
# Rationnal use of ressources in the beer production

12/10/23


## Industrial projects

## Energy

## Environment

# Today's agenda


**I am not a brewer…. I am just an engineer** (sorry)

**Let's talk about water**

**Let's talk about Energy**

**Let's not talk about Malt, yeast, hop or chemicals….** Because you know that part much better that I do.

**Disclaimer**
**Toutes les valeurs mentionnées dans cette presentation sont indicatives**
**Chaque situation doit être analysée individuellement !**
**Tout lien avec une brasserie existante ou ayant existé est purement fortuite**

# Why do we speak about water

## Beer is water…

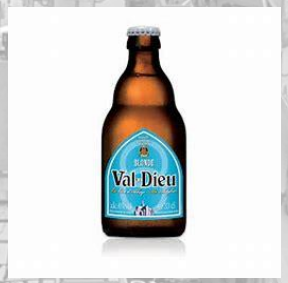
# Water Use Ratio

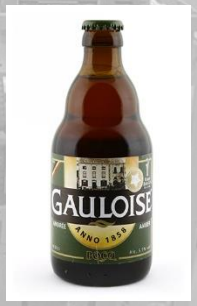
La bière, c’est de l’eau…

**Average :** 6 liters per liters

We are not equal toward our WUR…







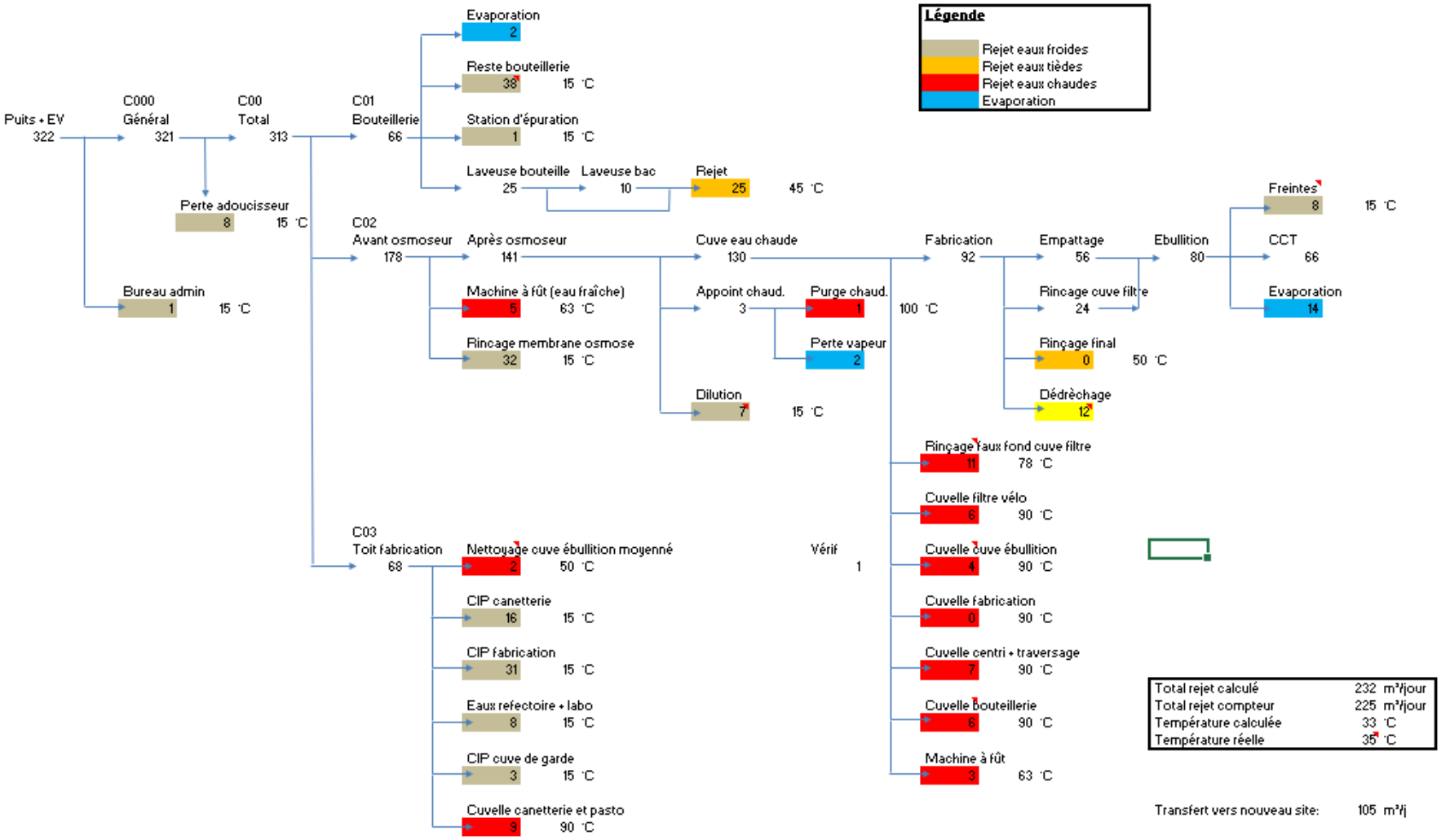




Can you link the beer to the WUR

