# Drought and water scarcity, hydrogeological risk and extreme weather events

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## CIIP S.p.A. experience

Claudio Bernardo Carini - CIIP S.p.A.
Energy Manager, Plants Maintenance & SCADA System Manager

# Numbers from CIIP

**4593 km**
**water main system**

**3**
**main sources**

**6**
**emergency well plants**

**2026 km**
**sewer system**

**20**
**WWTP PE > 2000**

- Over **30** millions m³ annually delivered
- Max peak **450k** Inahabitants served
- Integrated Urban Water Management AATO 5 Marche Sud
- over **250** employees
- revenue **44 M€**
- **59** Municipalities in 2 provinces
- capitalization **116 M€**

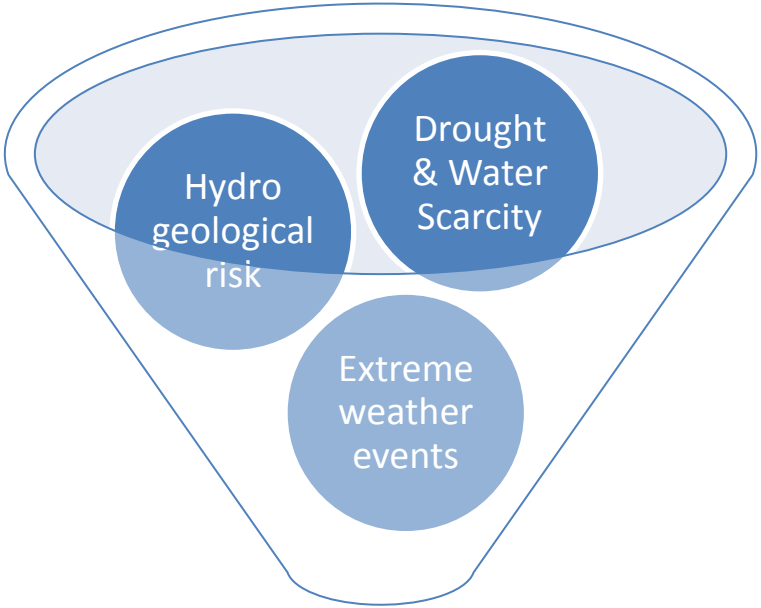
# Numbers from CIIP

3 Water main systems

6 Emergency well plants

2 Drink water treatment plants

# CIIP experience




water emergency plan

plants & networks monitoring

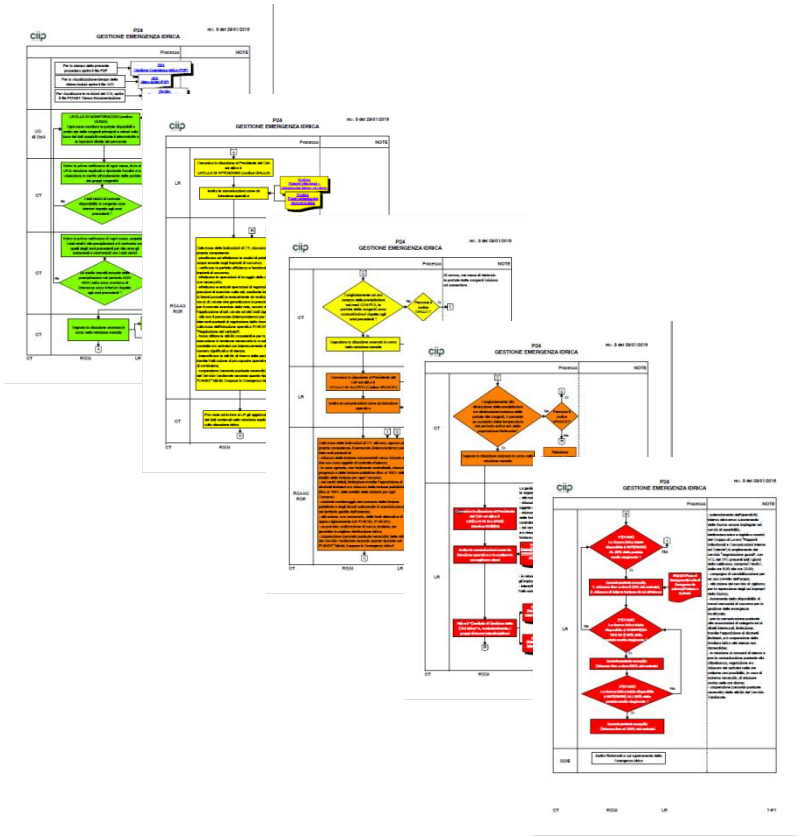
mainteinance procedures

Water & WWT supply

Costs containiment

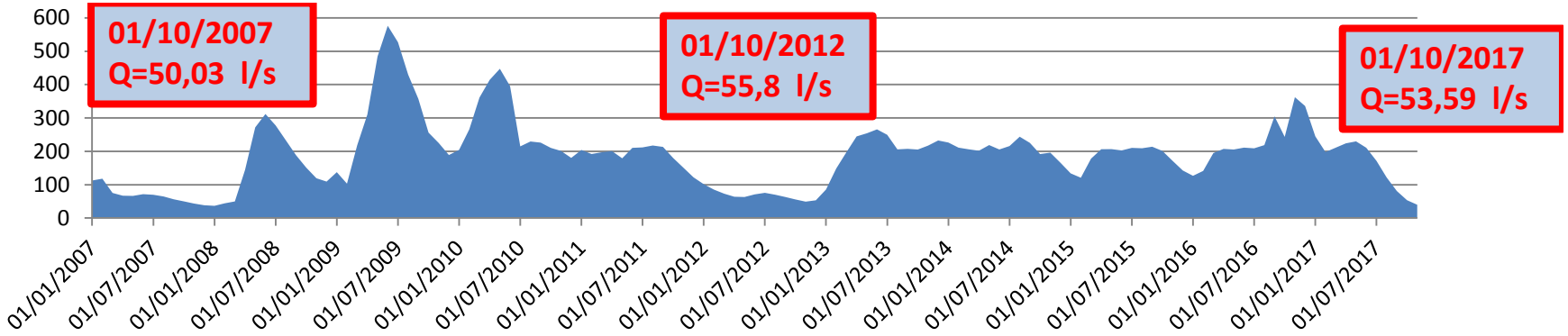
# Water Emergency Plan

- Four levels (monitoring, attention, alert, alarm)
- Use of SCADA system & historical data
- Source flow rate, precipitations, water tanks levels, temperature

