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**UC**2010

**Real Time Information** — Currency of the New Decade

Hilton San Francisco Union Square | San Francisco, CA

**April 26-28, 2010**



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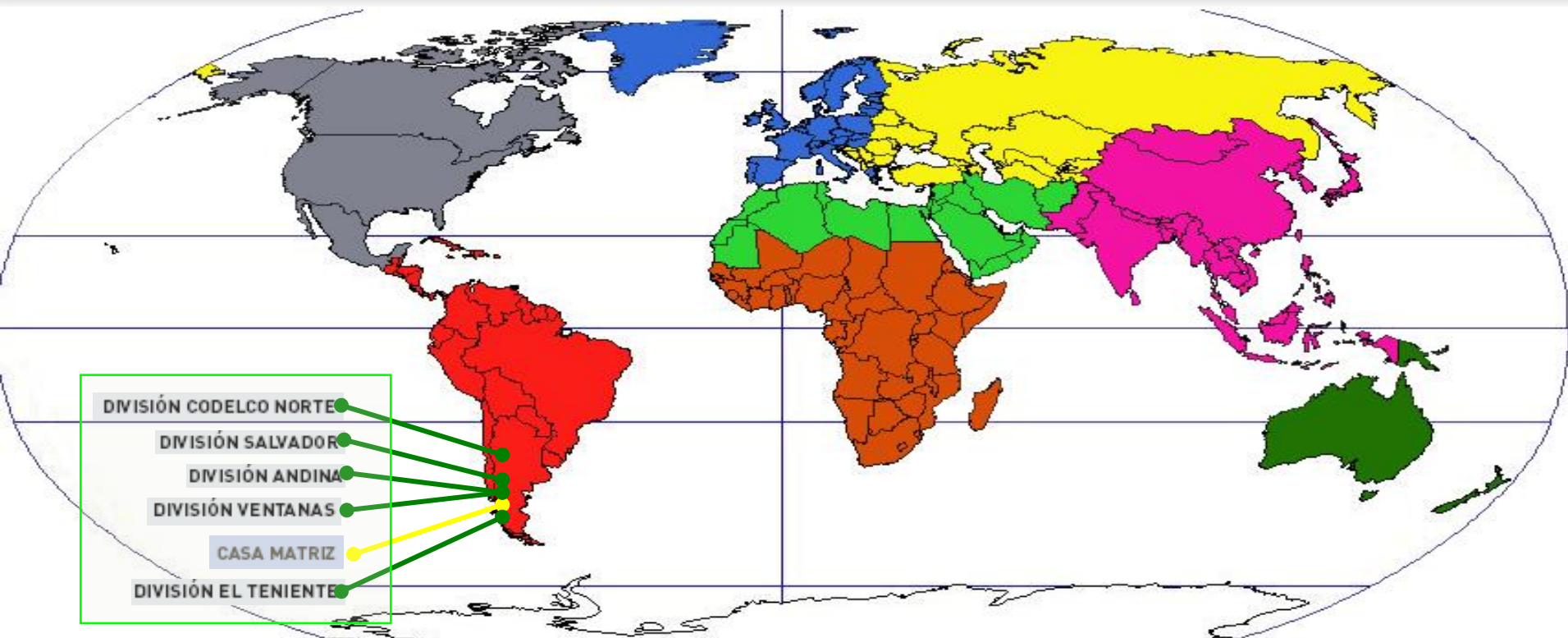
UC2010

