Food & Beverage technical trends : A sharing session

Jag heter : Benjamin Jude
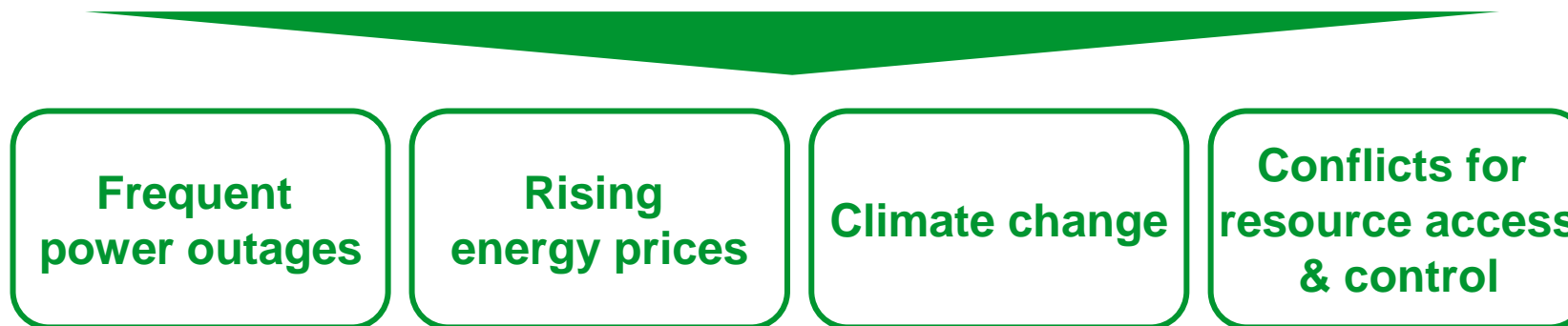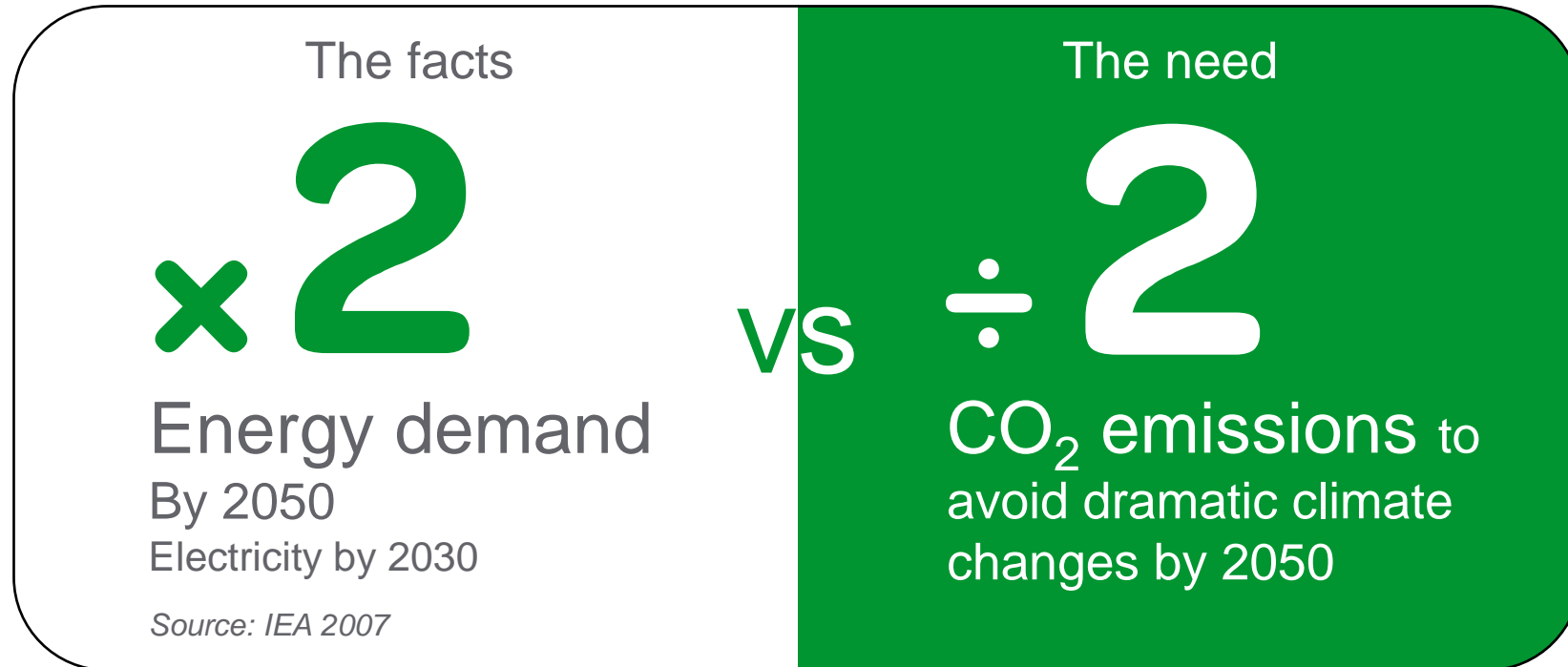
Date: April 16 - 2012

Place: Tetra Pak Lund Sweden

M.T.F.

at

The energy dilemma is here to stay

The facts

The need

$\times 2$

Energy demand
By 2050
Electricity by 2030

Source: IEA 2007

VS

$\div 2$

CO$_2$ emissions to avoid dramatic climate changes by 2050

Source: IPCC 2007, figure (vs. 1990 level)

Frequent power outages	Rising energy prices	Climate change	Conflicts for resource access & control

The F&B Market

Main Challenges

- **Sustainable operations** (green image sells!!)
  - **Carbon, Water and Waste footprint reduction**
  - **People Safety, Health and Development**

- **Food safety**
  - **Responsibility and brand/image protection**
  - **Tightening regulations and increasing security issues**

- **Emerging Markets**
  - **Increasing power of low/middle class people in emerging countries**
  - **New business model requirements**

- **Competitiveness**
  - **Increasing prices of raw materials and commodities**
  - **Increasing power of retail**

- **Healthier Food**
  - **Increasing demand for health, wellness, organic and ethical ingredients**
  - **Increasing demand for labelling and information**

The F&B Market

Clear Sustainability focus

Green image sells! Ideal audience for Energy Management
(F&B is **Energy-CO$_2$ Sensitive** => impact on **top line**
F&B is **Energy Intensive** => impact on **bottom line**)

Danone: "Far from contradictory, Nature and business can operate in synergy"

Between 2000 and 2010, Danone achieved a **42% reduction of energy used** per kg produced**, 30% reduction of factory waste, 41% reduction of water used** per kg produced

Coca-Cola aim to be the beverage industry leader in energy efficiency and climate protection

Coca-Cola's goal is to **reduce GHG emissions by 5% by 2015** in manufacturing operations.
Average megajoules/litter of product already improved by 13% between 2004 and 2009.

Mars HQ added 2MW Solar Garden

A **new solar installation** at the corporate headquarters of Mars Snackfood U.S. will provide up to 20% of the plant's energy during peak operating hours.

Nestlé's "eco-efficiency" aims at maximizing the production of goods while minimizing the consumption of resources

Global energy consumption per tonne of product was reduced and **energy use efficiency improved by 21%**.
Emissions of CO2 per tonne of product were reduced and eco-efficiency improved by 21%.

Unilever to halve its environmental footprint by 2020
By 2020, Unilever will **halve the environmental footprint of its products**, help more than 1 billion people take action to improve their health and well-being, and source 100% of our agricultural raw materials sustainably.

Source: Corporate Reports

A Strategy around two main axis ?

Our sustainable development strategy

Responsibility and energetic environmental is central to the culture and strategy of Schneider Electric. Sustainable development is a real and essential opportunity for mobilization, growth and differentiation, and Schneider Electric agrees to provide innovative and effective responses to two key problems:


North, put on the market of products and solutions that lead to waste less energy, has produced in burning and in the best on clean air compliance

In the South, be an actor facces has the energy for 1.6 billion people currently without safe water and recycled, with electricity and economic development perenne.

A strategic focus: Better **management of energy** and the **environment**

EcoStruxure :the right ecosystem to support the convergence of 5 key domains

Power Management

White Space Management

Process & Machine Management

Building Management

Security Management
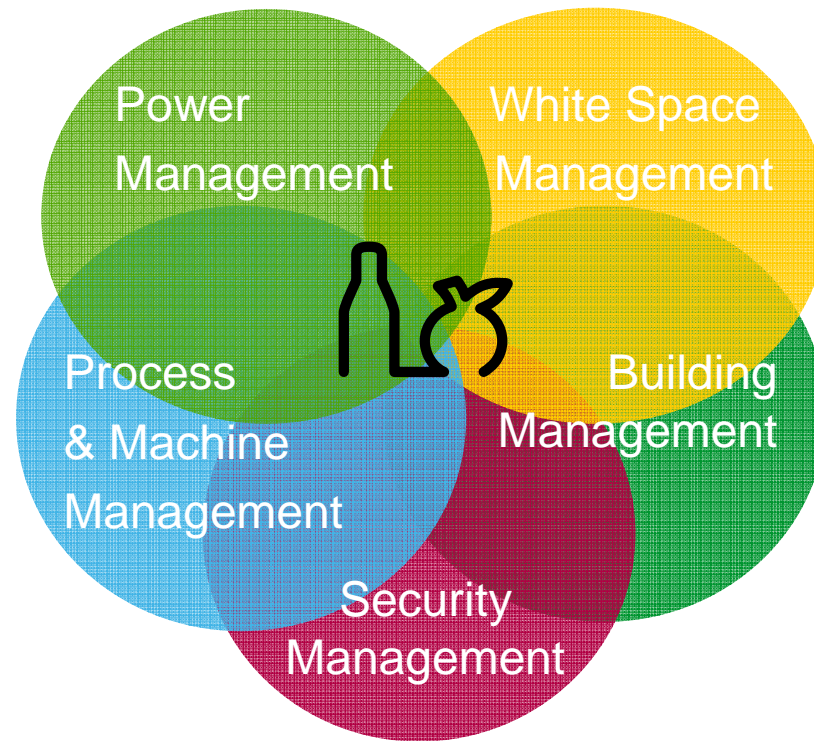
Helping our customer to solve their Energy Equation
Making the energy Safe, Reliable, Efficient, Productive and Green

Our value proposition for F&B

Hungry for green efficiency ?

Sustainability
- Carbon, Water & Waste reduction
- Renewable Energy

Food Safety
- Site security
- Traceability
- Genealogy

Competitiveness
- Capex & Opex
- Plant availability
- Productivity

Flexibility
- New Products
- New Packaging
- Flexible workshops

- Manufacturing Execution System
- Supervision and Historian
- Process control
- Machine control
- Electrical distribution
- Power monitoring & control
- Security
- Building Management
- Critical power
- Data Centers Control
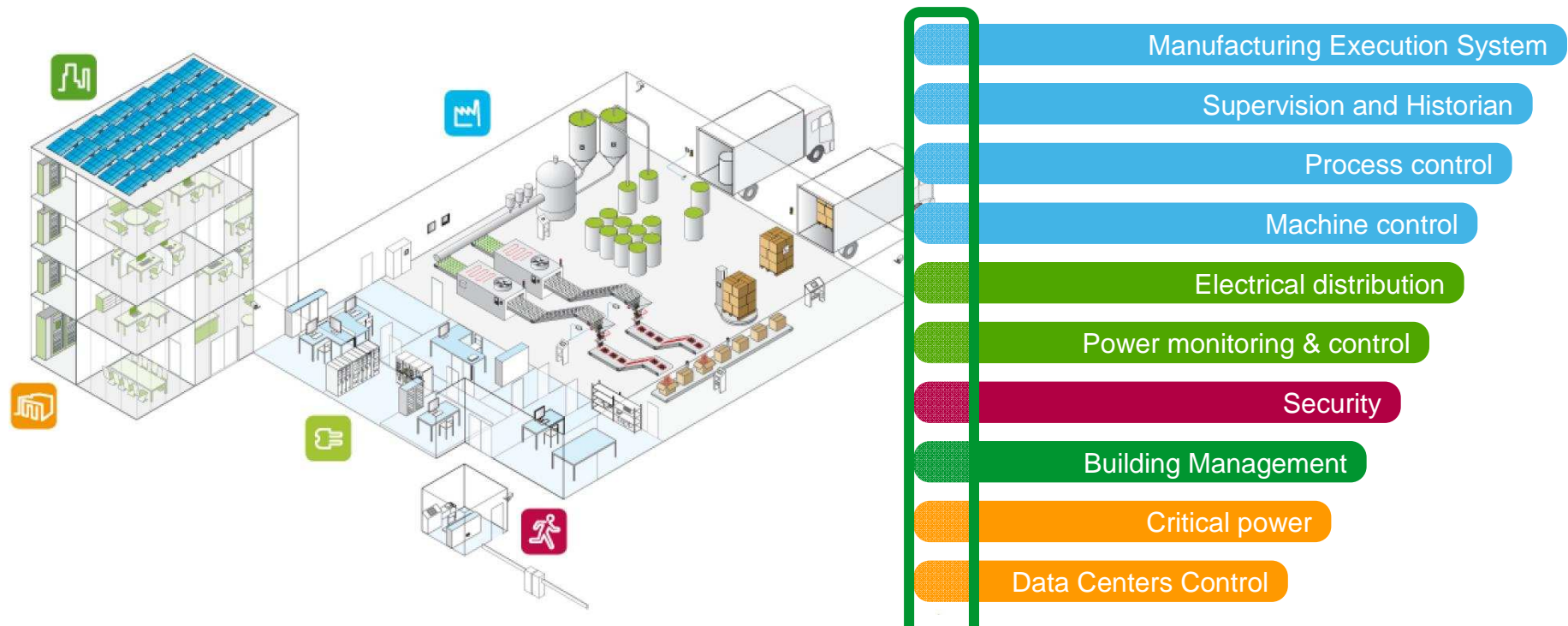
Based on Eco-struxure™