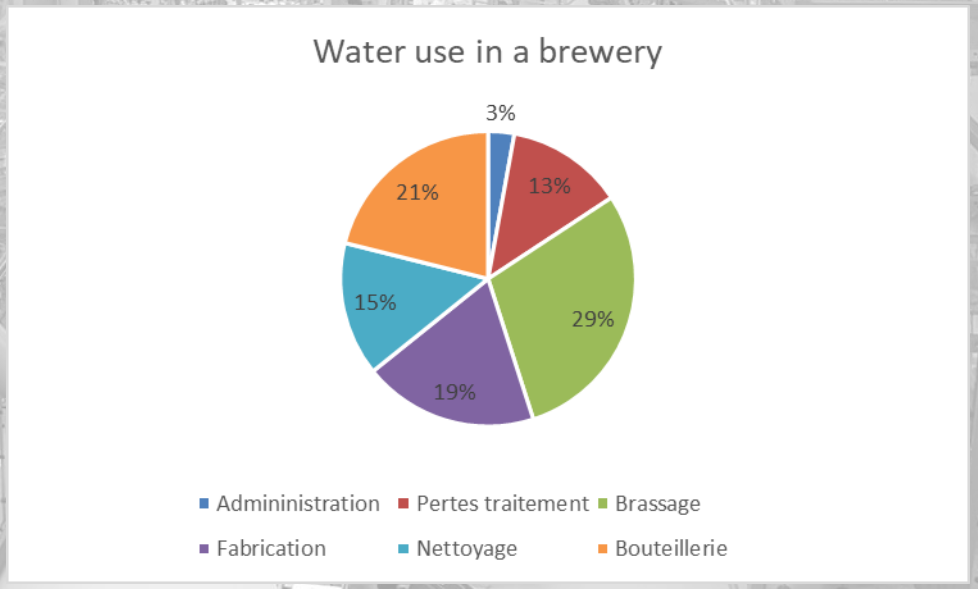
2.8 3.6 5 8 9 14 12

# Understand what is going on…



# Understand what is going on…

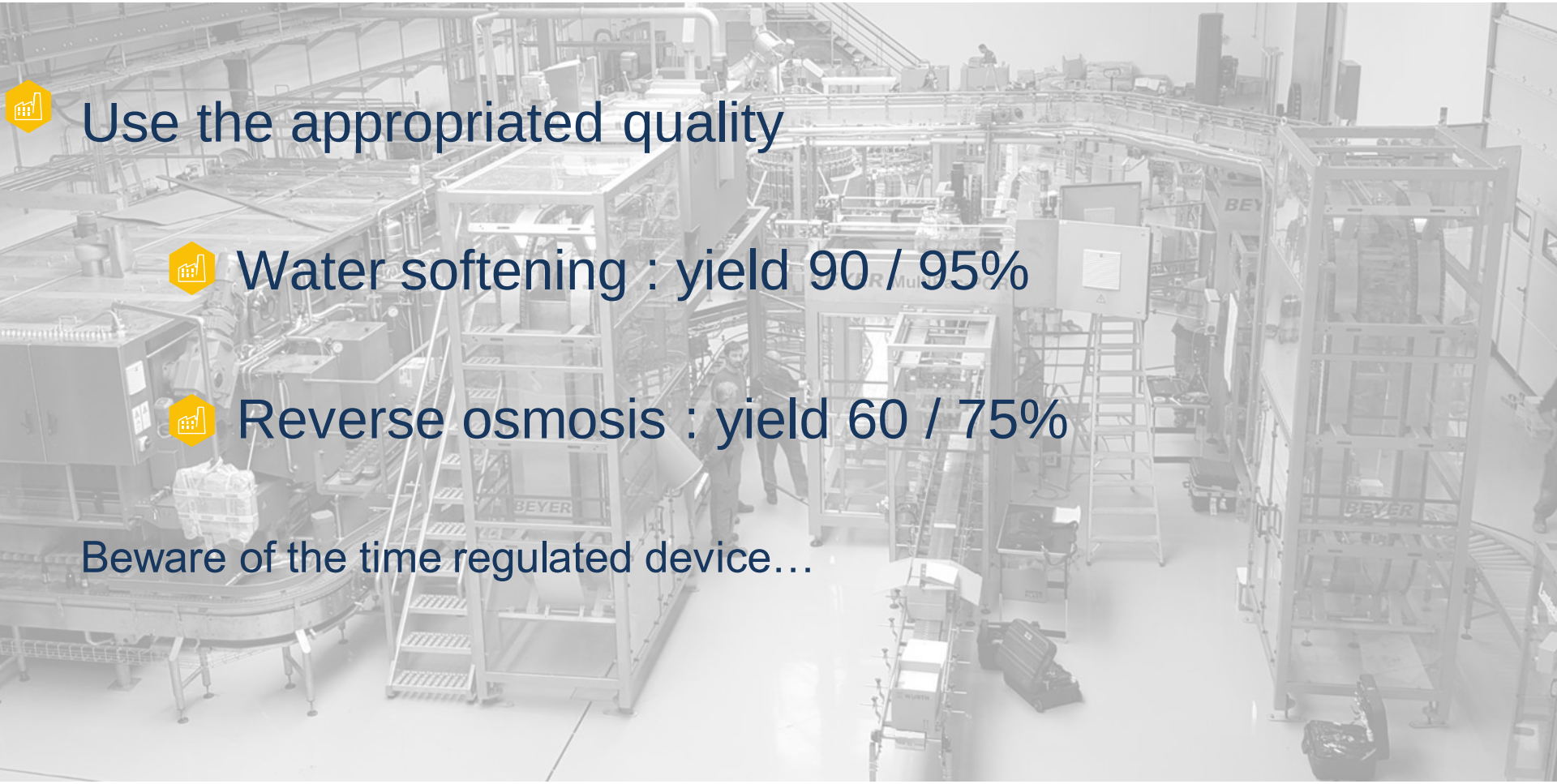
| | m³/j | |
|---|---|---|
| Admininistration | 9 | 3% |
| Pertes traitement | 40 | 13% |
| Brassage | 92 | 29% |
| Fabrication | 60 | 19% |
| Nettoyage | 46 | 15% |
| Bouteillerie | 66 | 21% |
| | | |
| Total | 314 | |




| | | |
|---|---|---|
| Biere | 66 | 21% |

Freintes : 8 m³/j (12%)

