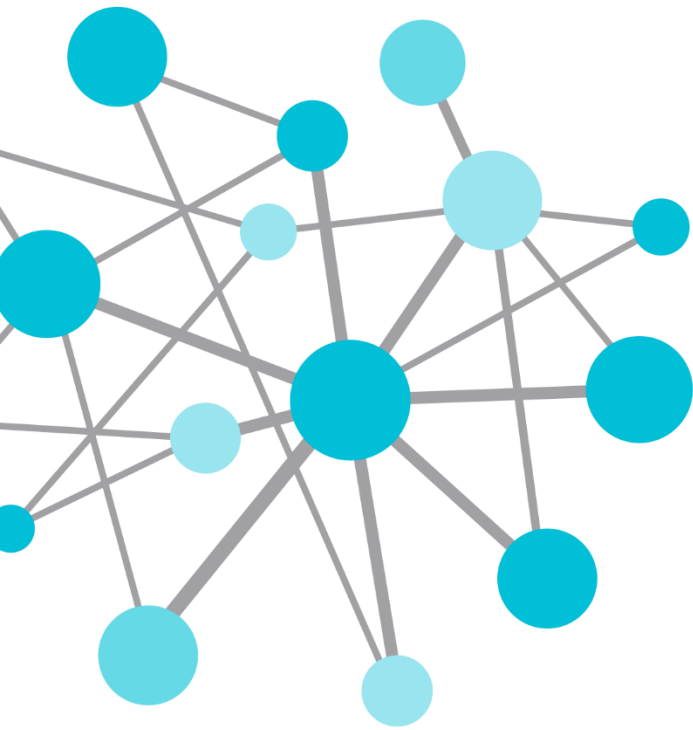




# Brewing a better future at Heineken Seville using the PI System Infrastructure

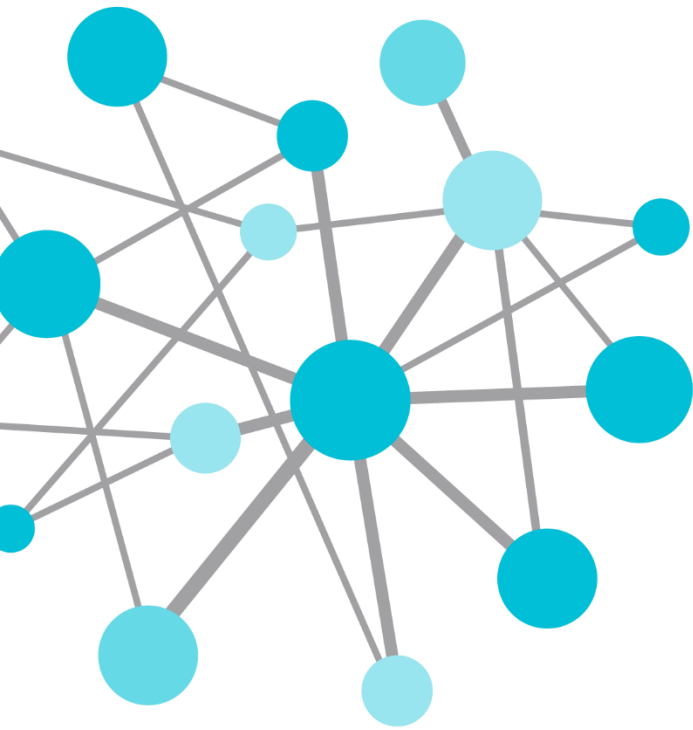
Presented by **Consuelo Carmona Miura**

Energy Capabilities Project Lead – Heineken Western Europe Region



# Agenda

- Heineken
- Sustainability challenges
- Solution
- Results
- Future Plans



# Agenda

- Heineken
- Sustainability challenges
- Solution
- Results
- Future Plans

# HEINEKEN | Proud, Independent, Responsible Global Brewer

## The world's most international brewer

- No 1 in Europe and No 2 in the world by revenue
- Operations in over 70 countries globally

## Brewing great beers, building great brands

## Committed to surprising and exciting consumers everywhere

## Long and proud history and heritage



# HEINEKEN | Brewing Great Beers, Building Great Brands

Heineken®, our flagship brand, is the world's leading international premium beer

Desperados, Sol, Affligem and Strongbow Apple Ciders complement our global brand portfolio

Altogether, we have over 250 international premium, regional, local and specialty beers and ciders in our portfolio

Passion for quality and Innovation are at the heart of how we build great brands and delight our consumers



# HEINEKEN | Truly Global Presence



>165 breweries in  
over 70 countries

>85,000 employees

>Group Beer  
Volume\* in 2013:  
195.2 million hl

The world's most international brewer

- No 1 in Europe and No 2 in the world by revenue





# Shaping Our Future | Our Global Priorities

- 1 **Grow the Heineken® brand**
- 2 **Be a consumer-inspired, customer-oriented, brand-led organisation**
- 3 **Capture the opportunities in emerging markets**
- 4 **Leverage the benefits of HEINEKEN's global scale**
- 5 **Drive personal leadership**
- 6 **Embed and Integrate Sustainability**



# Priority 6 | Embed and Integrate Sustainability

## Sustainability is a critical part of how we do business

- 10-year integrated sustainability programme launched in 2010
- On track to meet 2020 goals

## Highlights of 2012:

- Continued progress water and energy efficiency of our breweries, offices and warehouses
- 93% of our new fridges are green
- Local sourcing projects in 10 countries across Africa, benefiting more than 100,000 farmers and their families
- Global Industry Commitment to a new series of targeted actions to reduce alcohol related harm
- Our Supplier Code signed by 528 global and more than 34,000 local suppliers

Our business priority



Embed and  
integrate  
sustainability

Our strategy

**Brewing a  
Better Future**

Our focus



Water



CO<sub>2</sub>



Sourcing



Responsible  
Consumption

Our ways of working



Values and  
Behaviours







# Agenda

- Heineken
- Sustainability challenges
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- Future Plans

# Sustainability

## What does this mean for HEINEKEN?

- Part of our **DNA**; embedded in our Company values that guide how we relate to the world
- **Historical** commitment
- **One of our business priorities** in our Strategy to Win
- Considering **long-term** impact of our actions, not just short-term growth
- A tremendous opportunity to “**do good while doing good business**”



# The most urgent challenges faced by our industry and our planet

**W**

2020

Specific water consumption

Reduce by 25% to 3.7 hl/hl<sup>1</sup>

**Th**

Water balancing

Significant water balancing in water scarce and distressed areas

Protecting water resources

le. We need water to grow crops

atures and sea levels to rise.

materials and other resources.

**Popu**

2020

In production

Reduce by 40%<sup>1</sup> (eq 6.4 kg CO<sub>2</sub>/hl)

**Alco**

In fridges

Reduce by 50%

In distribution

Reduce by 20%<sup>2</sup> in Europe and the Americas

Reducing CO<sub>2</sub> emissions

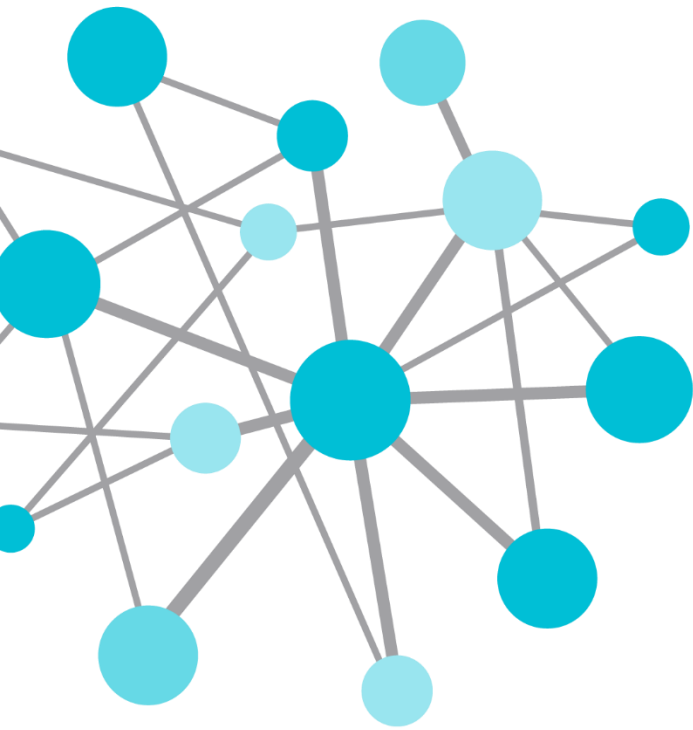
and sourcing more important

ply of raw materials.

is is damaging to the

and HEINEKEN's reputation.