Simple Integration / Global Energy Management

Flexibility and Innovation
Flexible workshops, New Products, New Packaging

Flexible Automation Architectures

Batch management

Flexible Packaging Modular lines
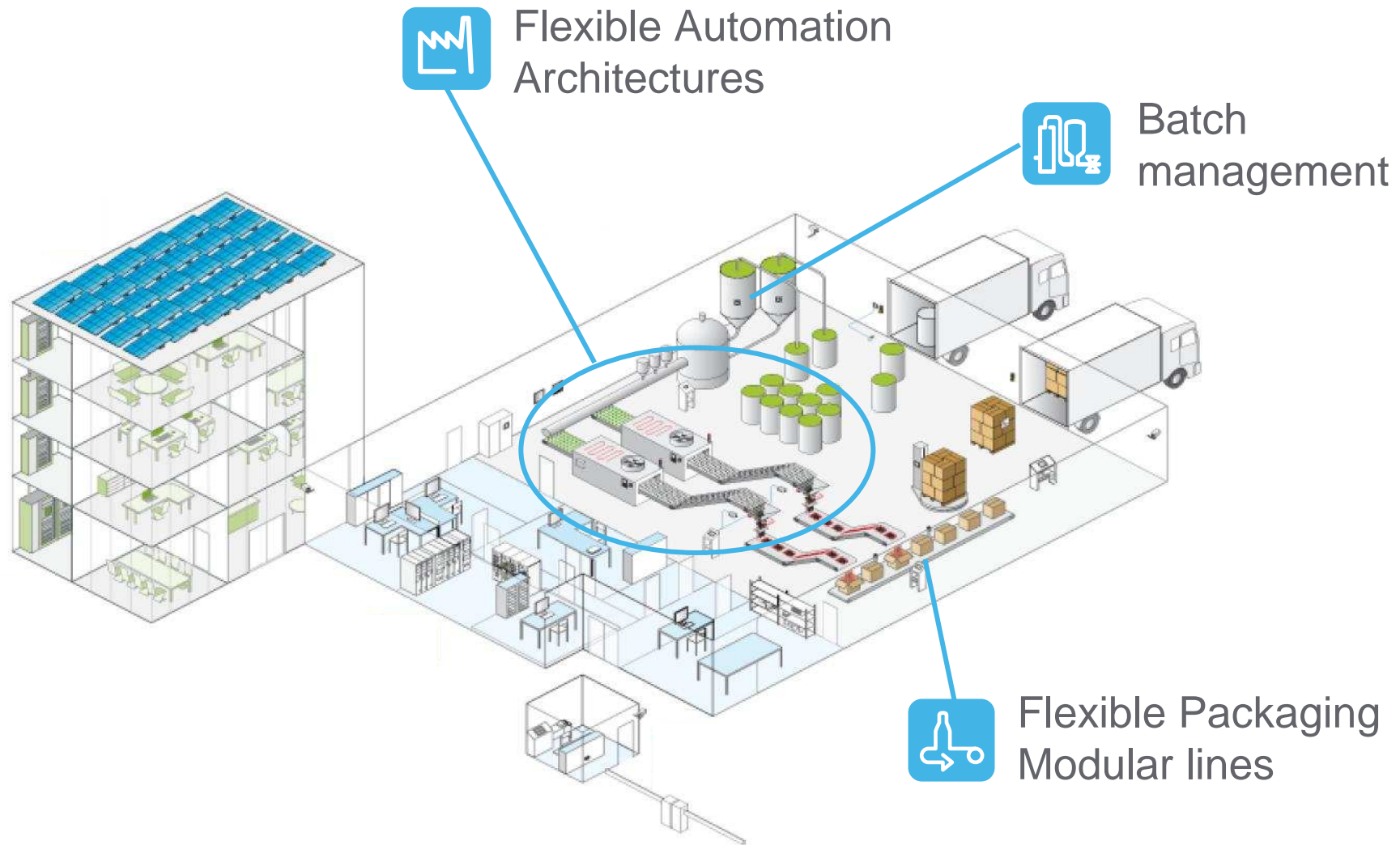
Flexible automation architectures
To meet your different process requirements
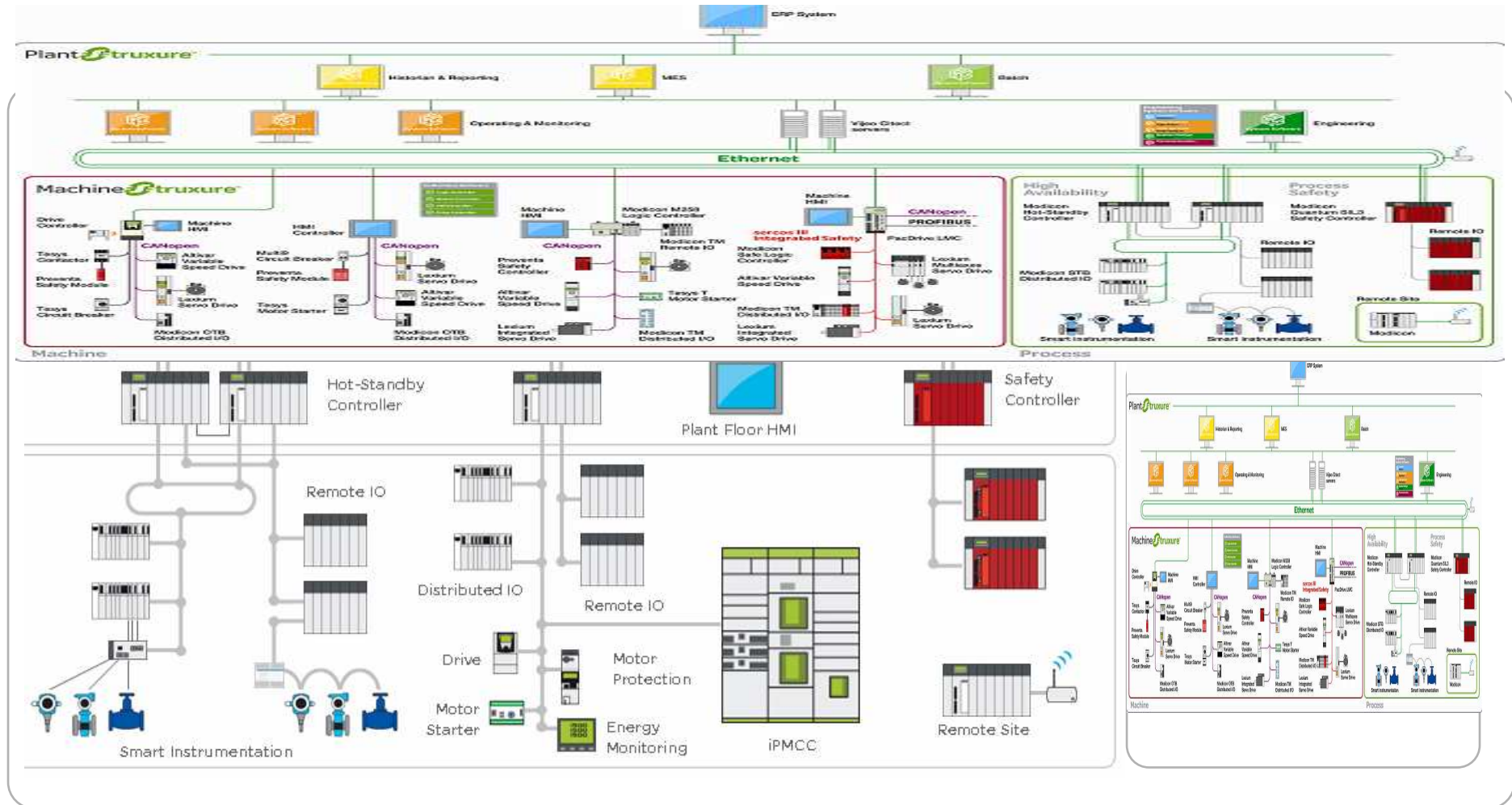
Process Automation System
More advanced operations with shorter time to market

➢Tested Validated Documented

  ● Known functionalities & performance

➢Simplified Engineering workflow

  ● Hardware independent development

  ● Highly flexible object model

  ● Multi-user

➢Out-of-the-box functionalities

  ● Communication / Device integration

  ● Process control

  ● Energy Management

➢Industry Specific components

  ● Liquid Food Library

Libraries

For both world power & automation but dedicated

- Motor starter
  - Tesys U & T
- Drives
  - ATV
- Power Meters
  - PM710 - 800
- Electrical Protection
  - Sepam20 - 40 – 80
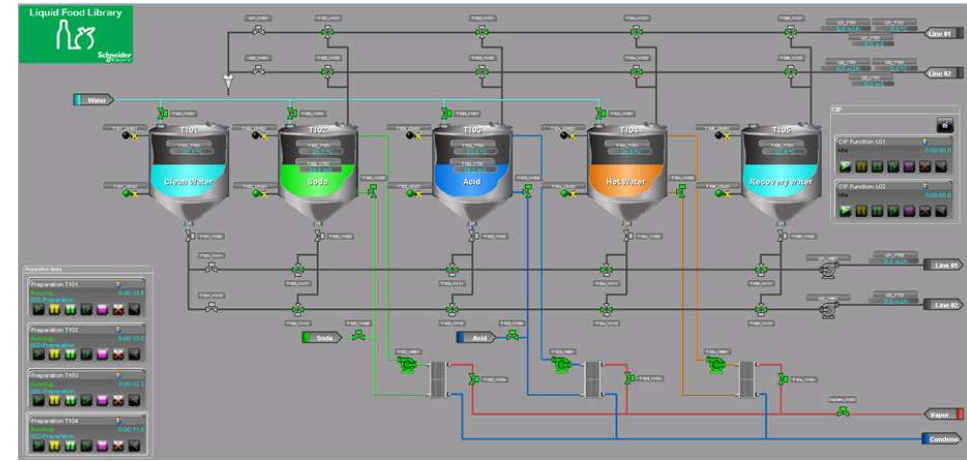
- Continuous control
  - Level control
  - Flow control
  - Temperature control

- Motor and pump management
  - Start, stop, runtime, trip

- Valve control
  - On/off valves, control valve
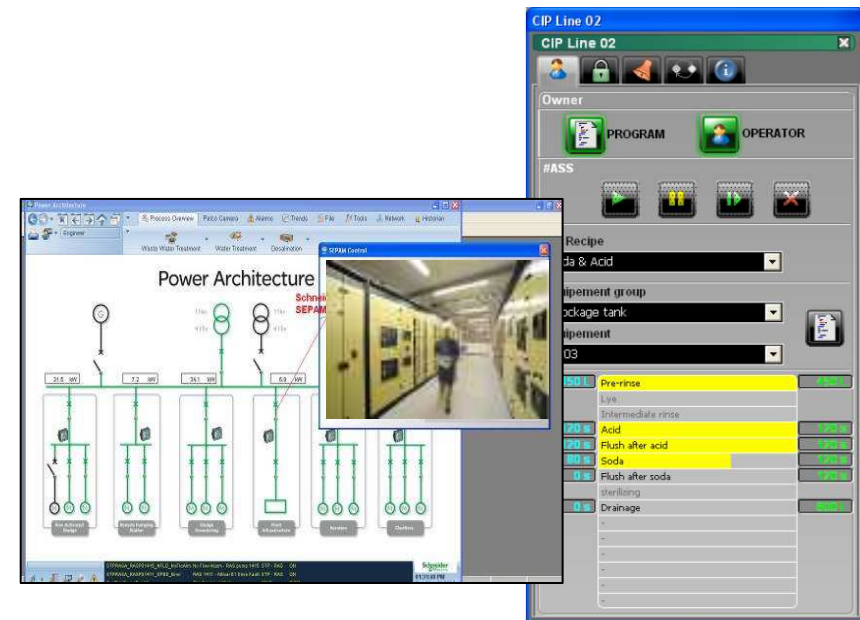
Batch Management
To combine flexibility and safety

I need to produce a given quantity according to a new recipe

Mr Production

It is not possible to modify and test our application in such a short timeframe

Mr Automation

Batch Management
Independent Procedures based on ISA S88 model

Mr Production

I can define new product recipes with flexible procedures based on equipments behaviours
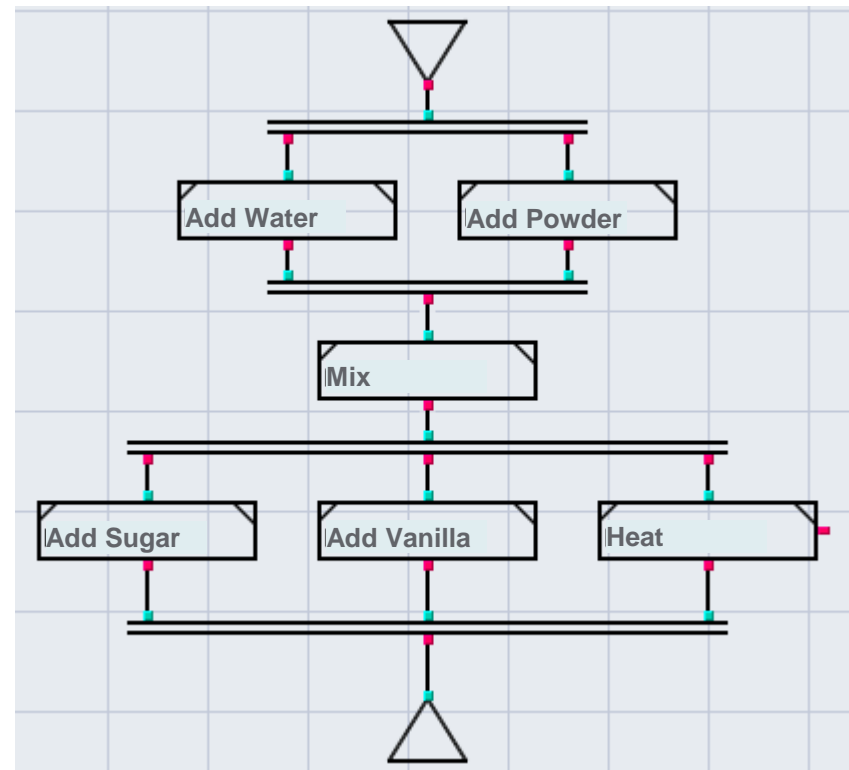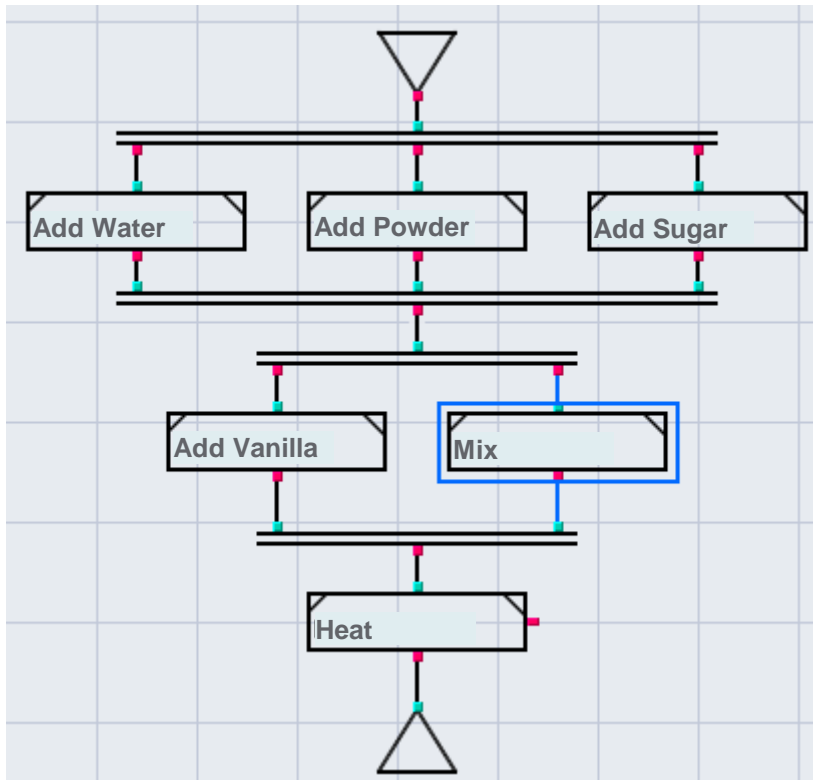
Batch Management
Interaction with ERP and system integration

