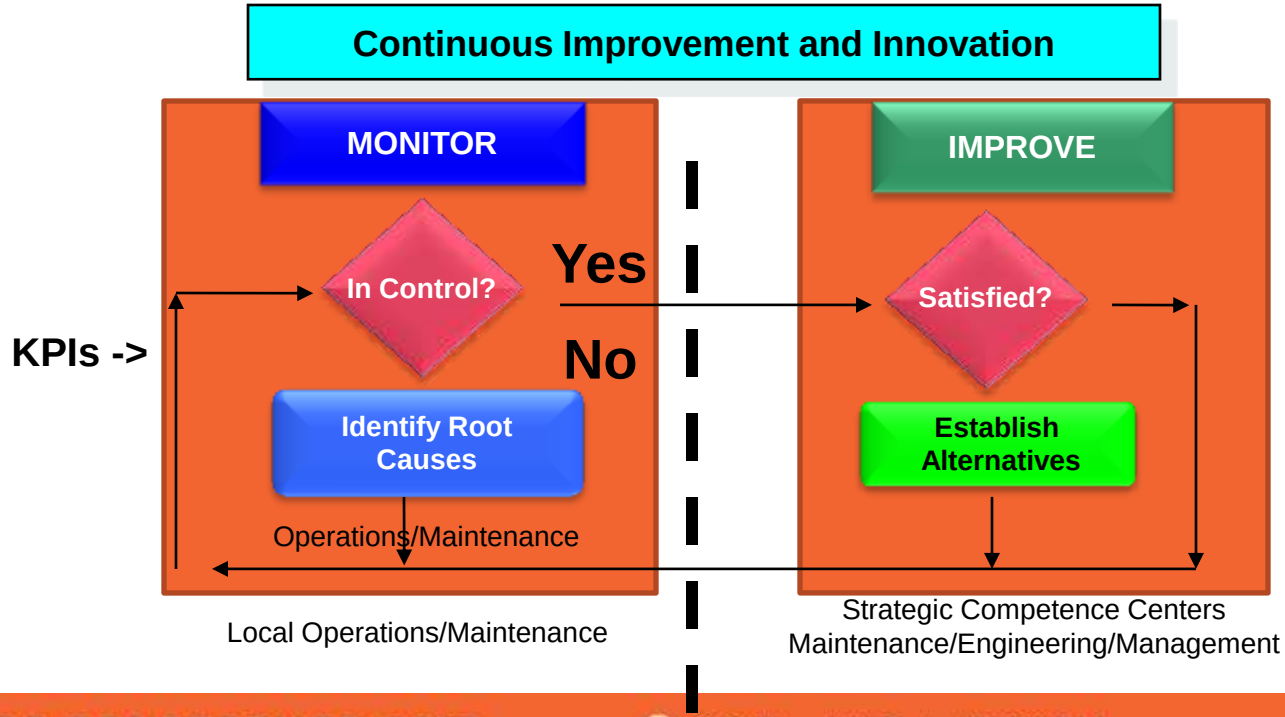


Drivers of growth

1. Continued rise of China
2. Development of other large Emerging markets (India, SEA)
3. Changing fuel mix towards non-traditional energy sources
4. Increased energy efficiency and safety requirements
5. Substitution, mainly Aluminium (negative)

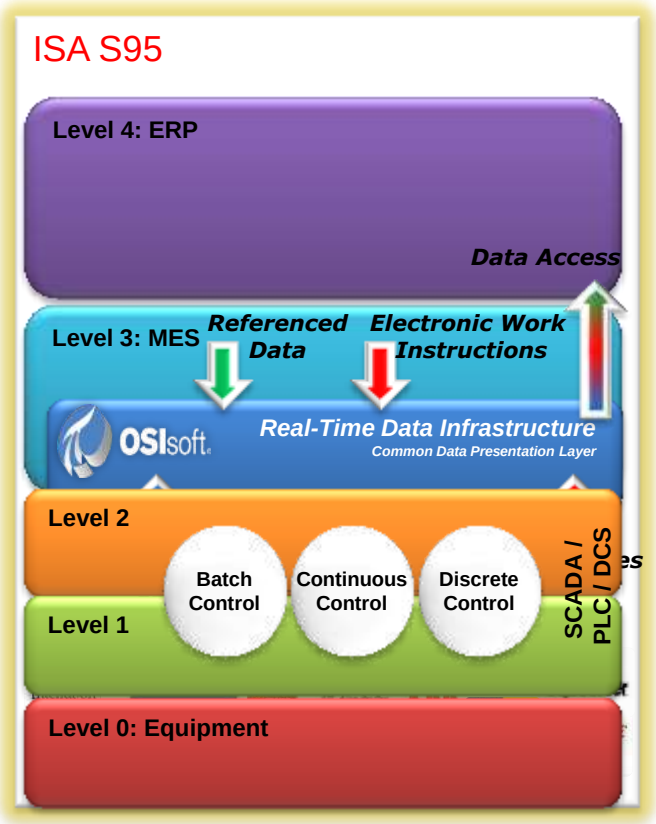
THE PEOPLE EFFECT
Local vs. Collaborative Decision Making

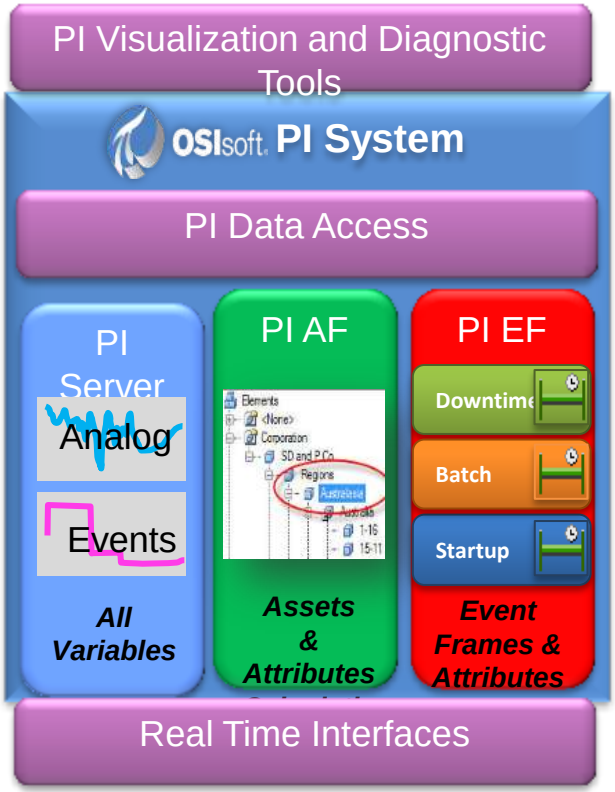
KPI Examples: Production, Quality, Costs, Equipment Availability, Environmental and Safety alerts with fast resolution and improved decision making.