# Agenda

- Heineken
- Sustainability challenges
- **Solution**
- Results
- Future Plans

# Seville Brewery



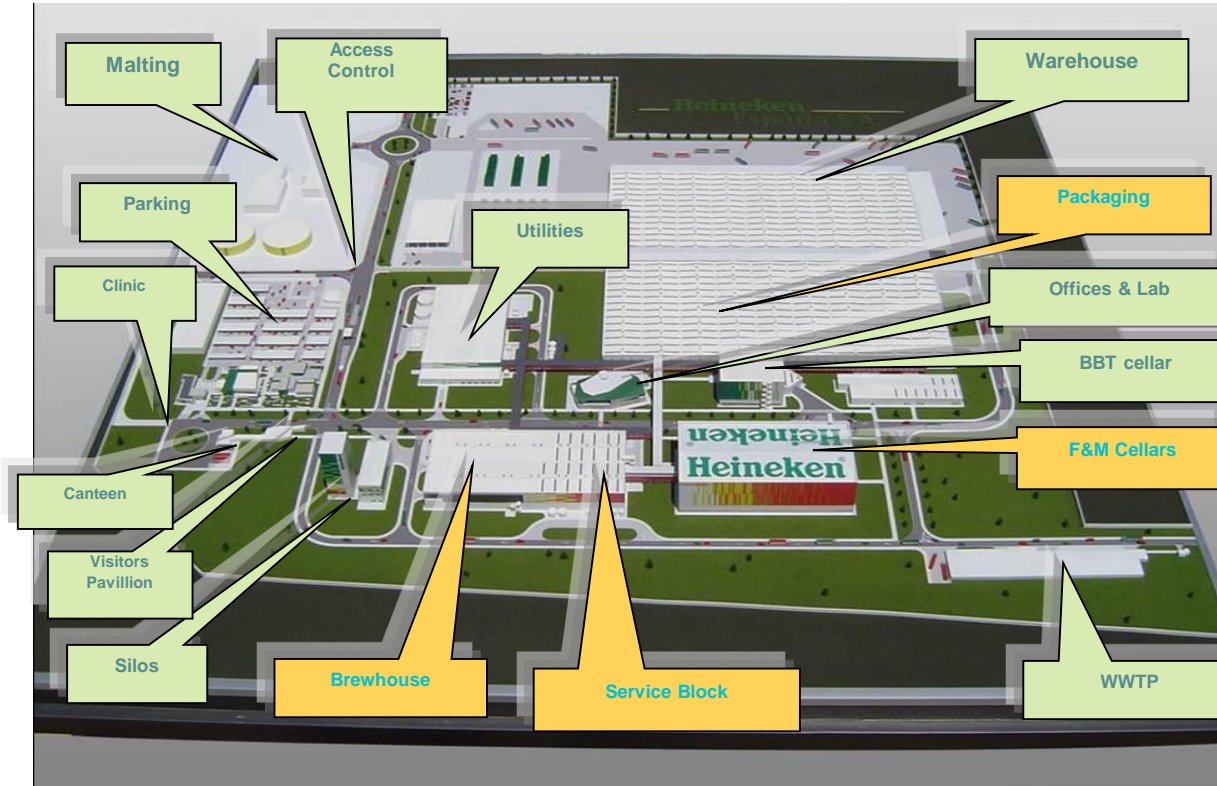
- **Water:** 3,6 hl/hl
- **Electricity:** 7,3 kwh/hl
- **Thermal Energy:** 55 MJ/hl

- **Leader in technological innovation & efficiency**
- **Capacity: 5 Mill Hls**
- **Brewhouse: 2 lines: 20.000 hl/day**
- **Cellar with 90 tanks (71 FVs + 19 BBTs)**
- **Beer Filtration: 2 lines: 1.200 hl/h**
- **Packaging:**
  - **2 Keg lines**
  - **1 Can line**
  - **5 Bottle lines**





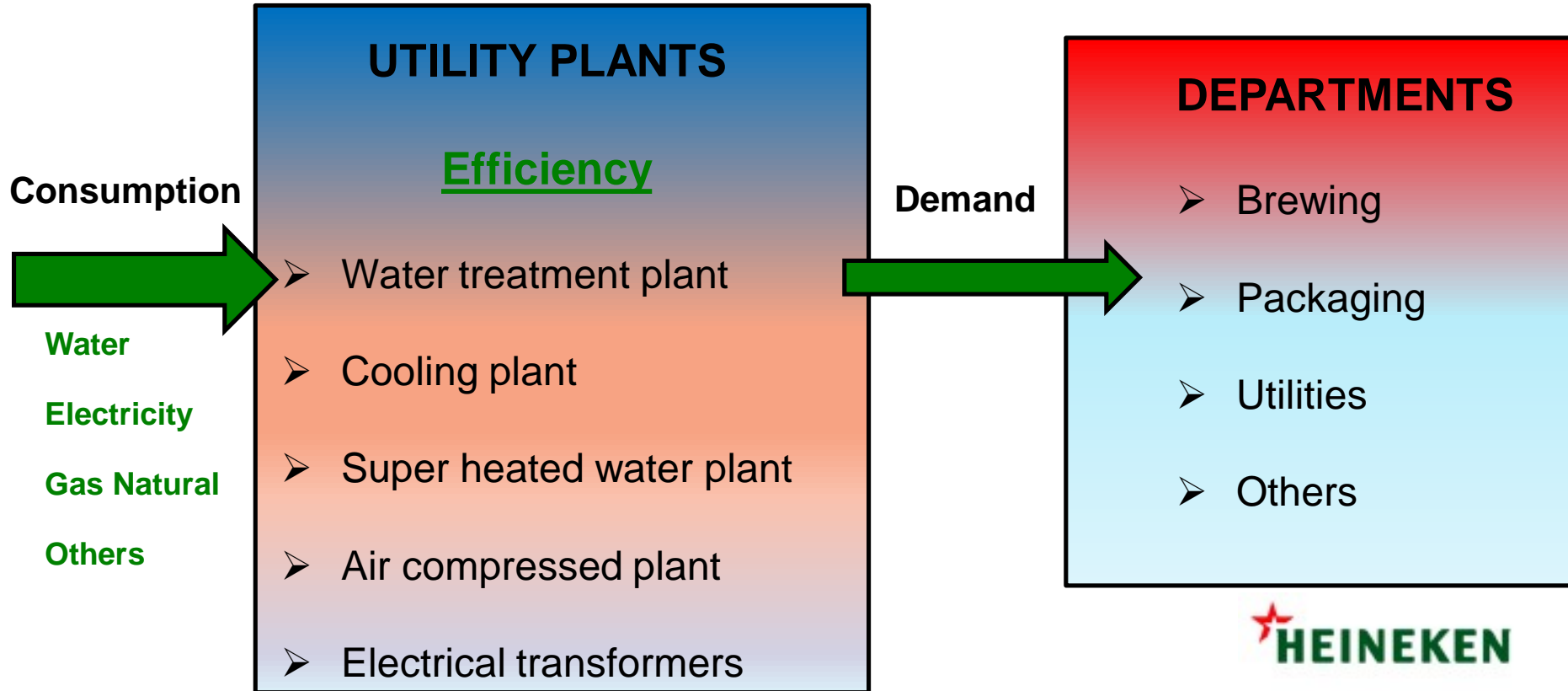
# Water and Energy Users



- **Water** consumption (hl/hl)
- **Electricity** consumption (kwh/hl)
- **Compressed air** consumption (Nm3/hl)
- **Cooling** consumption (MJ/hl)
  - Alcohol water (-5 °C)
  - Chilled water (3 °C)
- **Thermal Energy** consumption (MJ/hl) (gas natural and biogas)
  - Super heated water (160 °C – 13 bar)