- Flexible recipe edition
- Production plan download & scheduling
- Batch execution visibility
- Consistent batch reports
- Single equipment model

➢ **Benefits:**

- Reduce time to market.
- Increase product quality and consistency.
- Automate production recording and compliance.
- Maximize equipment usage.

Flexible Packaging Automation
Because performance is not enough

- Flexible software instead of rigid mechanics
- Modular design for both hardware and software components
- Integration of robotic
- High performance

➢**Benefits:**
- Lines are modular
- Add a line component in few hours
- Change packaging on the fly
- Increase your plant performance
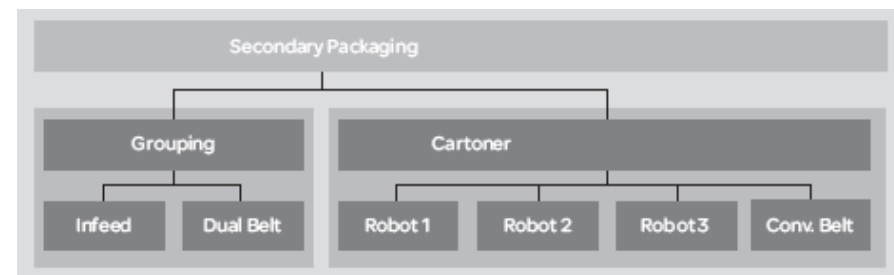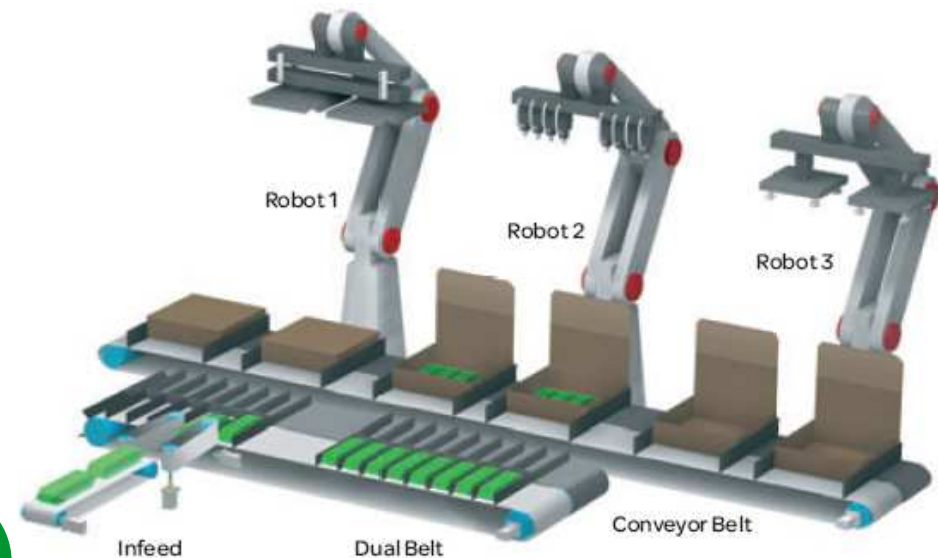
Outstanding Machine Performances
Improved throughput

➢ **PacDrive in some figures...**

- **Up to 99 servoaxis syncronized**
- **1 ms update rate with 1 µs syncronization**

Advanced Process Control
Make the most of complex processes

➢ **Understand process constraints and complex process interactions**

- Predict impact of known disturbances on operation.
- Predict, advise, make co-ordinated moves on **multiple** actuators.
- Exploit **all** opportunities to push quality / throughput close to constraint.
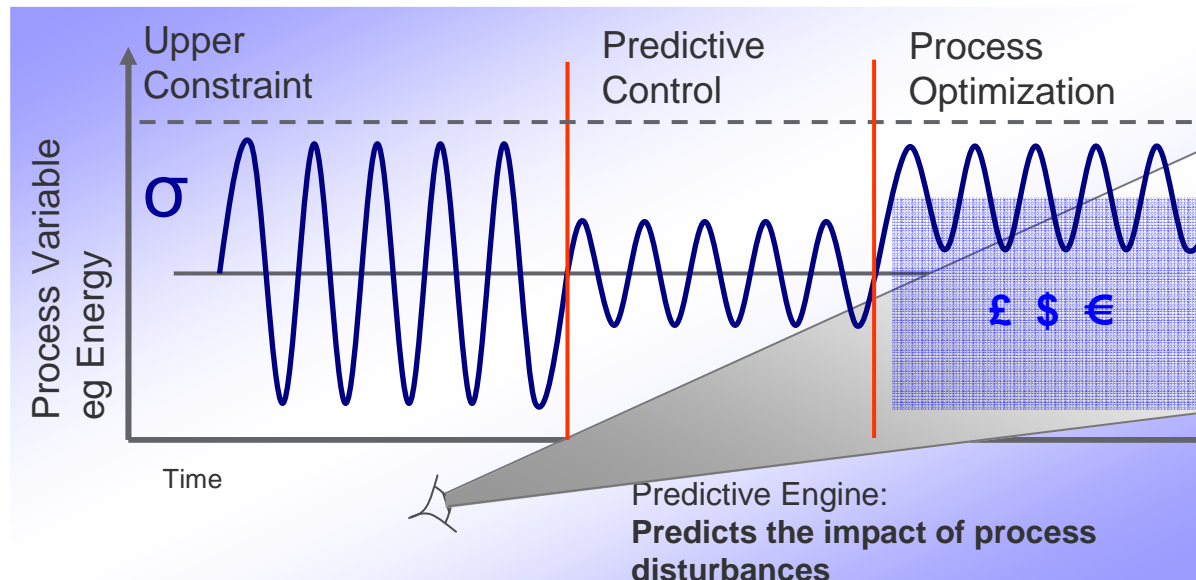
Food Safety
Site security, Traceability

System wide Access Control

Long Term Traceability

Material Tracking & Genealogy

Site Security & Access Control
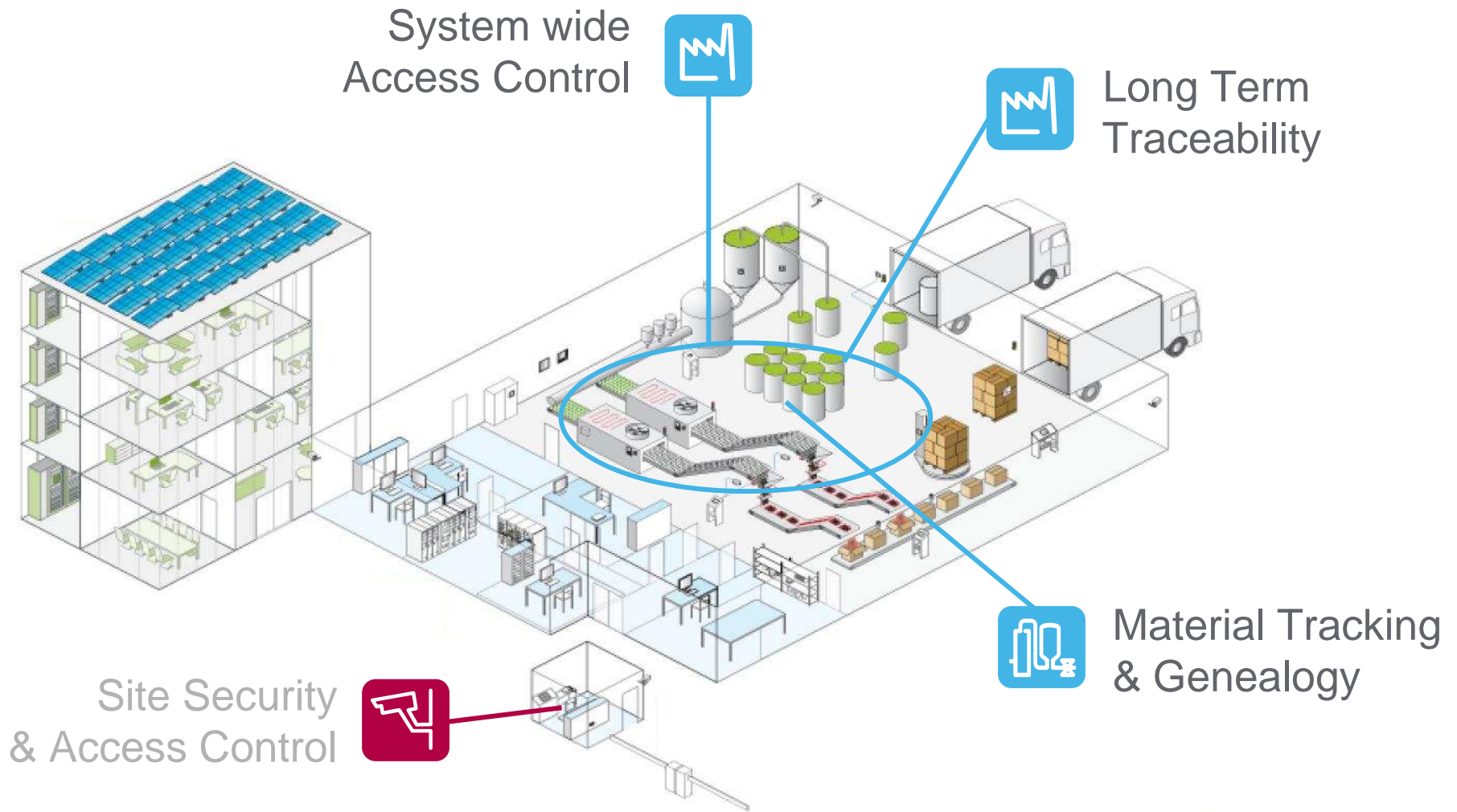
System Access Control
Users Authentication and Audit Trail

➤ Access control
- ➤ Badge

➤ Video
- ● Building
- ● Process
- ● …

➤ User Authentication

➤ **Benefits:**
- • Single environment
- • Track operations
- • Comply with 21CFR part 11

TAC Continuum access controller

PELCO by Schneider Electric

Pelco IP camera
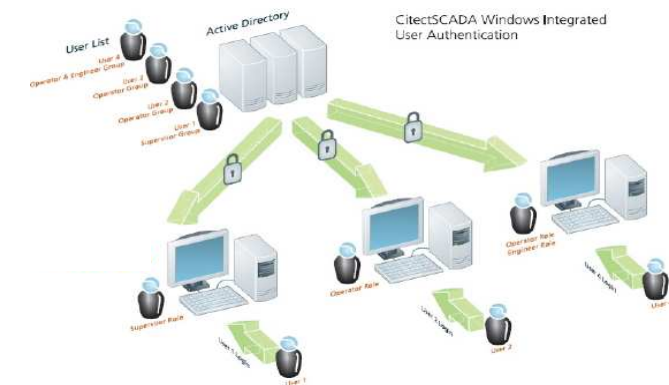
Material Tracking and Genealogy
Reduce impact from quality issues

➢ From raw material to end-product

➢ Ascendant and Descendant genealogy

➢ Real-time in progress inventory and genealogy

➢ **Benefits:**

• Improved quality assurance

• Eased compliance with new regulation

Production Energy Optimization

Reference architecture for Energy Management solutions

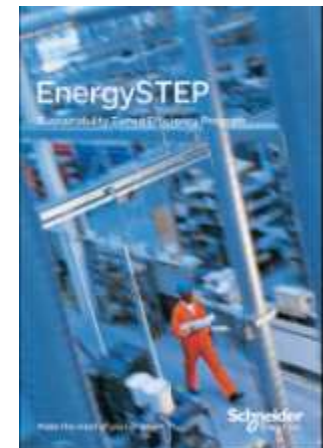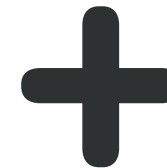All solution offers intentionally use the **same** underlying components and reference architecture

ONE set of skills regardless of project complexity

Dashboards
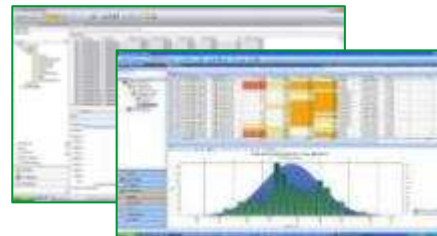
Ampla (EOS, PEO, MES)