# How to save water

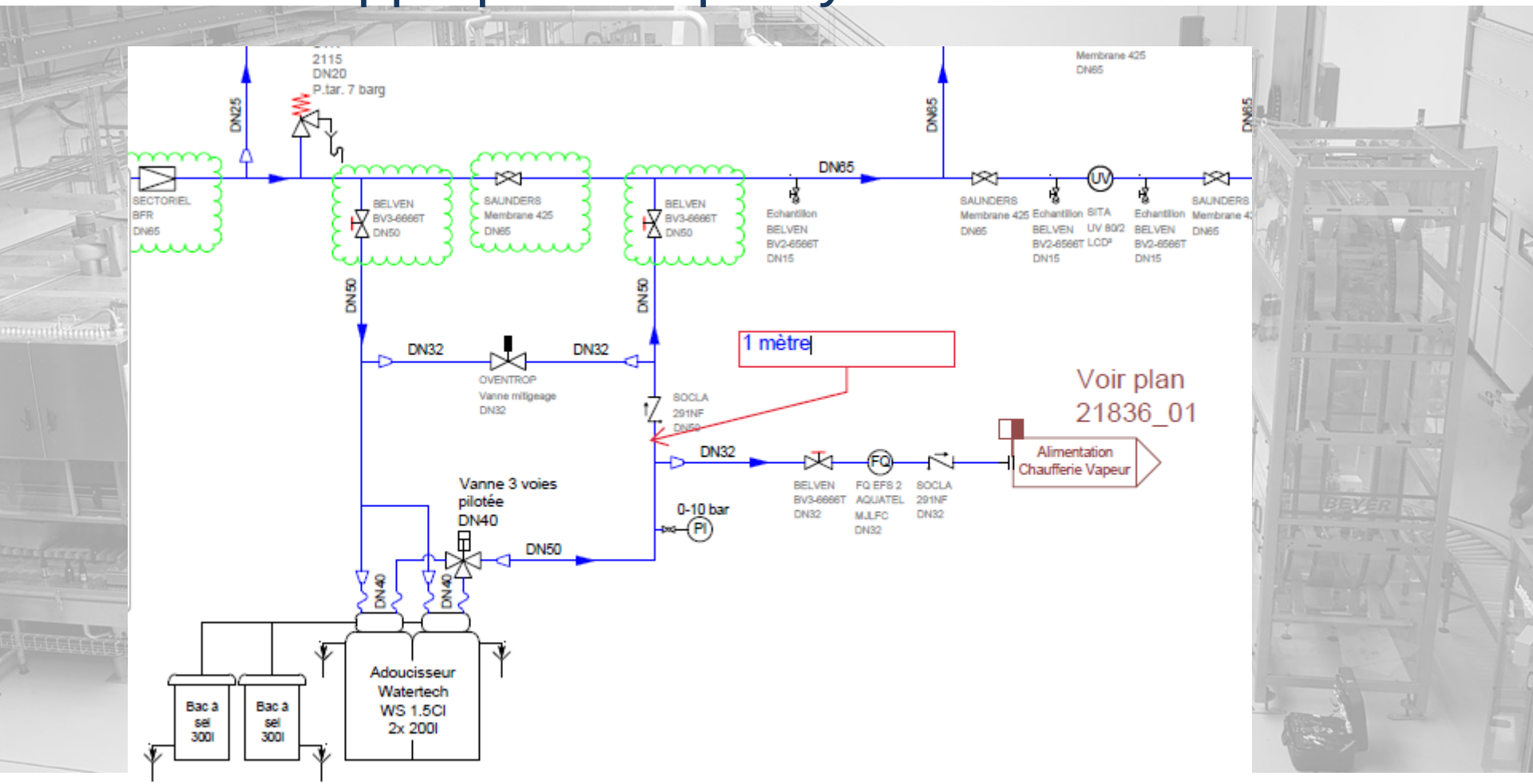


- Use the appropriated quality
  - Water softening : yield 90 / 95%
  - Reverse osmosis : yield 60 / 75%