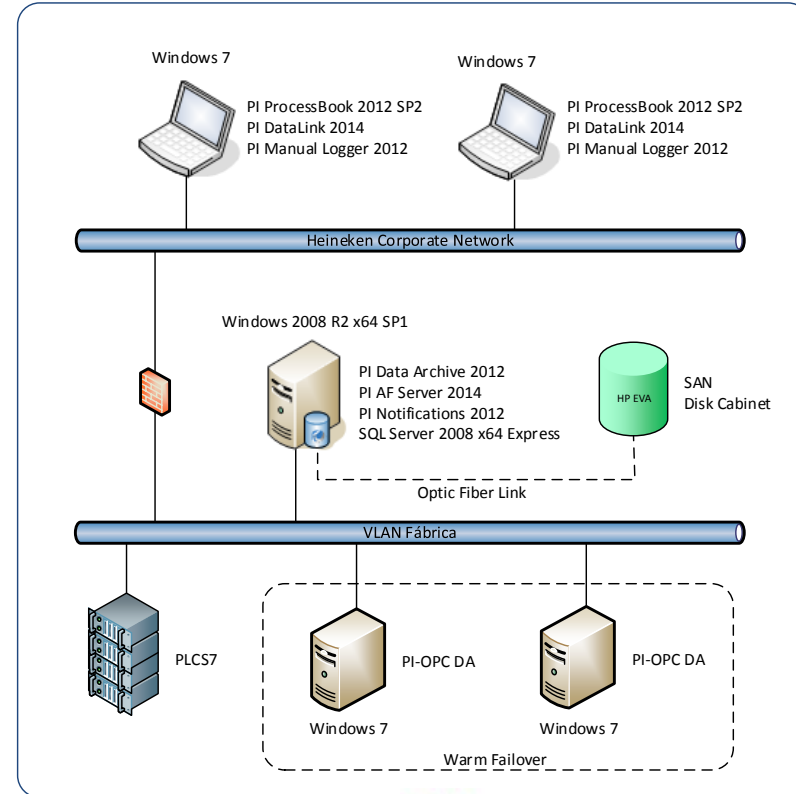
# Consumption = Demand/Efficiency



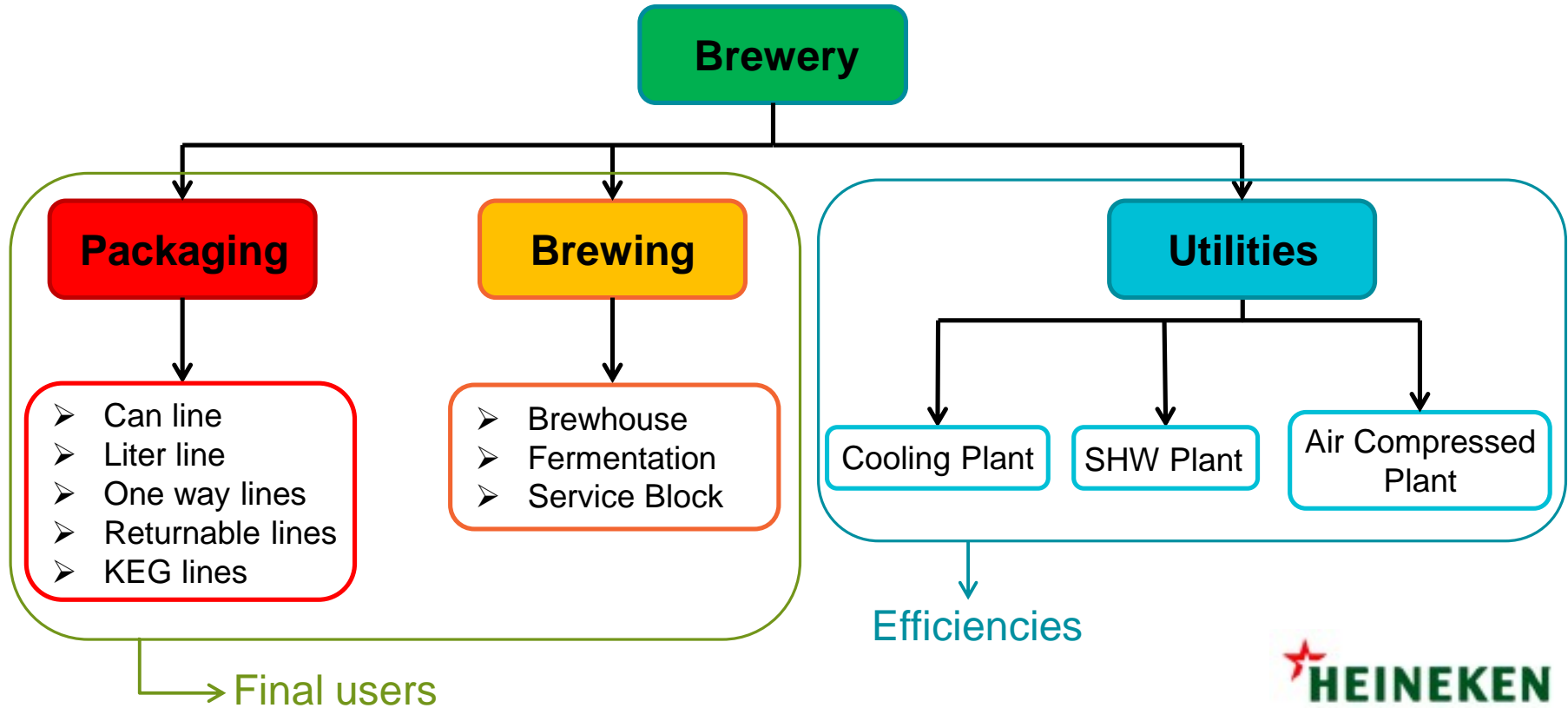
# PI System Architecture

- PI Interface for OPC DA in HA
- PI Asset Framework
- PI Notifications
- PI Manual Logger
- PI ProcessBook
- PI DataLink

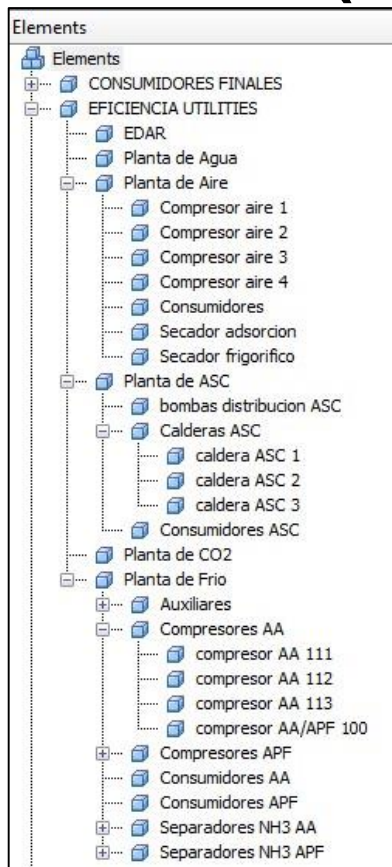
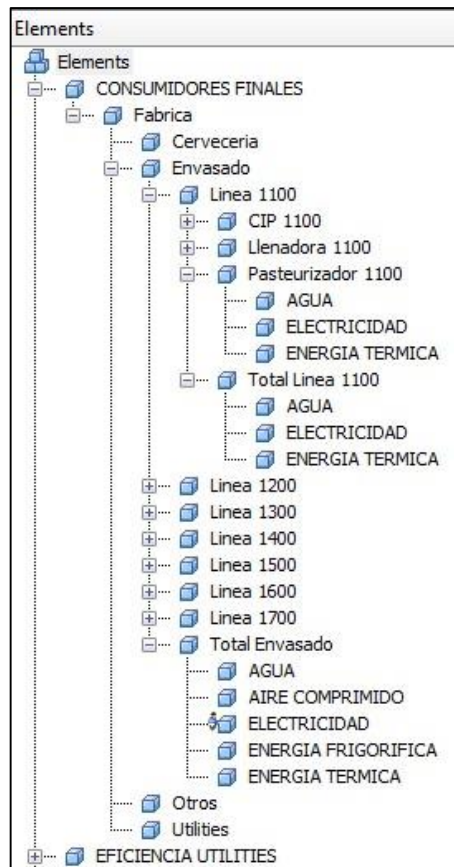
## Heineken Physical Network



# PI Asset Framework



# PI Asset Framework (Element Structure)



➤ **Flexible asset models** that allows us to **organize and structure PI System data and other data** according to:

- **Water, electricity or thermal energy**
- **Departments, areas and equipment (hierarchical models)**





## PI Asset Framework (Attributes to define a machine)

**Elements**

- CONSUMIDORES FINALES
  - Fabrica
    - Cerveceria
      - Envasado
        - Linea 1100
          - CIP 1100
          - Llenadora 1100
          - Pasteurizador 1100
            - AGUA
            - ELECTRICIDAD
            - ENERGIA TERMICA
          - Total Linea 1100
        - Linea 1200
        - Linea 1300
        - Linea 1400
        - Linea 1500
        - Linea 1600
        - Linea 1700
        - Total Envasado
      - Otros
      - Utilities
- EFICIENCIA UTILITIES
- RENDIMIENTO P1
- Element Searches

**ELECTRICIDAD**

General	Child Elements	Attributes	Ports	Analyses	Version
Filter					
Name	Value				
Consumo diario electricidad	6 kWh				
Consumo diario electricidad - Dia Cerrado	15 kWh				
Consumo diario por turnos electricidad	2 kWh				
Consumo mensual electricidad	287 kWh				
Consumo semanal electricidad	30 kWh				
Consumo turno electricidad	2 kWh				
Consumo turno electricidad - Turno Cerrado	5 kWh				
Objetivo ratio electricidad	0 KWh/HL				
Produccion mensual cerveza	96507 HL				
Produccion semanal cerveza	28040 HL				
ratio mensual electricidad	0,002973878 KWh/HL				
ratio mensual electricidad - Mes Cerrado	0 KWh/HL				
ratio semanal electricidad	0,0010699 KWh/HL				
ratio semanal electricidad - Semana Cerrada	0,003187933 KWh/HL				
Totalizador Energia electrica	2179 kWh				

- **Packaging line – pasteurizer machine – electricity, water and thermal energy consumption:**
  - **Real, shift, daily, weekly and monthly consumption**
  - **Monthly and weekly ratios**  
**(ex: kWh/hl beer produced)**



# PI Asset Framework (Attributes to define a process)

Elements	Consumidores AA																																						
<ul style="list-style-type: none"> <li>Elements</li> <li>CONSUMIDORES FINALES</li> <li>EFICIENCIA UTILITIES                             <ul style="list-style-type: none"> <li>EDAR                                     <ul style="list-style-type: none"> <li>Planta de Agua</li> <li>Planta de Aire</li> <li>Planta de ASC</li> <li>Planta de CO2</li> <li>Planta de Frio</li> </ul> </li> <li>Auxiliares                                     <ul style="list-style-type: none"> <li>Compresores AA</li> <li>Compresores APF</li> <li>Consumidores AA</li> <li>Consumidores APF</li> <li>Separadores NH3 AA</li> <li>Separadores NH3 APF</li> </ul> </li> </ul> </li> <li>RENDIMIENTO PI</li> <li>Element Searches</li> </ul>	<div> <div>General</div> <div>Child Elements</div> <div>Attributes</div> <div>Ports</div> <div>Analyses</div> <div>Version</div> </div> <div>Filter</div> <table> <thead> <tr> <th>Name</th><th>Value</th></tr> </thead> <tbody> <tr> <td>Produccion semanal cerveza envasado</td><td>93363 HL</td></tr> <tr> <td>Produccion semanal cerveza fabrica</td><td>97132 HL</td></tr> <tr> <td>Ratio mensual AA Aire acondicionado</td><td>0,02748419 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA BBT y FST 1-3-5-7</td><td>4,596542 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA Cocimiento</td><td>0,3981675 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA Cocimiento - Mes Cerrado</td><td>0,5920979 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA Envasado</td><td>1,191376 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA FST 2-4-6-8</td><td>3,36172 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA planta CO2 y Climatizacion CCM Energias</td><td>0,2720814 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA Service Block</td><td>2,242416 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA total consumidores</td><td>12,25808 MJ frig./HL</td></tr> <tr> <td>Ratio mensual AA total consumidores - Mes Cerrado</td><td>17,11957 MJ frig./HL</td></tr> <tr> <td>Ratio semanal AA Aire acondicionado</td><td>0,011968 MJ frig./HL</td></tr> <tr> <td>Ratio semanal AA BBT y FST 1-3-5-7</td><td>1,586564 MJ frig./HL</td></tr> <tr> <td>Ratio semanal AA Cocimiento</td><td>0,1602263 MJ frig./HL</td></tr> <tr> <td>Ratio semanal AA Envasado</td><td>0,5390586 MJ frig./HL</td></tr> <tr> <td>Ratio semanal AA Envasado - Semana Cerrada</td><td>1,459655 MJ frig./HL</td></tr> <tr> <td>Ratio semanal AA FST 2-4-6-8</td><td>0,79967 MJ frig./HL</td></tr> </tbody> </table>	Name	Value	Produccion semanal cerveza envasado	93363 HL	Produccion semanal cerveza fabrica	97132 HL	Ratio mensual AA Aire acondicionado	0,02748419 MJ frig./HL	Ratio mensual AA BBT y FST 1-3-5-7	4,596542 MJ frig./HL	Ratio mensual AA Cocimiento	0,3981675 MJ frig./HL	Ratio mensual AA Cocimiento - Mes Cerrado	0,5920979 MJ frig./HL	Ratio mensual AA Envasado	1,191376 MJ frig./HL	Ratio mensual AA FST 2-4-6-8	3,36172 MJ frig./HL	Ratio mensual AA planta CO2 y Climatizacion CCM Energias	0,2720814 MJ frig./HL	Ratio mensual AA Service Block	2,242416 MJ frig./HL	Ratio mensual AA total consumidores	12,25808 MJ frig./HL	Ratio mensual AA total consumidores - Mes Cerrado	17,11957 MJ frig./HL	Ratio semanal AA Aire acondicionado	0,011968 MJ frig./HL	Ratio semanal AA BBT y FST 1-3-5-7	1,586564 MJ frig./HL	Ratio semanal AA Cocimiento	0,1602263 MJ frig./HL	Ratio semanal AA Envasado	0,5390586 MJ frig./HL	Ratio semanal AA Envasado - Semana Cerrada	1,459655 MJ frig./HL	Ratio semanal AA FST 2-4-6-8	0,79967 MJ frig./HL
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## ➤ Cooling (alcohol water) consumers:

- Real, shift, daily, weekly and monthly **cooling demand per user**
- Monthly and weekly **ratios** (MJ frig/hl beer produced)
- Target setting



# PI Asset Framework (Attributes to define an utility plant efficiency)

**Elements**

- Elements
  - CONSUMIDORES FINALES
  - EFICIENCIA UTILITIES
    - EDAR
    - Planta de Agua
    - Planta de Aire
      - Compresor aire 1
      - Compresor aire 2
      - Compresor aire 3
      - Compresor aire 4
      - Consumidores
      - Secador adsorcion
      - Secador frigorifico
    - Planta de ASC
    - Planta de CO2
    - Planta de Frio
  - RENDIMIENTO PI
  - Element Searches

**Planta de Aire**

General Child Elements Attributes Ports Analyses Version

Filter

Name	Value
Consumo mensual electricidad secadores	19222 kWh
Consumo semanal aire total consumidores	146719,5 Nm3
Consumo semanal electricidad compresores	24559 kWh
Consumo semanal electricidad planta aire	26518 kWh
Consumo semanal electricidad secadores	1959 kWh
Eficiencia compresores	6,91467 Nm3/h/KW
Eficiencia de planta	6,444524 Nm3/h/KW
Eficiencia diaria compresores	6,180669 Nm3/h/KW
Eficiencia diaria de planta	5,780525 Nm3/h/KW
Eficiencia diaria secadores	89,28665 Nm3/h/KW
Eficiencia mensual compresores	5,909735 Nm3/h/KW
Eficiencia mensual de planta	5,425534 Nm3/h/KW
Eficiencia mensual secadores	66,21935 Nm3/h/KW
Eficiencia secadores	94,7828 Nm3/h/KW
Eficiencia semanal compresores	5,974164 Nm3/h/KW
Eficiencia semanal de planta	5,532827 Nm3/h/KW
Eficiencia semanal secadores	74,8951 Nm3/h/KW
Objetivo Eficiencia compresores	6,25 Nm3/h/KW

➤ **Air compressed plant:**

➤ **Real, daily, weekly and monthly efficiency (Nm3/kw)**



# PI AF (Analysis Type: Expression)

## 1. List of attributes: Attributes required for creating the variable

Name	Value
Consumo diario electricidad total	13782,99 kWh
Consumo diario frio total	49568,38 kWh Frig
Consumo mensual electricidad total	674592,3 kWh
Consumo mensual frio total	2143210 kWh Frig
Consumo semanal electricidad total	62352,28 kWh
Consumo semanal frio total	209447,9 kWh Frig
COP Planta	3,785164 KW frig/KW
COP planta diario	3,596344 KW frig/KW
COP planta mensual	3,177044 KW frig/KW
COP planta semanal	3,359106 KW frig/KW
Objetivo COP	0 KW frig/KW
Potencia electrica total	1082,882 kW
Potencia frigorifica total	4098,888 KW frig

## 2. Variable definition (PI Point): Expression used for the variable definition

Name: Planta de Frio - COP Planta

Description:

Categories:

Analysis Type: ☒ Expression ☐ Rollup ☐ Event Frame

Example Element: [Select an example element](#)

Name	Expression	Value	Output Attribute
Variable1	IF ('Potencia electrica total' = 0) OR ('Potencia frigorifica total' < 0) THEN 0 ELSE ('Potencia frigorifica total' / 'Potencia electrica total')		COP Planta

### ➤ Creating complex variables (PI Point) by PI AF instead of using PI Performance Equations:

- Much more intuitive as you do it by using the defined structure (attributes)
- You do not need to know/use the names of the PI Tags when building the analysis



# PI AF (Analysis Type: Rollup)

**1. List of attributes:** Attributes required for creating the variable

Name	Value
Potencia electrica de los compresores	357,6 kW
Potencia electrica de los secadores	37,7 kW
Potencia electrica total	395,3 kW

**2. Variable definition (PI Point):** Expression used for the variable definition

Planta de Aire

General Child Elements Attributes Ports Analyses Version

Name: Planta de Aire - Total Potencia Electrica Planta Aire

Description:

Categories:

Analysis Type: ☐ Expression ☒ Rollup ☐ Event Frame Generation

Rollup attributes from

☐ Child elements of Planta de Aire

☒ This element - Planta de Aire

To select attributes set criteria below

Attribute Name:

Attribute Category: Potencia Electrica Total

Select the function(s) to write to an attribute

Function Output(s) Value

☒ Sum Potencia electric

Attributes

Name	Parent Element	Categories
✓ Potencia electrica de los compresores	Planta de Aire	Potencia Electrica Total
✓ Potencia electrica de los secadores	Planta de Aire	Potencia Electrica Total
caudal total consumidores	Planta de Aire	
Consumo diario aire total consumidores	Planta de Aire	
Consumo diario electricidad compresores	Planta de Aire	
Consumo diario electricidad planta aire	Planta de Aire	
Consumo diario electricidad secadores	Planta de Aire	
Consumo mensual aire total consumidores	Planta de Aire	

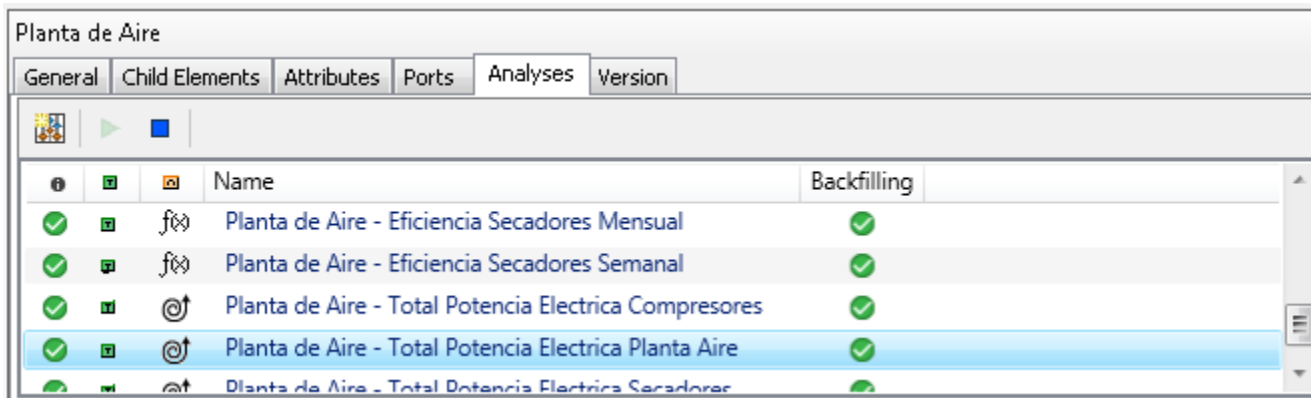
- Calculate sum, average, minimum, maximum, count and median of attributes under the same template (category)
- Based on search criteria resolved “on the fly” enabling the return of result sets involving any number of child attributes





# PI AF Analysis Advantages

- All based on PI AF templates to ease deployment and maintenance
- Create results sets that are stored in the PI Data Archive enabling high performance visualizations on calculated and aggregated data in real time
- Create new information previously more difficult to obtain using the more classical tools like PI Performance Equation and PI AF Formula Data Reference
- This new information is exposed alike any other PI Tags and can be used afterwards to trigger other calculations or PI Notifications



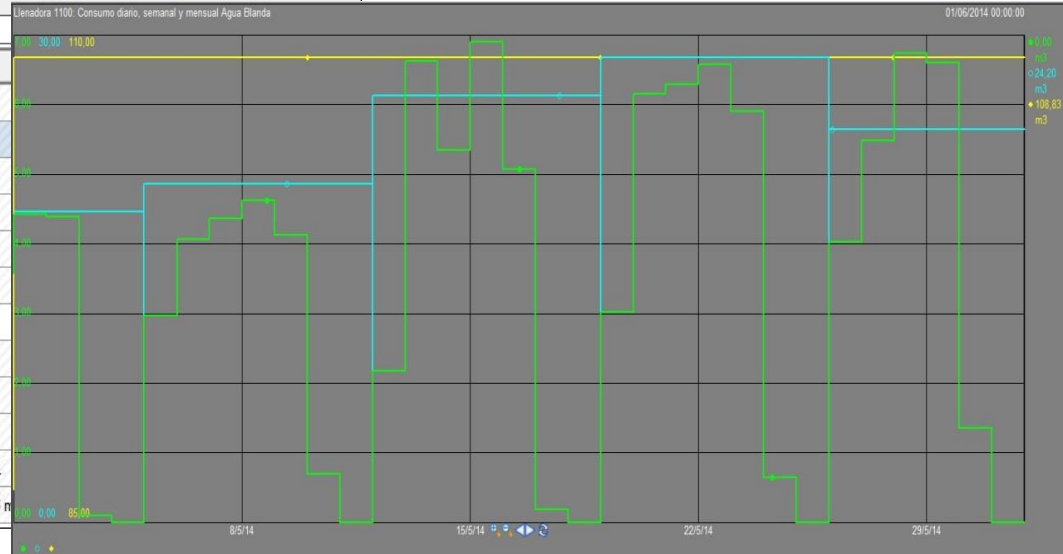
The screenshot shows the PI AF software interface with the 'Analyses' tab selected for the 'Planta de Aire' project. The interface includes a toolbar with icons for analysis types and a table listing the configured analyses. Each row in the table has a green checkmark in the first column and a green checkmark in the 'Backfilling' column.