ION:E Energy Monitoring System

Vijeo Citect SCADA Supervisory Control System

EnergySTEP
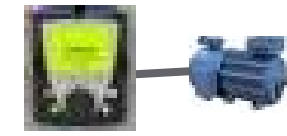
Services

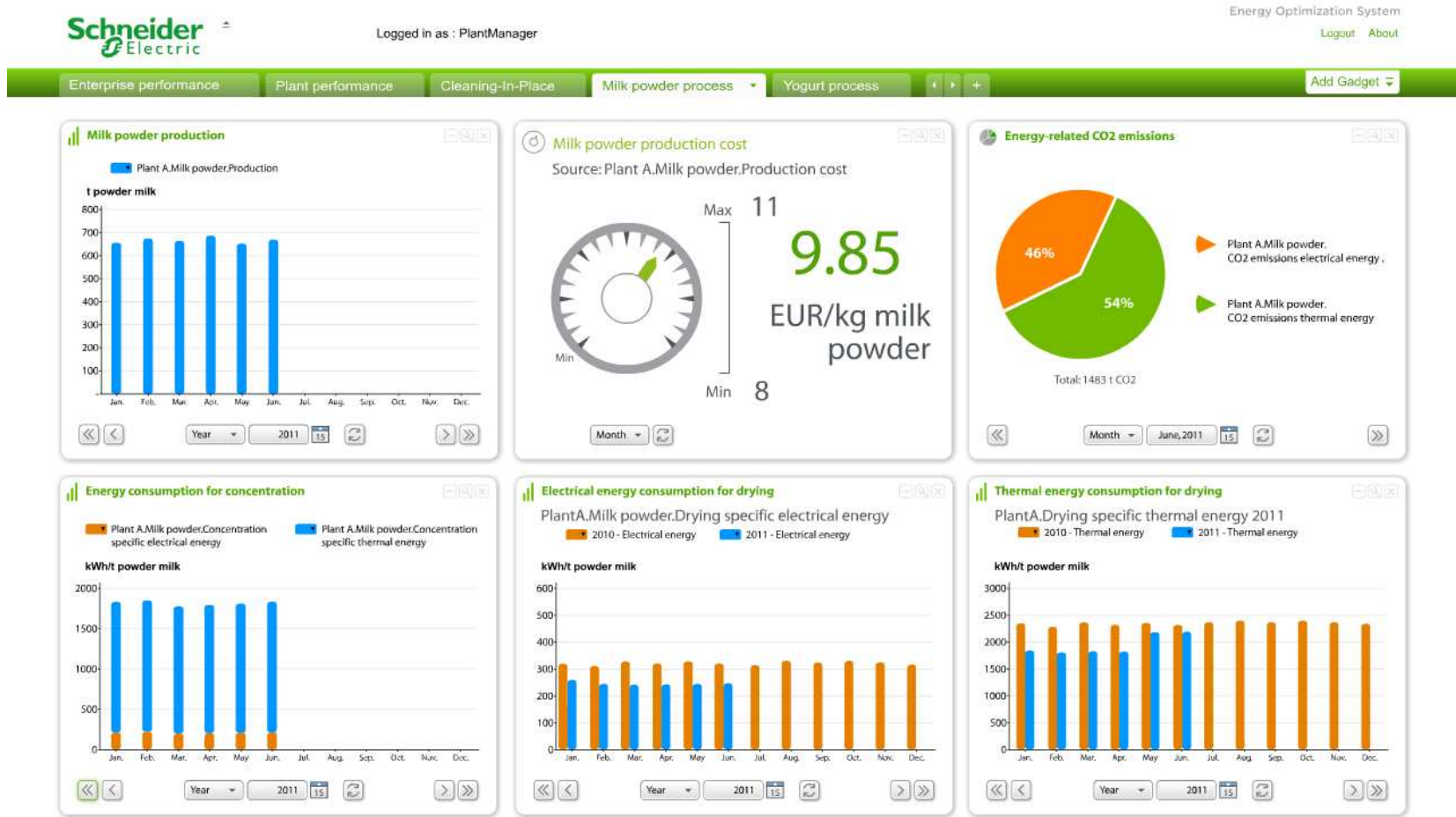Integrated hardware infrastructure

SEPAM

ION 7650

EGX300 Gateway

PM 6200

PLC

VSD

EOS for Dairy

We have a comprehensive approach to Energy Management
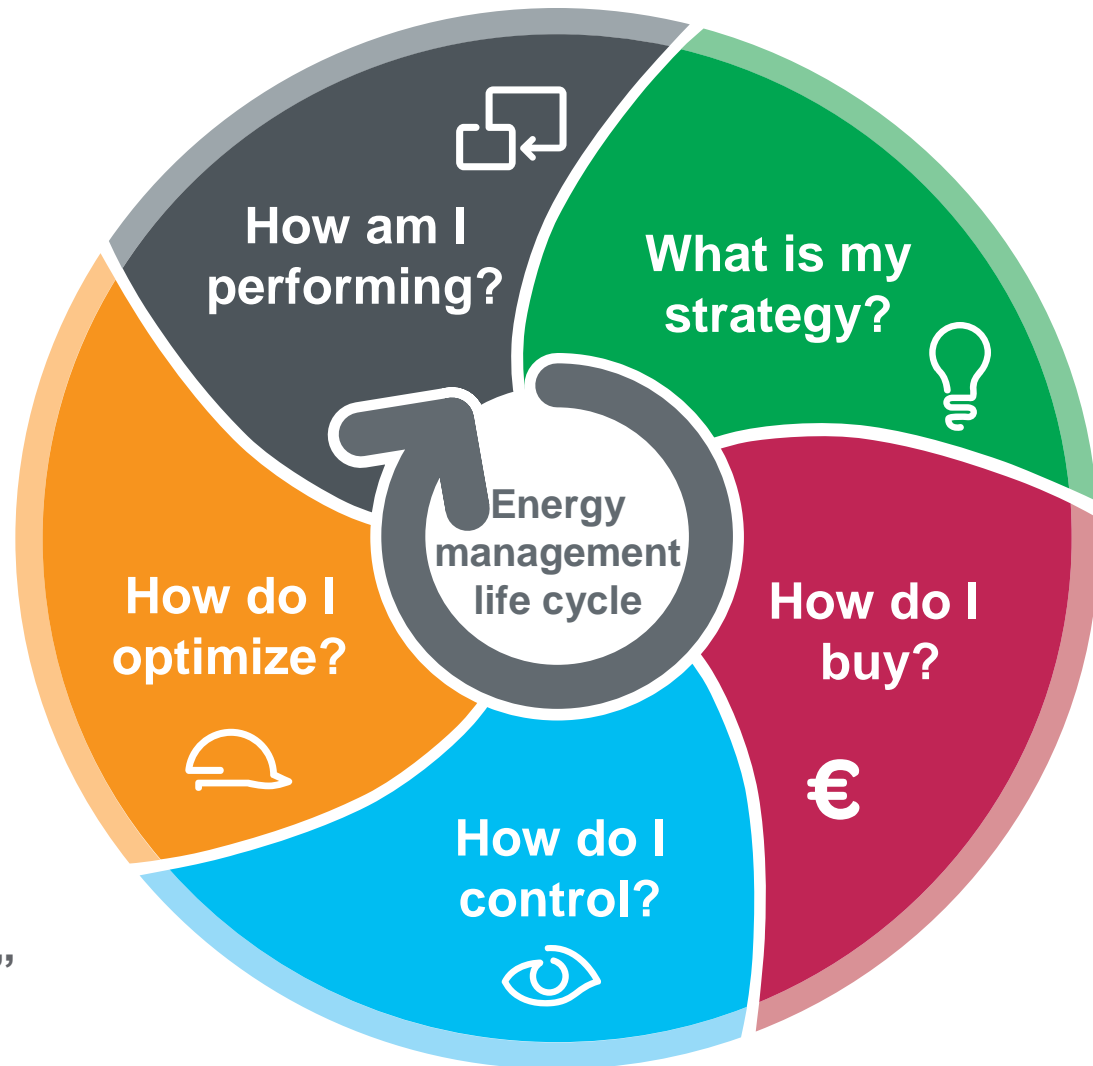
Enterprise

"I Conserve our enterprise resources"
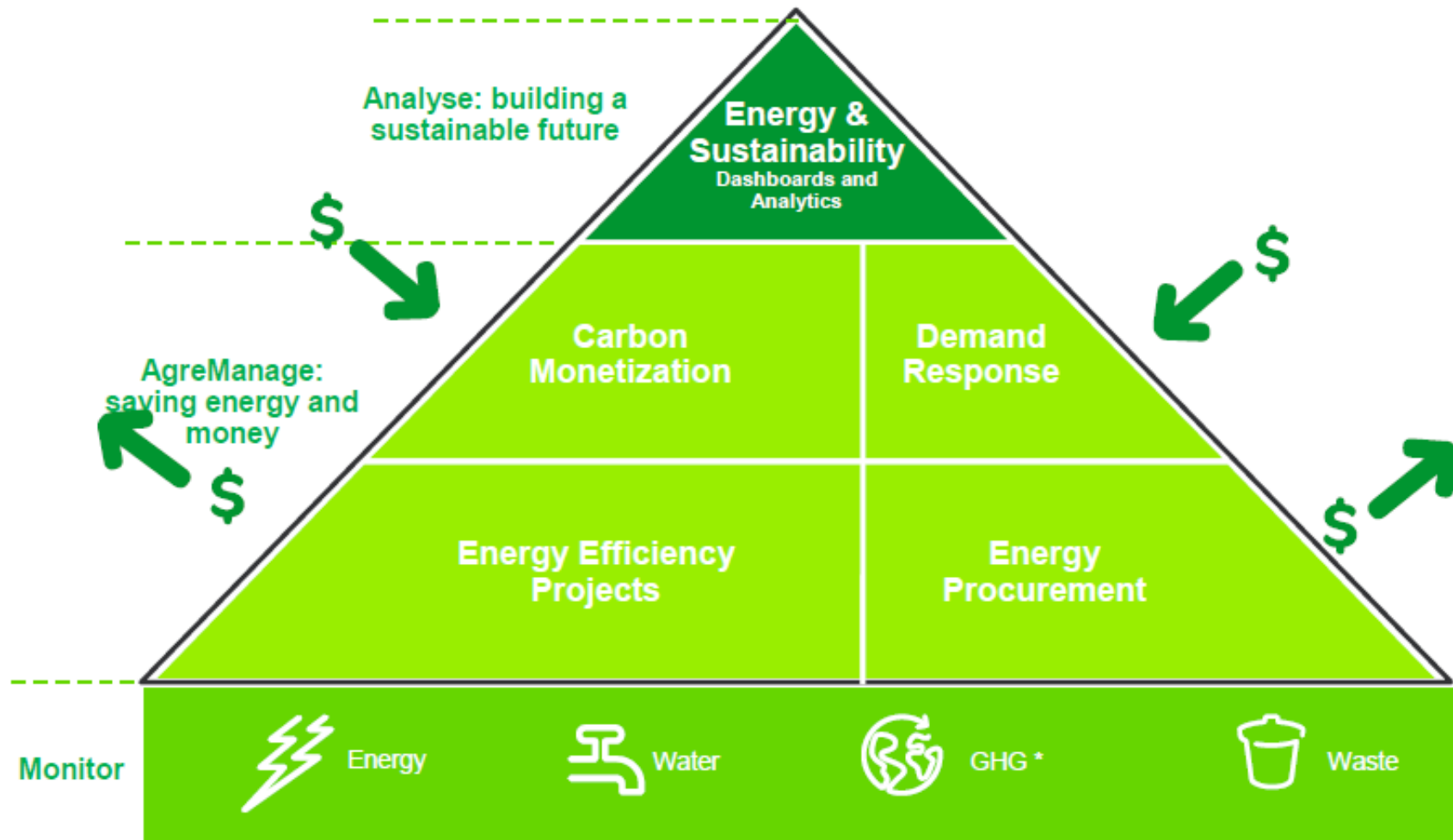
Operations

"I Optimize our operations and assets"
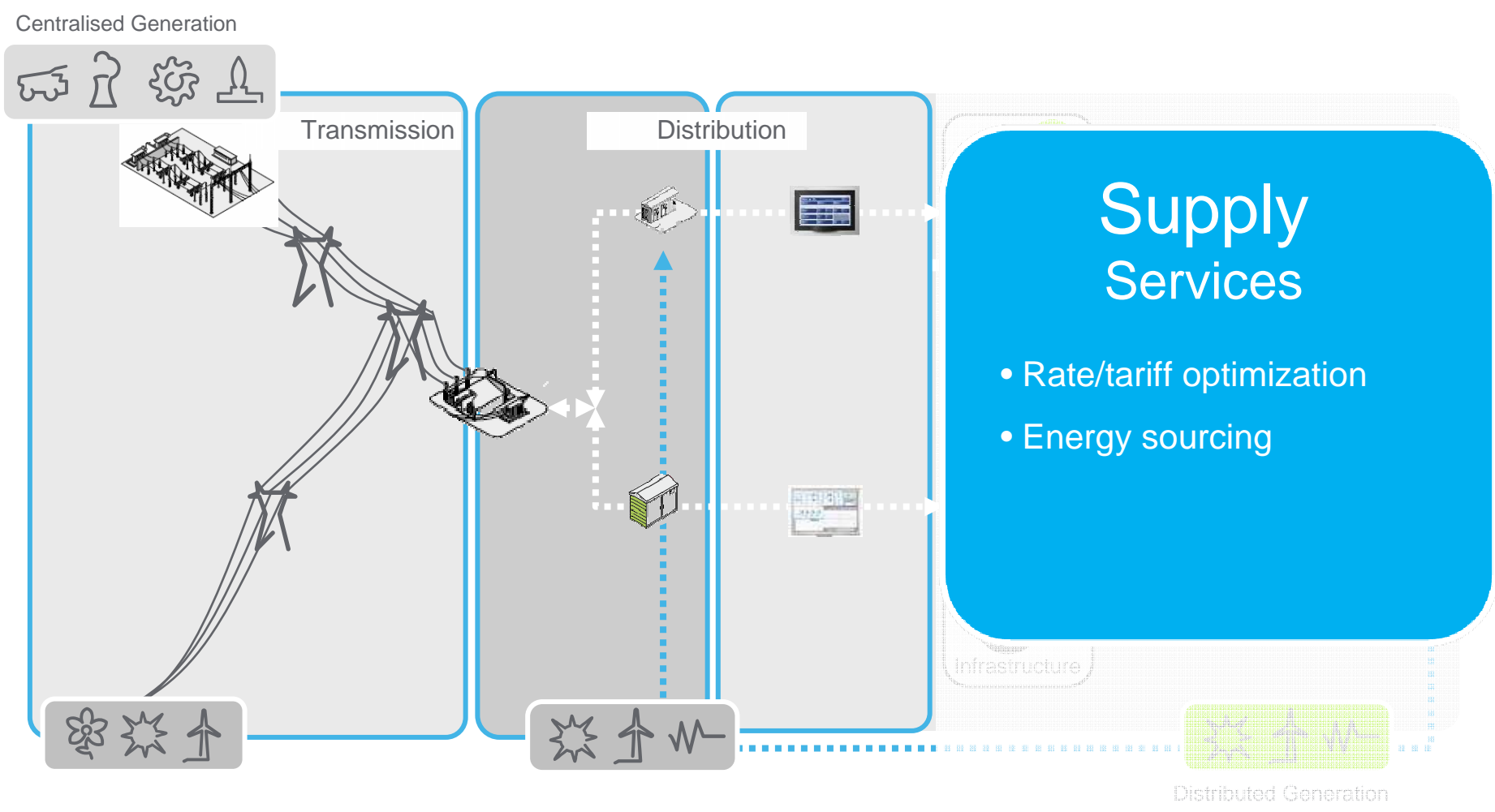
Control

"I Control our facilities processes"

How am I performing?