**Real Time Information** — Currency of the New Decade

# Codelco Norte online consumption control

Leonel Mundaca P - Automation Leader  
Codelco Chile

April 27 , 2010

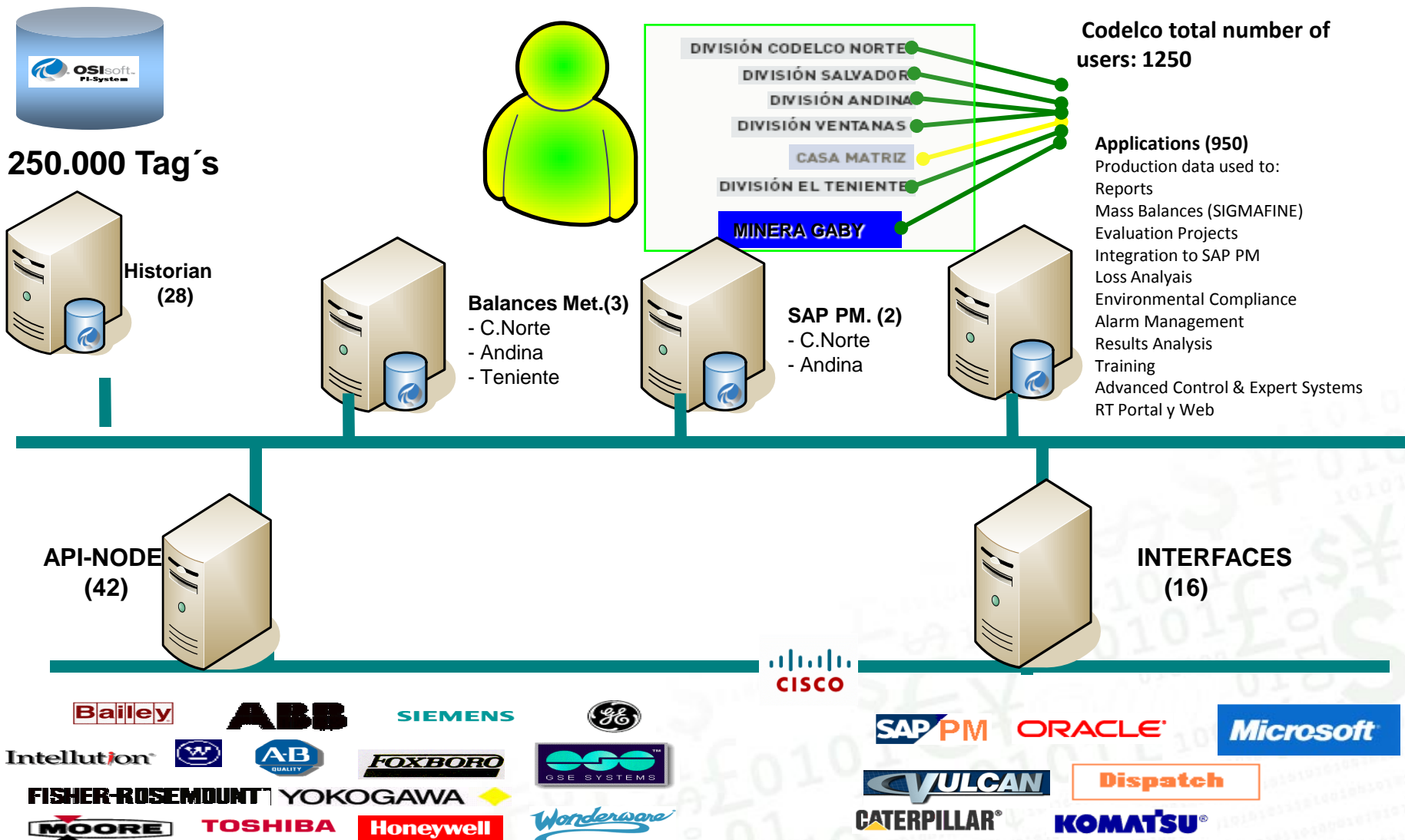


**CODELCO NORTE MINING AREAS ARE LOCATED ON THE SECOND REGION IN CHILE, 230 KM FROM ANTOFAGASTA CITY, AT 2.900 METERS OF MEDIUM ALTITUDE**

**CODELCO NORTE PRODUCTION LINES ARE:**

- **COPPER CONCENTRATE.**
- **MOLIBDEN CONCENTRATE**
- **COPPER ANODE**
- **COPPER CATHODE**
- **SULPHURIC ACID**







Not Implemented



Implemented

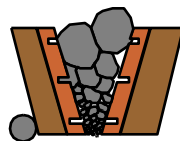


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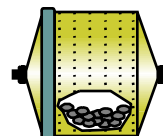
## SULFURE LINE – MINE CONCENTRATOR



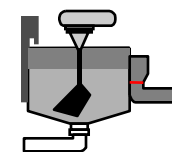
SULFUR  
MINE



CRUSHER



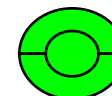
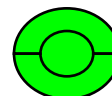
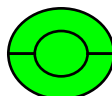
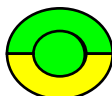
GRIND



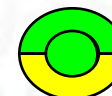
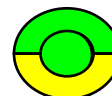
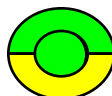
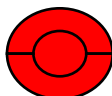
FLOTATION



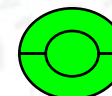
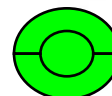
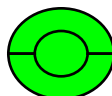
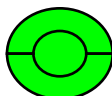
Codelco Norte



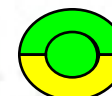
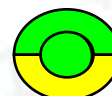
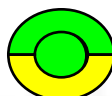
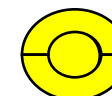
Codelco Salvador



Codelco Andina



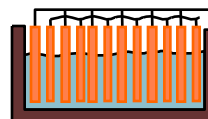
Codelco Teniente



## SULFURE LINE – SMELTER & REFINERY

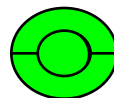
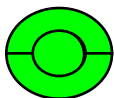


SMELTING

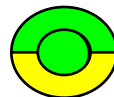
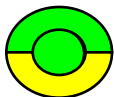


REFINERY

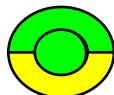
Codelco Norte



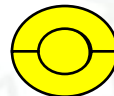
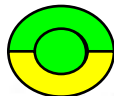
Codelco Salvador



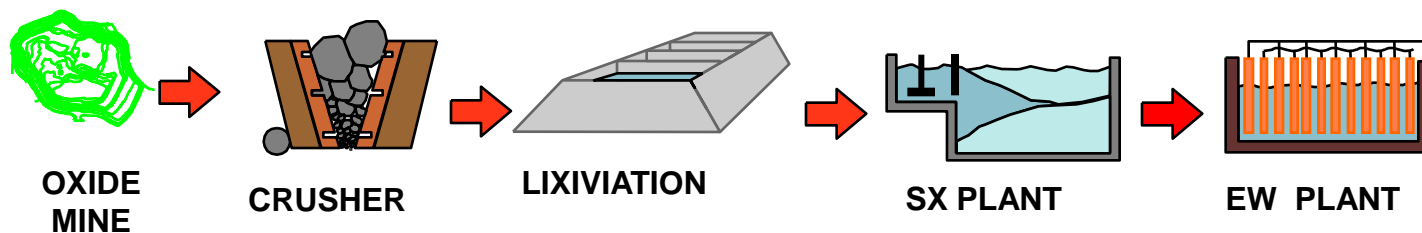
Codelco Teniente



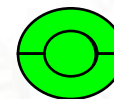
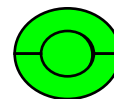
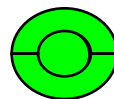
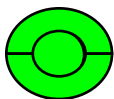
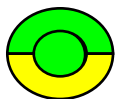
Codelco Ventanas



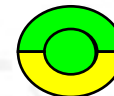
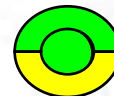
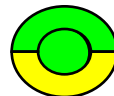
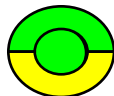
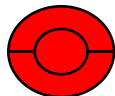
## TRADITIONAL HIDROMETALLURGICAL LINE



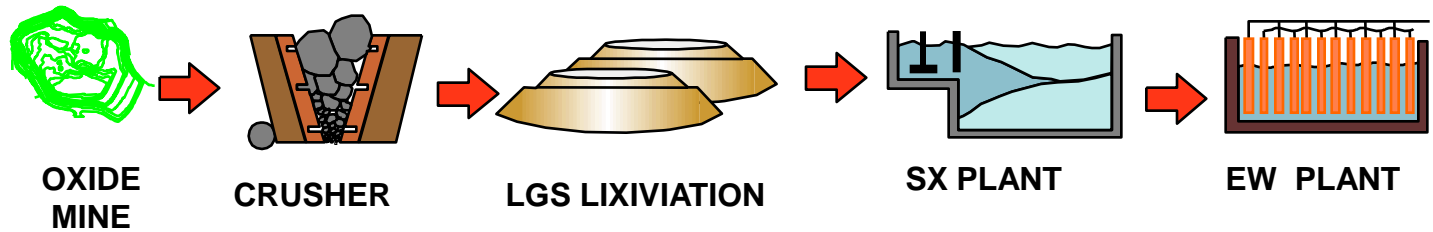
Codelco Norte (HS)



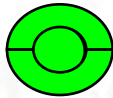
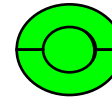
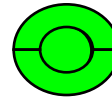
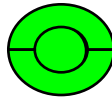
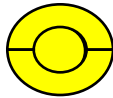
Codelco Salvador