	Name	Backfilling
✓	Planta de Aire - Eficiencia Secadores Mensual	✓
✓	Planta de Aire - Eficiencia Secadores Semanal	✓
✓	Planta de Aire - Total Potencia Electrica Compresores	✓
✓	Planta de Aire - Total Potencia Electrica Planta Aire	✓
✓	Planta de Aire - Total Potencia Electrica Secadores	✓



# PI Totalizer Subsystem

AGUA		
General Child Elements Attributes Ports Analyses Version		
Filter		
	Name	Value
	Caudal agua llenadora	4,168484 m3/h
+	Consumo diario agua llenadora	2,541992 m3
+	Consumo diario por turnos agua llenadora	1,02832 m3
+	Consumo mensual agua llenadora	121,689 m3
+	Consumo semanal agua llenadora	13,09131 m3
+	Consumo turno agua llenadora	1,02832 m3
	objetivo ratio agua llenadora	0 HL/HL
	Produccion mensual cerveza	96507 HL
	Produccion semanal cerveza	28040 HL
+	ratio mensual agua llenadora	0,01260934 HL/HL
+	ratio semanal agua llenadora	0,004668798 HL/HL
	Totalizador agua llenadora	5891,69775390625 m3



## PI Totalizers (PI Point):

- Storage of shift, daily, weekly and monthly consumption
- Using staircases to minimize storage and provide comprehensive visualization



# PI Manual Logger

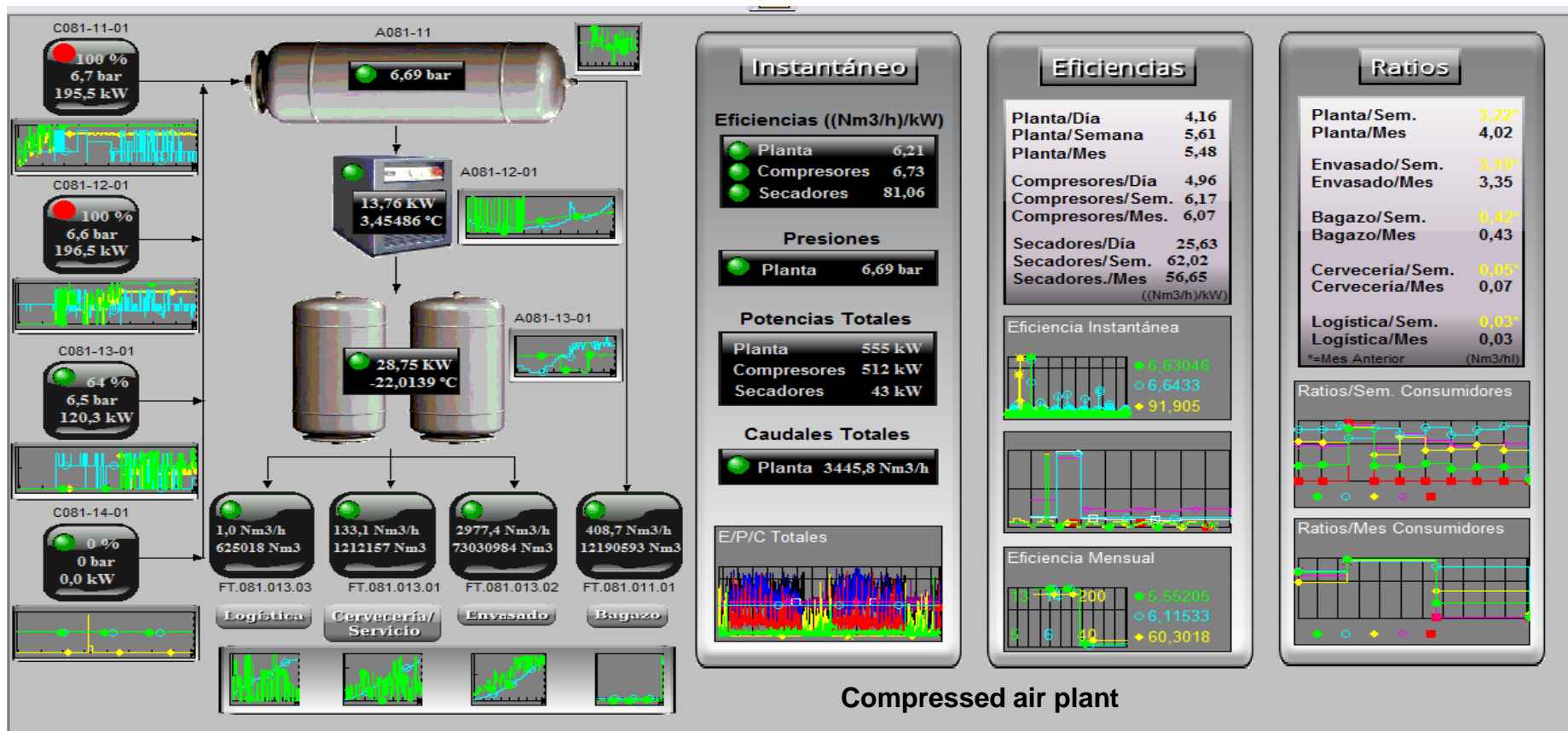
## Manual data entries:

- Beer productions
- Working hours
- Used to insert beer production data from SAP of weekly and monthly totals

The screenshot displays the PI Manual Logger application interface. The main window is titled 'PI Manual Logger - [Select a Tour]'. It features a menu bar with 'PIML', 'Tours', 'Mobile Devices', 'Tools', 'MobilePC', 'Window', and 'Help'. Below the menu bar is a 'Search Options' section with a 'Filter by Tour Name' field and a 'Help...' button. The 'Tour List' table shows various tours, including 'Tour Mensual Volumen Cerveza HMS - Envasado - Fabricado - Mostos' and 'Tour Semanal Volumen Cerveza HMS - Envasado - Fabricado - Mostos'. The 'Data Entry Form' is open for the 'Tour Semanal Volumen Cerveza HMS - Envasado - Fabricado - Mostos' tour. It displays a table of data entries with columns: Tag Name, Tag Description, Value, Comment, TimeStamp, Barcode, Is Due, and Violations. The table shows entries for 'VOL\_CERV\_SEM\_CERVEERIA', 'VOL\_CERV\_SEM\_ENVASADO', 'VOL\_CERV\_SEM\_FABRICA\_HMS', 'VOL\_MOSTO\_SEM\_COC1', and 'VOL\_MOSTO\_SEM\_COC2'. The 'Tag Info' window is also open, showing details for the 'VOL\_CERV\_SEM\_CERVEERIA' tag, including its name, description, unit, point type, barcode, and conditional specifications.