Beware of the time regulated device…

# How to save water

## Use the appropriated quality



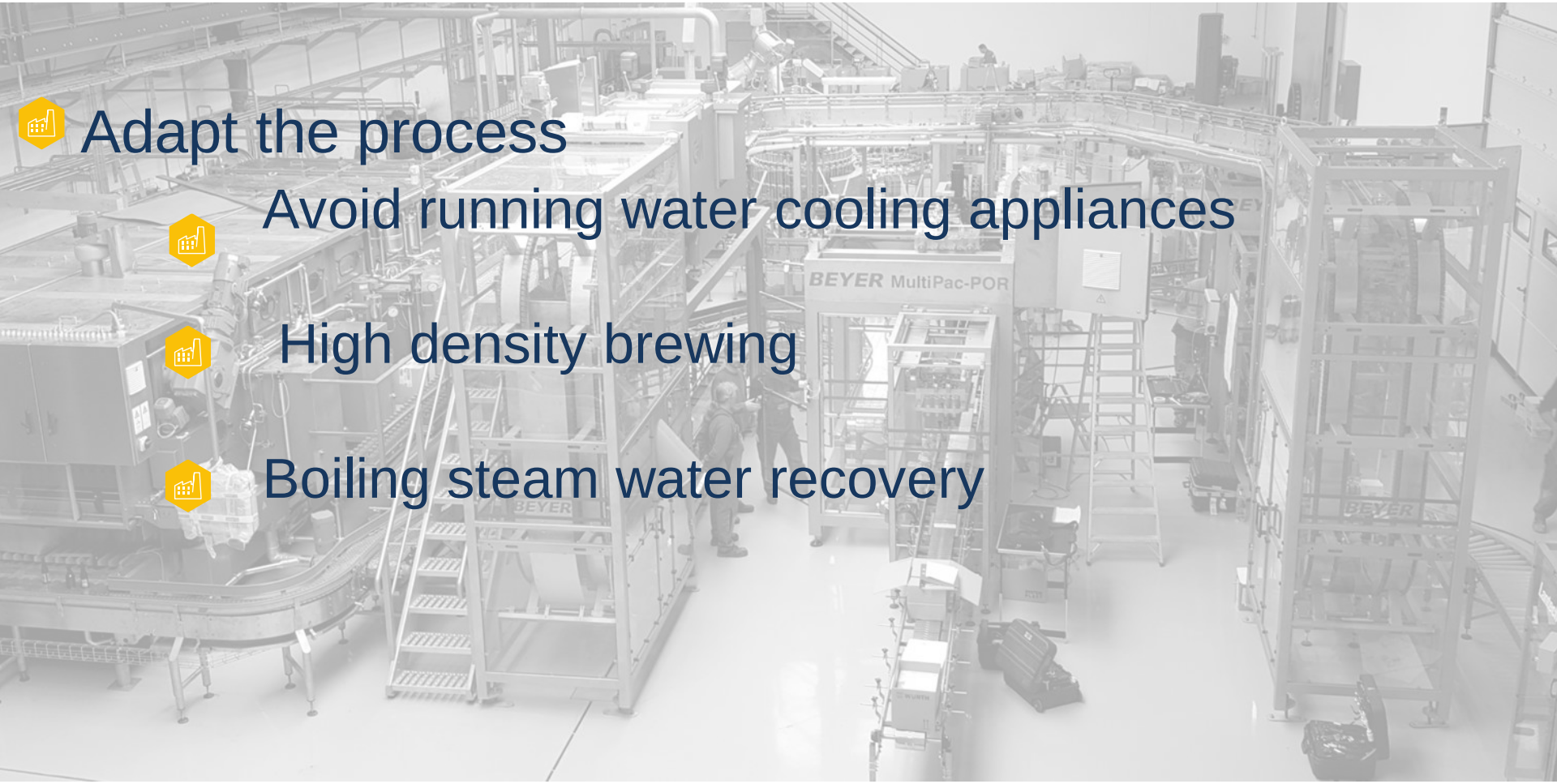
# How to save water

## Cleaning process

- Set and overview cleaning procedure
- CIPS : Closed loop
  - Tank dimensionning
  - Choose the location
  - Recovery tank on CIPs

| Réduction de la consommation d'eau chaude rincage faux fond cuve filtre | |
|---|---|
| Eau consommée par rinçage faux fond | 11m³/jour |
| Température eau | 78°C |
| Pourcentage de gain | 50% |
| Gain énergie vapeur | 105MWh/an |
| Gain financier | 7017€/an |
| Gain AEE | 1.1% |
| Gain ACO2 | 1.4% |
| Investissement | 10000€ |
| Temps de retour | 1.4ans |