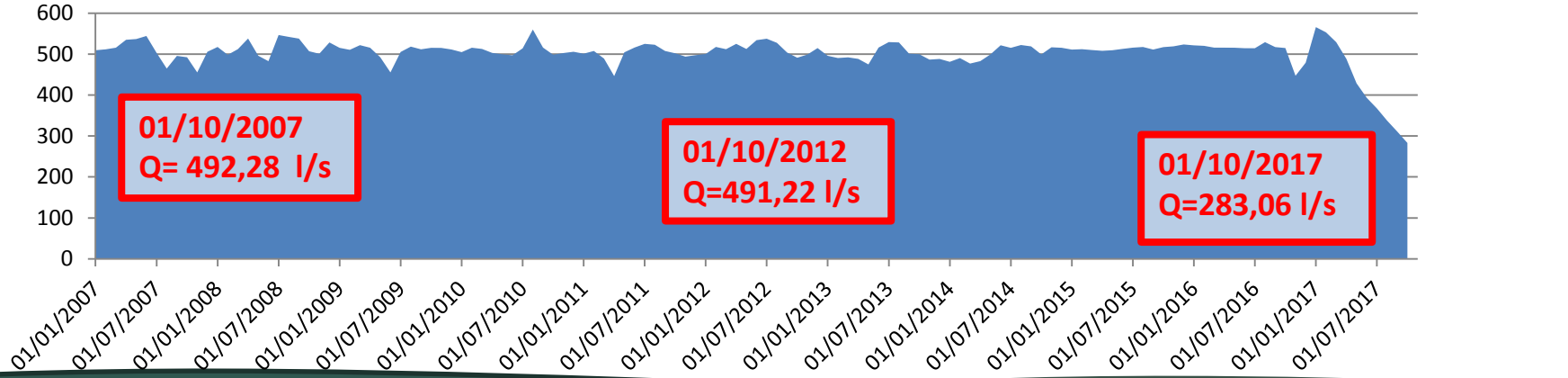


# Water Emergency Plan

## Pescara




## Foce di Montemonaco



# Water Emergency Plan

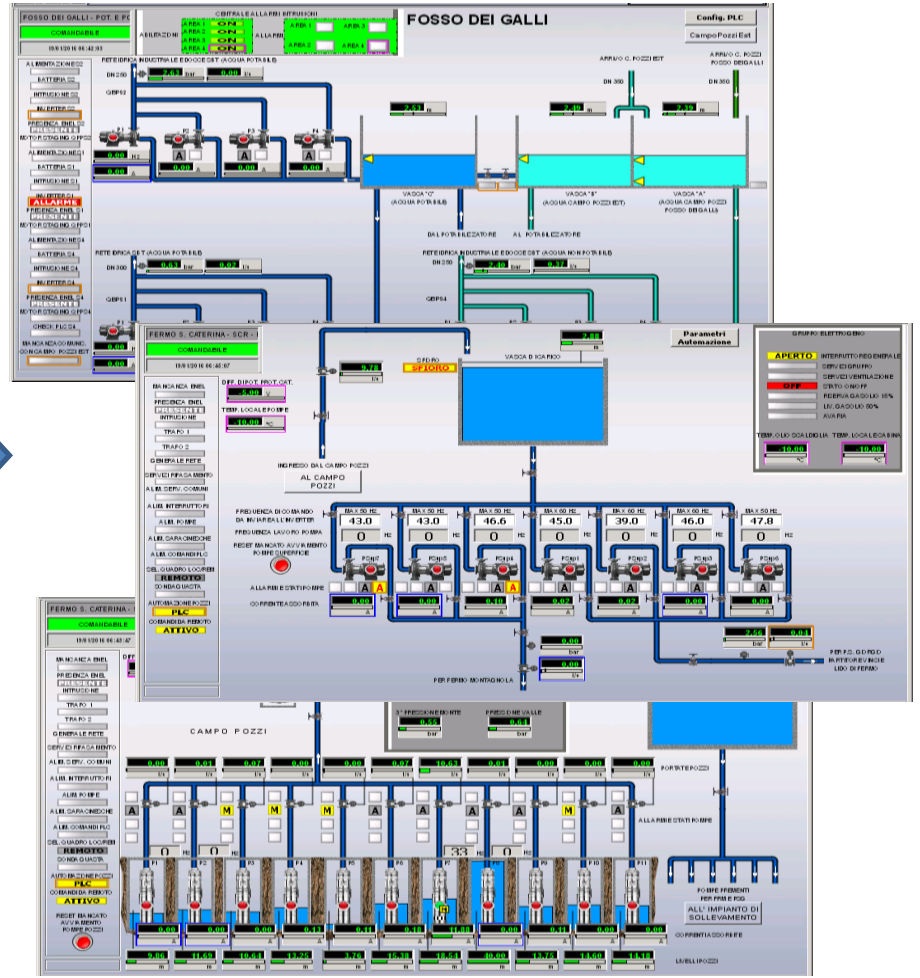
Sasso Spaccato

# Water Emergency Plan

Emergency Plants Activation

2017

- Petritoli EP
- Campofilone EP
- Santa Caterina EP
- Fosso dei Galli EP
- Capodacqua EP



# How it works

regulations

actions, data collection
& data mining

Technicians

Operating level

informations

SCADA

PLC

# WWTP automation

## Massignano Marezi

- 1000 PE
- Sludge Rising, auth. limits
- 12/2013 – 2/2014

## Cupramarittima Taffetani

- 15000 AE
- Auth. limits, PE fluctuation
- Groundwater infiltrations
- 4/2014 - 5/2014

# WWTP automation

## Montefiore San Giovanni

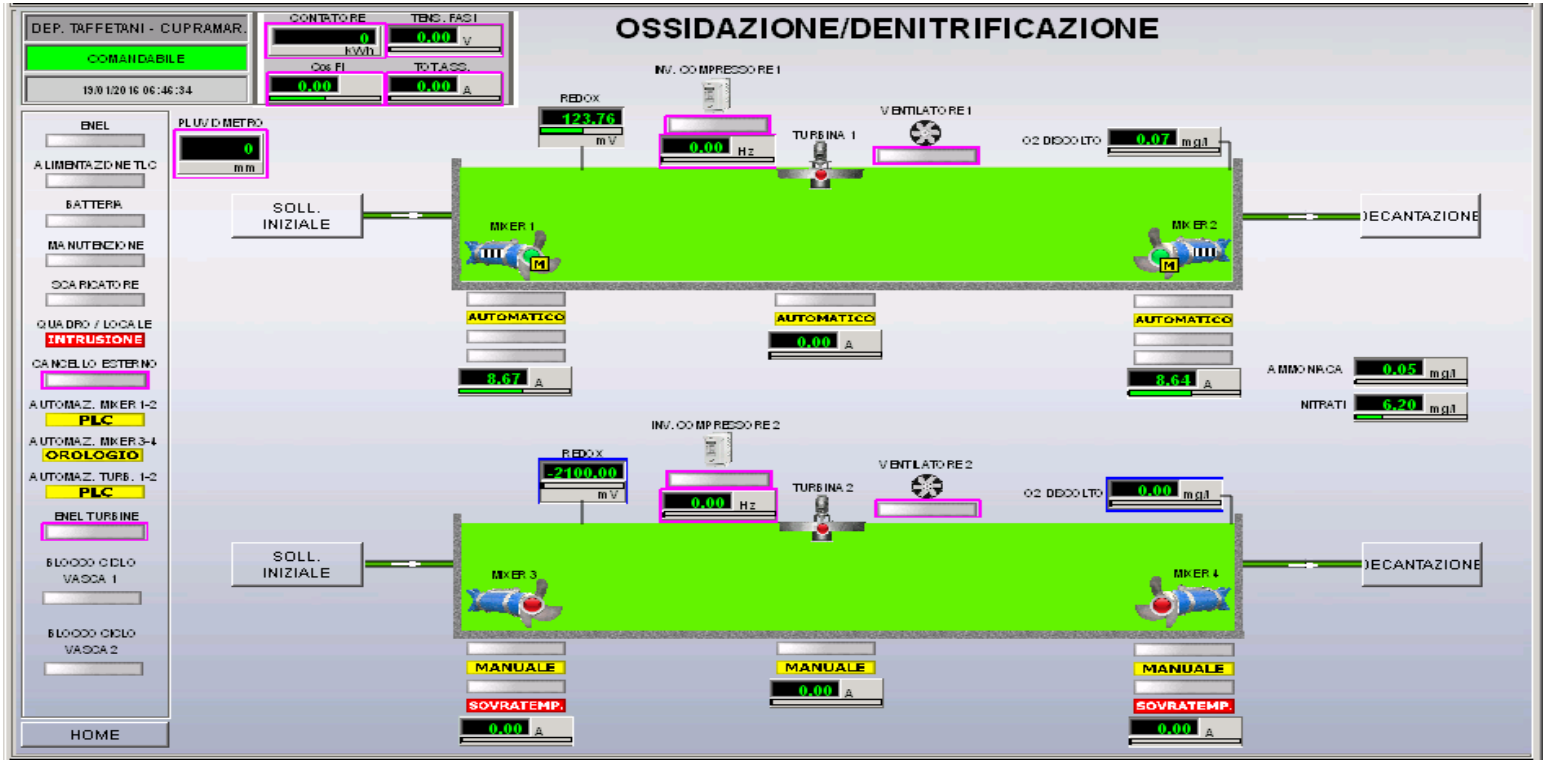
- 1950 PE
- Plant control & automation, auth. limits
- 6/2014


## Montalto Madonna del Lago

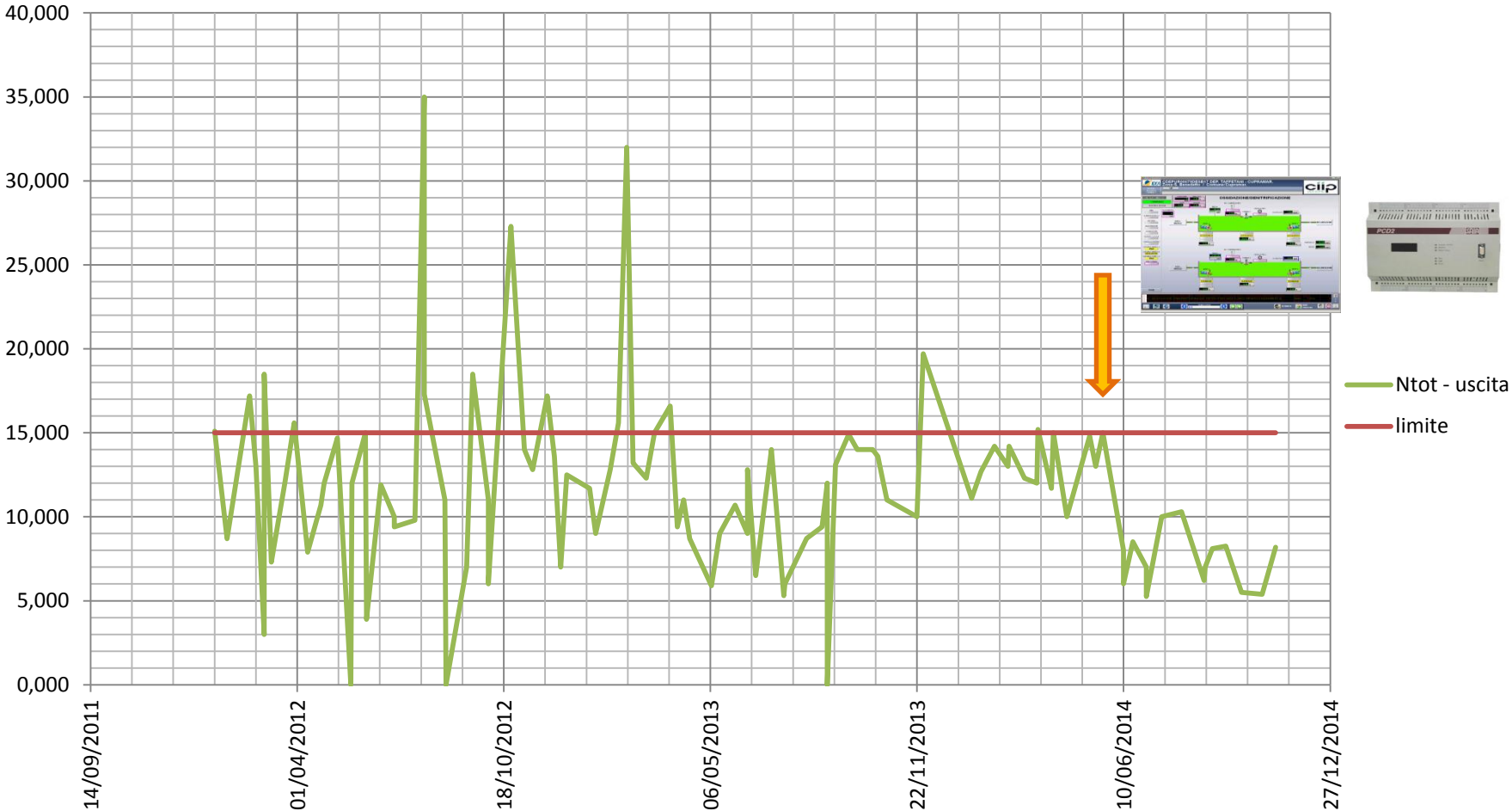
- 500 PE
- Plant control & automation, auth. limits
- 6/2014