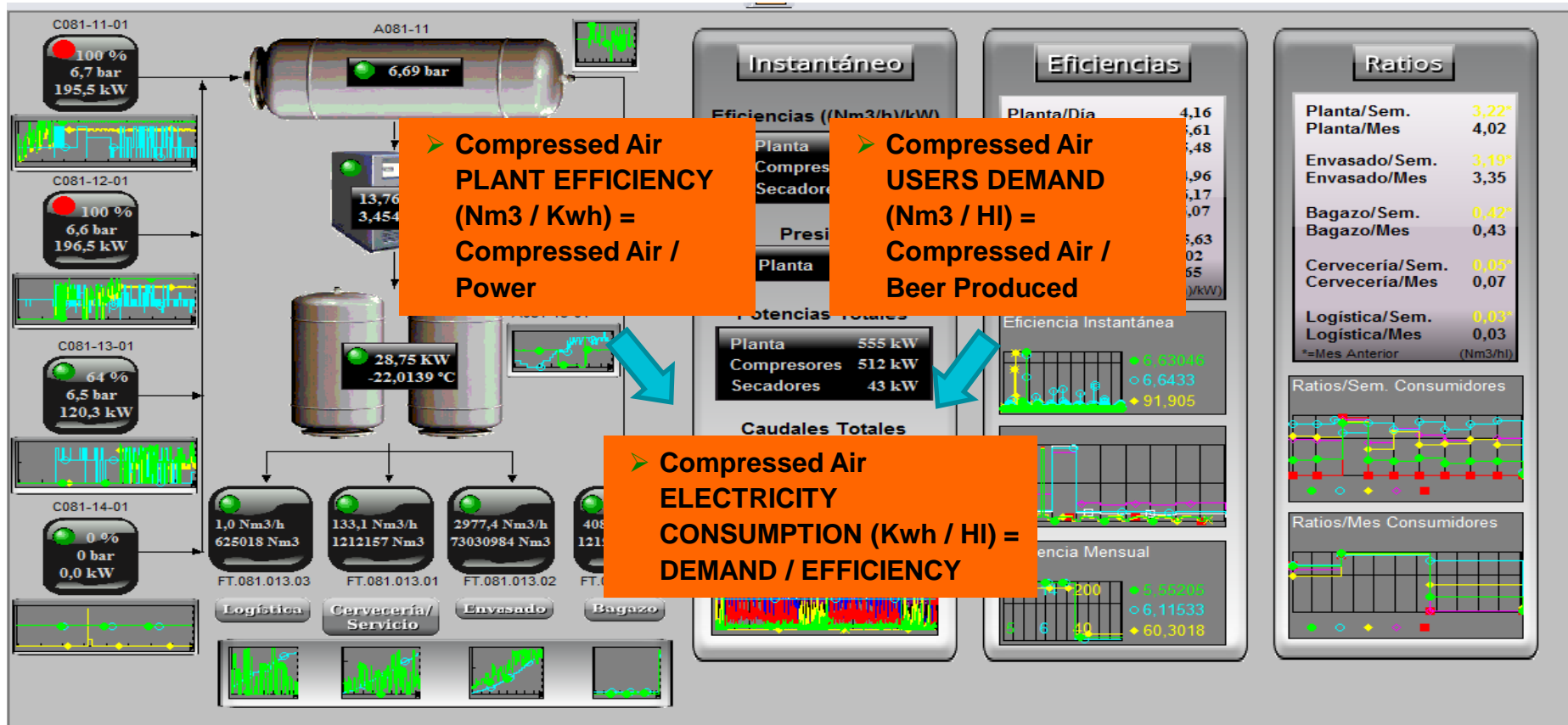


# Utility Plant Monitoring (PI ProcessBook)



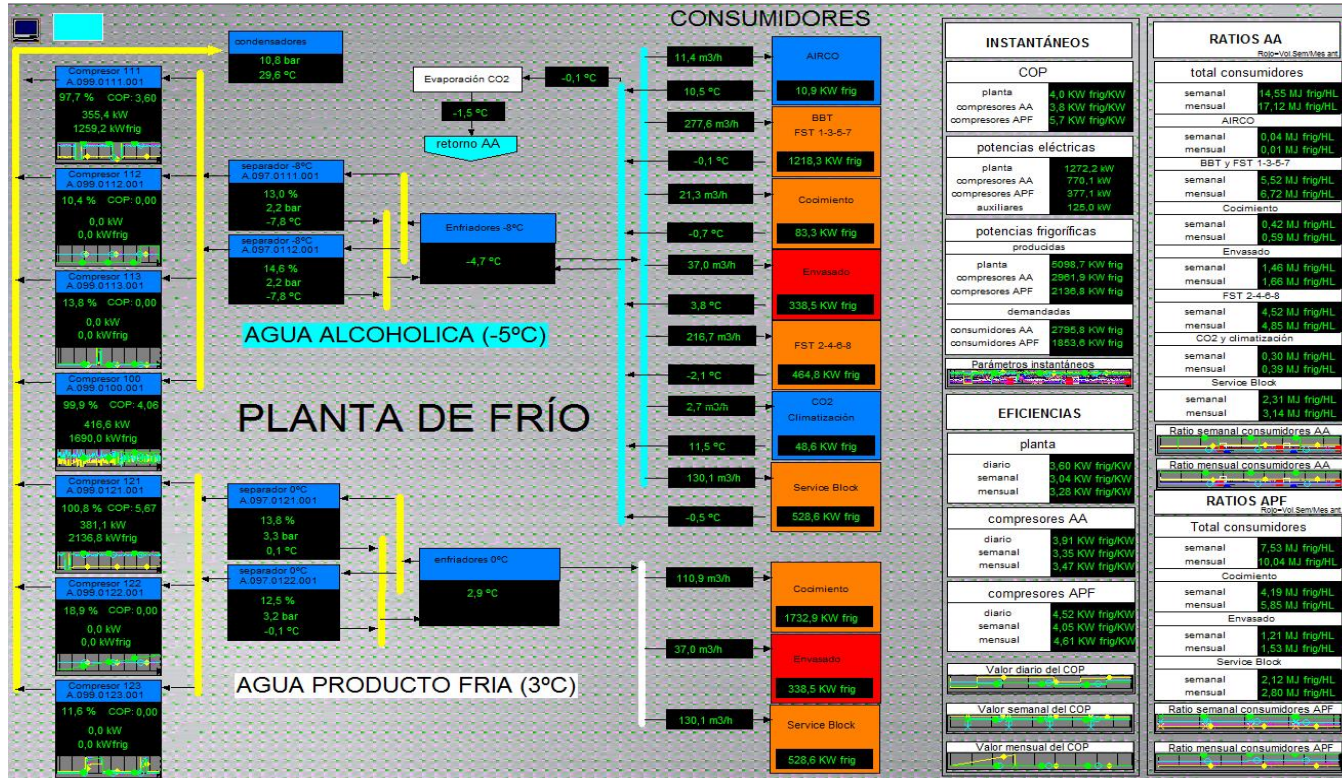
Compressed air plant

# Utility Plant Monitoring (PI ProcessBook)





# Electricity – Cooling plant (PI ProcessBook)



PLANT EFFICIENCY

END USER DEMAND



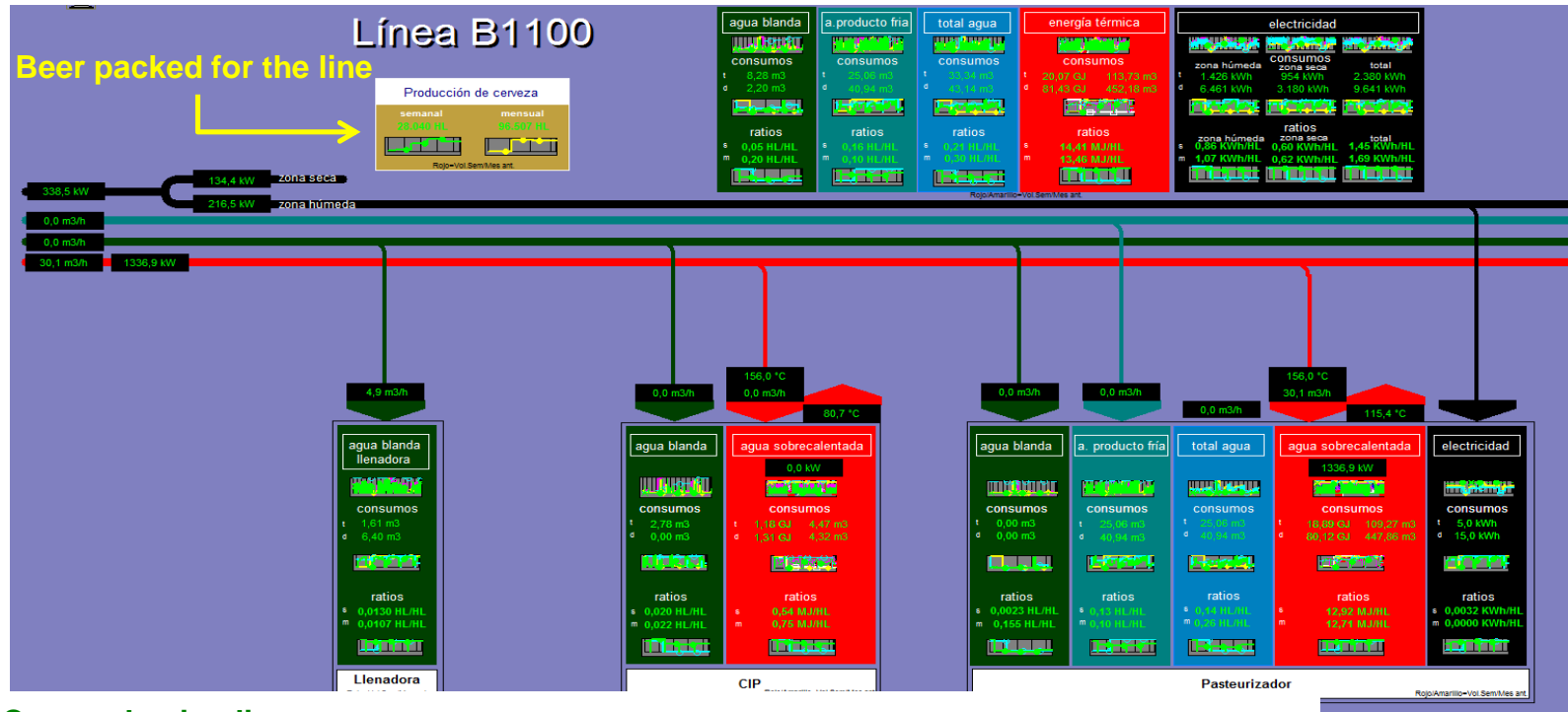
➤ **COP real time =**  
**Refrigerating Power /**  
**Electrical Power**

➤ **COP references:**  
**Daily/weekly/monthly**  
**COP**

➤ **Demand real time**

➤ **Demand ratio:**  
**Weekly/monthly**  
**Demand/HI produced**

# Water and Energy User Monitoring (PI ProcessBook)

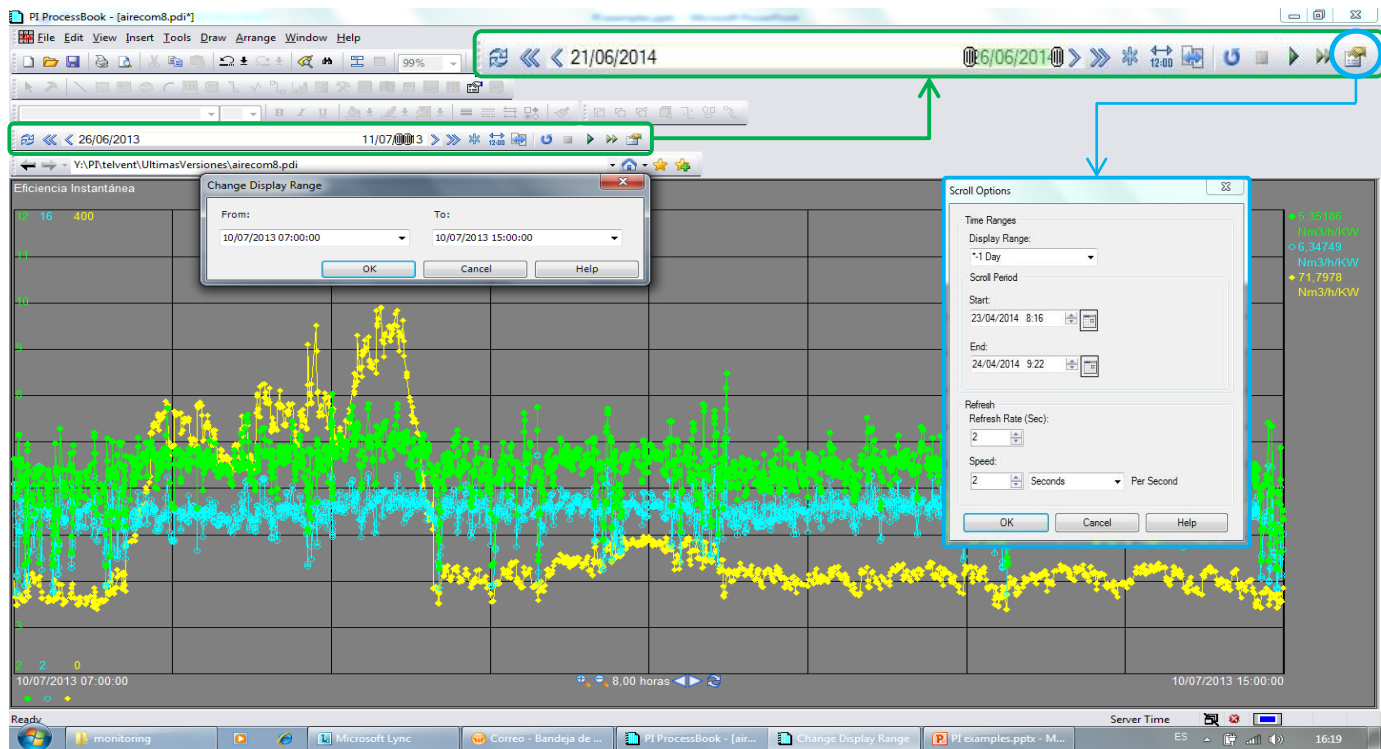


Can packaging line:

- Shift, daily, weekly and monthly water (softened and chilled water) and energy (electricity and thermal energy) consumption in each machine.