# How to save water



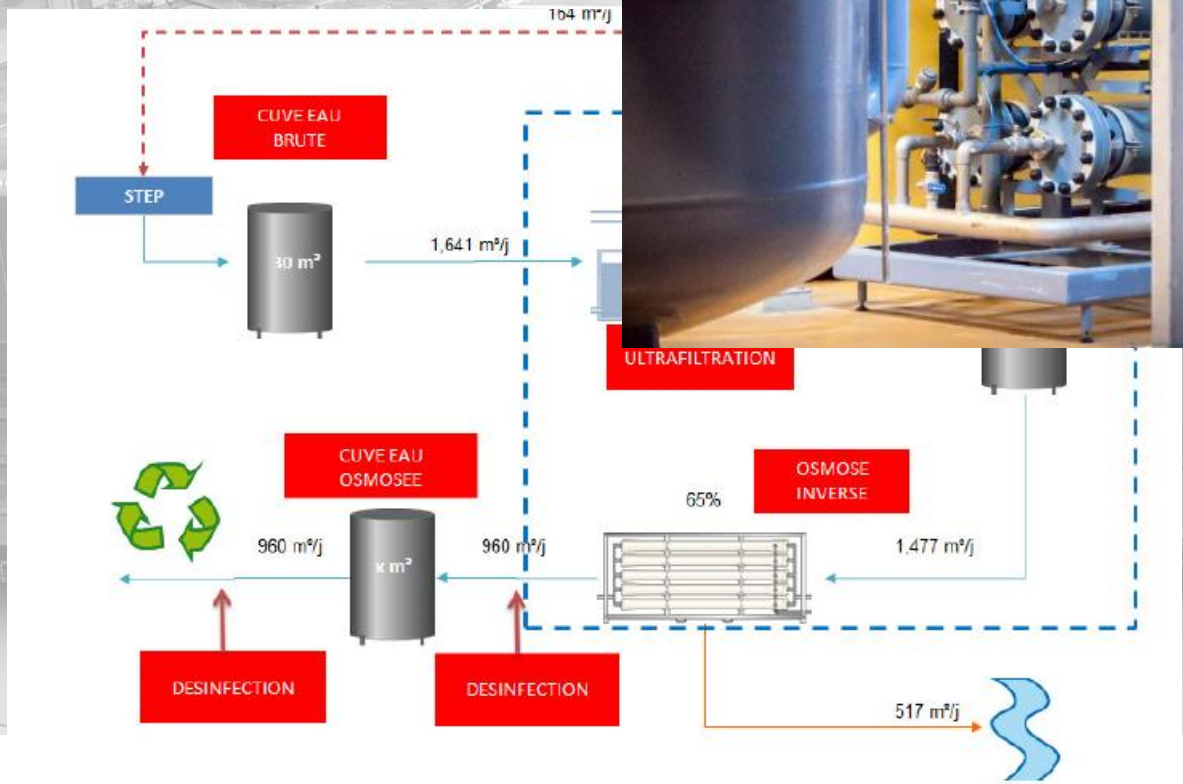

- Adapt the process
  - Avoid running water cooling appliances
  - High density brewing
  - Boiling steam water recovery