What is my strategy?

How do I optimize?

Energy management life cycle

How do I buy?

How do I control?

Towards integrated Energy & Carbon management

Analyse: building a sustainable future

Energy & Sustainability
Dashboards and Analytics

AgreManage: saving energy and money

Carbon Monetization

Demand Response

Energy Efficiency Projects

Energy Procurement

Monitor

Energy

Water

GHG *

Waste

Energy Management Services
Supply Side

Centralised Generation

Transmission

Distribution

Supply
Services

- Rate/tariff optimization
- Energy sourcing

Infrastructure

Distributed Generation

Focus on **Summit Energy**

- Acquisition of Summit Energy Services Inc., providing expertise in energy procurement on supply and sustainability on demand

-

Data Operations
- Invoice collection
- Invoice Validation
- Utility bill management

Regulated Markets
- Tariff analysis
- Rate comparisons
- Utility negociations
- Tax exemptions

Market Intelligence
- Regulatory assessments
- Market price tracking
- Industry trends
- Energy pricing
- Public utility commission updates

Sourcing
- Load profiling
- Energy contract optimization
- Supplier negociations
- Market pricing analysis
- Supplier review
- Supply recommendations

Risk Management
- In-depth market analysis
- Strategic Risk Plan development
- Timely helping recommendations
- Detailed position reporting

Sustainability
- Roadmap planning
- Supply chain/ life cycle analysis
- Renewable/ clean energy
- Offset, credits, incentives
- Carbon price forecasts

Optimize your energy procurement policy

- Get exclusive recommendations from our specialists

- Identify the best suppliers and the best tariff

- Manage the risk and detect opportunities

Track the performance of your Energy and Sustainability program...

- Communicate mission, goals & program achievements

- Aggregate emissions (scope 1,2 and 3), water, waste, etc. for the enterprise

- Access emission factor data and methodologies for verification

- Share key documents and information resources

- Report and manage status of projects with archives

Energy Management Services
Commercial services

Centralised Generation

Transmission

Distribution

Residential

Commercial
services

- Certification services
  - ISO 50001
  - Leeds

Data Centres

Infrastructure

& Energy Storage
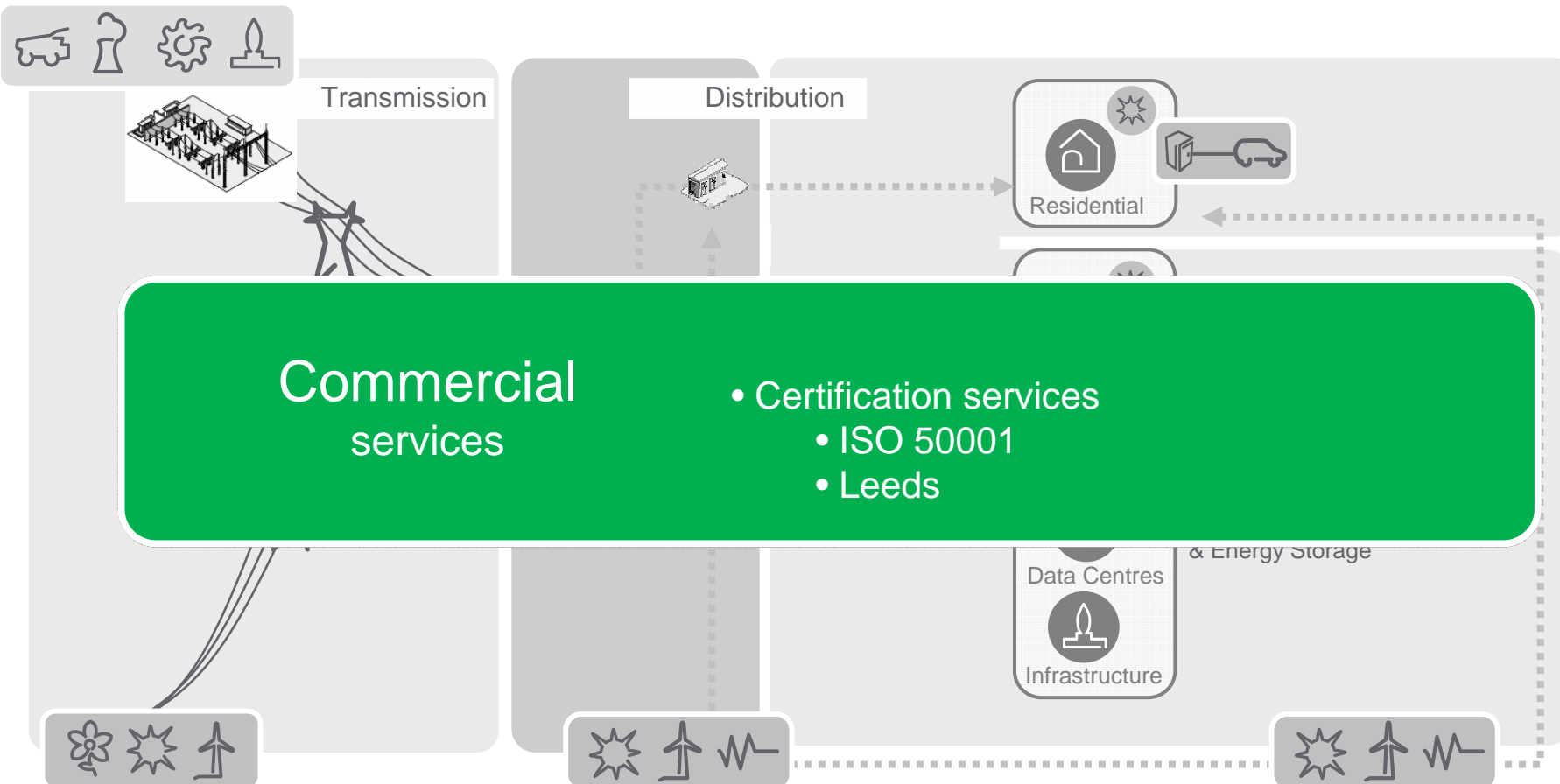
Energy Management Services enable the Smart Grid

Smarter Supply

Smarter Demand

Demand Response

Residential

Industry

Buildings

Data Centres

Infrastructure

Electric Vehicles
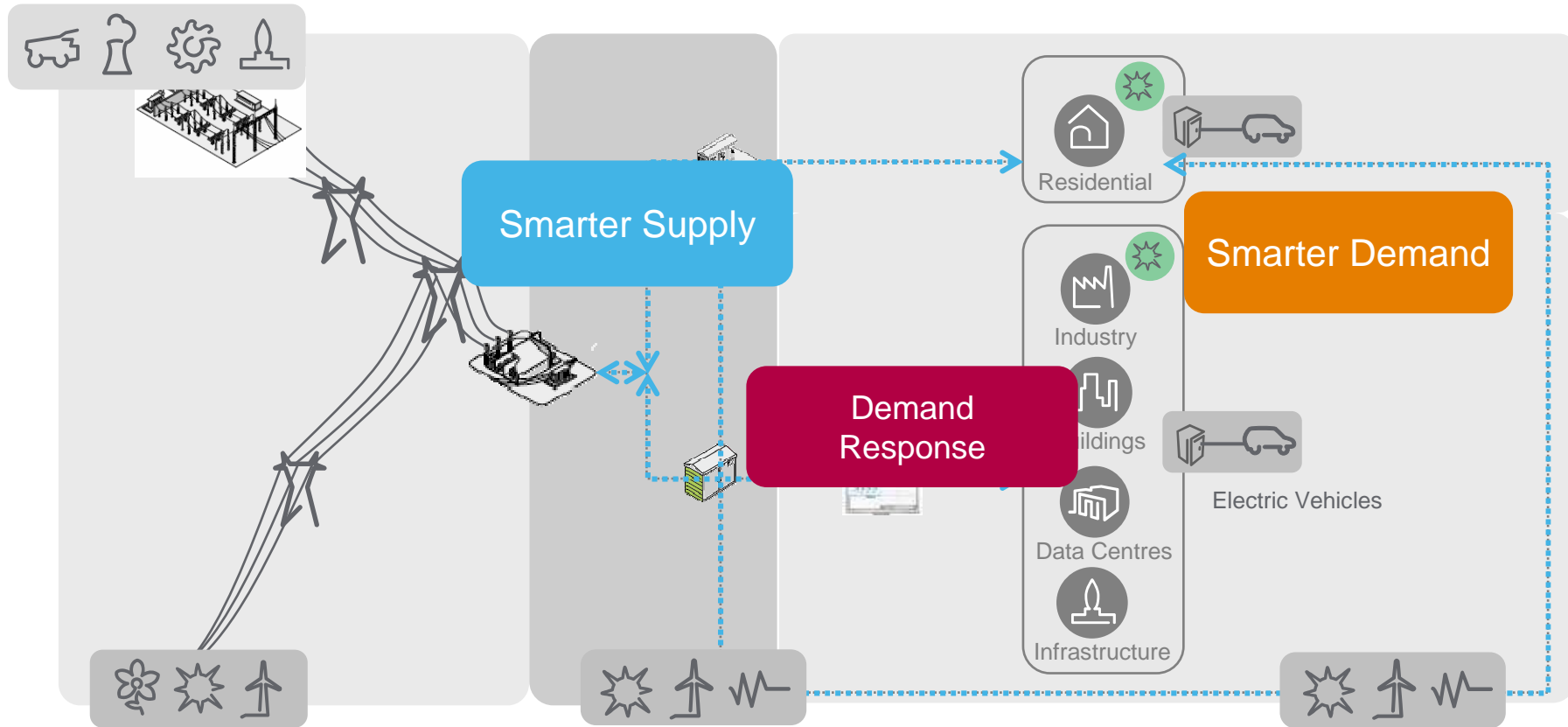
Smarter Demand + **Smarter Supply** + **Demand Response** = the Smart Grid

Focus on **Energy Pool**

- **Energy Pool**: a leading player in Demand Response

« With Energy Pool no need to start polluting when the production capacity is at the maximum because it replaces a virtual Power Plants »

EnergyPool

Typical EcoStruxure architecture

Control Room

Remote Client

Power monitoring
Building control
Process control

Vijeo Citect SCADA

With video integration

Continuum
Access controller

TCP/IP Backbone

Wireless link
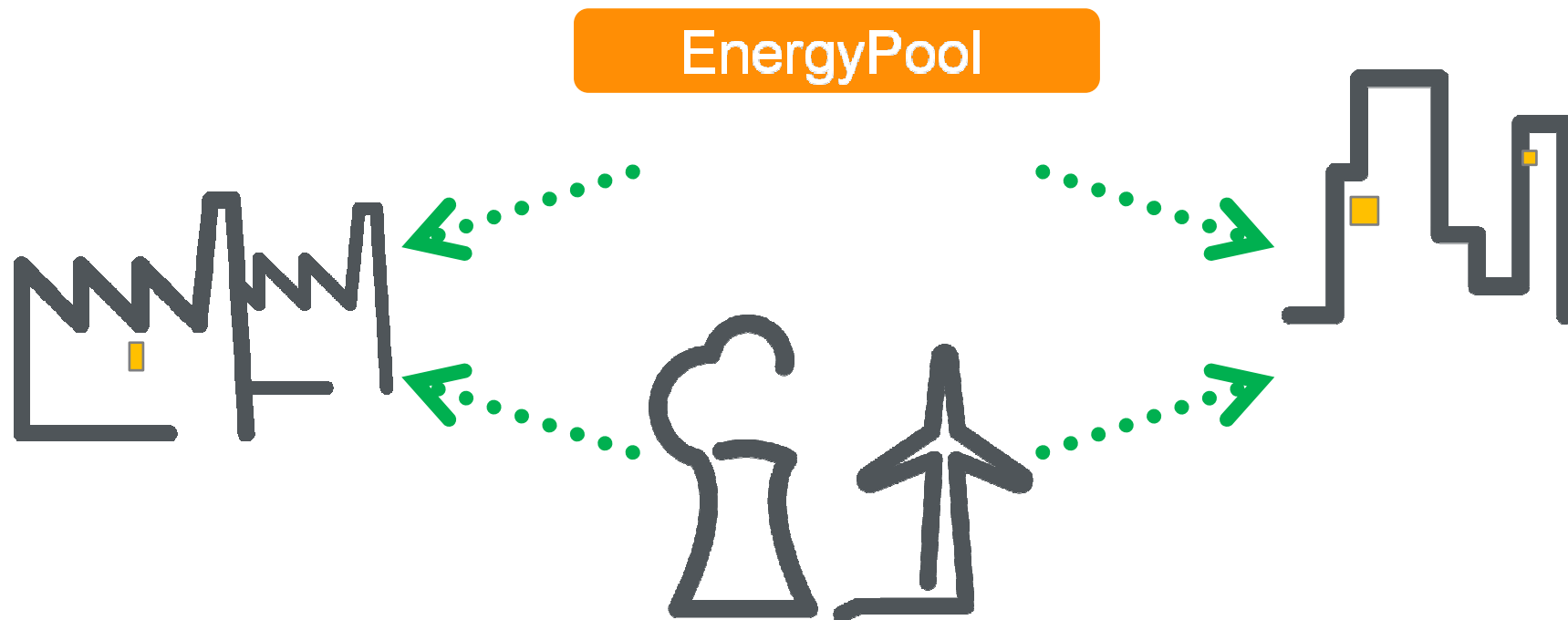. Ethernet radio,
Cellular network (Edge, 3G..)