# Playback past occurrences (PI ProcessBook)

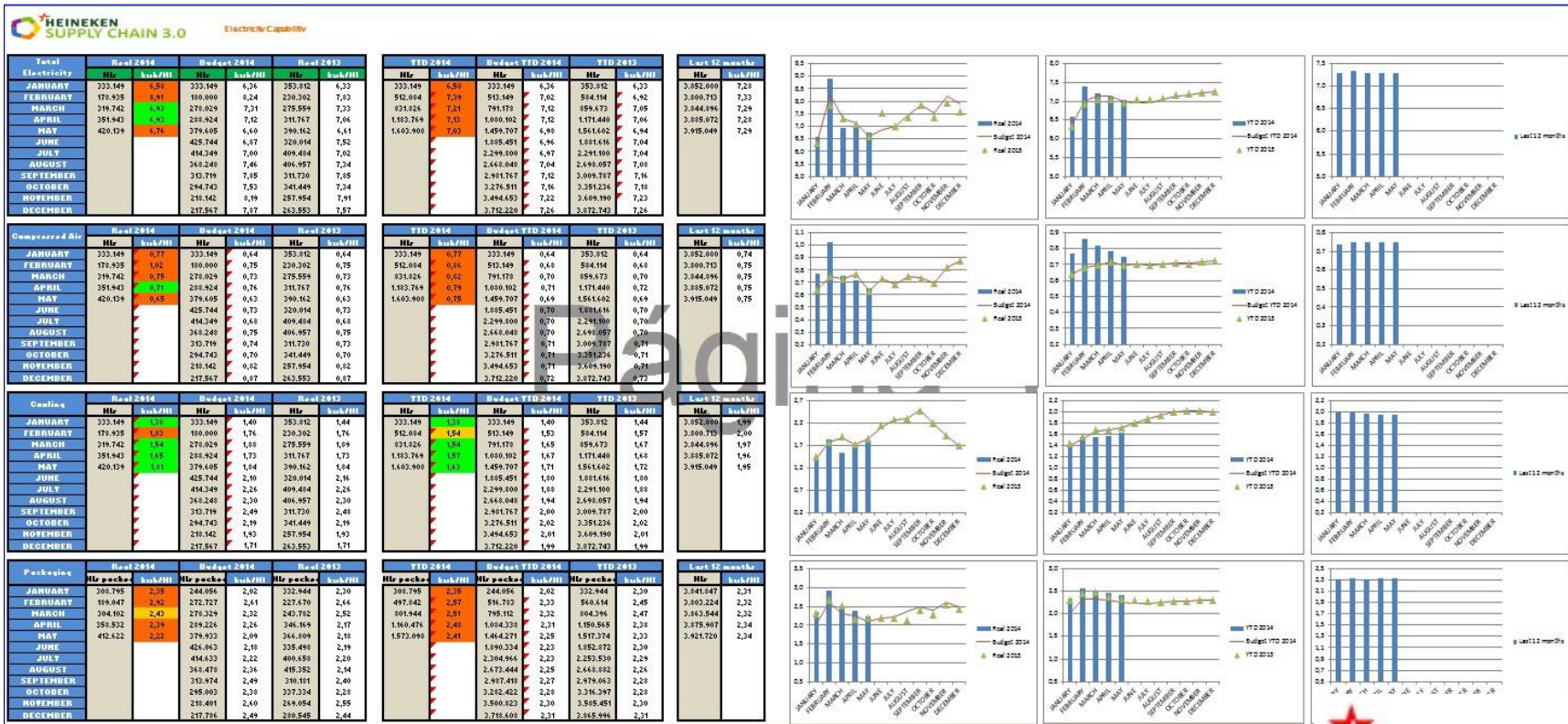


➤ **Rewind** time and **accelerated** playback to review occurrences in a glance



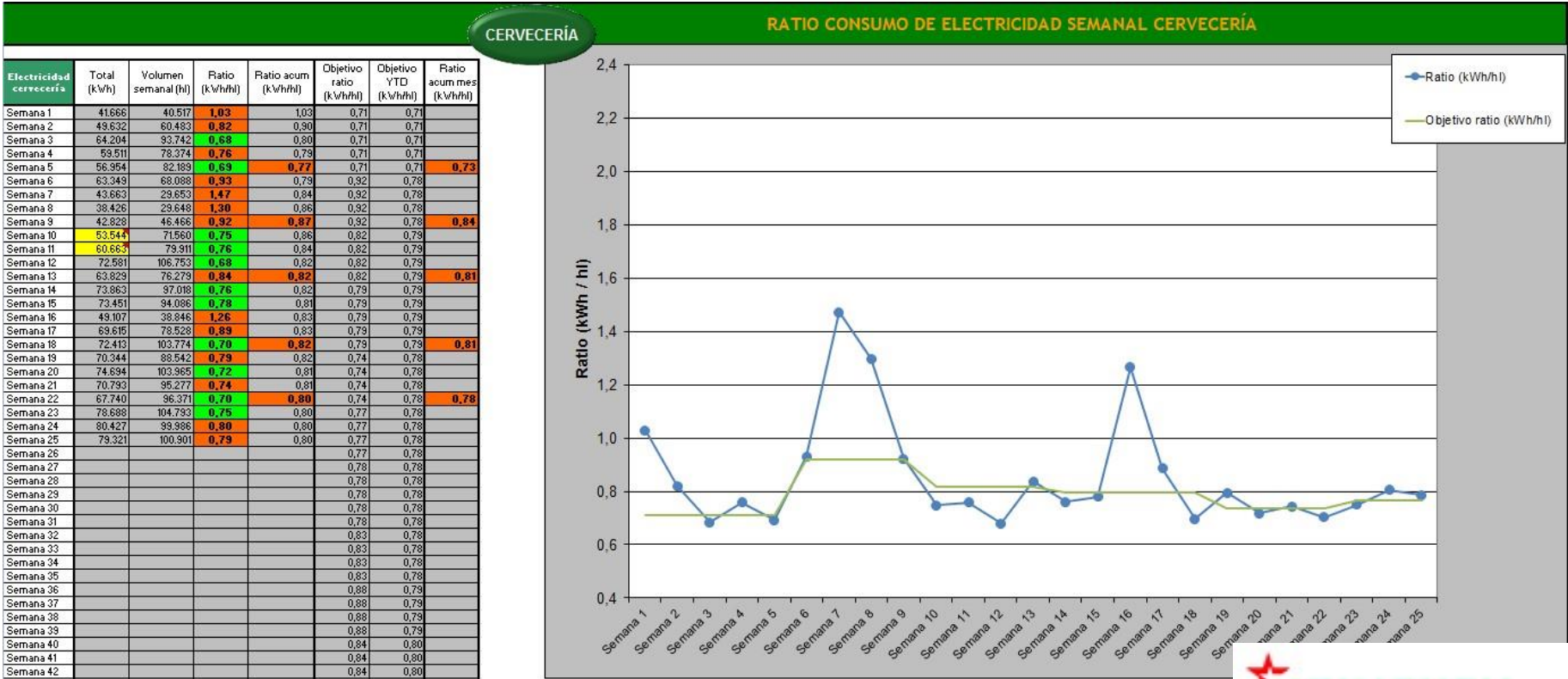


# Enable Production Reports in Excel (PI DataLink)



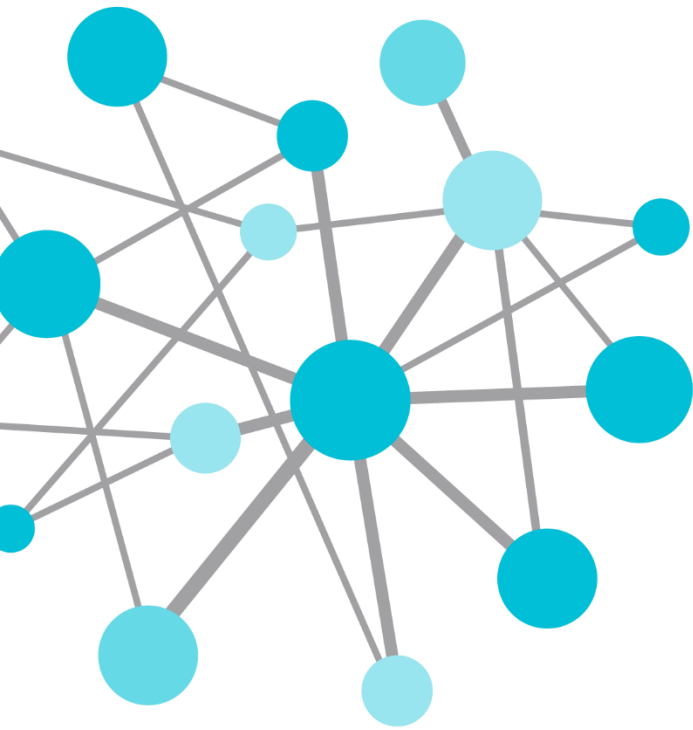
Driving System – Electricity consumption – Monthly follow up