# How to save water

- Use the water-push for diluting
- High efficiency bottle washer

# How to save water

## Water re-use



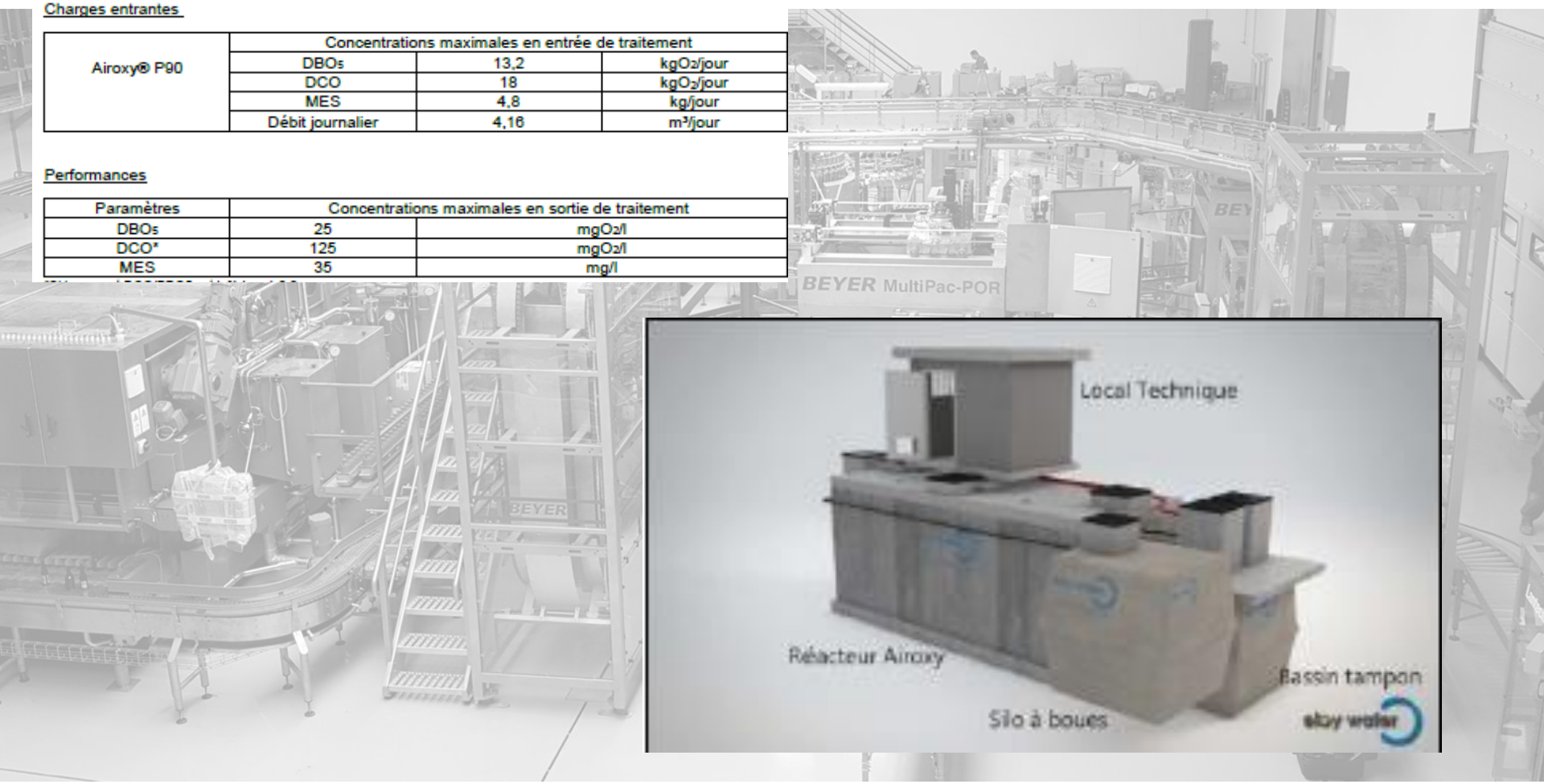

# Don’t forget what is going out.

Charges entrantes