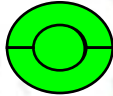
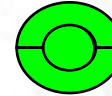
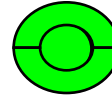
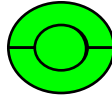
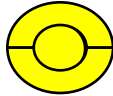
## MODERN HIDROMETALLURGICAL LINE



Codelco Norte (HN)



Minera Gaby





# ONLINE CONSUMPTION CONTROL

## PI WEBPARTS APPLICATION FOR CODELCO NORTE

## Old Way Operation vs New Way:

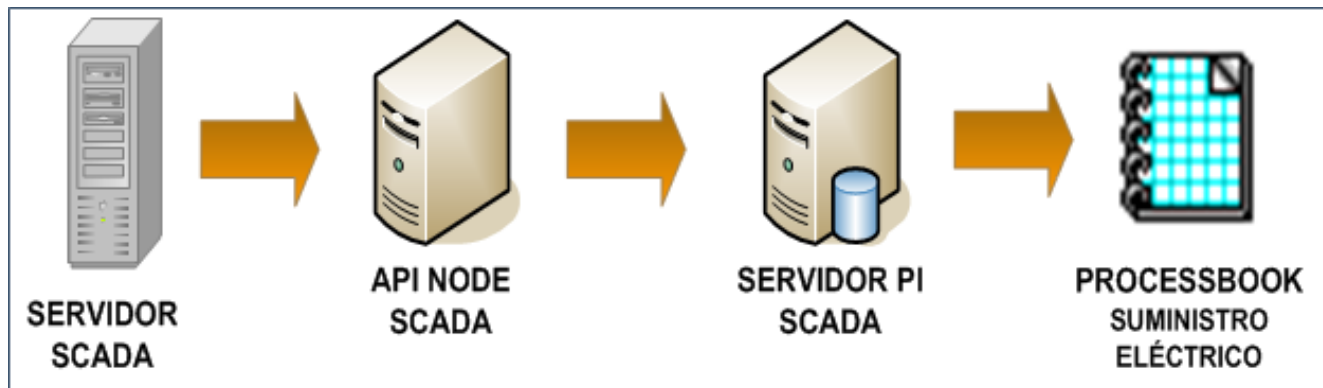
- Before this project, all consumption reports were generated monthly and no action was taken on time during the production cycle
- Major issues: consumption information data errors or data missing
- Consumption control was difficult and required many hour of specialized professionals
- Online process efficiency was imposible to calculate

## Benefits

- **Efficiency Increase:** exact consumption data is available for each process
- **Productivity Increase:** people are working with information and not working on generating data
- **Faster Response Time:** online information available allowing fast action
- **Cost Saving:** processes pay only for the exact consumption, not a penny more... nor less
- **Improved Quality:** estimated less impurities in the final product