# Step 1: alternated aeration –Taffetani

- Developing a alternated aeration treatment



# Step 1: alternated aeration –Taffetani



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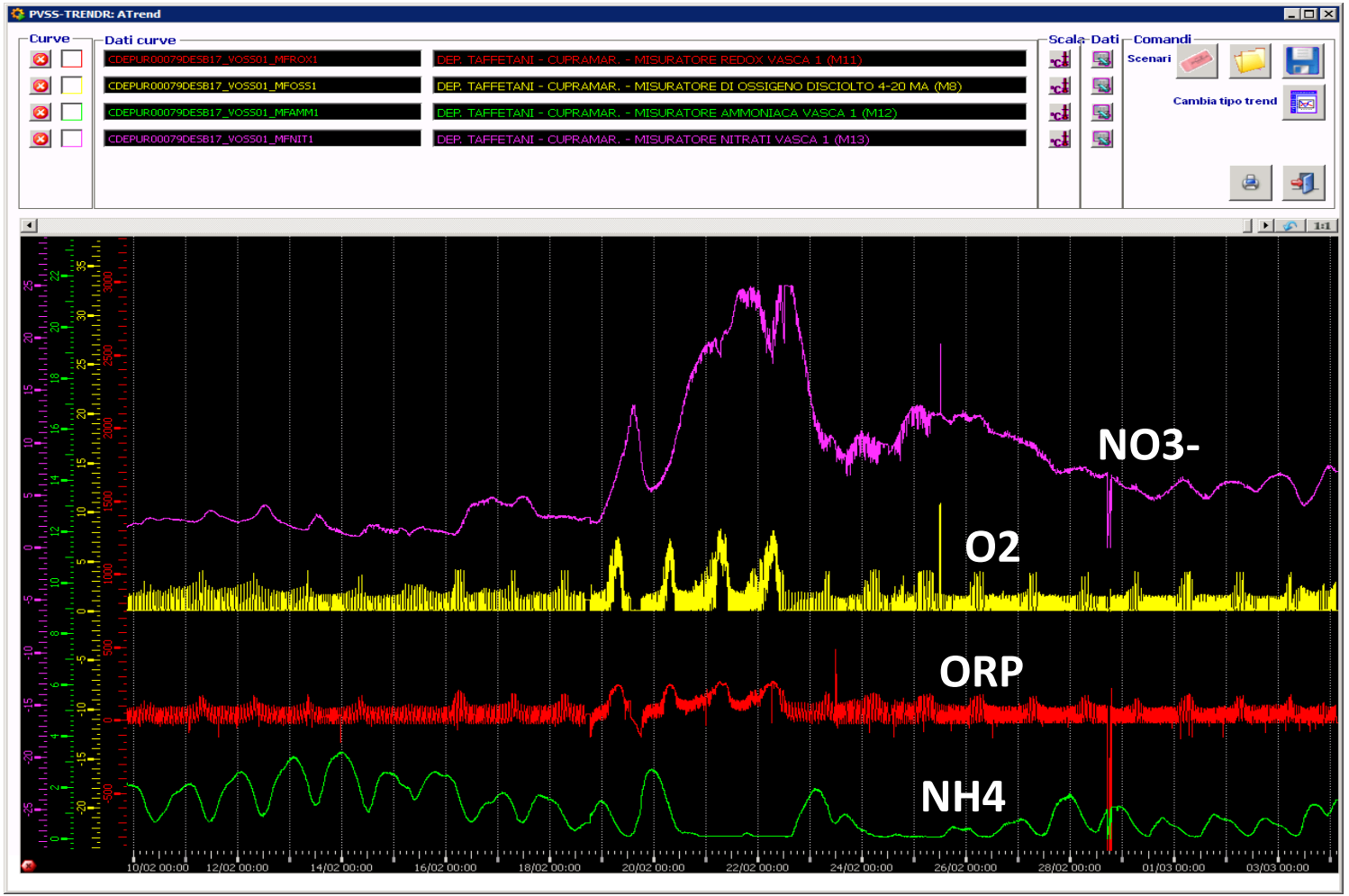
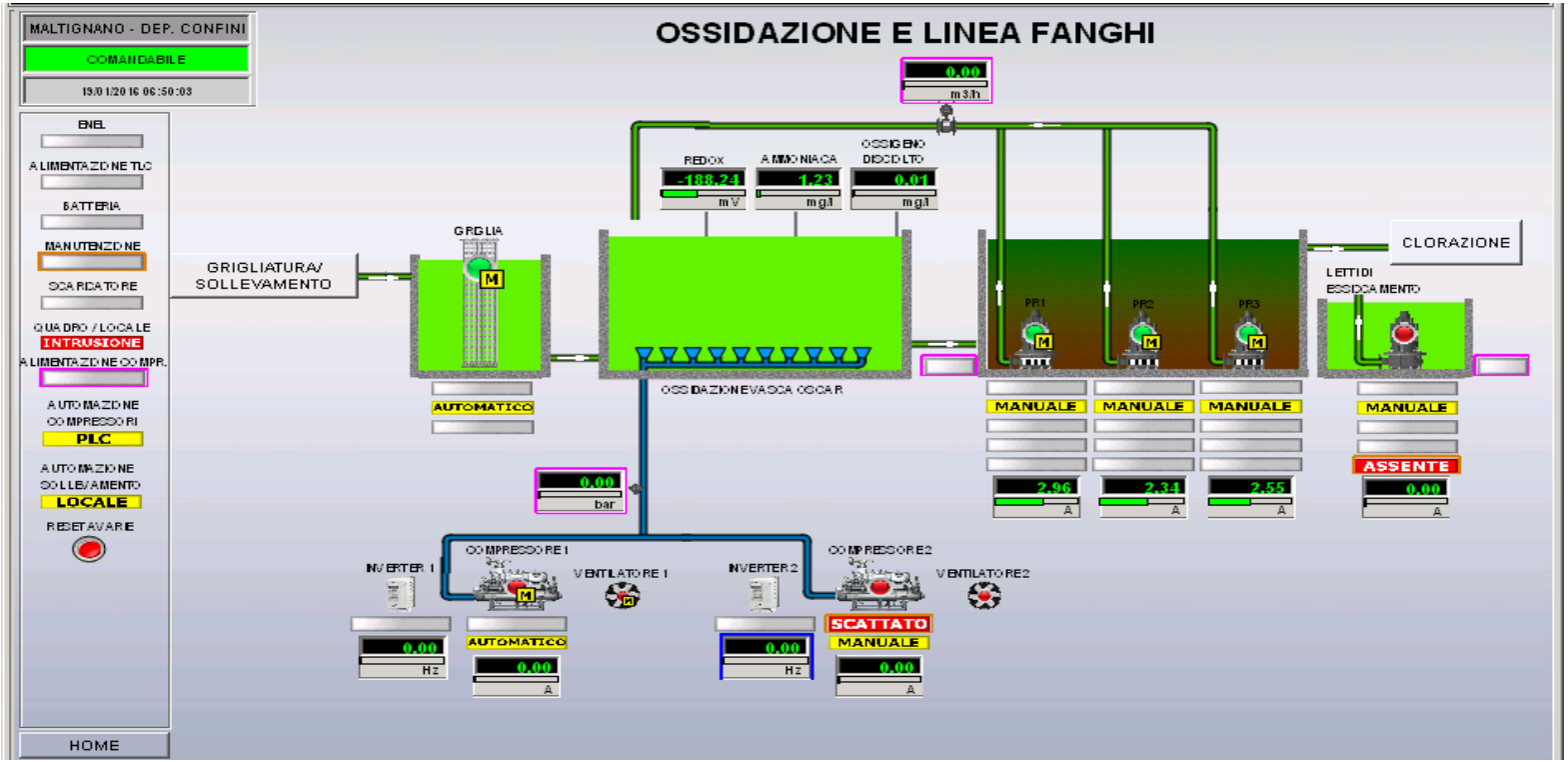