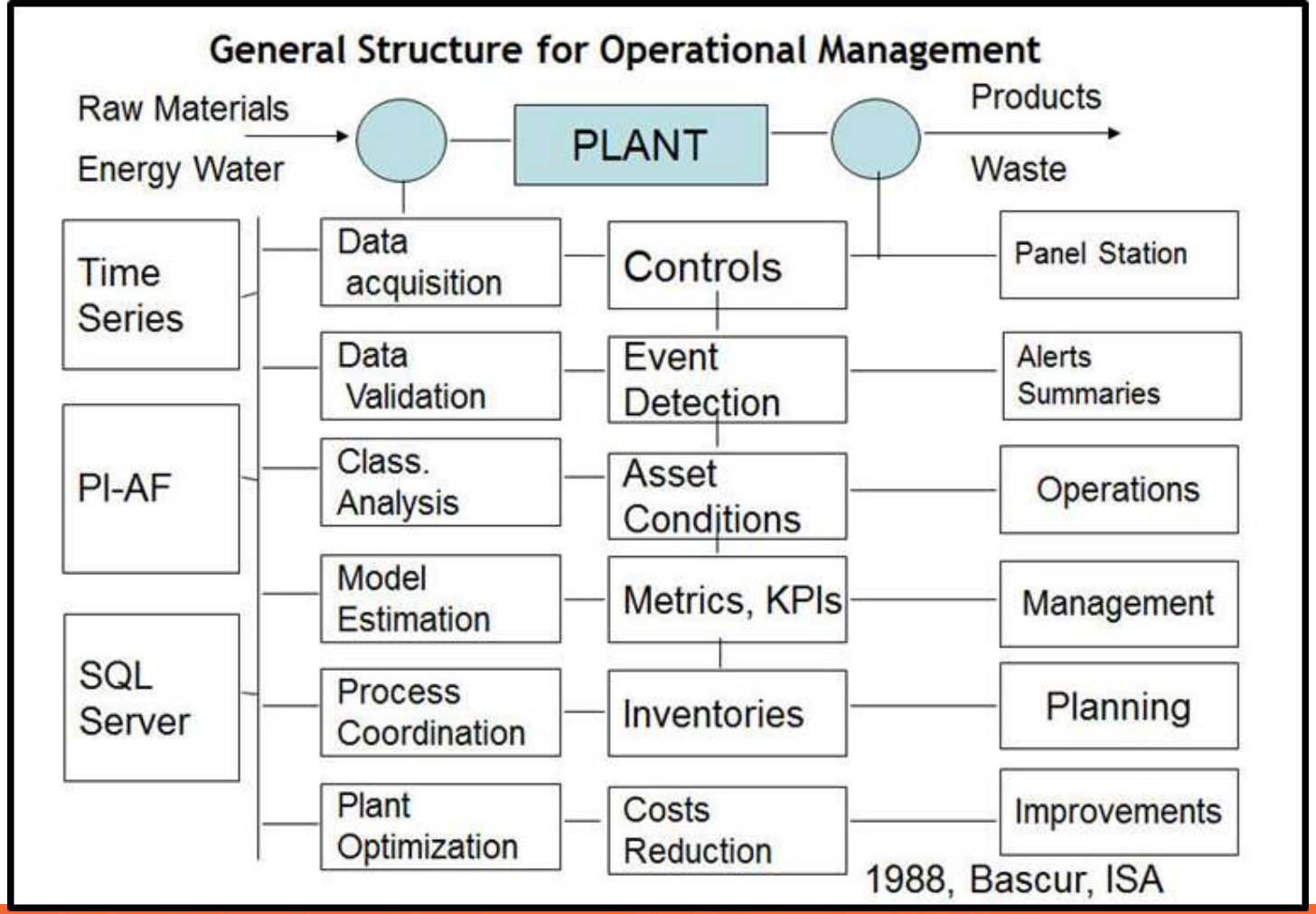


Real Time Information Integration and Standardization

PI System Data Infrastructure

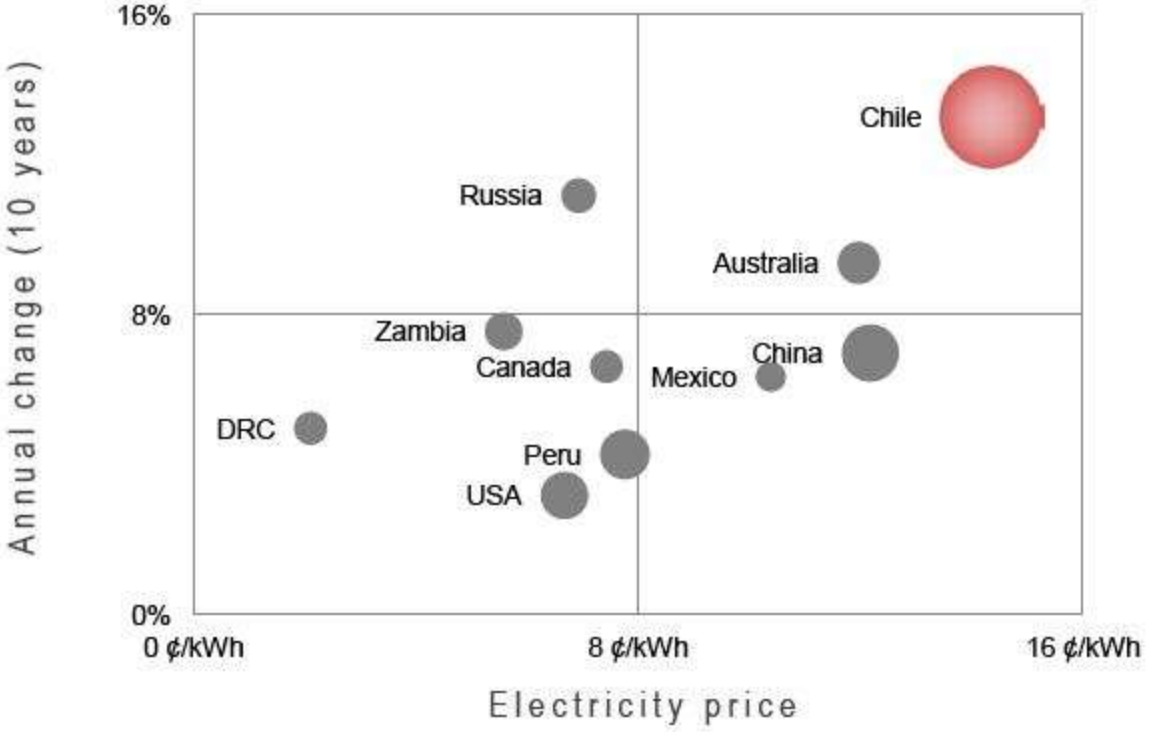






Improving the Transformation of Energy Resources into Electricity

The problem...

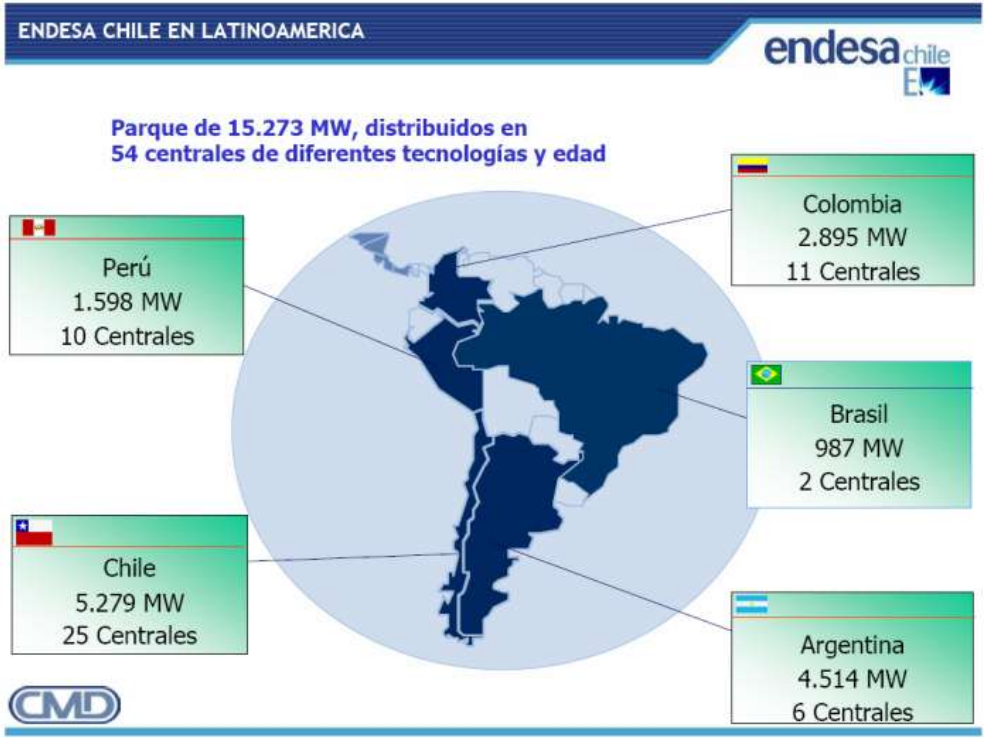


Weather and Country Energy Limitations

Most Arid Region in the World

Large Energy Requirements

Optimizing Latin American Energy Generation Management



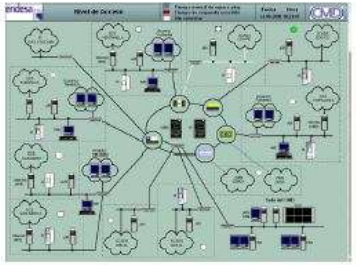
CMD: CAMINO RECORRIDO

ENDESA Examples

ÁMBITO DE DESARROLLO

SISTEMA INTEGRADO DE INFORMACIÓN DE PROCESO

Es un sistema informático multiusuario que, captura la data de proceso de los sistemas de control de las unidades generadoras y almacena esos datos en servidores de planta, y en un servidor central, permitiendo a los usuarios el acceso a la información en línea y a la base de datos histórica de las plantas generadoras.