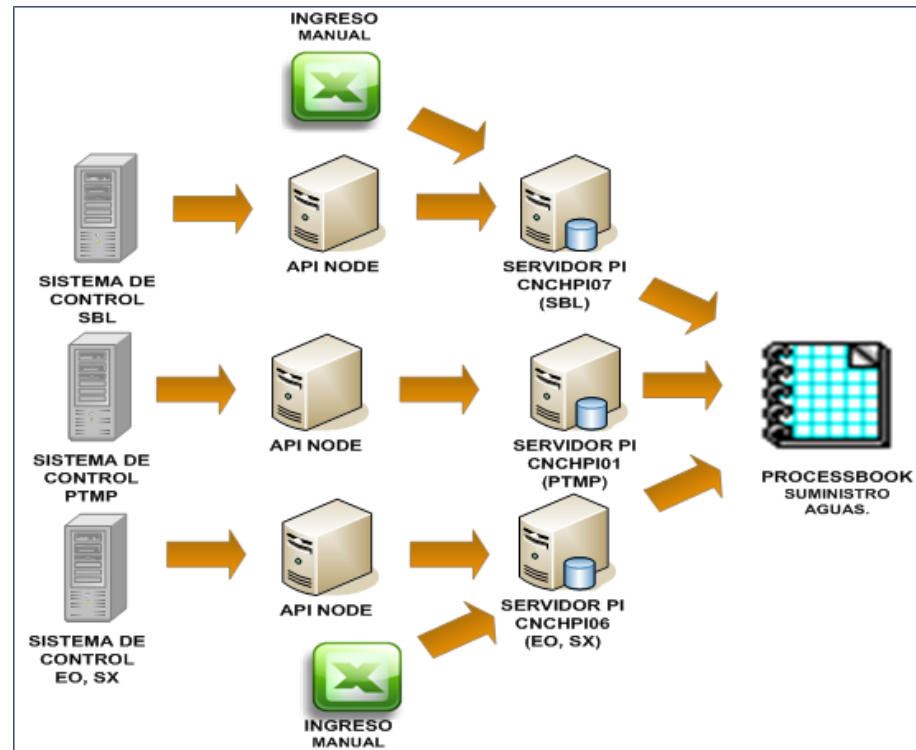
# Electrical Power

## Information Flow



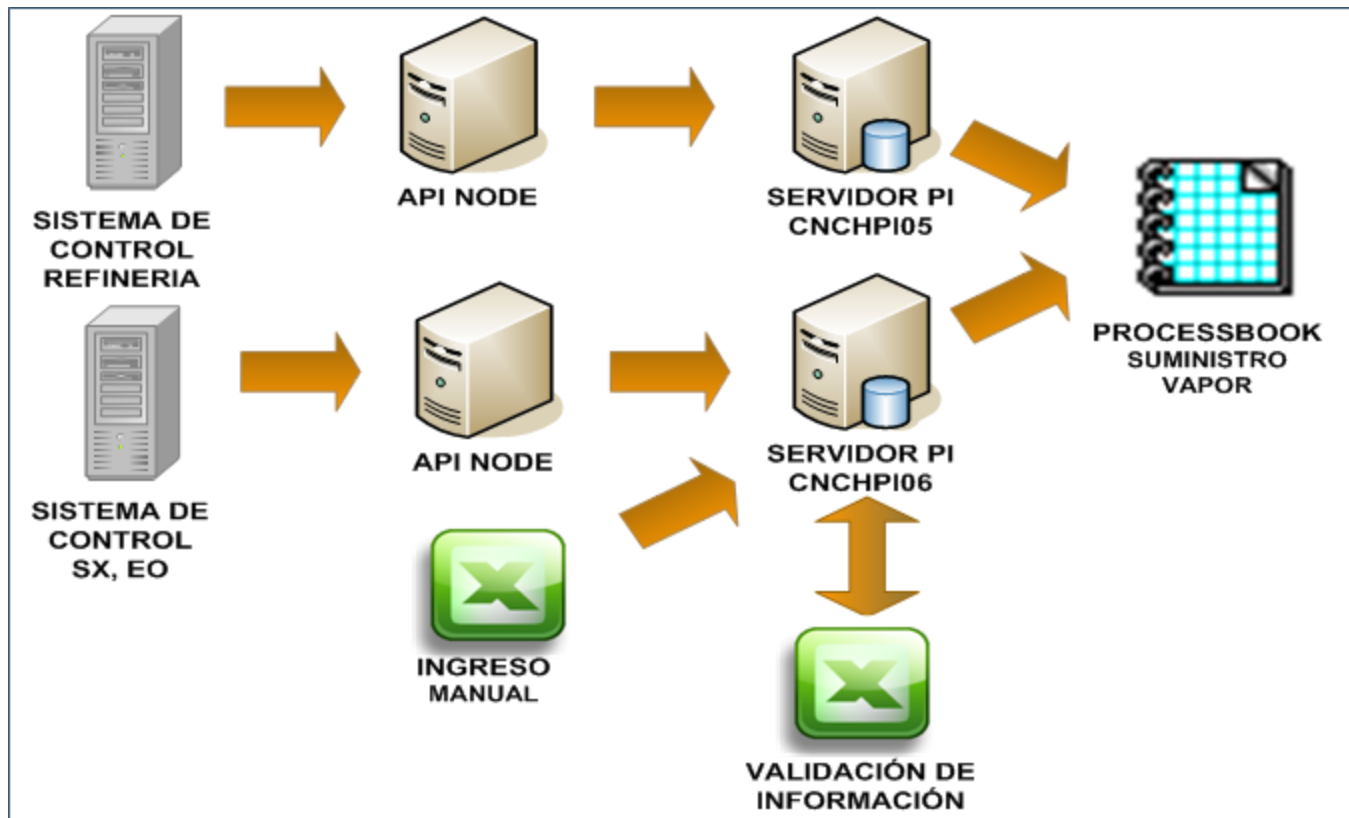
# Water

## Information Flow



# Steam

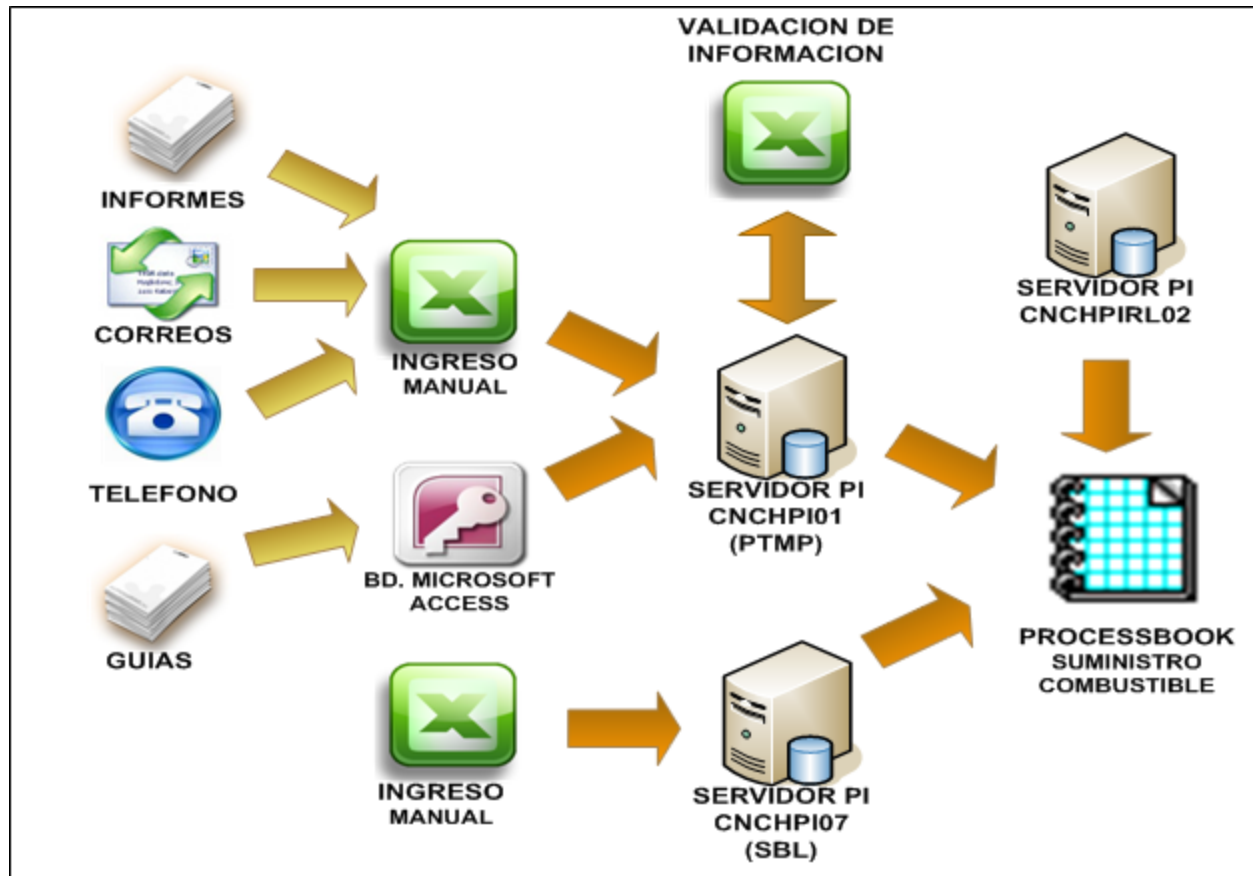
## Information Flow





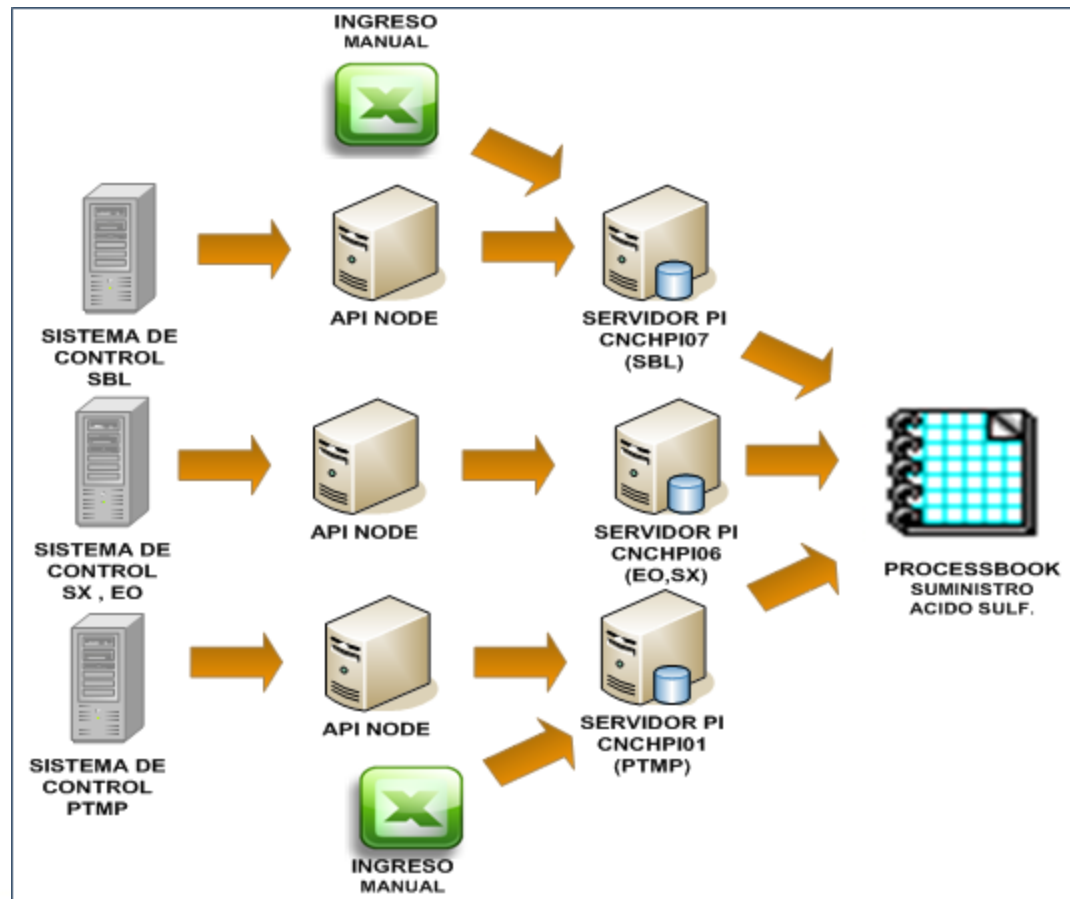
# Fuel

## Information Flow



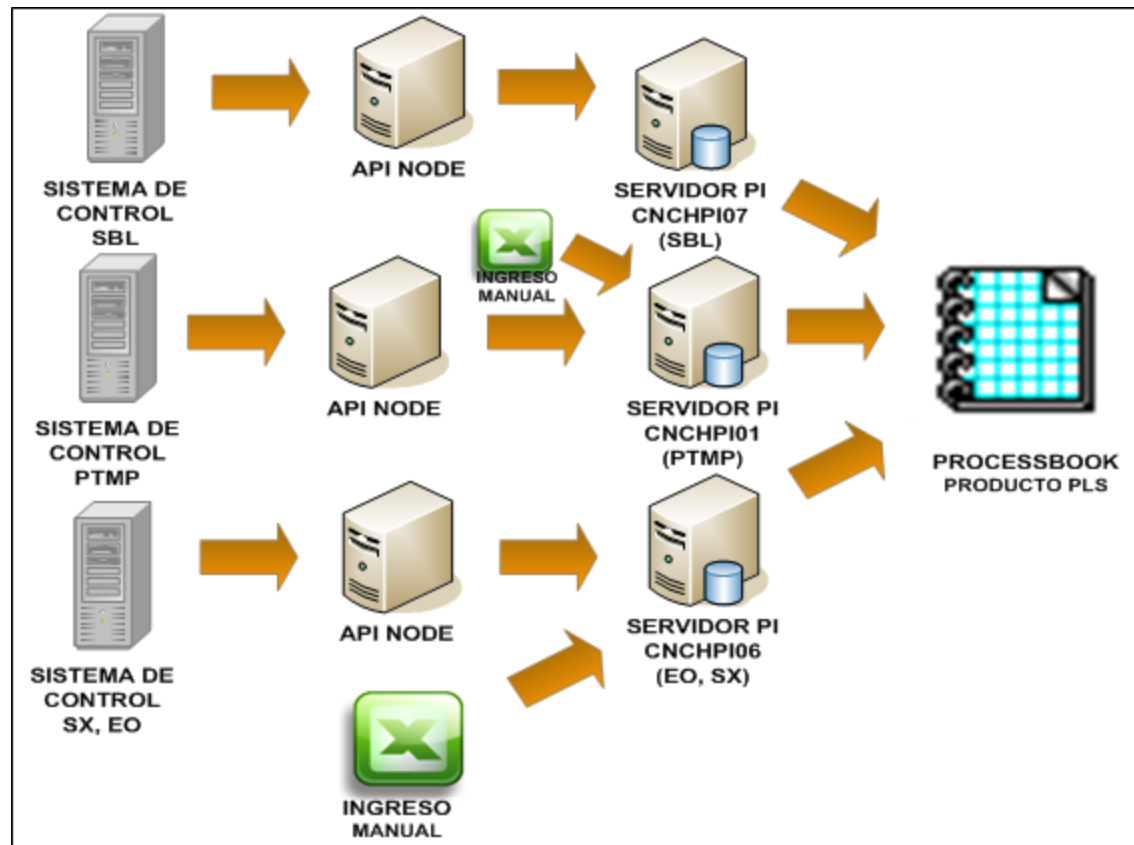
# Sulphuric Acid

## Information Flow

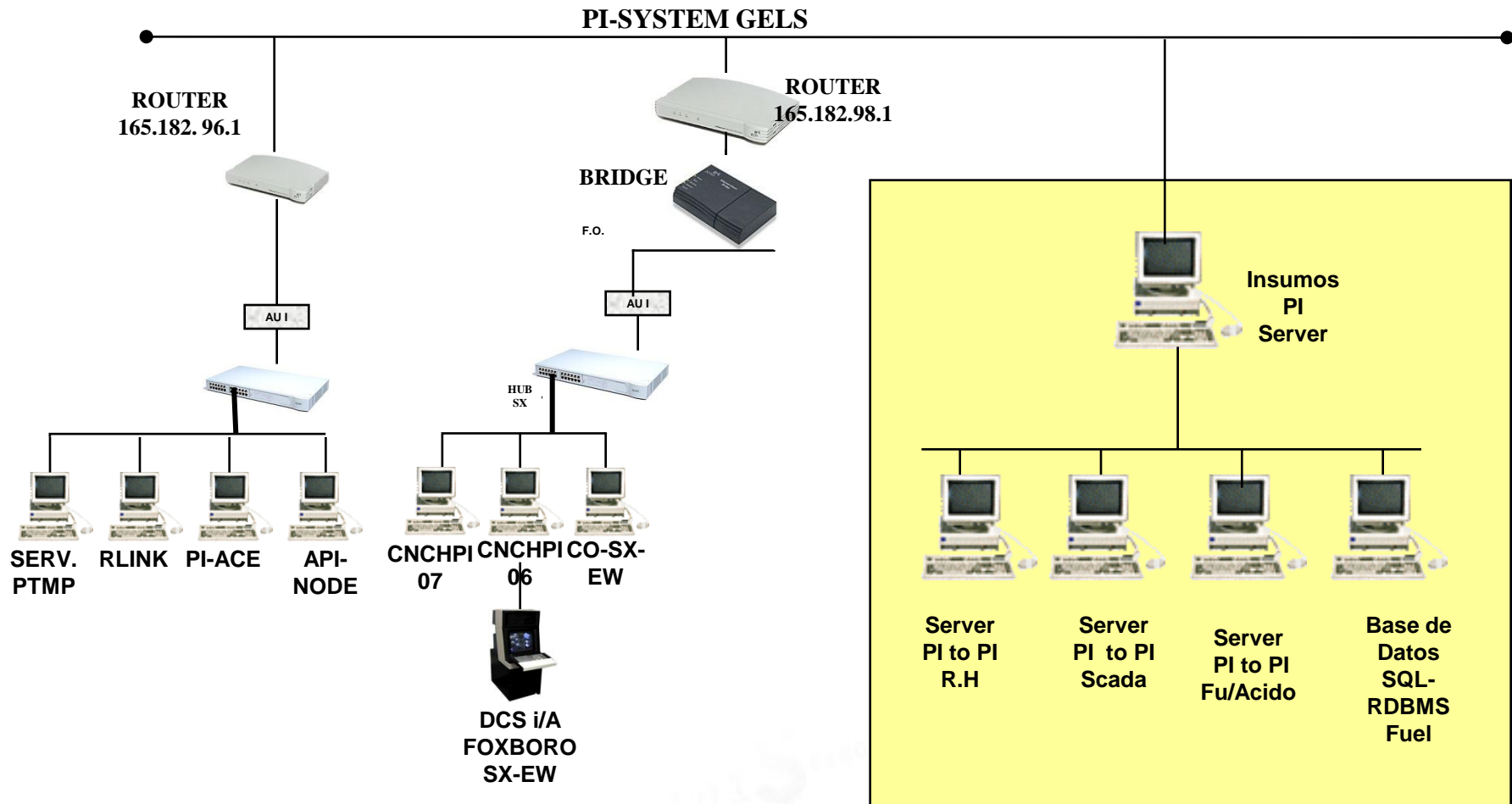


# Reactive PLS

## Information Flow



# IMPLEMENTED ARCHITECTURE



# ONLINE G.E.L.S. SYSTEM

G.E.L.S.
Welcome Oliva Perez Cristian Pablo (Cont... | My Site | My Links |

G.E.L.S.

All Sites
Advanced Search

G.E.L.S.
Despliegues en Línea
Suministros en Línea

View All Site Content