# Step 2: OSCAR - Maltignano

- Integration of a commercial process control product



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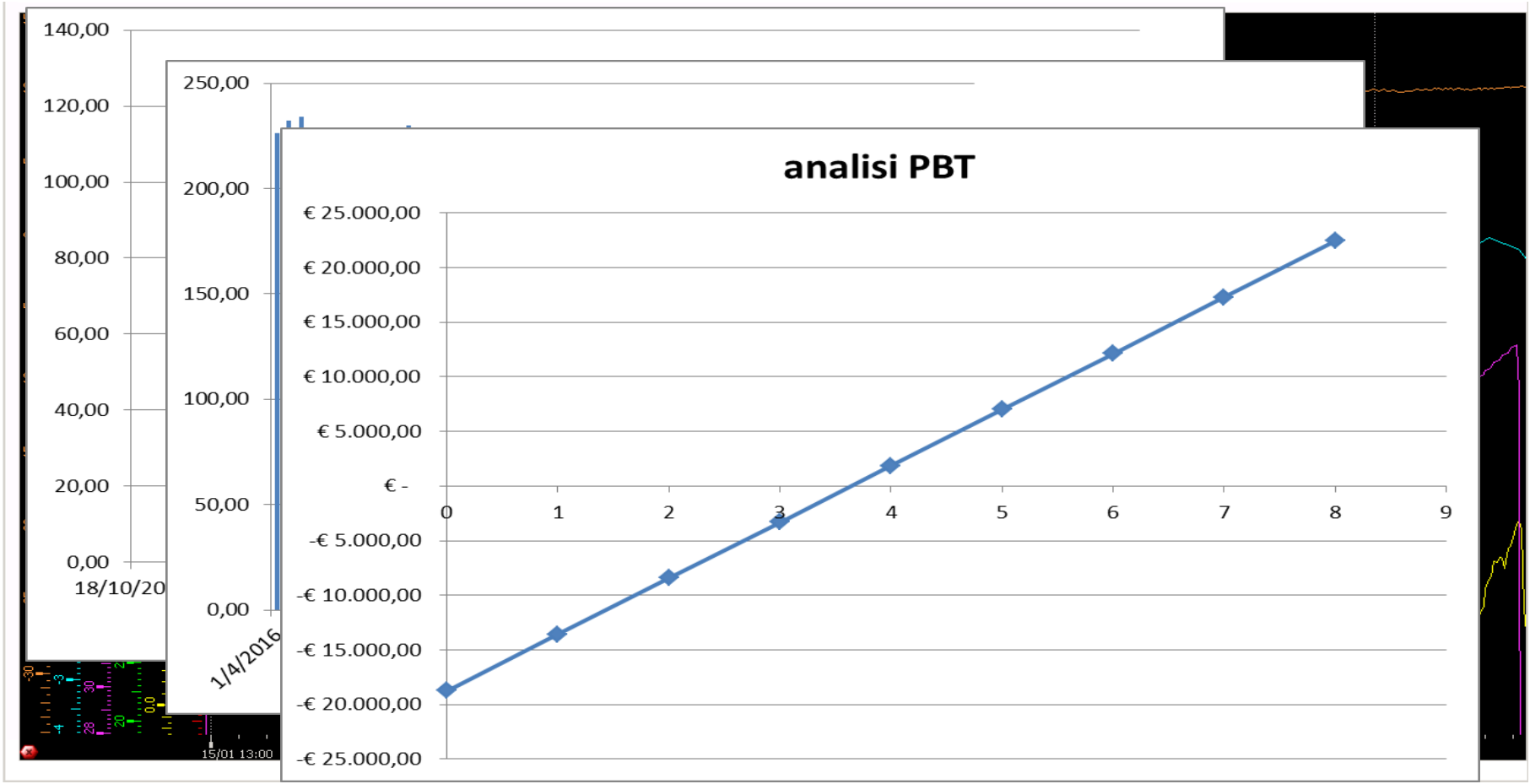
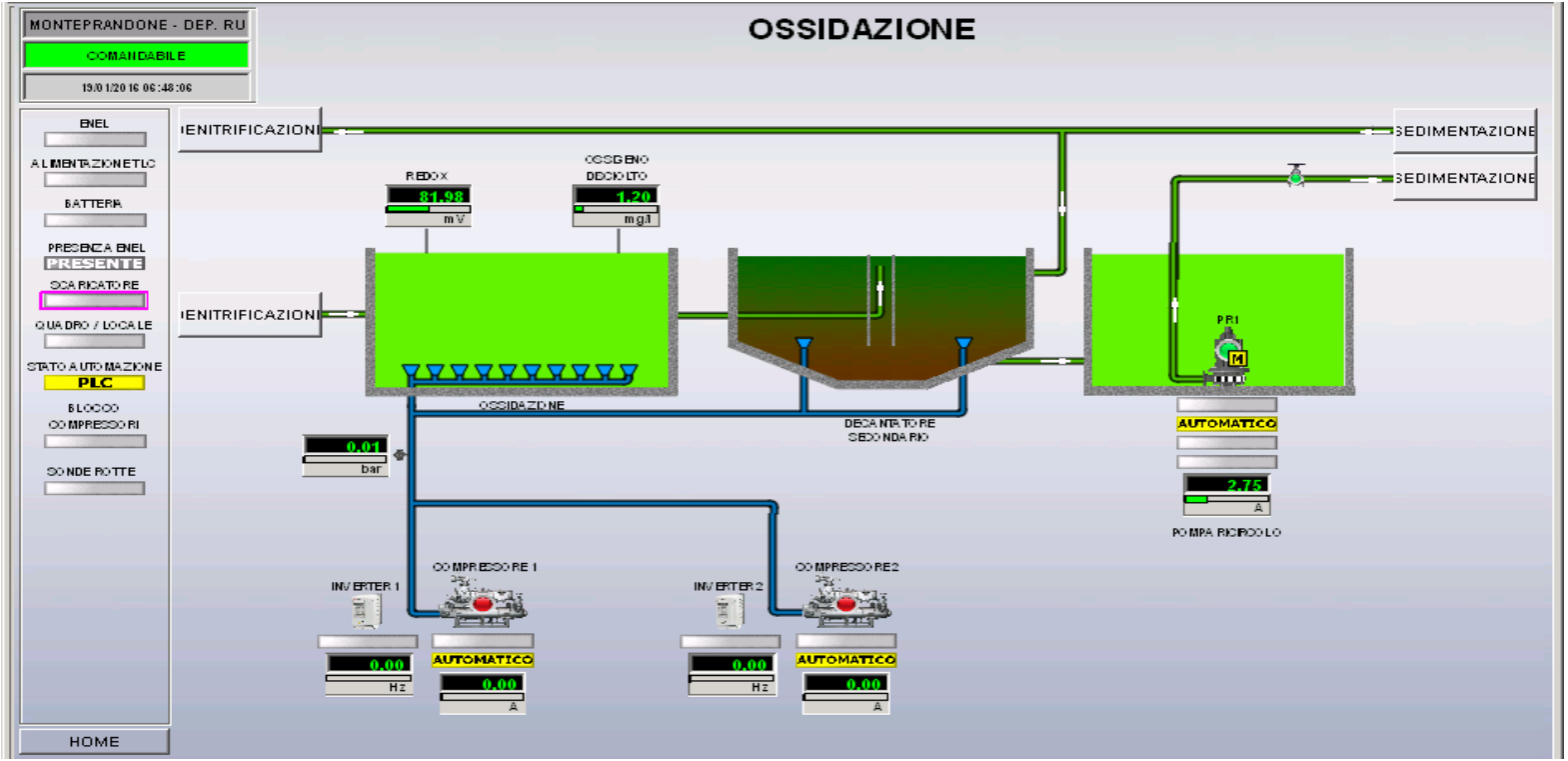


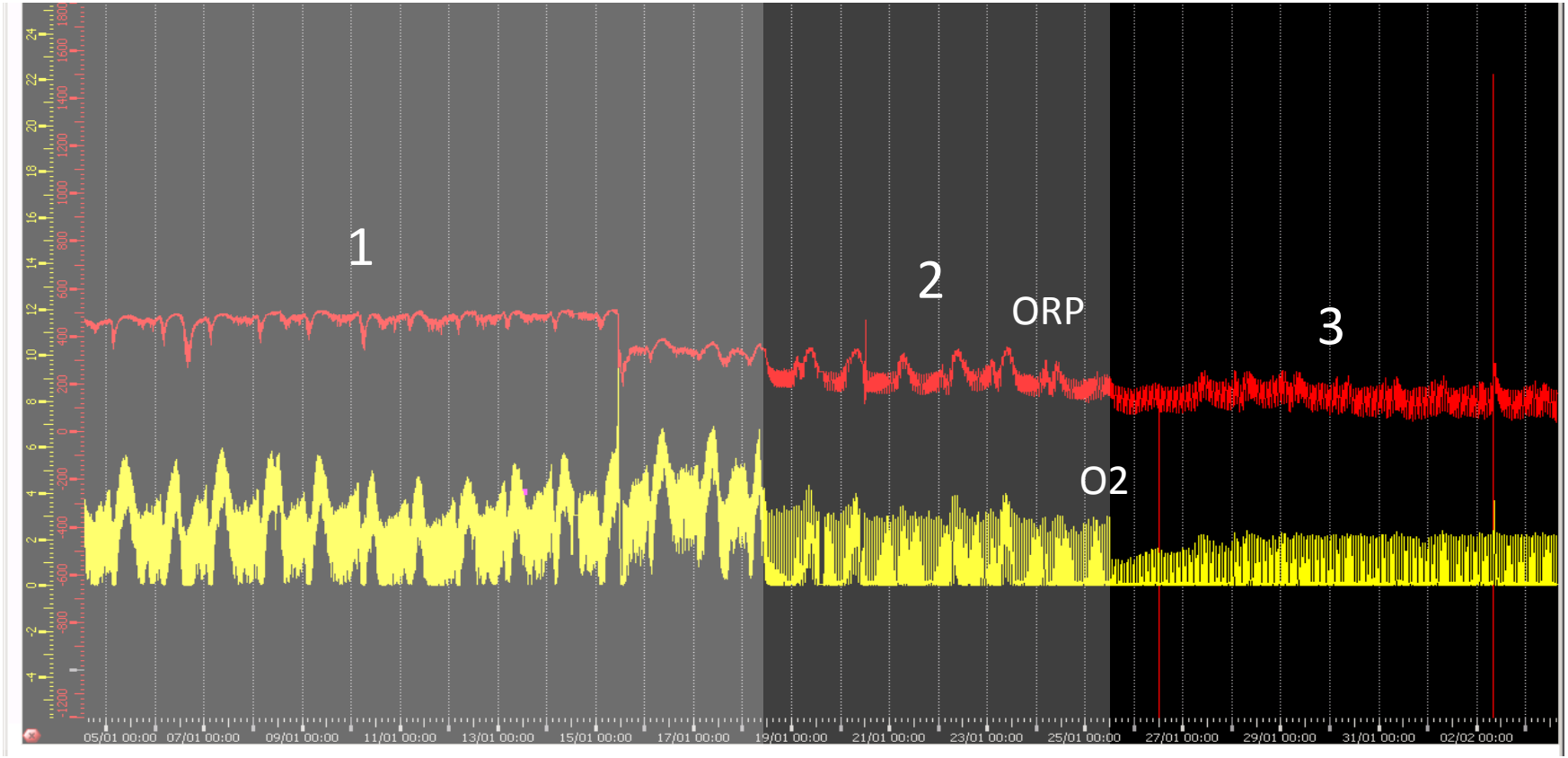
# Step 3: alternated aeration v2 – Rustichelli