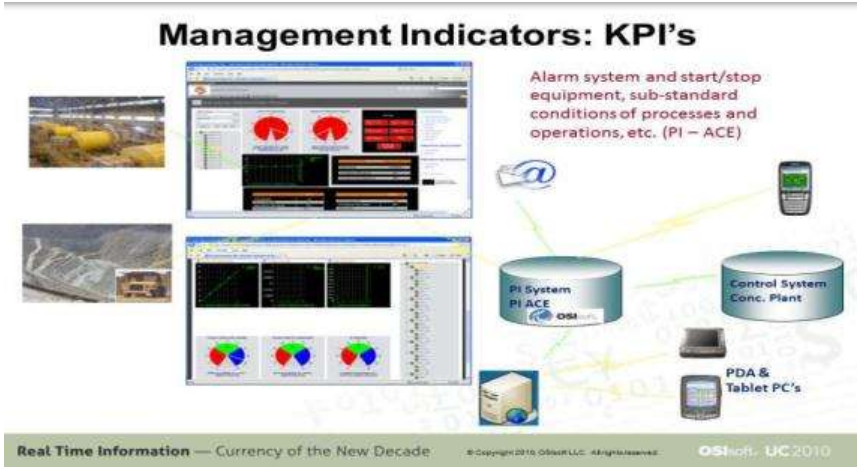


SISTEMAS EXPERTOS Y APLICACIONES

Son desarrollos de software que utilizan la información en línea o histórica, procesándola a través de modelos, contadores, informes automáticos y personalizados, pantallas gráficas o tablas de datos.

Southern Peru Copper: Cuajone

- Cuajone
- Production 87,000 MT fine Copper per day.
- Conventional open-pit mine
- Concentrator - 10 Grinding Lines.



Southern Peru Copper: Cuajone

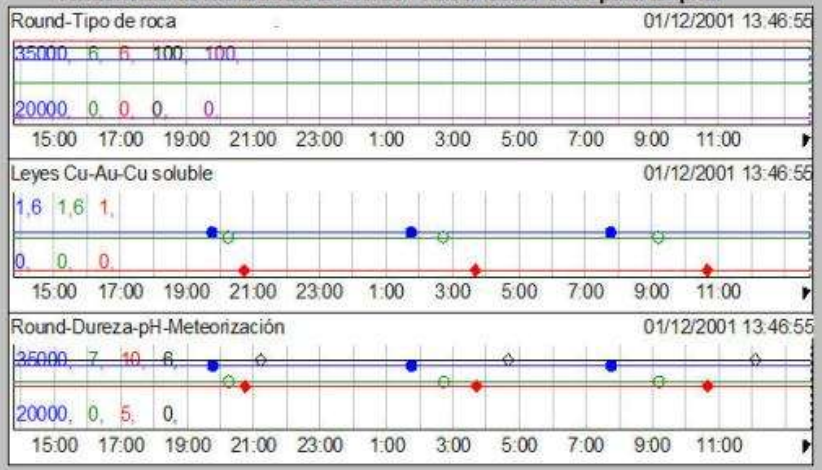
DISPATCH

(Ultimos datos: 29/11/2001 20:06:39)

Round	31316
Meteorización	5
Tipo de roca 1°	3
% Tipo de roca 1°	91,1
Tipo de roca 2°	6
% Tipo de roca 2°	8,9
pH	7,61
Dureza	4
Cu %	0,75
Au g/t	0,84
Cu soluble %	0,09

Datos de mineral de mina al chancador, actualizado por hora.

Tendencias de las últimas 24 horas - Hacer doble click para ampliar



Tipo de roca

3 - Pórfiro P3
4 - Pórfiro P2
5 - Pórfiro Los Amarillos
6 - Andesita
9 - Andesita Rubble Zone

Tipo alteración

1 - Potásica fuerte
2 - Cuarzo-Magnetita
3 - Epidoto-Clorita
4 - Fílica
5 - Argílica

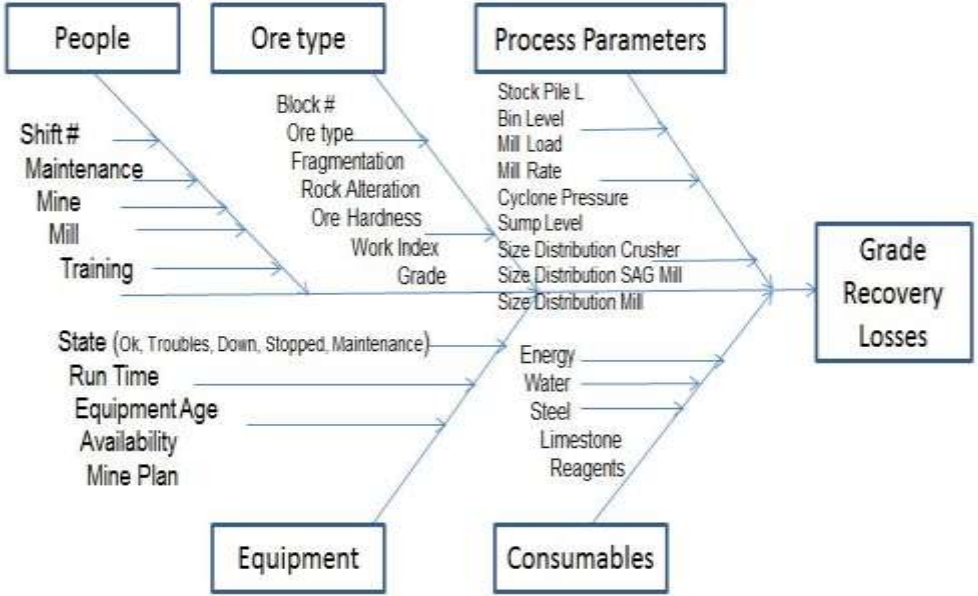
Meteorización/Enriquecimiento

1 - Suelo residual. Fábrica original, destruida
2 - Completamente meteorizada/alterada. Roca descompuesta y friable
3 - "Zona de Lixiviación" No visible Pyrita/Calcopirita Alta meteorización/alteración
Roca decolorada y de reducida resistencia por meteorización
4 - "Zona de enriquecimiento" Visible Calcosina/Covelina. Moderada meteorización/alteración
Roca decolorada, pero su resistencia poco afectada solo en discontinuidades con meteorización
5 - Suave meteorización/alteración, resisrencia inalterada,meteorización solo en diaclasas
6 - Fresca e inalterada. Alteración puede resultar en una mayor competencia de la roca (ej silicificacion).