**Proceso**

- Tonelaje Apilado Día
- Flujo PLS a POND 2
- Alimentación Tren A
- Alimentación Tren B
- Cobre en PLS a SX
- Refino Tren A - B
- Eficiencia Tren A - B

**Reportes**

- S.I.M.P.

G.E.L.S.

GERENCIA DE EXTRACCIÓN Y LIXIVIACIÓN SUR

CODELCO Norte

Descripción	Fecha/Hora	Valor Actual	Unidad de Ing.	Tendencia
Tonelaje Apilado Día	30-03-2010 15:47:00	2172,30	TON	\\cnchpi01\200WQITOTAL_DIA
FLUJO BOOSTER POZO SX	30-03-2010 15:47:07	1351,20	M3-H	\\cnchpi06\SX-LX-FIT-688B
FLUJO SOLUCION TREN A	30-03-2010 15:47:07	1049,68	M3-H	\\cnchpi06\SX-TA-E1A-F1-3705
FLUJO SOLUCION TREN B	30-03-2010 15:47:07	1050,62	M3-H	\\cnchpi06\SX-TB-FIK-1710
Cu ALIMENTACION SX	30-03-2010 11:00:00	8,43	G/L	\\cnchpi06\SX-TB-CU-716_M
Cu REFINO TREN A	30-03-2010 11:00:00	0,59	G/L	\\cnchpi06\SX-TB-CU-719_M
Cu REFINO TREN B	30-03-2010 11:00:00	0,61	G/L	\\cnchpi06\SX-TB-CU-721_M
PROMEDIO EFIC EXT TA	30-03-2010 15:40:47	93,00	%	\\cnchpi06\SX-EF-EX-730_C
PROMEDIO EFIC EXT TB	30-03-2010 15:41:47	93,48	%	\\cnchpi06\SX-EF-EX-731_C

**Sitios Corporativos**

- Portal Codelco
- S.I.G.R.I
- Personático
- Vitrina Documental GELS
- Sistema Control Tiempo
- 30GSAW Control Despacho de Camiones EIMS
- Detalle de Despliegues
- SAP
- G.E.L.S.

**Descargas**

- Convertir Excel 2007 a 2003
- Adobe SVG Viewer 3.0
- Manual de Usuario

**Sitios de Interés**

- Cochilco
- Traductor en Línea
- Diario Estrategia
- Emol
- Mercurio Calama
- Google
- Sitios.d





G.E.I.S.