- Alternated aeration activation



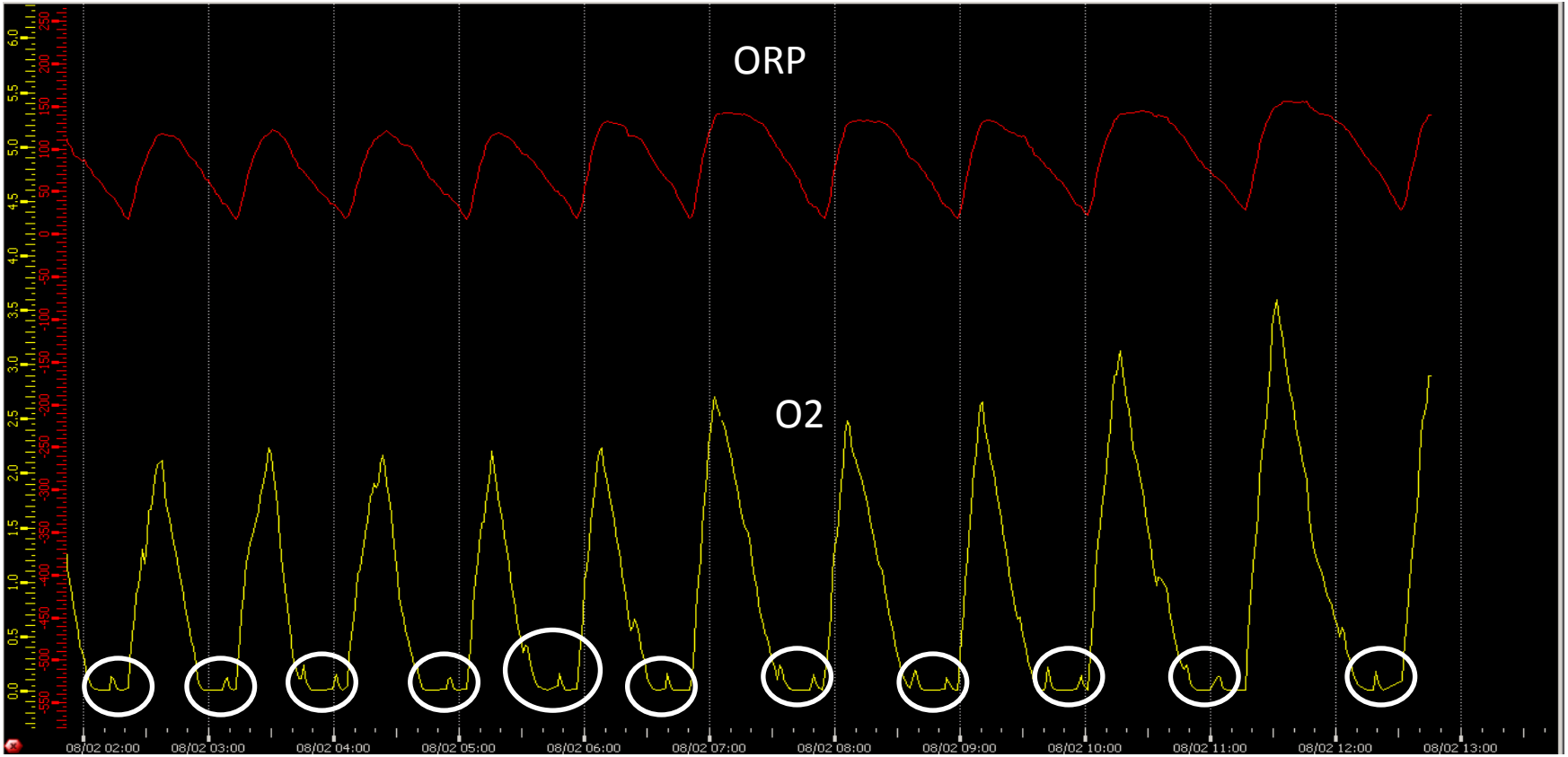
# Step 3: alternated aeration v2 – Rustichelli

- Alternated aeration activation

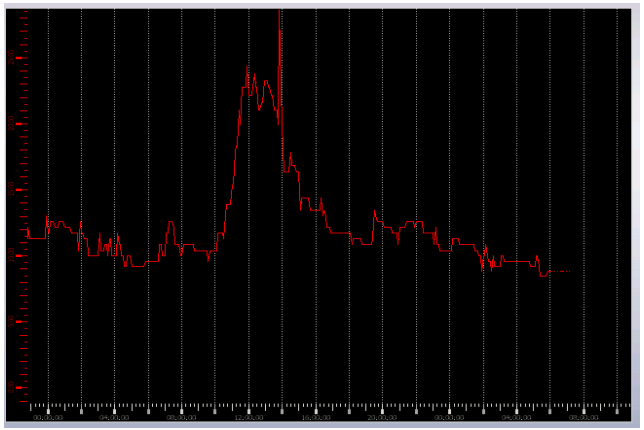


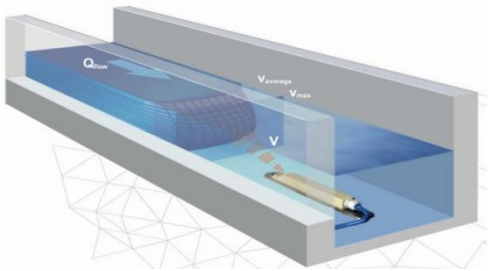
# Step 3: alternated aeration v2 – Rustichelli