Dureza de roca

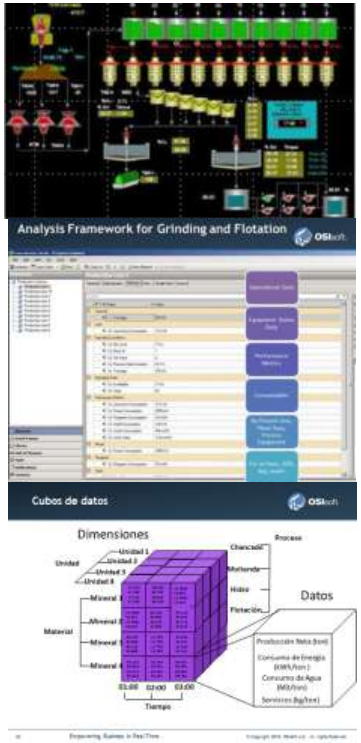
1 - Roca extremadamente blanda
2 - Roca muy blanda
3 - Roca blanda
4 - Roca de media a dura
5 - Roca dura
6 - Roca muy dura

SIX Sigma PI AF Design Strategy

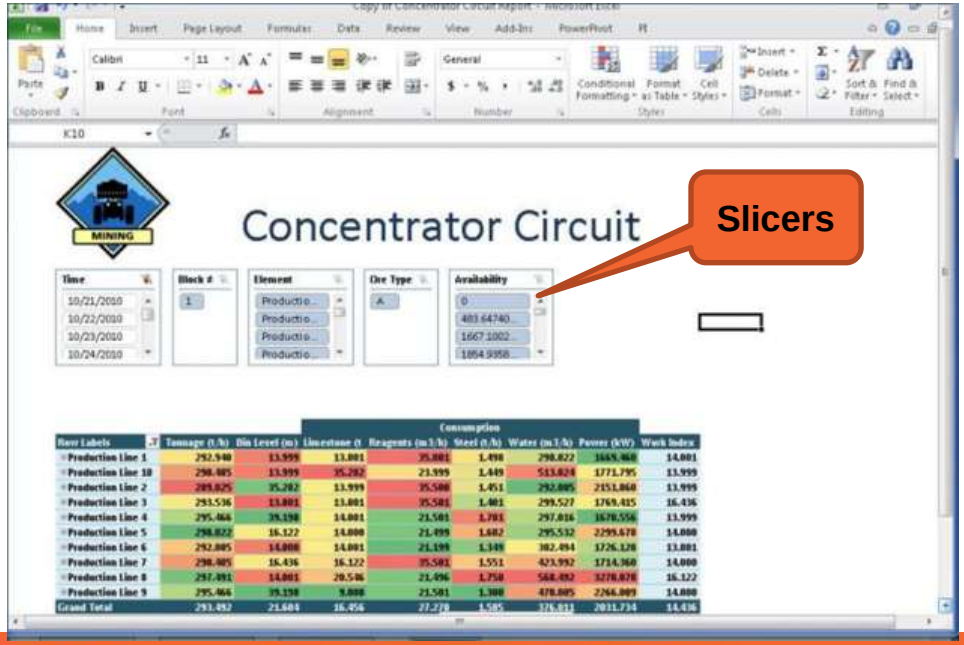


Strategy for Operational Data Mining

Southern Peru Copper: Cuajone



Sharepoint, PI AF, PI Slicers and PI Cubes
Using Latest Power Pivot in Memory technologies



Tangible benefits: Advanced Mine to Mill Integration

Production Benefits:

- Increase of ore milling: 4.6%
- Decrease of mil power: 3.9%
- Decrease of fresh water consumption: 6.8%

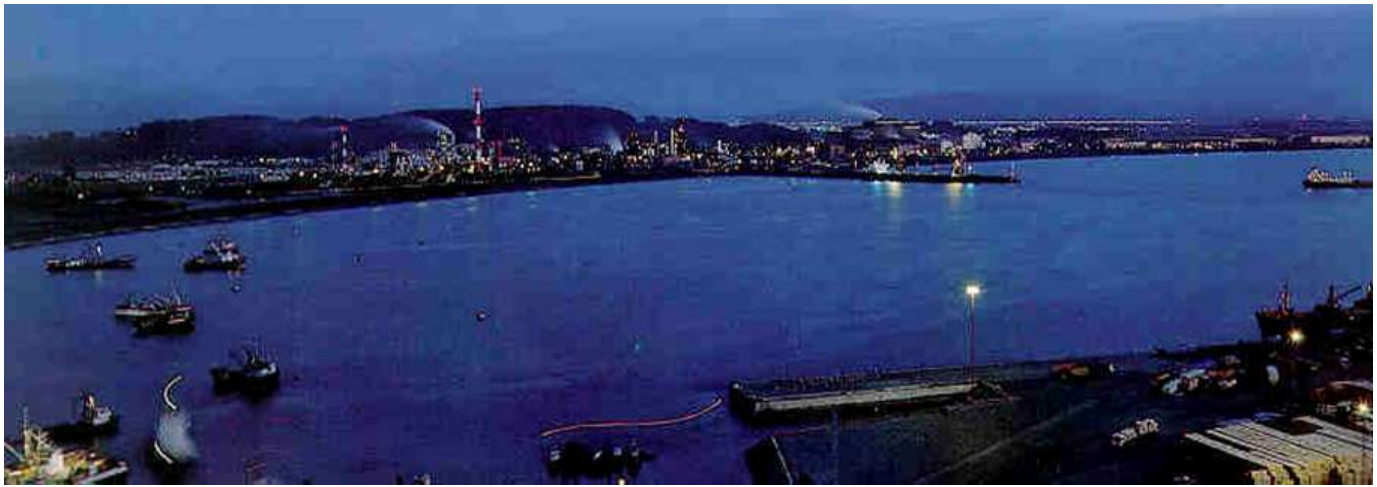
Economic Benefits:

- Net profit: US$ 31.8 million (period: 2009/04/04 to 2009/12/31
- PI System contribution: US$ 7.95 million (same period)