All Sites

Advanced Search

G.E.I.S. Despliegues en Línea Suministros en Línea

G.E.I.S. &gt; Páginas &gt; Suministros en Línea



## Suministros en Línea

Despliegues Suministros - RiPortal

1.- Ácido Sulfúrico

2.- Aguas

3.- Combustibles

4.- Energía Eléctrica

5.- Vapor

6.- Scaid

7.- PLS

Ingrese Fecha

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End Time =

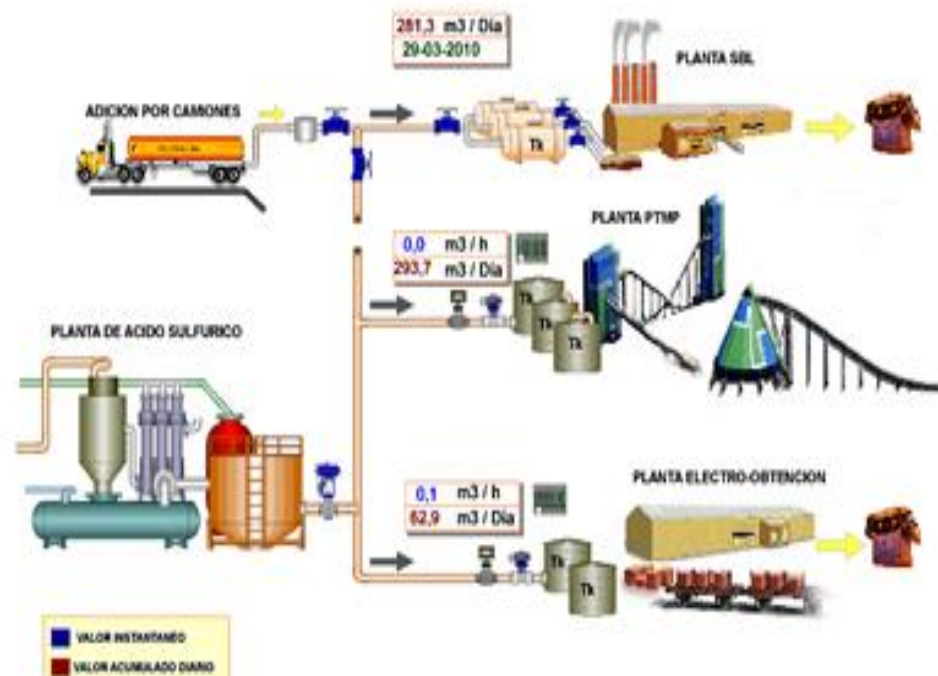
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⏪

⏩

## GENERAL DE ÁCIDO SULFÚRICO GELS





## Suministros en Línea

### Despliegues Suministros - RtPortal

- 1.- Acido Sulfúrico
- 2.- Aguas
- 3.- **Combustibles**
- 4.- Energía Eléctrica
- 5.- Vapor
- 6.- Scald
- 7.- PLS

Ingrese fecha

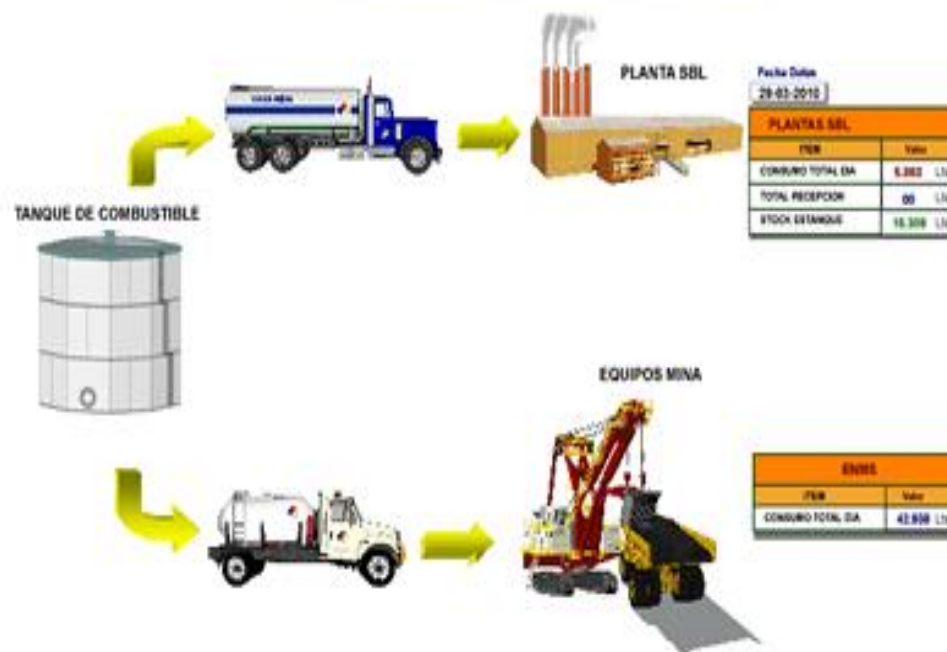
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### SUMINISTRO COMBUSTIBLE DIAGRAMA GENARAL



Paginas - Suministros en Línea - Windows Internet Explorer


http://cnchpipo01/Paginas/Suministros%20en%20Línea.aspx

Archivo Edición Ver Favoritos Herramientas Ayuda


Ad hoc SVG - Diálogo de página web

OSIsoft Start  End  Apply ( ) << >> Ad hoc Trend


### CONSUMO RELEVANTE DE COMBUSTIBLE EN ENMS




CAMIONES DE EXTRACCION	
CARGA DE COMB.	Valor
TOTAL DIA	41.515 Lts
TOTAL MES	0,000 Lts
Por MATERIAL TRANSP.	3,90 Ton/Lts
Por DIST. RECORRIDA	0,13 Km/Lts




CAMIONES REGADORES	
CARGA DE COMB.	Valor
TOTAL DIA	0,000 Lts
TOTAL MES	0,000 Lts
Por DIST. RECORRIDA	0,000 Lts/Km



CARGADORES FRONTALES	
CARGA DE COMB.	Valor
TOTAL DIA	1,423 Lts
TOTAL MES	0,000 Lts
Por MATERIAL CARGADO	34,57 Ton/Lts
Por DIST. RECORRIDA	0,00 Lts/Km



PALAS	
CARGA DE COMB.	Valor
TOTAL DIA	0,000 Lts
TOTAL MES	0,000 Lts
Por MATERIAL CARGADO	0,000 Lts/Ton



RETROEXCAVADORAS	
CARGA DE COMB.	Valor
TOTAL DIA	0,000 Lts
TOTAL MES	0,000 Lts

Inicio Bandeja de entrada - Mic... UC 2010\_Codelco\_LMP... ETAPA DE EJECUCION O... Microsoft PowerPoint - [...] Paginas - Suministros... ES 16:36



## Suministros en Línea

### Despliegues Suministros - RtPortal

- 1.- Aodo Sulfúrico
- 2.- Aguas
- 3.- Combustibles
- 4.- **Energía Eléctrica**
- 5.- Vapor
- 6.- Scald
- 7.- PLS