Sepam

NSX

PM

Premium

Instrumentation

TCP/IP

M340

NSX

PM

Instrumentation

Pelco
IP camera

Pelco
IP camera

| Power metering | Process control | Video Security | Power metering | Pump control | Video Security |

Remote station

EcoStruXure Demo Center

TAC Continuum access controller

PELCO by Schneider Electric

Pelco IP camera
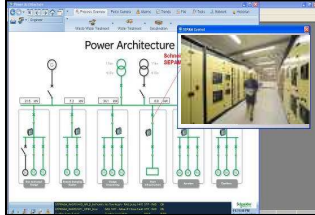
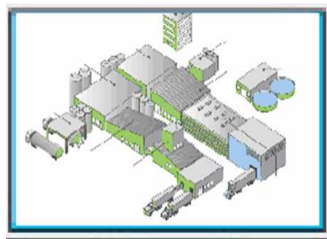- Energy management & sustainability

WAGES & Co2 footprint

- Multi sites/countries Dashboards
- Plant/Local Dashboards

- Power monitoring & control

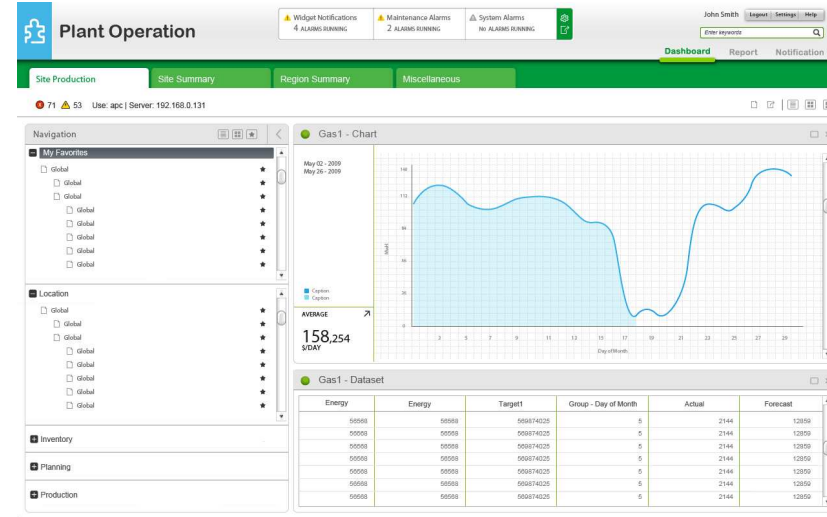Power Architecture

- Building Mngt

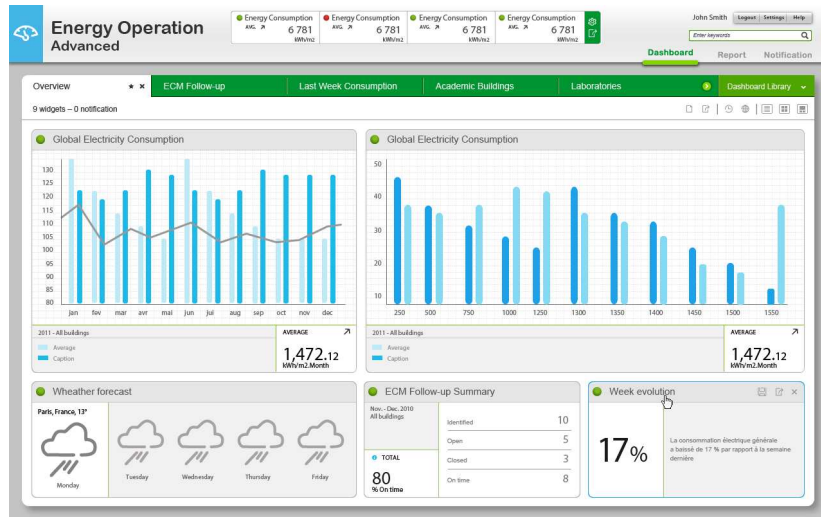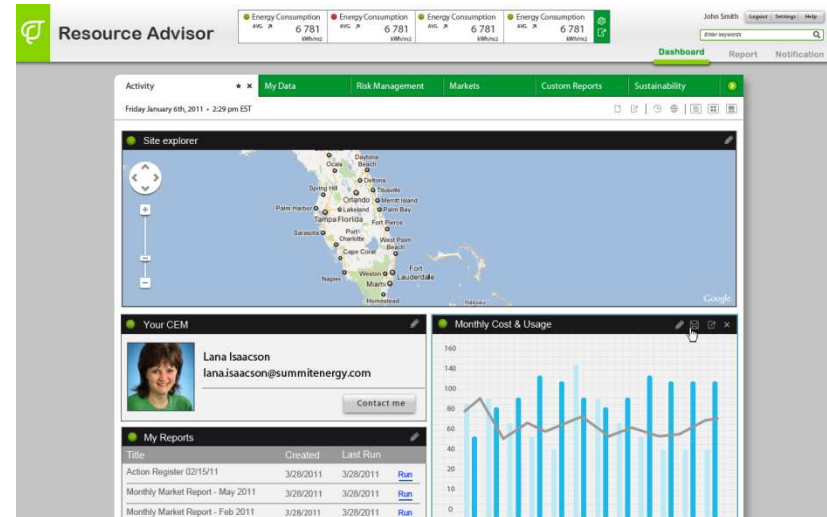

- Process and machines automation

EcoStruxure - User Interface Designs
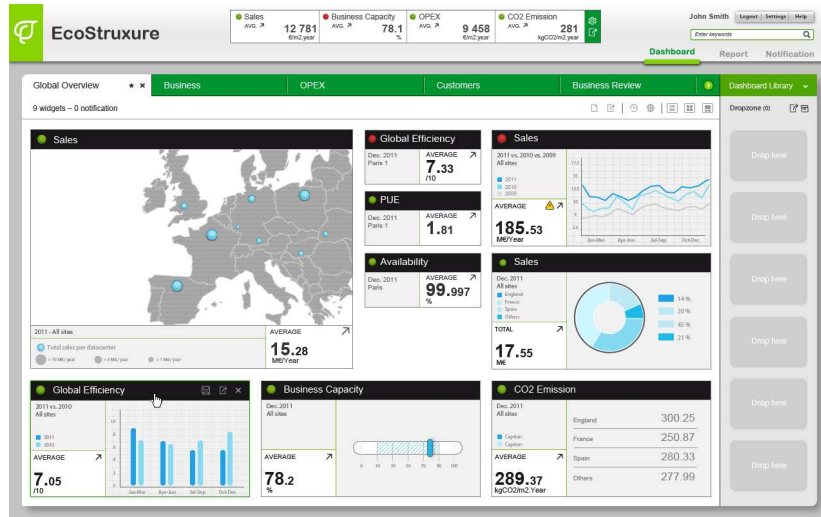
A real F&B Example

Clean-In-Place (CIP)

- An automatically operated cleaning system that delivers a number of wash and rinse cycles to the internal surfaces of processing equipment such as
  - tanks,
  - piping,
  - pasteurizers
  - filling machines,…

- Typical cleaning cycles in a CIP system for F&B processes consist of
  - a water rinse
  - a caustic wash
  - a second water rinse
  - an acid wash
  - a third water rinse
  - and often, a sanitizer rinse

Clean Water | Nitric Acid | Caustic Soda | Hot Water | Recup. Water | Processing Equipment
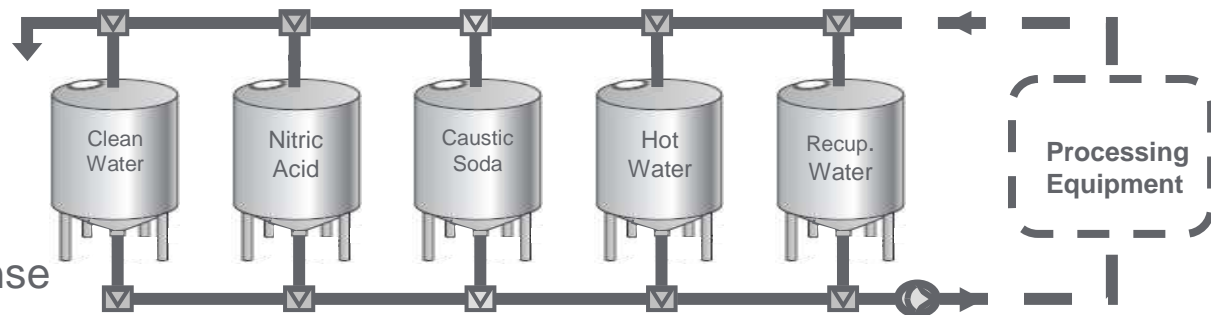
Clean in Place (CIP)

- As it impacts Quality and Safety your production

The Clean in Place is the Heart of your F&B plant

- But at the same time :

  - It is a high Energy consumer (Steam, electricity)
  - It has high Water, Chemical and Carbon footprint
  - It has a negative impact on overall Equipment Availability

There something we can do optimize a CIP !!

CIP Process Automation
Four fundamental Parameters

Continuously verify the **4T** rule

- **Turbulence**
  - Speed of cleaning products to generate needed turbulence in equipment (1.5m/s as a minimum)
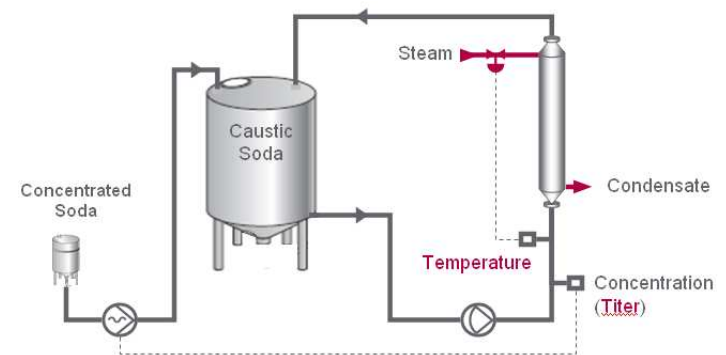
- **Time**
  - Duration of the cleaning cycles

- **Temperature**
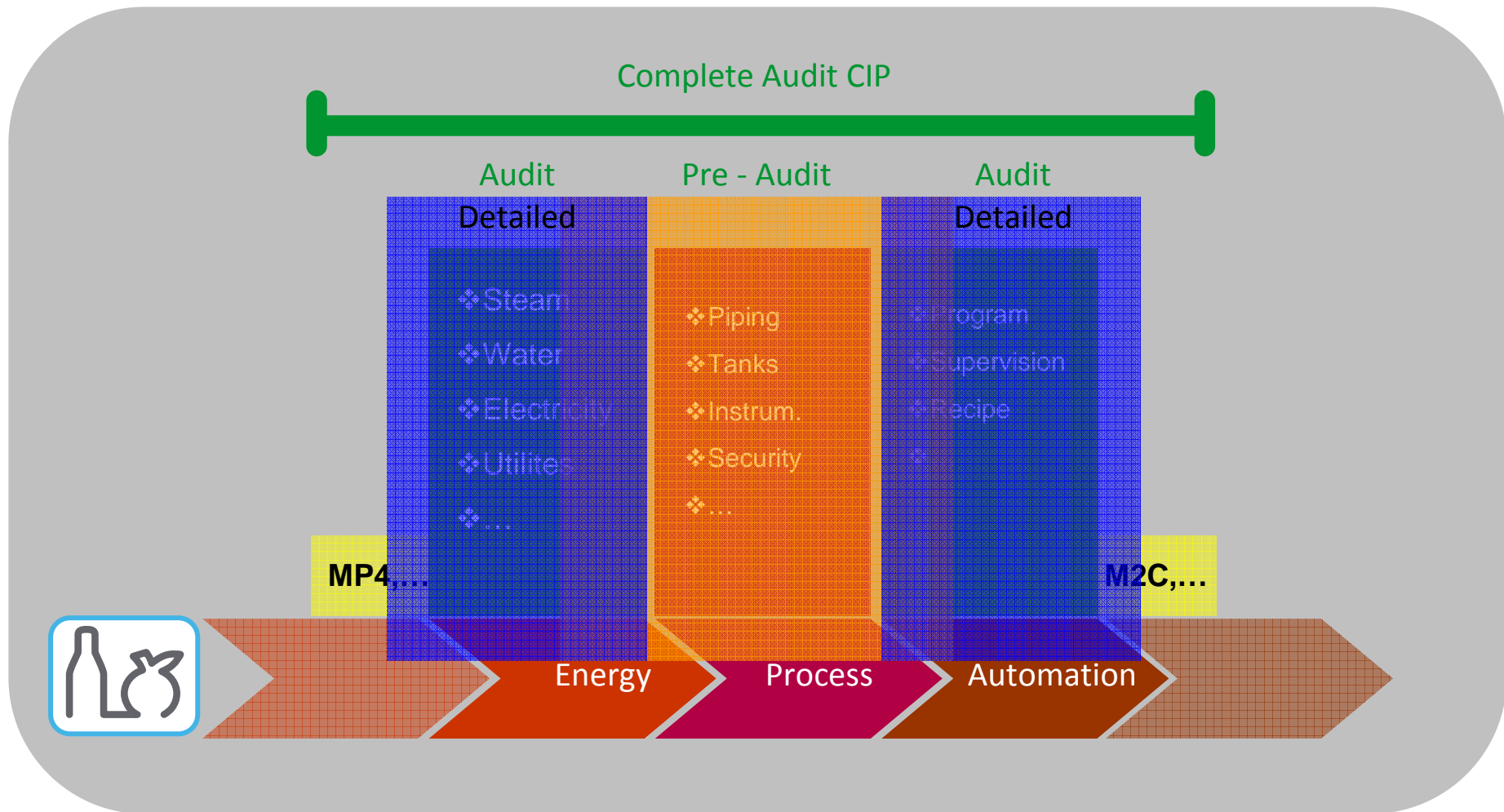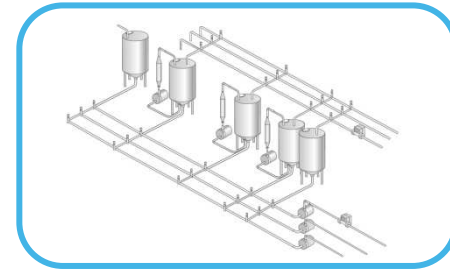 - Temperature of the cleaning products

- **Titer**
  - Concentration of the cleaning products

Audit CIP - Principle

Complete Audit CIP

Audit	Pre - Audit	Audit
Detailed		**Detailed**

- Steam
- Water
- Electricity
- Utilites
- …

- Piping
- Tanks
- Instrum.
- Security
- …

- Program
- Supervision
- Recipe

MP4,…

M2C,…

Energy → Process → Automation

Why audit the CIP system?