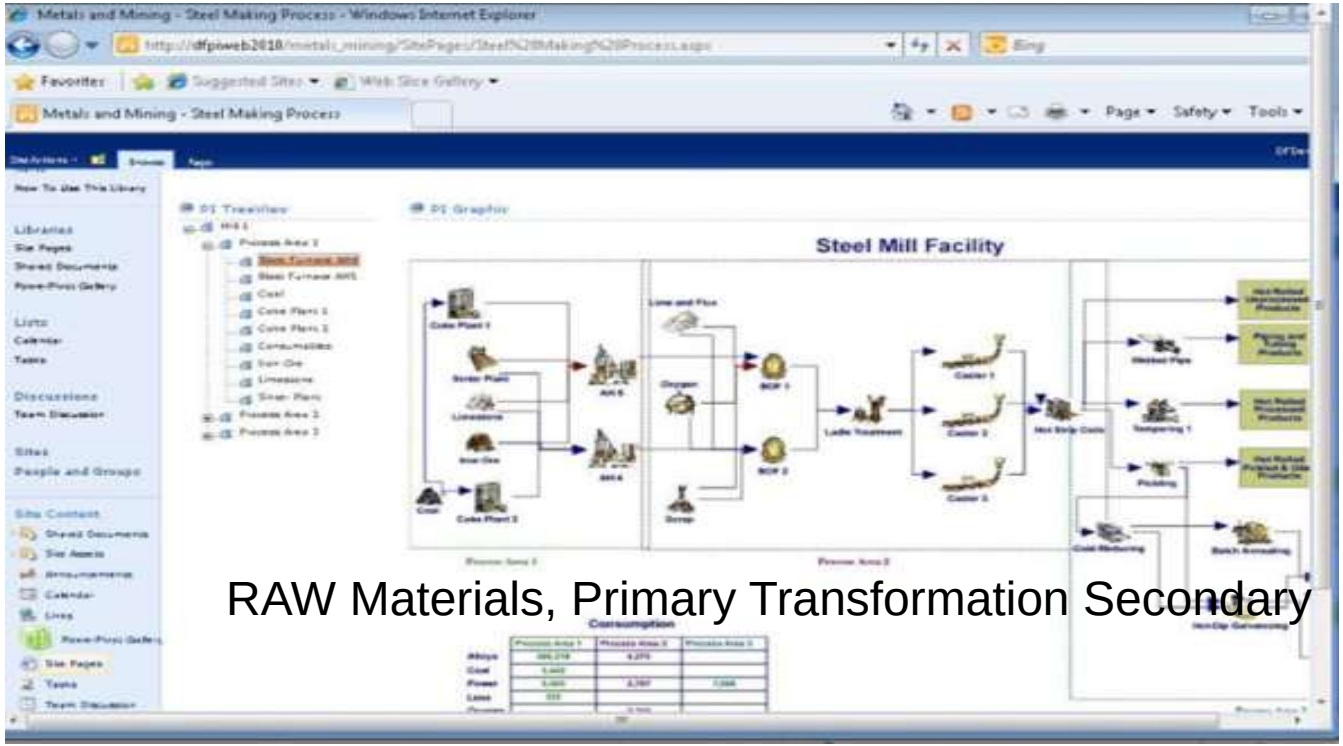
CAP Acero Huachipato Steel Mill

PI System Seminar Chile Y2009

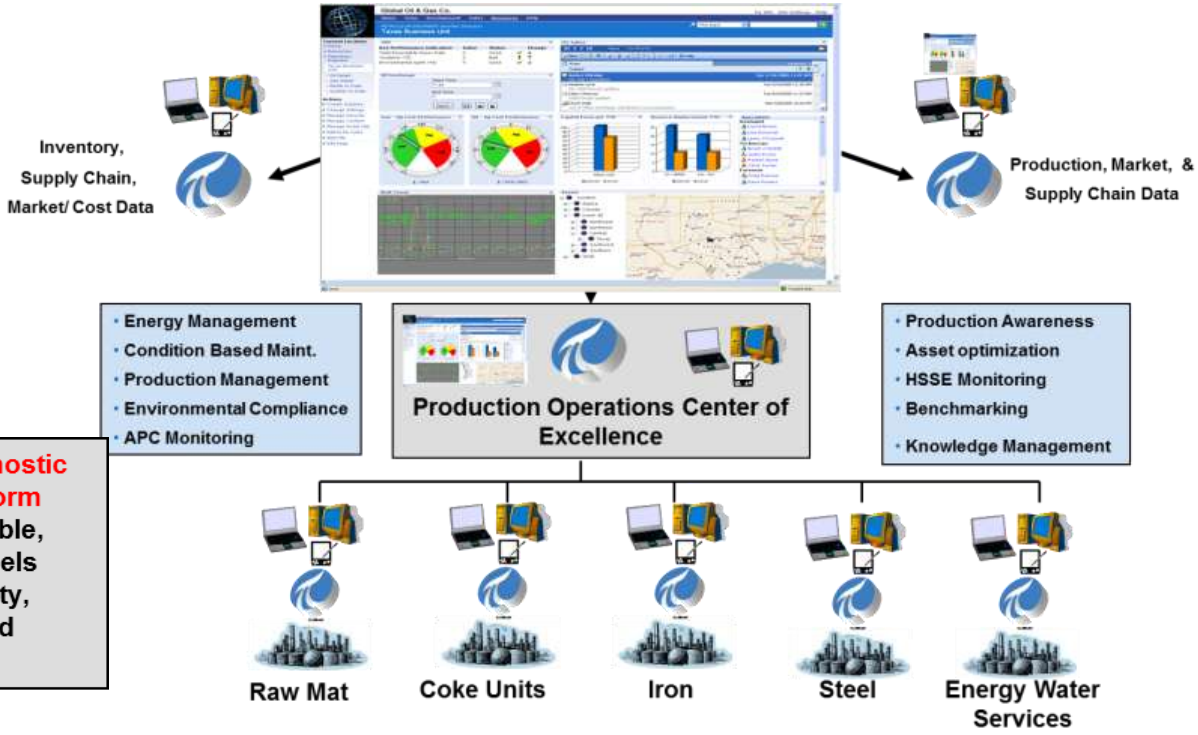
Fully Integrated Steel Company
Reduction of Pellets in Blast Furnaces to produce Iron
Steel produced in BOF then casted into Slabs
1.2 Tones of Steel per Year.



Iron and Steel Metallurgical Complex
Real Time Information Integration and Standardization

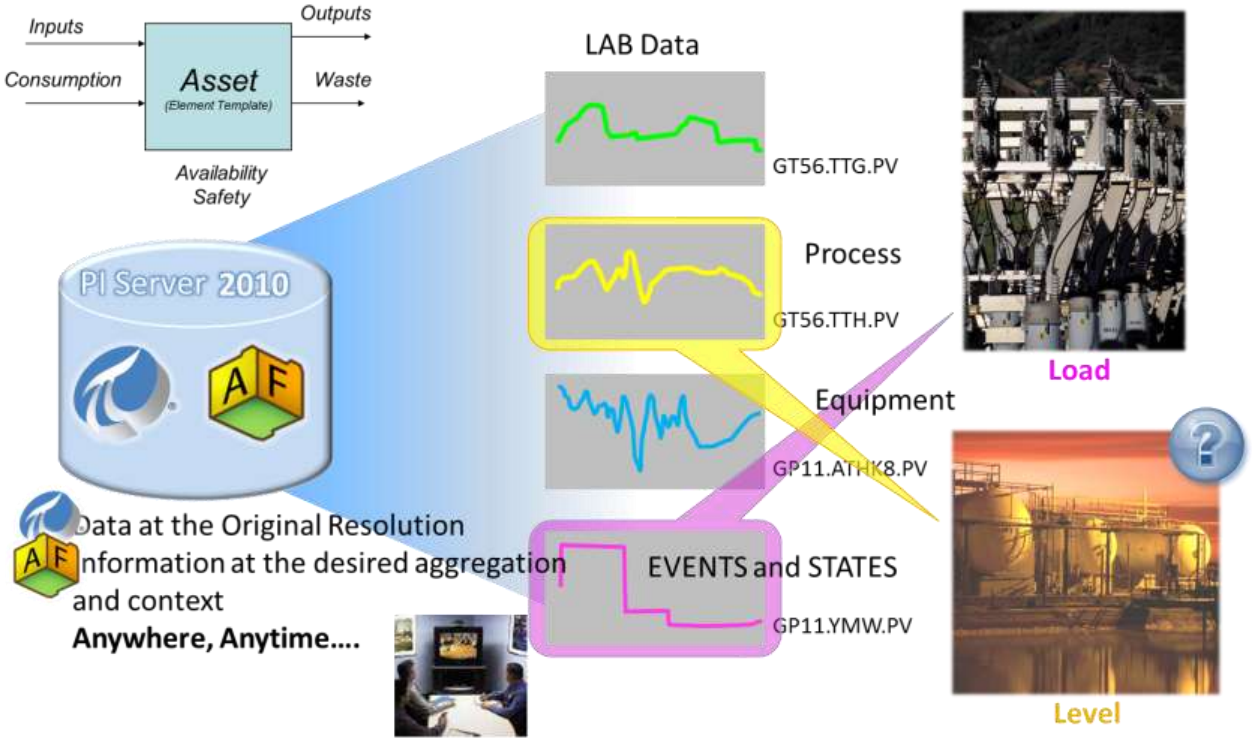


Manufacturing Services Center



PI provides an agnostic enterprise IT platform that enables scalable, evolutionary Biofuels value chain visibility, benchmarking, and optimization