Ingrese Fecha

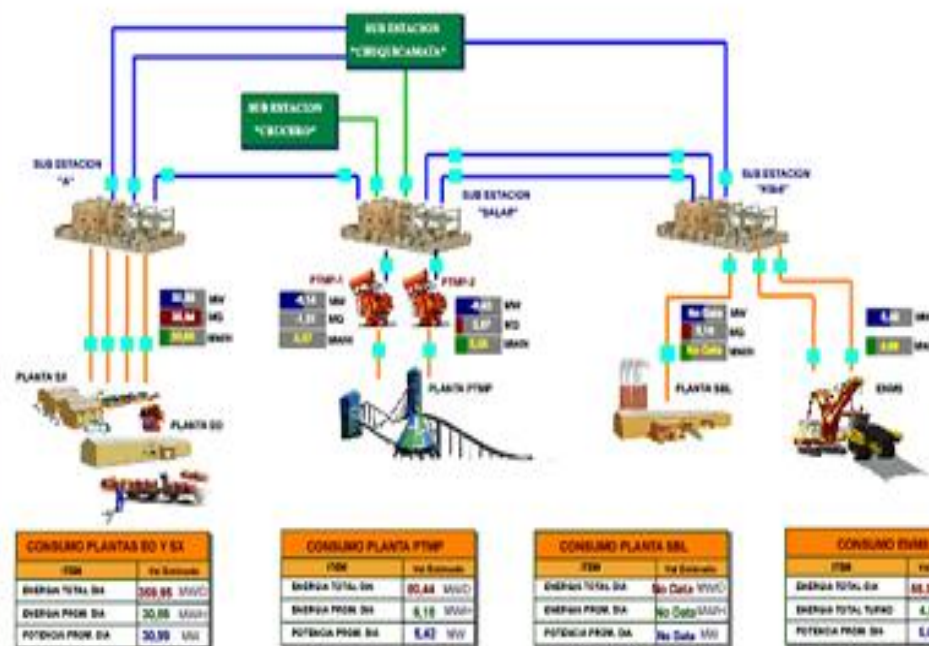
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End Time =

Apply



### DIAGRAMA GENERAL DE ENERGIA ELECTRICA







G.E.I.S.

All Sites

Advanced Search

G.E.I.S. Despliegues en Línea Suministros en Línea

G.E.I.S. &gt; Páginas &gt; Suministros en Línea



## Suministros en Línea

Despliegues Suministros - RI Portal

- 1.- Ácido Sulfúrico
- 2.- Aguas
- 3.- Combustibles
- 4.- Energía Eléctrica
- 5.- Vapor
- 6.- Scaid
- 7.- PLS

Ingrese Fecha

Start Time \*-1d

End Time \*

Apply



## DIAGRAMA GENERAL DE VAPOR EW





## Despliegues Suministros - RtPortal

- 1.- Ácido Sulfúrico
- 2.- Aguas
- 3.- Combustibles
- 4.- Energía Eléctrica
- 5.- Vapor
- 6.- Sólido
- 7.- PLS

Ingrese fecha

Start Time 

End Time

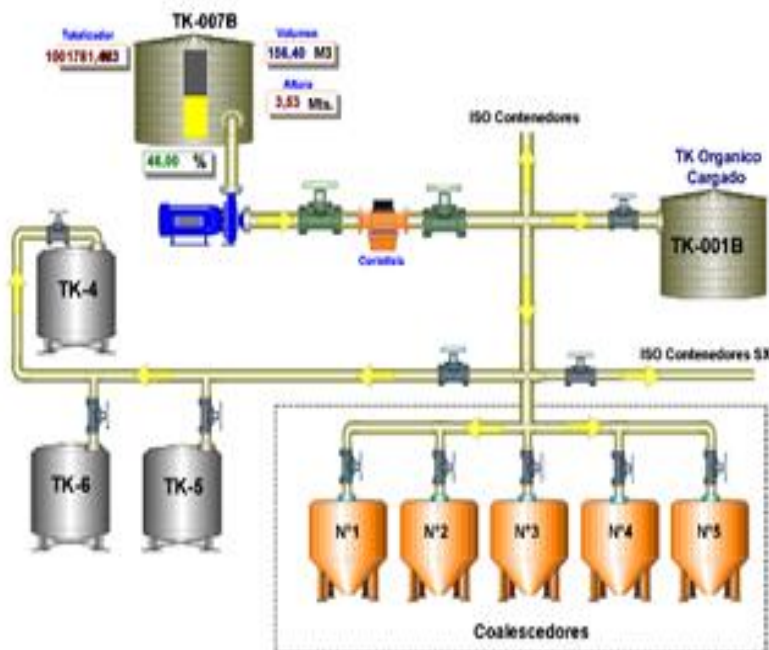
Apply

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## SCAID-100 PLANTA SX





**G.E.L.S.**

All Sites



Admitted Search

Despliegues en Línea

### Suministros en Línea

G.E.L.S. > Páginas > Suministros en Línea



## Suministros en Línea

Ingreso Fecha

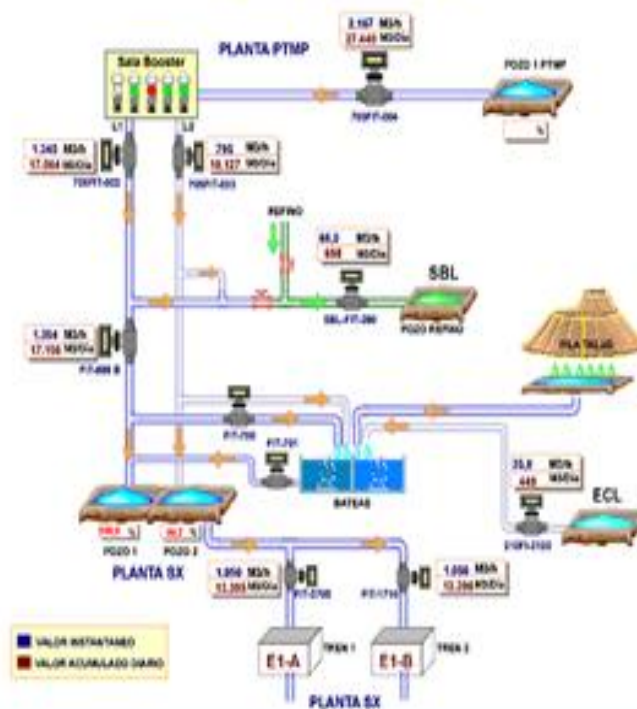
Start Time 

End Time

Apply



DIAGRAMA GENERAL "PLS"



- VAL (IN INSTRUCTIONS)
- VAL (IN ALLOCATED CIPHER)



**OSIsoft®**

**UC2010**

**Real Time Information** — Currency of the New Decade

**Thank you**