# Weekly Aggregated Report of Sustainability Goal vs Reality (PI DataLink)



Electricity consumption – Brewing department – Weekly follow up



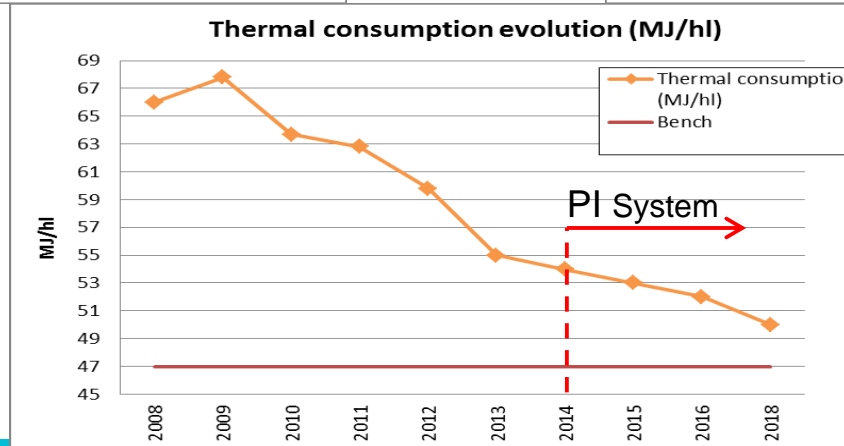
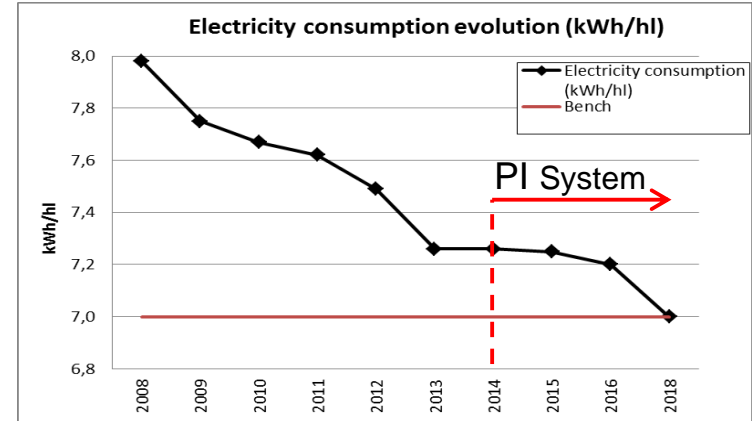
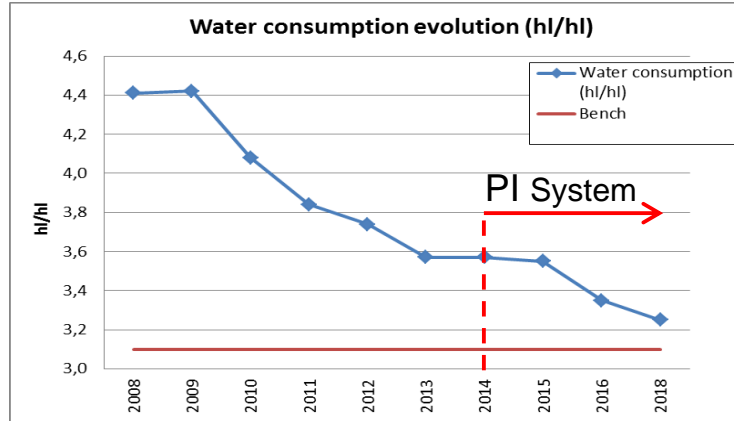


# Agenda

- Heineken
- Sustainability challenges
- Solution
- **Results**
- Future Plans



# Energy & Water KPIs: 2008 - 2014 - vision



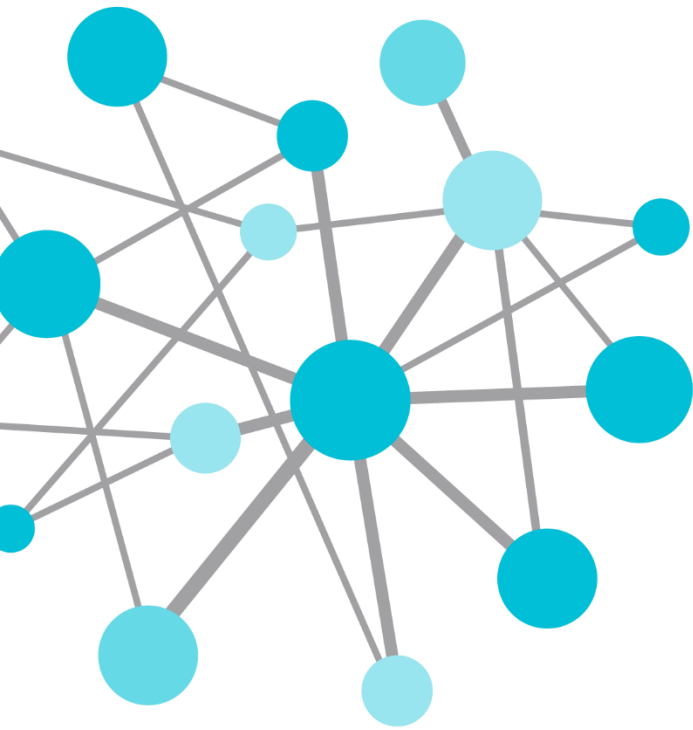
# Expected Results

PI System

Seville Brewery	2010	2011	2012	2013	LE'14	2015	2016	Bench
Volume produced kHL	4.113	4.091	3.888	3.872	3.980	3.980	3.980	4.050
Water Consumption (Hl / Hl)	4,08	3,84	3,74	3,57	3,56	3,45	3,35	3,10
Efficiency Savings	211	148	59	99	6	66	60	153
Thermal Consumption (MJ / Hl)	63,7	62,8	59,8	55,0	54,0	53,0	52,0	47,0
Efficiency Savings	138	30	96	153	33	32	33	166
Electricity Consumption (kWh/Hl)	7,67	7,62	7,49	7,26	7,26	7,25	7,20	7,00
Efficiency Savings	33	20	50	88	0	16	20	80
k€Annual Savings k€	382	199	205	340	39	114	112	399

PI System is fundamental to help Heineken Seville realise its Sustainability Strategy Goals by providing insights on highly added value information that was previously not accessible





# Agenda

- Heineken
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# Next Steps: PI Event Frames and BI

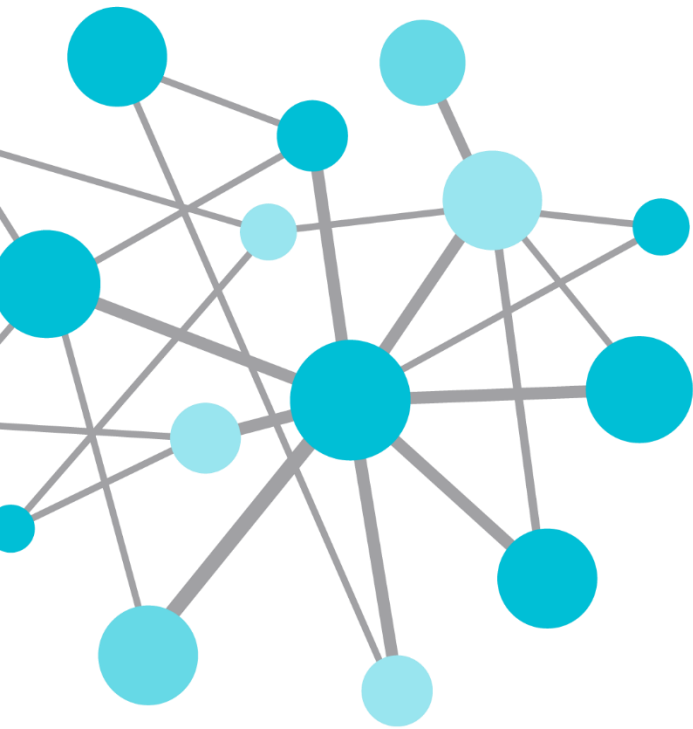
- Use of PI Event Frames
  - Compare shift efficiency based on day of the week
  - Compare weekly startup of the plants
  - Report easily on equipment downtime
  - Will enable enhanced rich reporting and facilitate events retrieval via other Reporting tools like BI
- Integrate PI System data into Business Intelligence reports
  - PI OData
- Real targets according to real production and climate conditions calculated by the PI System
  - More PI AF modeling and analysis work
  - Future Data



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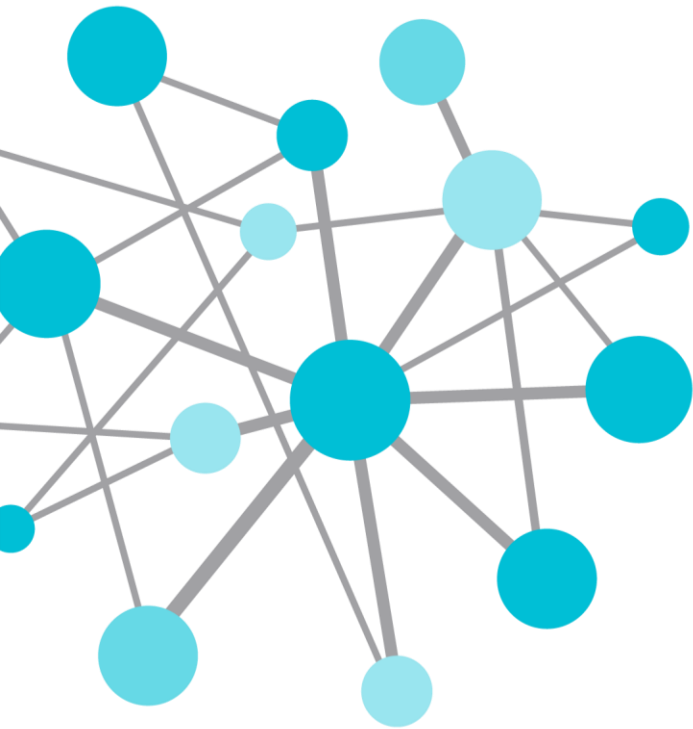
# Questions

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before asking  
your questions



State your  
**name &  
company**





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