Strategy: Standardization of Assets and with Dynamic Contextual Information

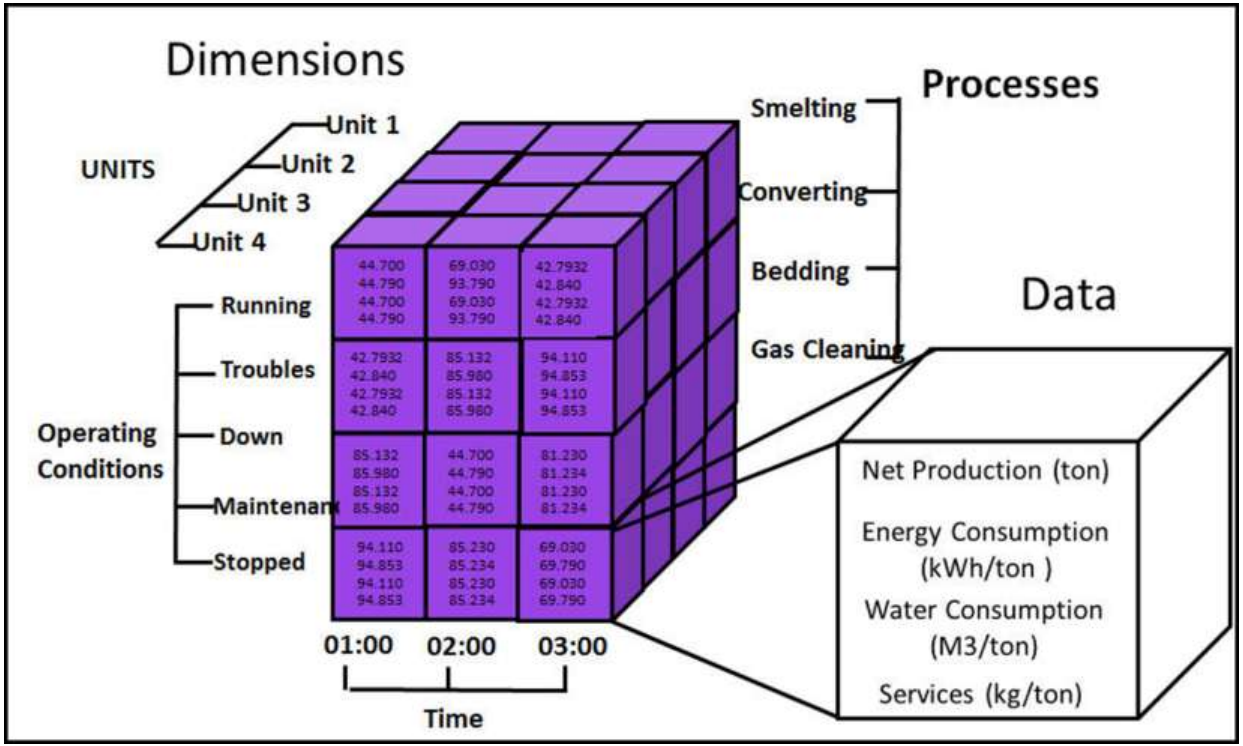


Iron and Steel Metallurgical Complex
Real Time Information Integration and Standardization

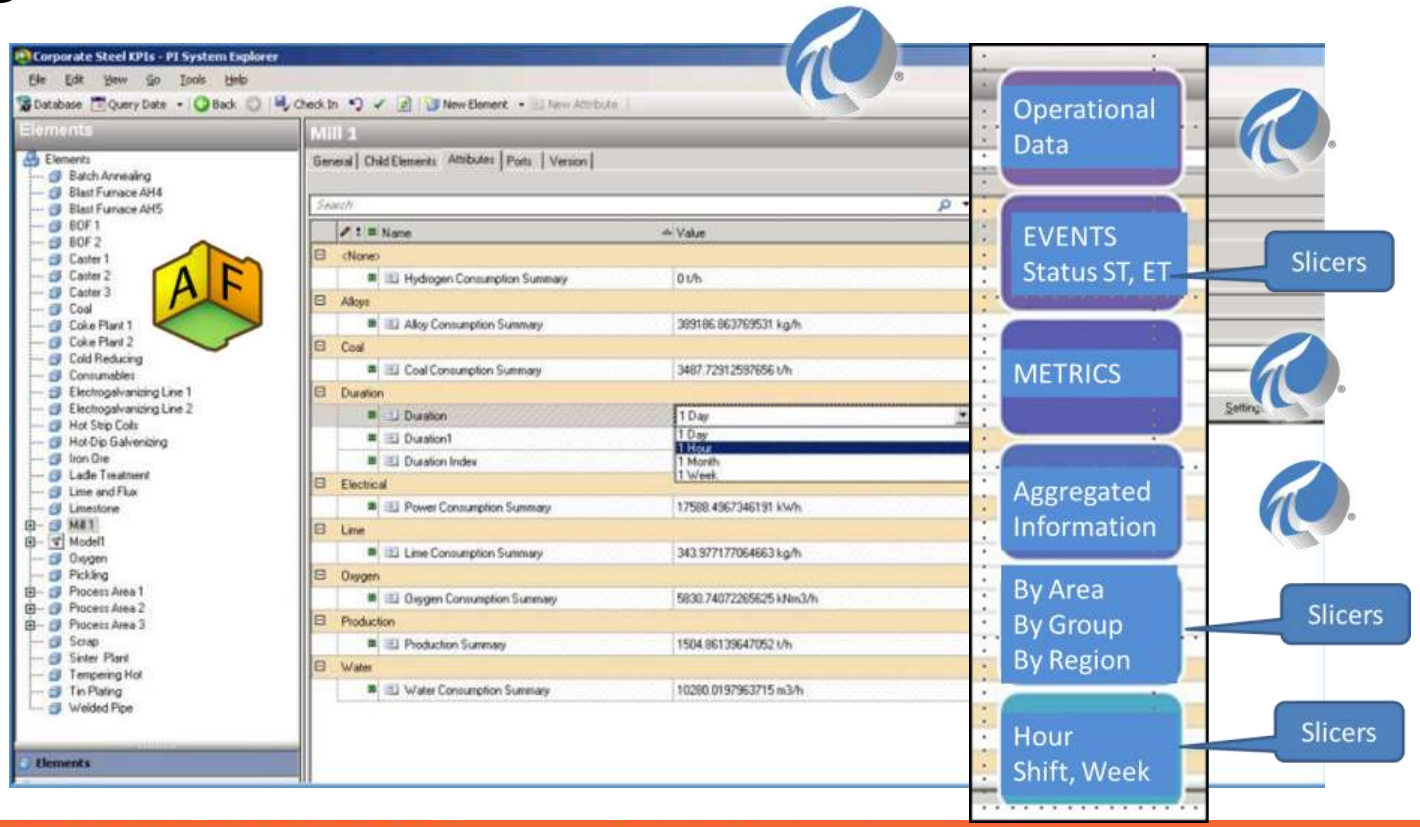
Iron
Limestone
Oxygen
Coal
Air
Fuel
Energy
Water
Alloys (Zinc, Moly, Chrome, etc)
Scraps

Steel Production
Variances
Operational Time Wasted
Equipment Availability
Quality
Air Quality Emissions
Water Discharge Emissions
Environmental
Safety Incidents

Operational Multidimensional Analysis



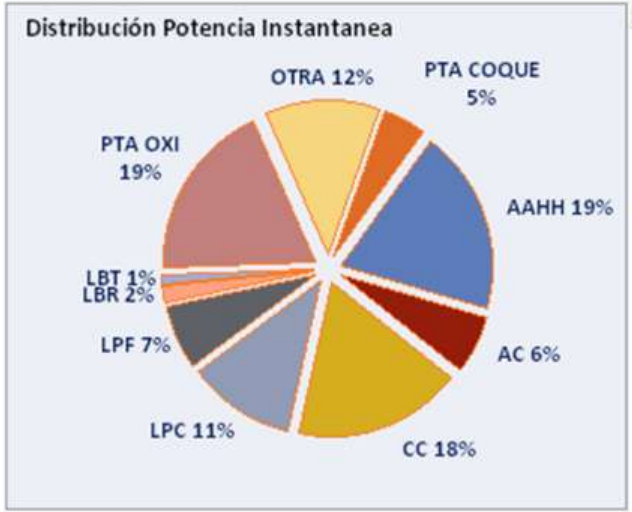
Integration of Data, Metrics and Events



Tangible benefits: Instant Power CAP ACERO

Actualizar

POTENCIA INSTANTANEA			
UNIDAD		MW	%
CAP-Acero	CAP	61,18	100
Planta de Coque	PTA COQUE	2,79	5%
Altos Hornos	AAHH	11,88	19%
Acería	AC	3,62	6%
Colada Continua	CC	11,05	18%
Laminador LPC	LPC	6,96	11%
Laminador LPF	LPF	4,23	7%
Laminador LBR	LBR	0,96	2%
Laminador LBT	LBT	0,61	1%
Planta Oxígeno	PTA OXI	11,54	19%
Otras	OTRA	7,53	12%