➢ We have to heart to reduce your energy consumption at large (water, air, gas, electricity and steam) and reduce your environmental impact (CO_2, chemicals, waste).

➢The CIP is the heart of the process is the essential component of agro-food

NO CLEANING > NO PRODUCTION

➢ **A project that demonstrates the commitment of Schneider-Electric:**

  ➢ Waste less > reduce consumption

  ➢ Be more effective in doing the same with fewer resources,

  ➢ Being a cleaner planet "greener".

Weaknesses of the CIP stations

➢A station CIP well sized and instrumented, circuits wash properly calculated, good hydraulic design without too much loss, an automatic optimized for efficient cleaning, a good monitor for continuous improvement.
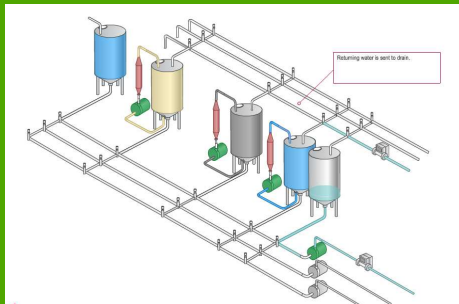
THIS IS VERY RARE

➢We meet stations:
- ➢ Consume plenty of water
- ➢ Consume too much steam
- ➢ Consume a lot of electricity
- ➢ Consume too many chemicals
- ➢ Time consuming to produce

CIP Traceability and Optimization

CIP Report

CIP Process

Returning water is sent to drain..

DB

Gantt Diagram

Trending & Report

Audit & Expertise

- Measure and Analyze
- Fix - Report

Per line and Equipment
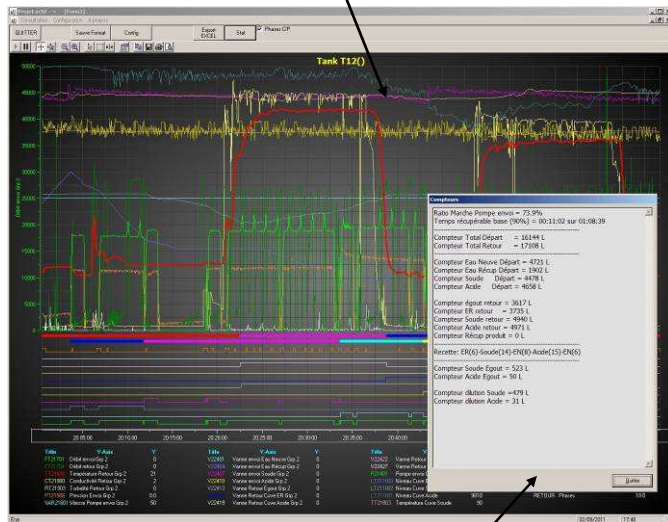
Regulation Compliance

Possible link to our Energy & Co2 dashboards
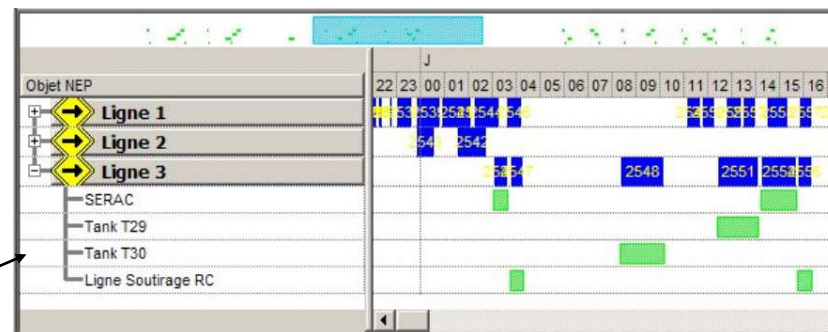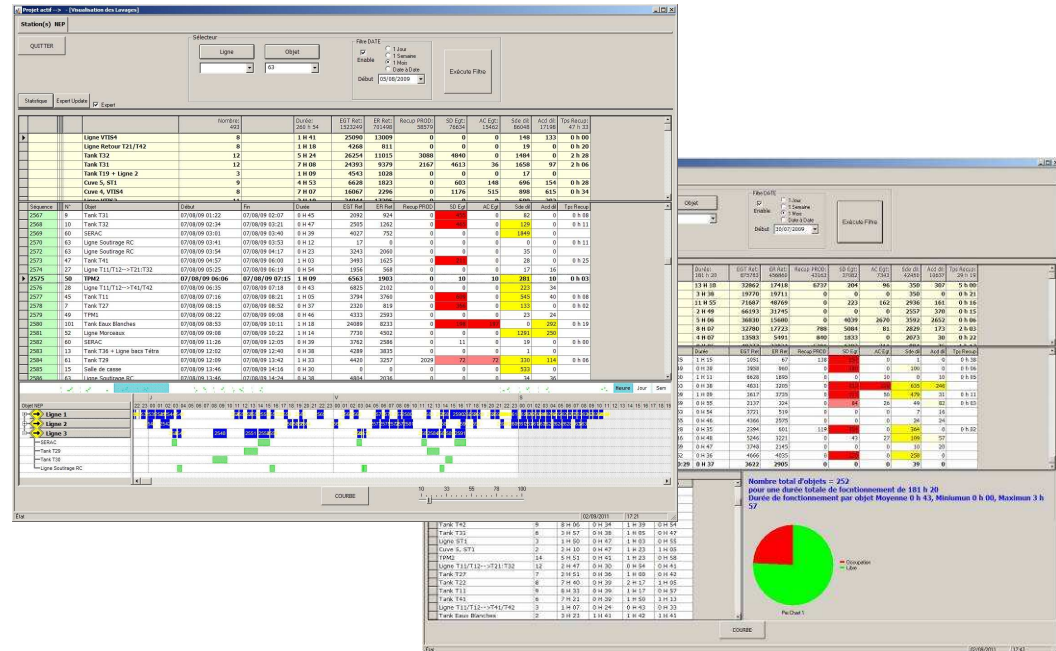
CIP Traceability and Optimization

Detailed Analysis based on trend tools
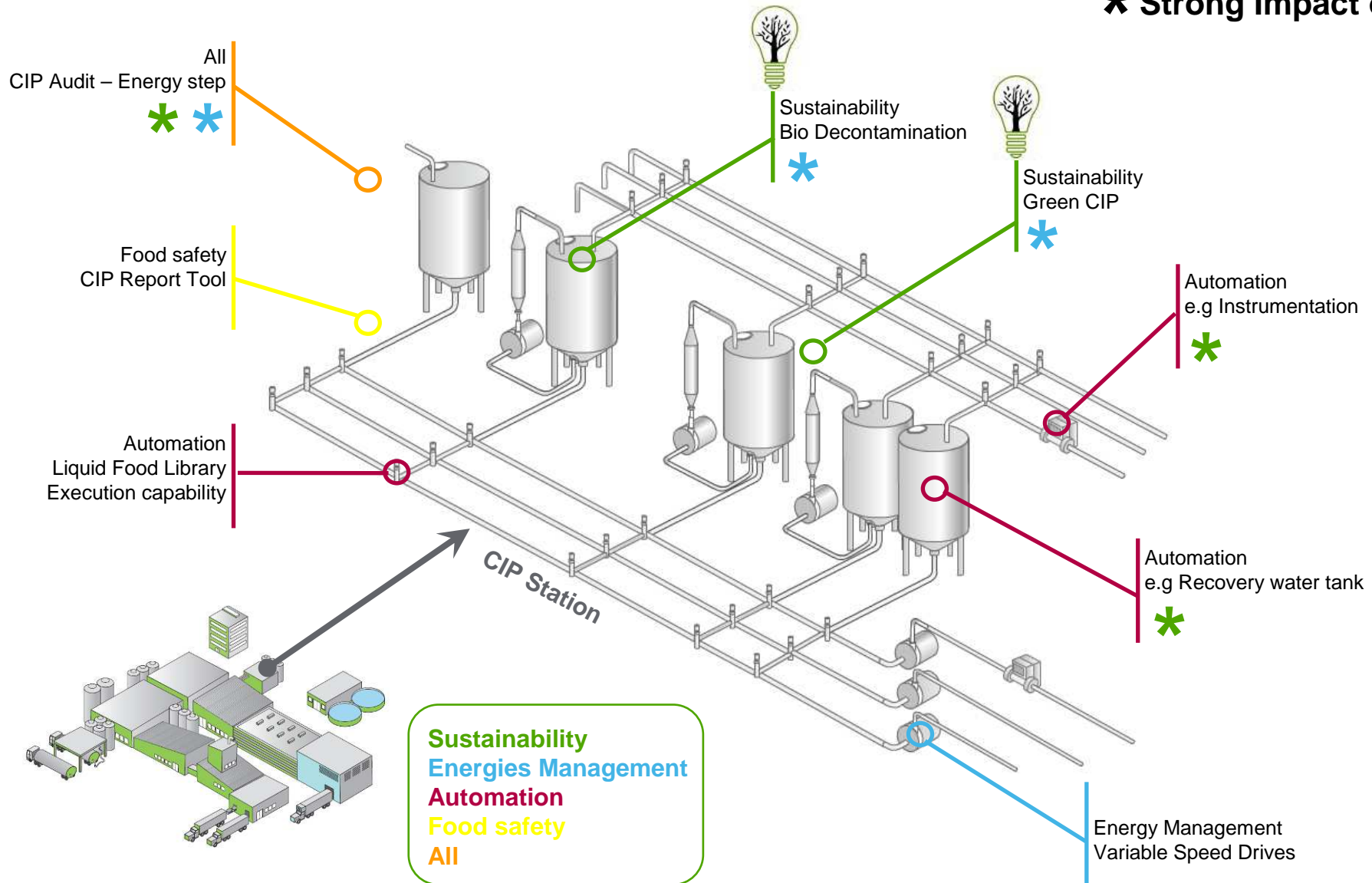
Expert Analysis

Line occupation diagrams

PlantSolution Take Away ! Something unique

* **Strong Impact on :**

All
CIP Audit – Energy step
* *

Food safety
CIP Report Tool

Automation
Liquid Food Library
Execution capability

Sustainability
Bio Decontamination
*

Sustainability
Green CIP
*

Automation
e.g Instrumentation
*

Automation
e.g Recovery water tank
*

CIP Station

Sustainability
Energies Management
Automation
Food safety
All

Energy Management
Variable Speed Drives

Energy step – CIP module

- Energy step – Energies and Sustainability
  - Measure and analyze
    - Power Quality, Reliability
    - Power factor, Harmonic control or …
    - Carbon, Water, Chemical consumption

- Energy step - Audit capabilities
  - CIP walk through
    - Energies, Process, Automation, instrumentation…
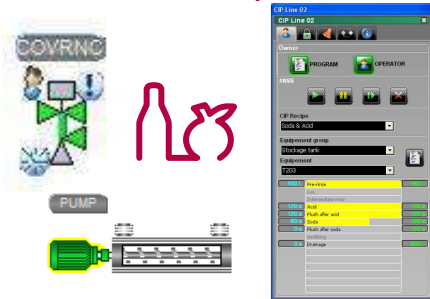 - Fix the basic

- Energy step – Solutions
  - Monitor and improve
    - CIP Dash boards
      - KPIs for Energies consumption (WAGES*)
      - KPIs for Sustainable footprint or …
    - Plants Benchmark
    - Projects pipeline impact
    - Energies cost optimization,…