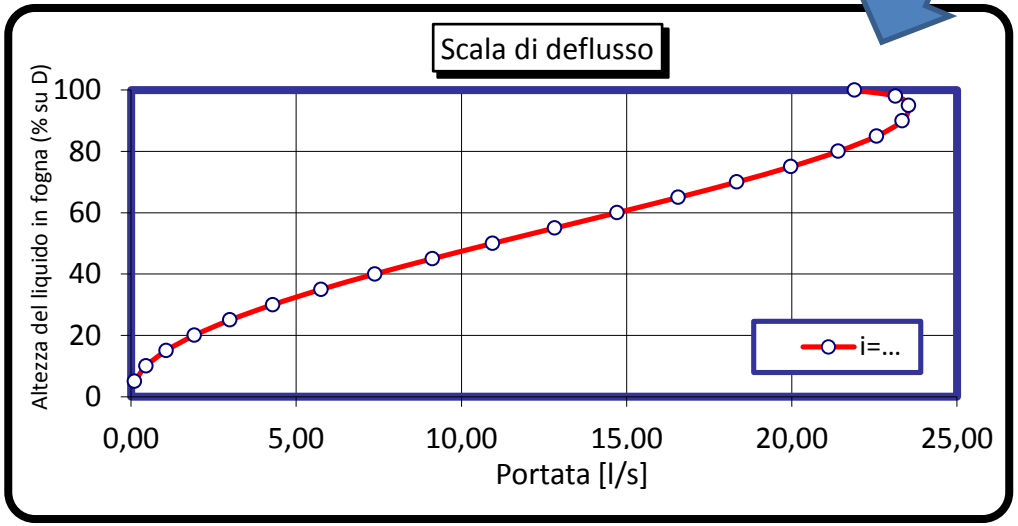
- Pulse Aeration



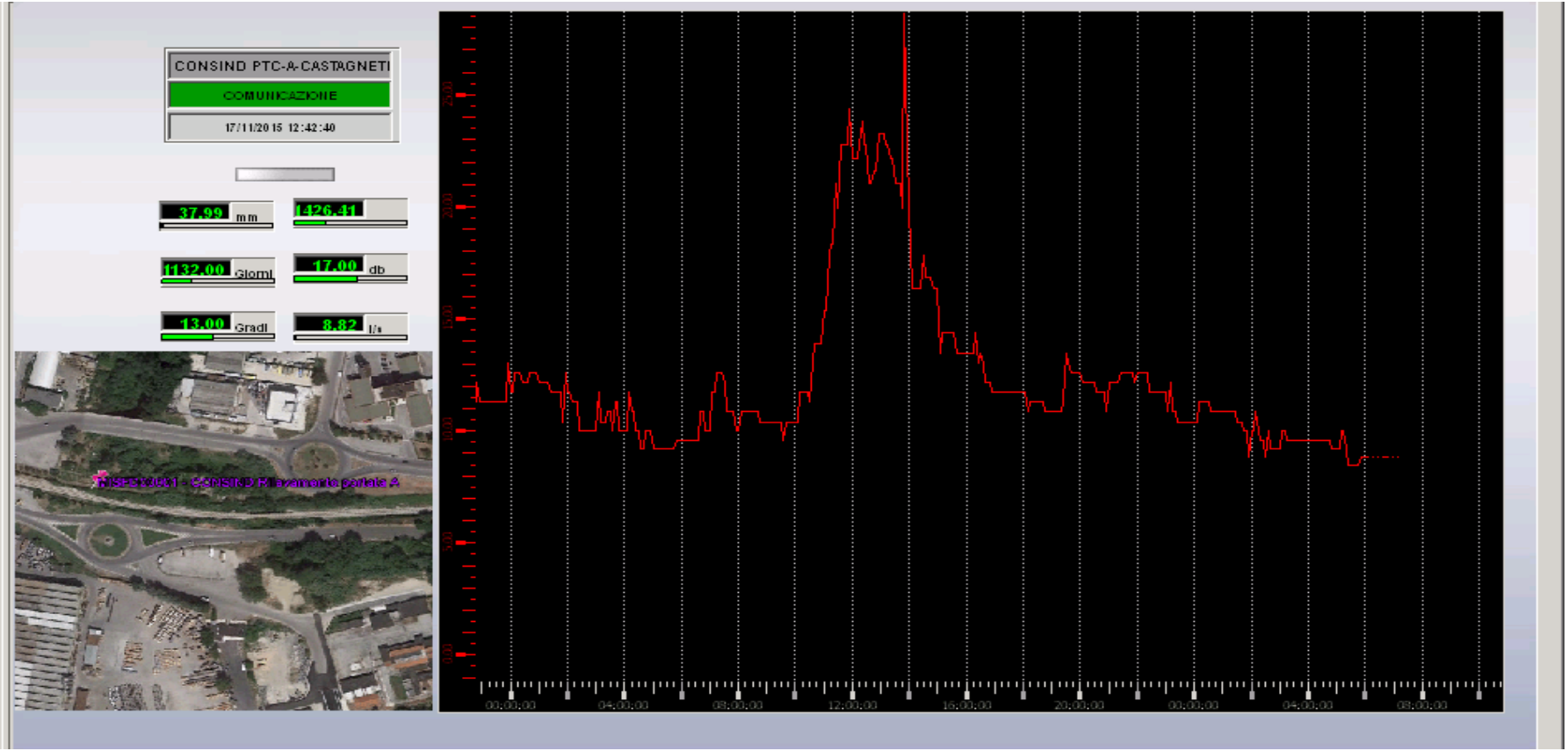
# Flow rate in sewerage



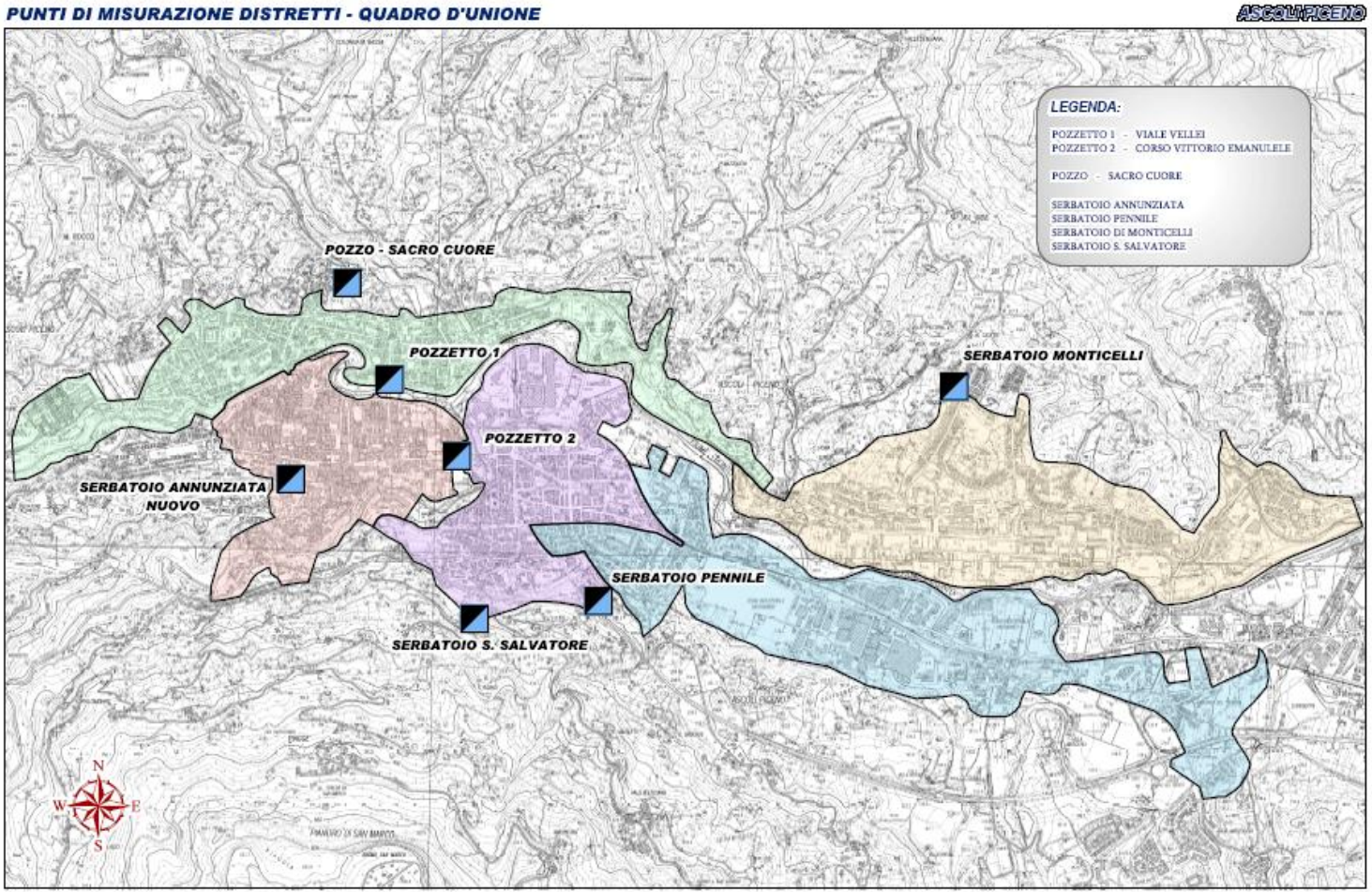



# Groundwater infiltration

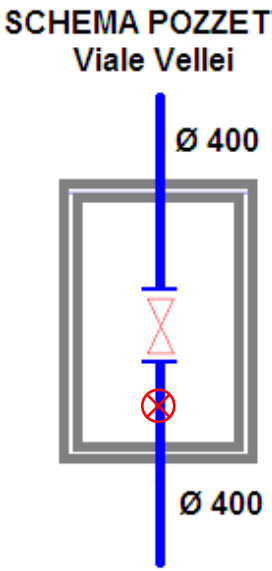


# Water districts



# Water districts

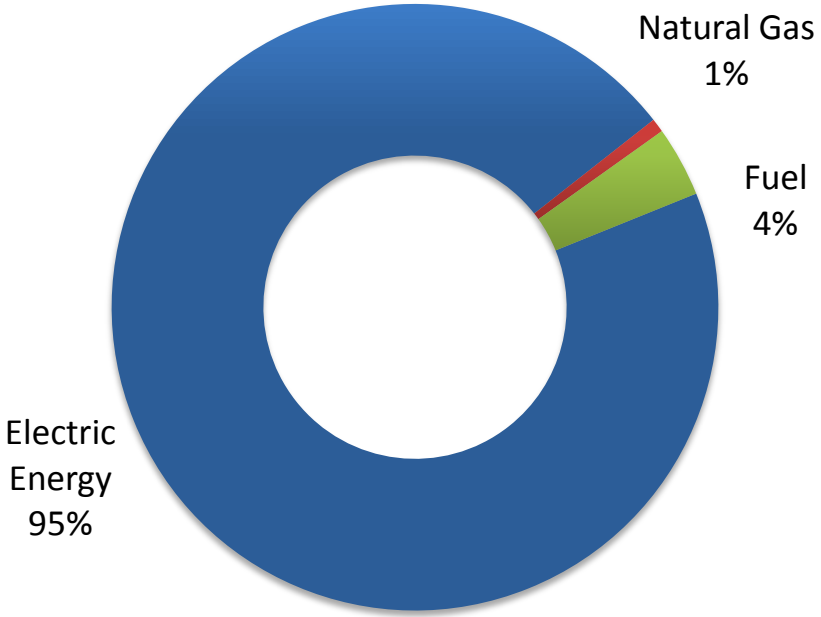
**District 2 "CAMPO PARIGNANO – PORTA CAPPUCCINA – STADIO"**