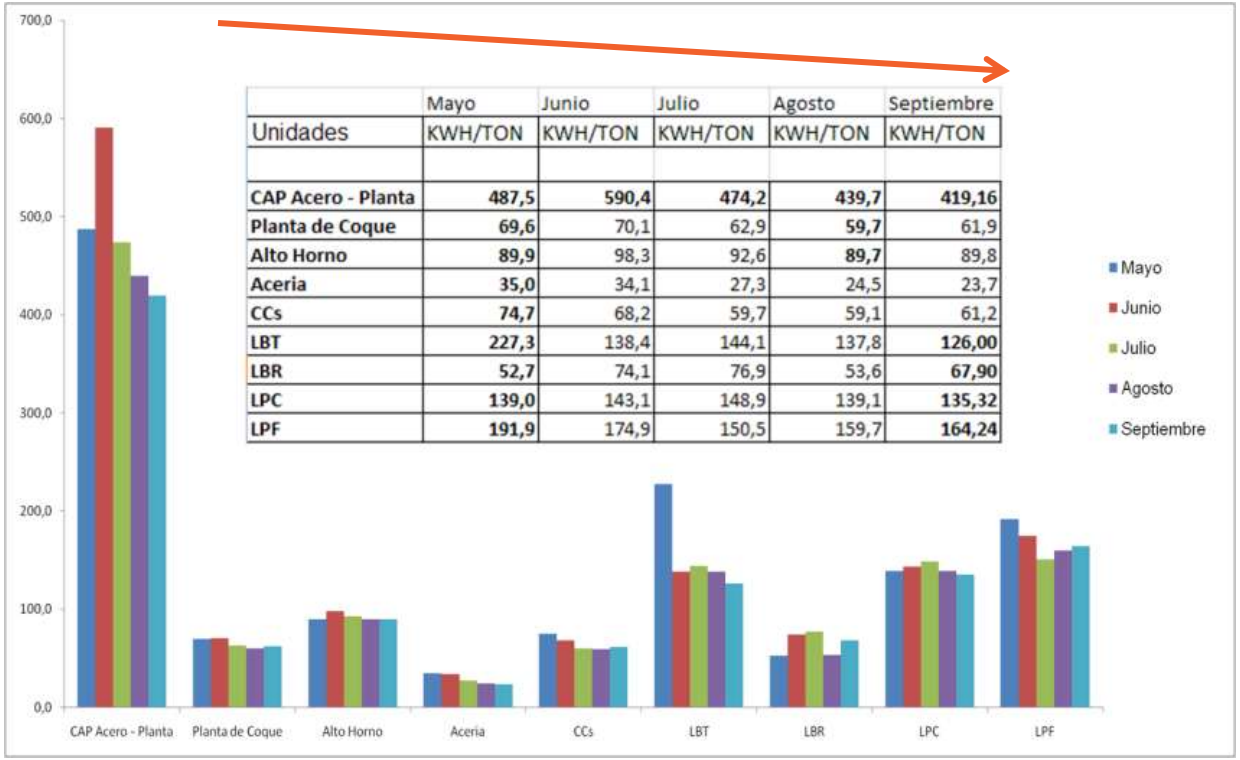
Periodo Potencia Instantanea

Start Time *-2h End Time * Apply

Classification of Productive and LOST Times in a Large Metallurgical Complex

	Performance (% time during last shift)				
	Running	Stopped	Down	Maintenance	Problems
Process Units	%	%	%	%	%
Batch Annealing	.0	25.0	32.1	5.6	37.3
Blast Furnace AH4	61.9	28.8	.2	1.3	7.9
Blast Furnace AH5	18.5	18.8	10.2	41.0	11.5
BOF 1	13.3	25.4	20.4	29.8	11.0
BOF 2	.0	25.0	32.1	5.6	37.3
Caster 1	61.9	28.8	.2	1.3	7.9
Caster 2	18.5	18.8	10.2	41.0	11.5
Caster 3	13.3	25.4	20.4	29.8	11.0
Coke Plant 1	61.9	28.8	.2	1.3	7.9
Coke Plant 2	18.5	18.8	10.2	41.0	11.5
Cold Reducing	13.3	25.4	20.4	29.8	11.0
Electrogalvanizing Line 1	.0	25.0	32.1	5.6	37.3
Electrogalvanizing Line 2	61.9	28.8	.2	1.3	7.9
Hot Strip Coils	18.5	18.8	10.2	41.0	11.5
Hot-Dip Galvenizing	13.3	25.4	20.4	29.8	11.0
Ladle Treatment	61.9	28.8	.2	1.3	7.9
Pickling	61.9	28.8	.2	1.3	7.9
Sinter Plant	13.3	25.4	20.4	29.8	11.0
Tempering Hot	61.9	28.8	.2	1.3	7.9
Tin Plating	18.5	18.8	10.2	41.0	11.5
Welded Pipe	13.3	25.4	20.4	29.8	11.0

Tangible benefits: 10 % REDUCTION SPECIFIC POWER or US$ 10 M



	Mayo	Junio	Julio	Agosto	Septiembre
Unidades	KWH/TON	KWH/TON	KWH/TON	KWH/TON	KWH/TON
CAP Acero - Planta	487,5	590,4	474,2	439,7	419,16
Planta de Coque	69,6	70,1	62,9	59,7	61,9
Alto Horno	89,9	98,3	92,6	89,7	89,8
Aceria	35,0	34,1	27,3	24,5	23,7
CCs	74,7	68,2	59,7	59,1	61,2
LBT	227,3	138,4	144,1	137,8	126,00
LBR	52,7	74,1	76,9	53,6	67,90
LPC	139,0	143,1	148,9	139,1	135,32
LPF	191,9	174,9	150,5	159,7	164,24