*Wages : Water, Air, Gas, Electricity, Steam
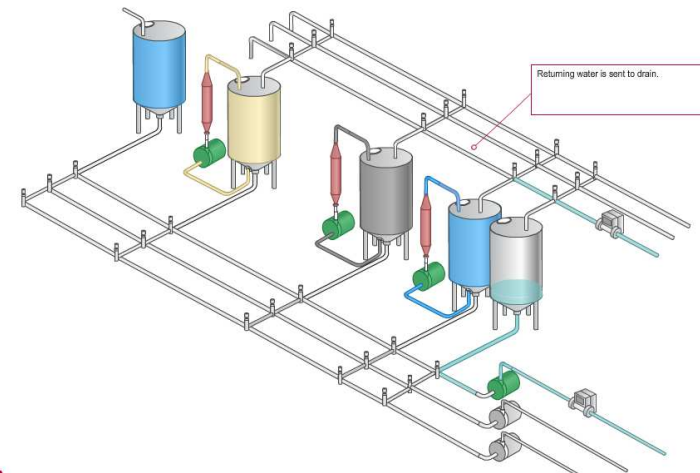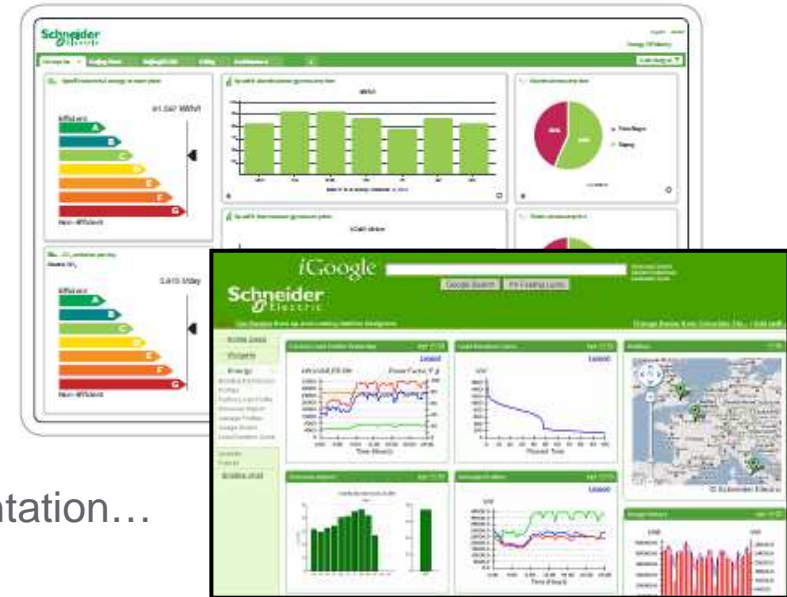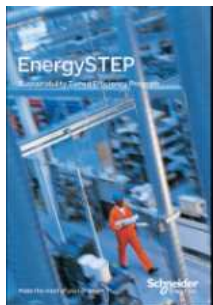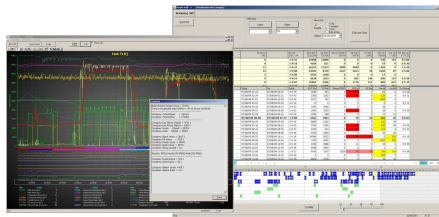
Based on dedicated Solutions for CIP
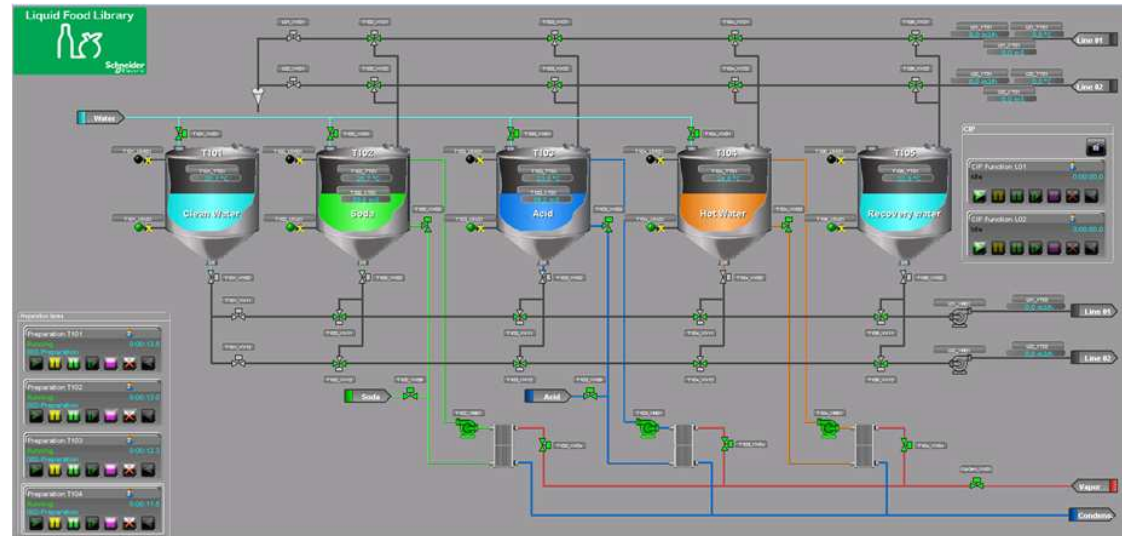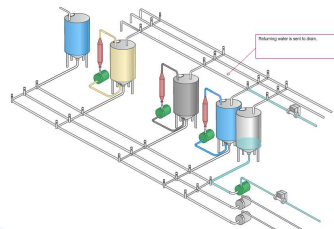

A library

Optimization Tool

Monitoring Tool
Dashboard

Innovative solutions in Process

Services
AUDIT

Our offer for CIP Optimization

● Reduction of Water consumption

● Reduction of chemical products consumption (e.g : acid – soda)

● Reduction of energies consumption (e.g : heating)

● Reduction of Carbon footprint

● Optimize productivity by reducing the length of the cleaning program (just enough), optimize CIP's lines availability

● To summarize : Produce more with less energy, be more green by using less chemical product. Reduce your Carbon and water footprint by optimizing your CIP.

● And of course Guarantee food safety !!!

Innovations

A New CIP Concept to be more Greer and Efficient

➤Green CIP :

- Based on chemical regeneration (soda and acid)
- **Recover** (effluent), **Regenerate** (soda/acid), **Recycle** (reagents & "sludges")

➤3 STEPS to be more green !

- Chemical solution recovery before drain
- Chemical regeneration to clean soda and acid solutions (Depollution)
- Chemical reuse for next cleaning programs

➤Benefits

- Water consumption reduction
- Chemical consumption reduction
- Energy consumption reduction
- Productivity Improvement
- Sustainability, environmental footprint reduction
- Pollution tax reduction and CAPEX cut (waste treatment)

BARRAULT RECHERCHE

Before   After

Treatment through a reagent

Green CIP Concept in Brief

➢Water : No need to rinse first, you could start immediately with the chemical phase
- Water consumption reduction
- CIP duration reduction – productivity improvement
- Improve your water footprint

➢Chemical : Regeneration of soda & acid solutions
- Reduce the chemical consumption
- Save energies due to tank refilling and heat step
- Improve your carbon & sustainable footprint

➢Waste water treatment plant impacts
- Treatment partially done before rejection
- Save electricity due to effluents treatment
- Avoid chemical rejection and Ph variation

➢Already some pilot & study projects ongoing

BARRAULT
RECHERCHE

Innovation in Sanitization

➤How do you do your Sanitization ?

  ● By hot water or steam ? With a chemical solution ?

  ●Chemical

    ●Pro's : Very fast

    ●Con's : Must be followed by a rinse with sterile water, need to monitor chemical agent concentration, generate chemical waste to be treated

  ●Heat by hot water or steam

    ●Pro's : No need of additional rinse

    ●Con's : Time for heat treatment and equipment to cool down stress on equipment due to fast temperature changes, energy cost to produce steam/hot water

➤We propose a bio solution usable at room temperature

  ● Reducing chemical waste, reducing electricity and steam consumption, reducing your carbon footprint, Improving your productivity

What is a Bio-Decontaminant ?

➤ In a few words :

- ● Solutions able to kill Microorganisms by modifying their **Electrical** environment
- ● Based on a vegetable combination (100% Bio)
- ● Useable for sanitation phase at room temperature instead of 95℃

➤ Replace your current sanitation phase with a bio decontamination phase

Bacterias :
Listeria innocua,
Salmonella Dublin,
Escherichicia coli,
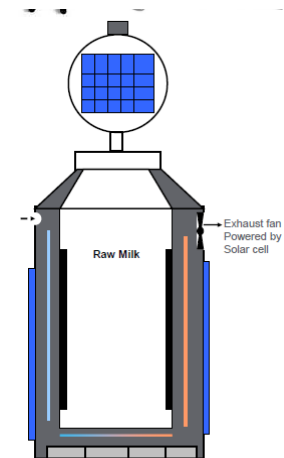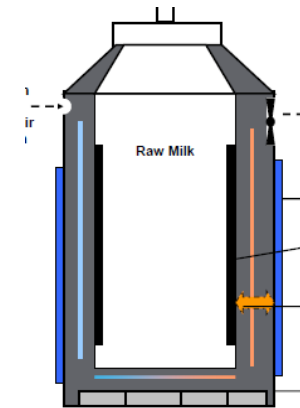*Bacillus subtilis,*
Staphylococcus aureus,
Aspergillus niger,

Without   **With**

Ions
négatifs
OH-

Protons H+

Molécule H₂0
Molécule BS
Micro-organisme
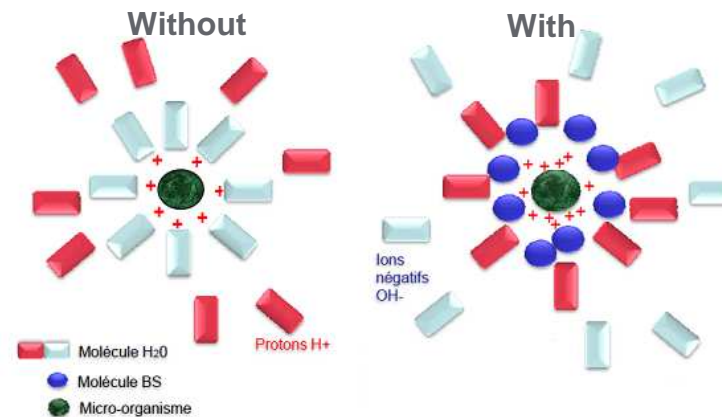
Innovation in Emerging countries

Scope

- **Application**
  - Raw milk pre-cooling solution to minimize bacterial growth and maintain quality of raw milk (by reducing the raw milk temperature)

- **Lead Users**
  - Milk agent
  - BMC In charge

- **Customer problems**
  - Today it is taking 6 to 8 Hrs to cool raw milk at 25 – 27C to 4 C temperature. We need to reduce the cooling time
  - Prior to reaching the BMC station, the milk stays in 40 liters plastic cans for about 3-4 hours at environmental temperature.
  - The cans are transferred in vehicles which do not have any refrigeration units and are not insulated to maintain the temperature.
  - So, a significant amount of time lapses before the milk reaches the BMC.
  - This leads to bacterial growth in the raw milk.
  - ⇨ This leads to deterioration of the milk quality which is not able to meet international standards.

CC No 2 - Quality of the intake milk from BMC is questionable

CC No 31 - Power consumption in chillers (BMC) is very high

CC No 2 - Quality of the intake milk from BMC is questionable

CC No 25 - Milk Adulteration testing is challenging

Verbatim • Causes

41-151: "Th improveme replace the accurate a milk testing testing is n adulteratio detected o collection processing challenges.

CC No 31 - Power consumption in chillers (BMC) is very high

Verbatim

41-163: "Challenges in setting up the BMCs:

1. Because of the scarcity of power in village they are mostly run on generators which are highly expensive

it is about 25

2.

3.

Raw Milk

Raw Milk

Exhaust fan
Powered by
Solar cell

36

Truck monitoring with GPS Modem

GPS tracking of truck

Schneider Electric India Private Limited

Services

Milk reception & Schedule @ dairy plant

- **Proposed offer**
  - Milk Truck Tracking : Service oriented solution designed for Tracking the Milk Truck from the Dairy Plant.
  - Integrated solution with PlantStruxure
    - Link with Milk Reception Point to schedule receiving the Milk Tanks
    - Optimize the milk process with better predicted "Time & Quantity" of milk to be received
  - GPS modem & Tracking web portal are the offer components

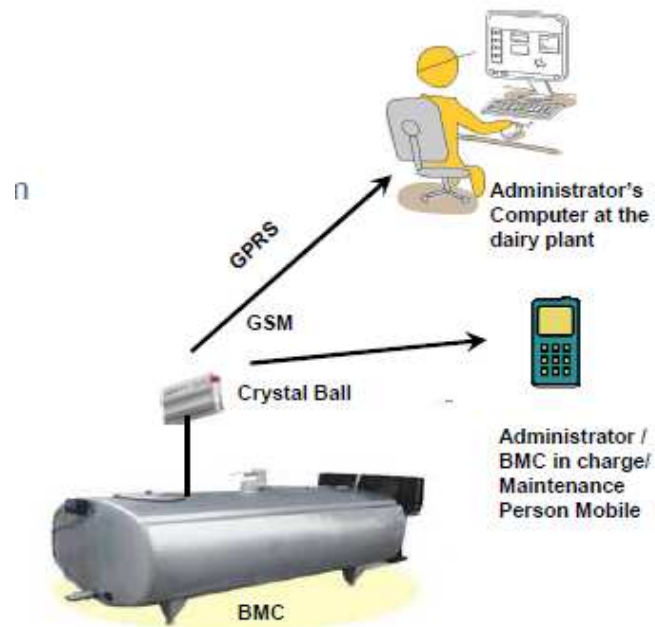GPS tracking of truck
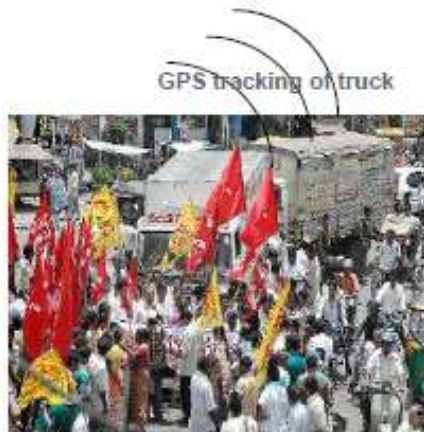
- **Price:**
  - TBD

- **Customer benefits**
  - Productivity & Process optimization
  - Energy efficiency
  - Improved milk quality with associated futuristic initiatives (ex: On-Truck milk processing when delayed on road)

Schneider Electric - Industry Innovation Platform , AOCI, Bangalore– Veerendra Vasamsetty – Dec-2011

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Innovation in Brief

- BMC Remote monitoring

- QR Code on product

Questions ?
/ Answers

"Hungry for Green Efficiency" ?

Questions ?

Conclusion

Our greatest reward:
the satisfaction of our
F&Bev customers

Thank You !
Tack så mycket !

" Better Food and Hygiene for More People Using Less Energy