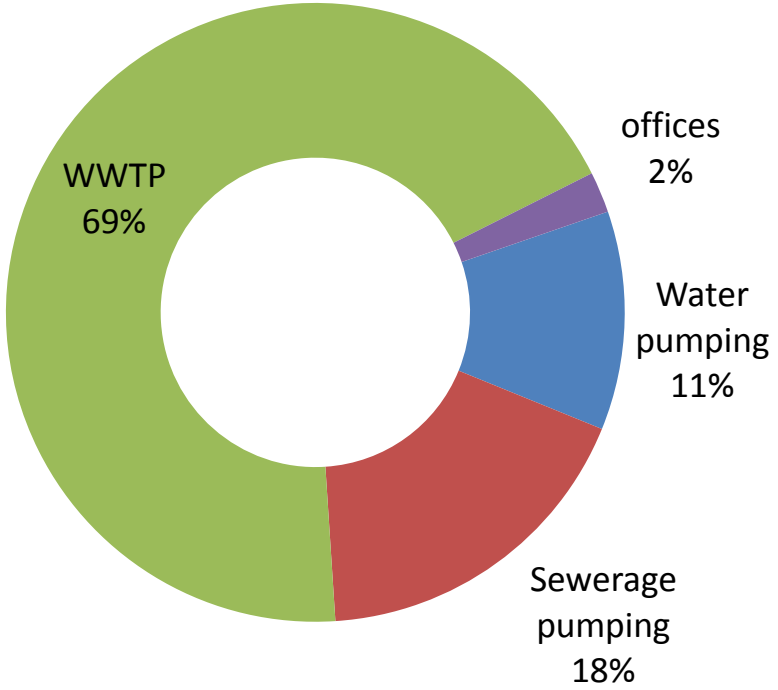

- Measurement
  - Data Logging
    - Data Analisys
      - Leak Identification & ILI calculation (asset performance)

# Energy Management System

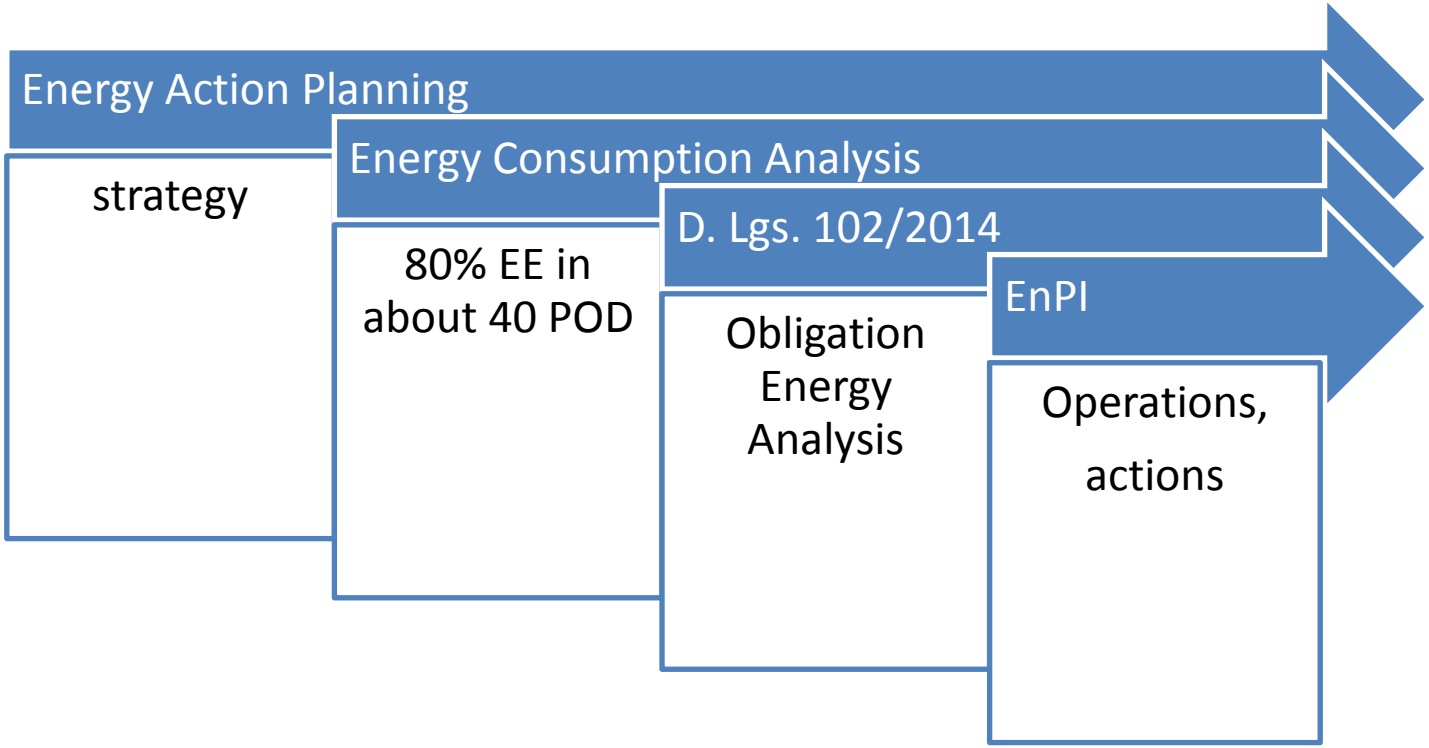
**CIIP Primary Energy Consumption by vector**