US $ 5.0 millions per year

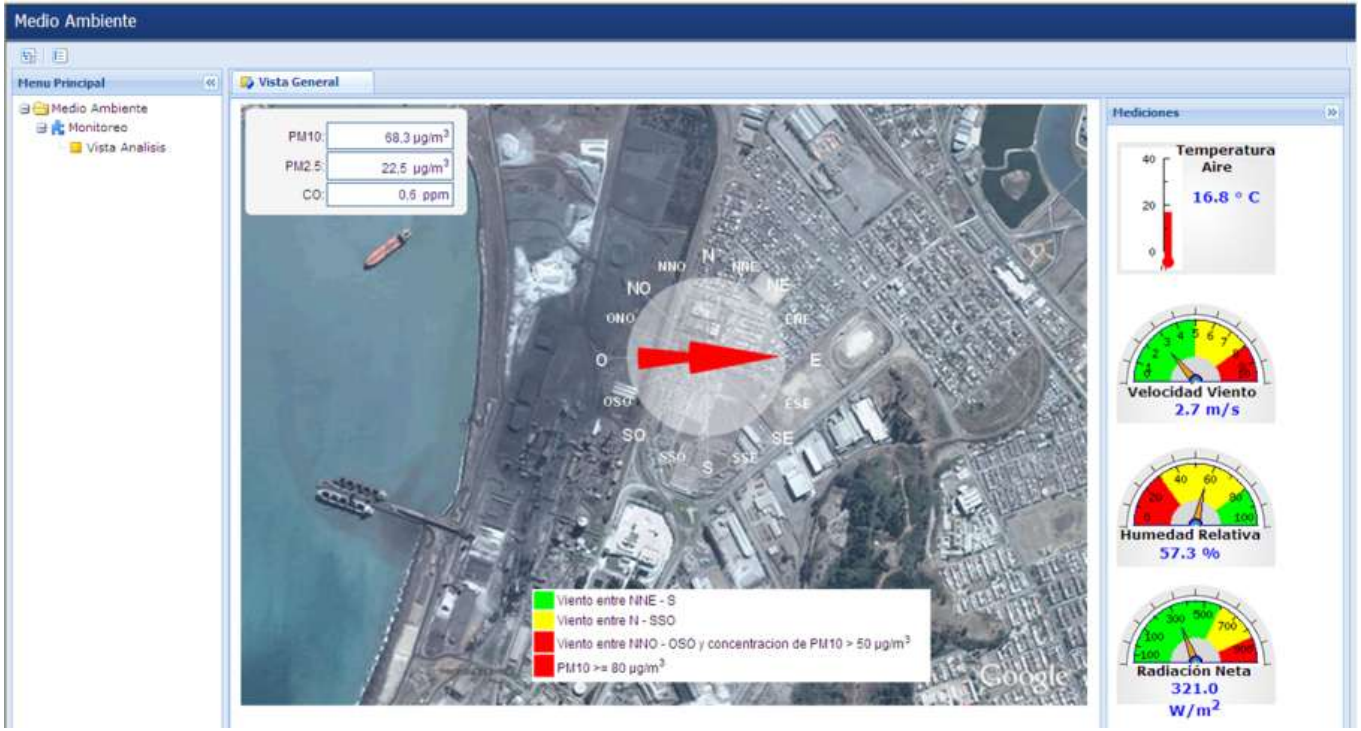
de Altos Hornos:

Iniciativa de Combustibles reportó ahorro de US$ 5 millones

le marzo el departamento de Combustibles realizó una
nonia para celebrar la exitosa ejecución de una Mejora
permitió disminuir el consumo especifico de petróleo por
por en las calderas, usando una mayor cantidad de Gas
s calderas auxiliares 5 y 6.Un proyecto que no requirió de
ón, pero que se tradujo en un ahorro de casi 5 millones de
a Compañía en su primer año de implementación.

ad. 16 trabajadores que participaron en el proyecto se
uditorio del Club Deportivo Huachipato, donde recibieron
del Coordinador General del Programa Mejora Enfocada,

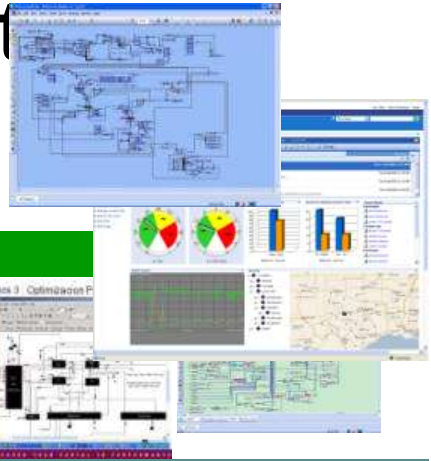
Tangible benefits: Web Based Air Quality Management for Authorities



Mine to Metals Product

Microsoft

Corporate



PI Visualization and Collaboration

PI Analytics and Notifications

OSIsoft.

PI Server and Data Services

Jigsaw

MODULAR

ROSEMOUNT Analytical

TECNOMATIX

FANUC

FISHER

Honeywell

ABB

EMERSON

Delta V

TOSHIBA

Honeywell

Bailey

Rockwell Automation

Integration: Rio Tinto Kennecott Utah Copper

Energy and Water Tracking

Mining

Mineral Processin

Metallurgical

Products

Energy **Assets** **Reagents** **Environmental**

INTEGRATE- FIND – ANALYZE- DELIVER-VISUALIZE

Drastic Energy and Water Savings

✓**Dynamic Performance Management Infrastructure with Collaborative Services**

✓**PI Asset Framework standardization and cross-pollination at the local plant and at the Enterprise**

✓**PI Asset Notification using Performance Metrics and Statistical Tools**

✓**Visibility Using Internet Web Services with standard BI tools.**

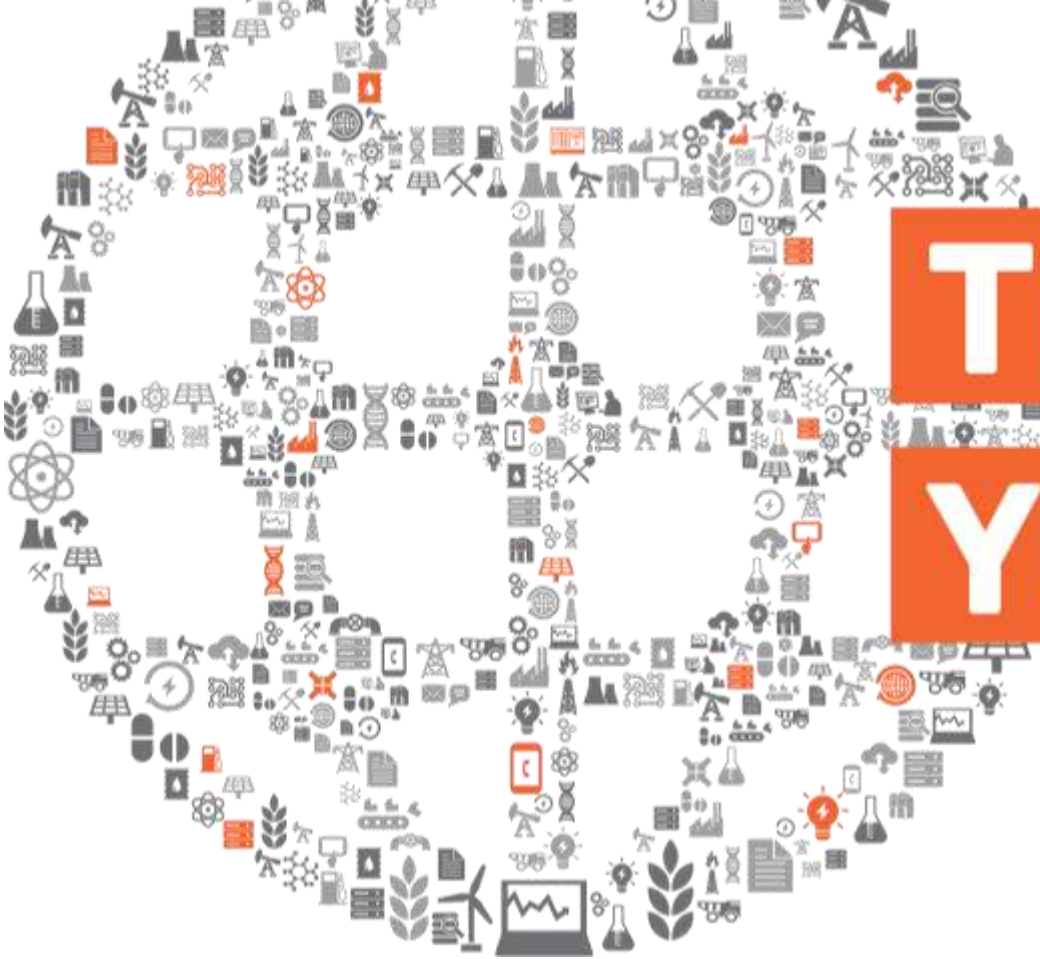
✓**RESULTS: Improvements in sustainability management with large operational cost reductions**

Osvaldo Bascur

osvaldo@osisoft.com

Global MMM Industry Principal

OSIsoft, LLC



THANK YOU

Brought to you by

OSIsoft.