**Electric Energy by use**

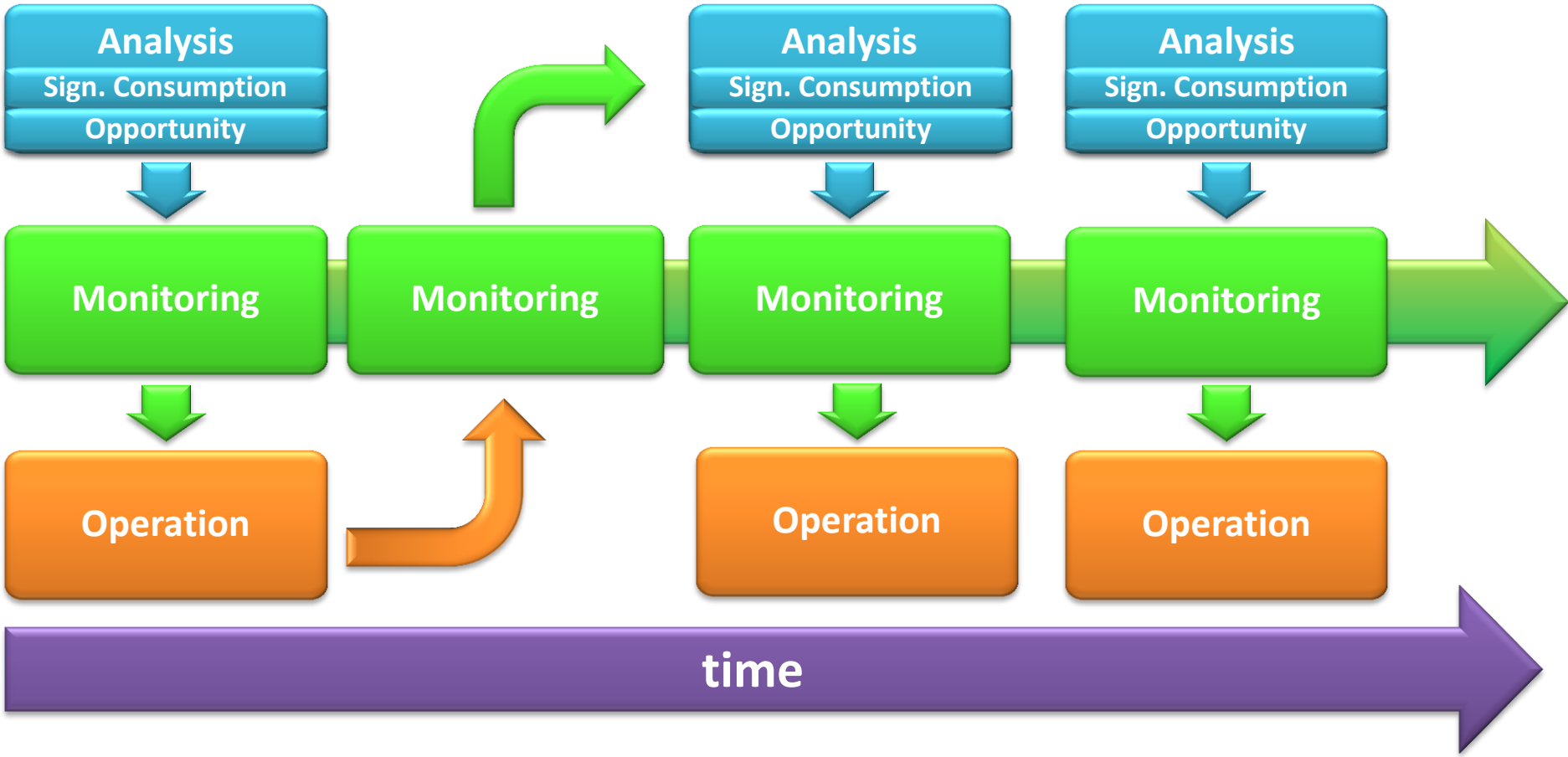


# Energy Monitoring System




**CIIP Energy Management System**

# Energy Monitoring System



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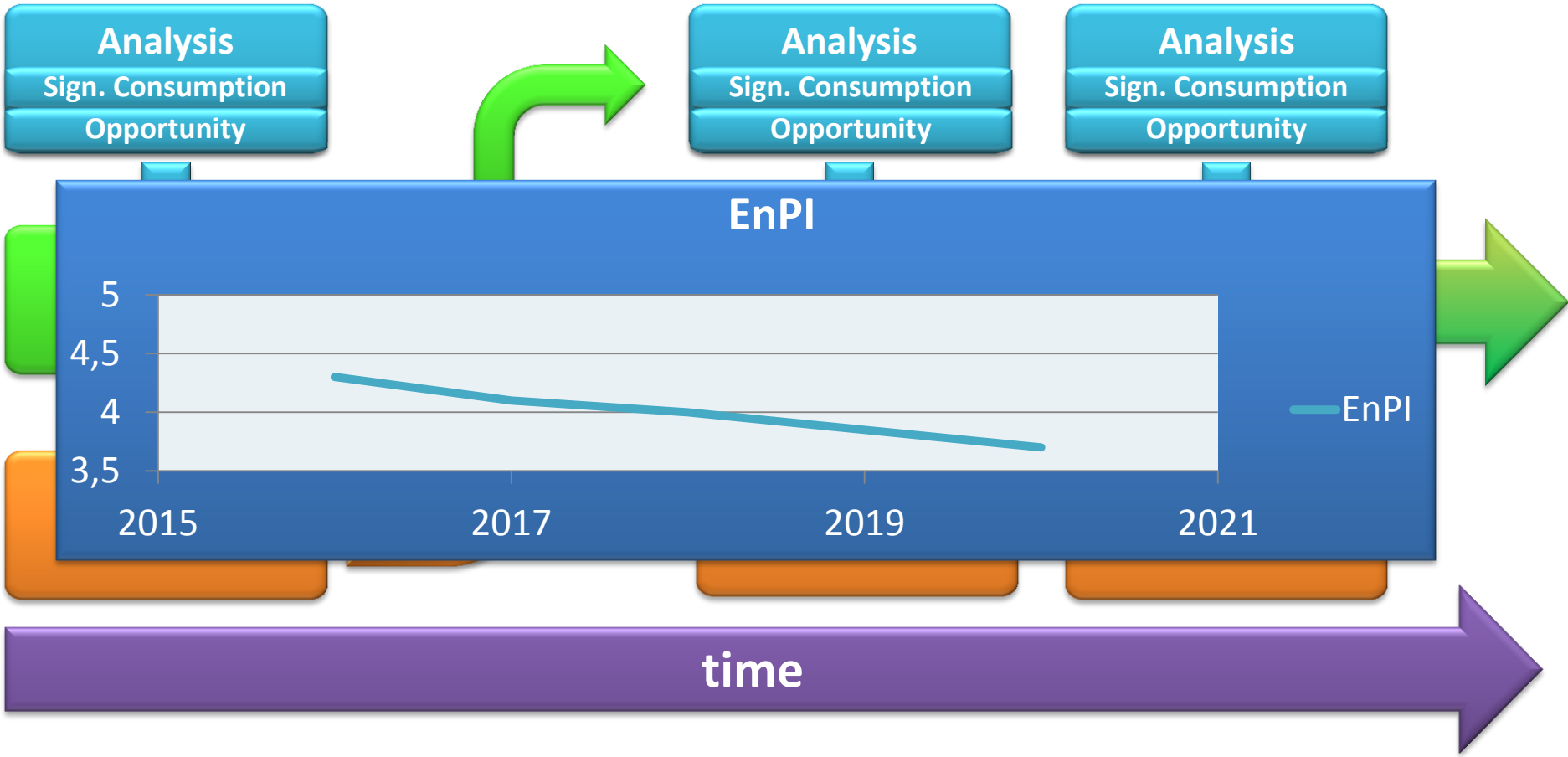

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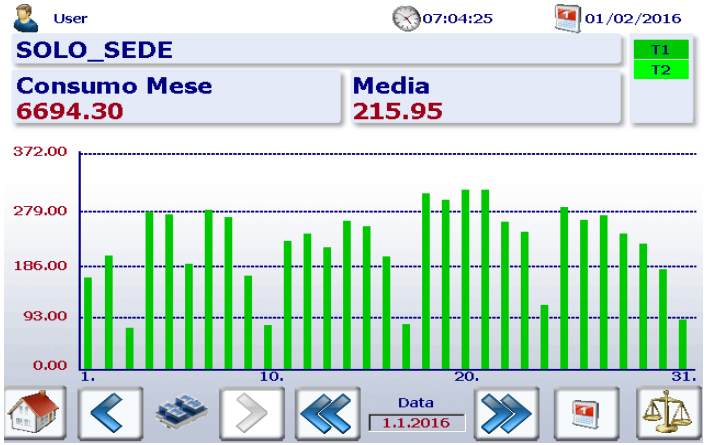
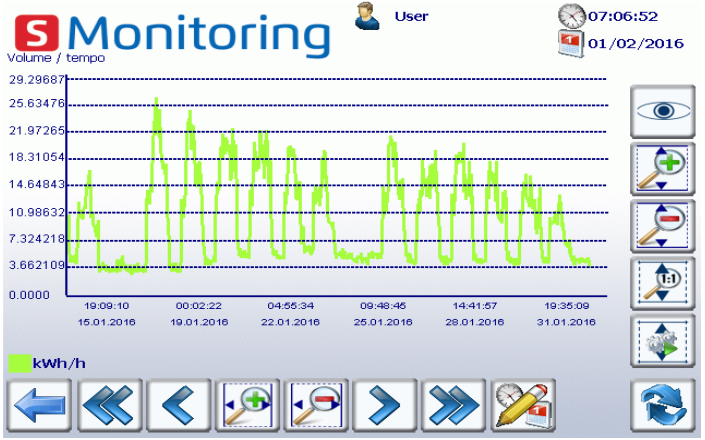


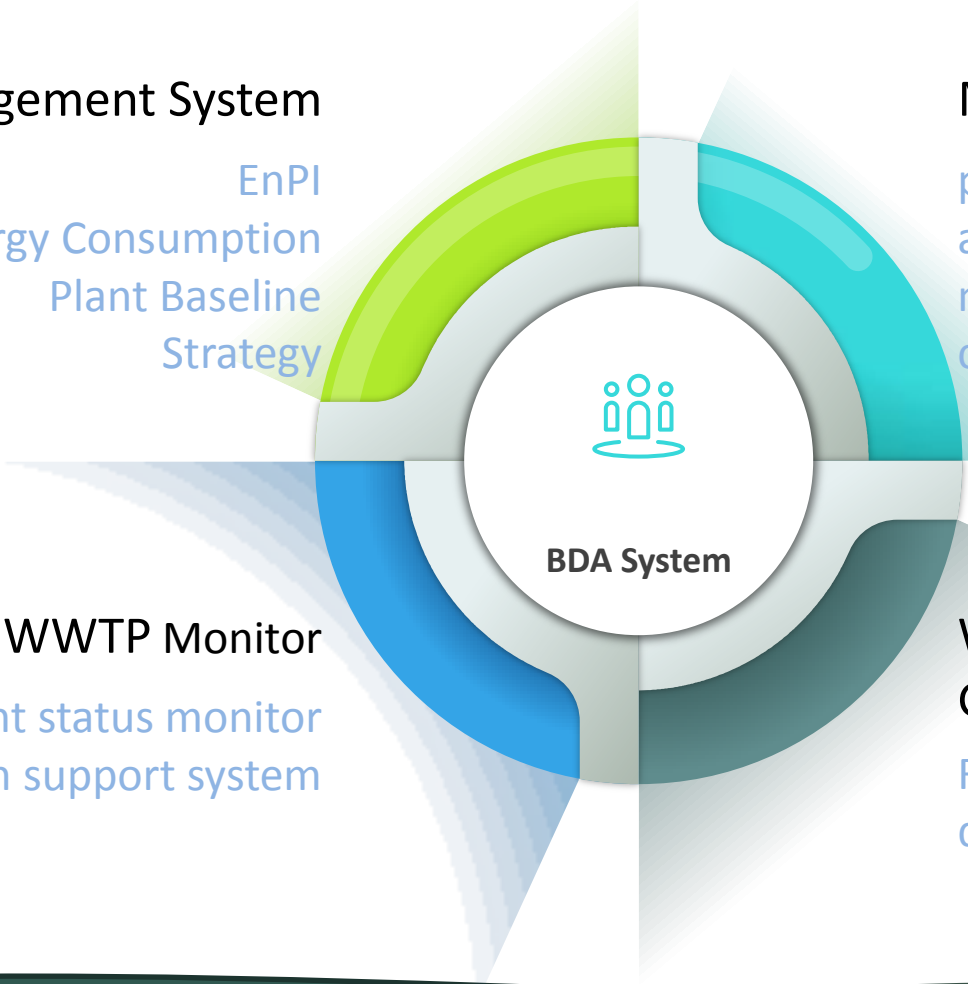
# in the future…

## Energy Management System

EnPI
Plant Energy Consumption
Plant Baseline
Strategy

## Maintenance System

plants Upkeep
affordable programmed
maintenance
costs containment




## WWTP Monitor

Plant treatment status monitor
decision support system

## Water Leaks & Groundwater infiltration

Reduce intervention time & costs
decision support system