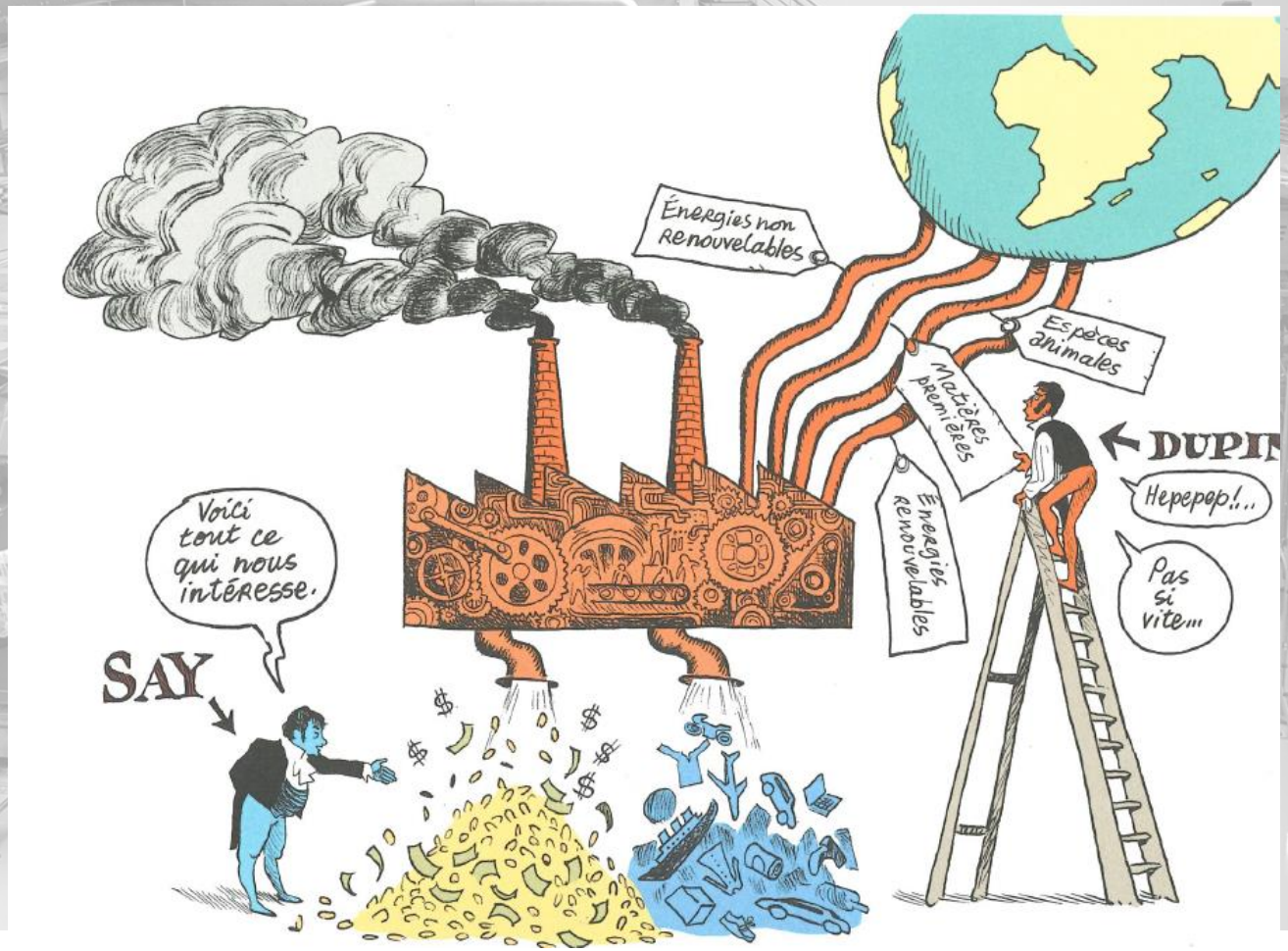
| | Concentrations maximales en entrée de traitement | | |
|---|---|---|---|
| Airoxy® P90 | DBO5 | 13,2 | kgO2/jour |
| | DCO | 18 | kgO2/jour |
| | MES | 4,8 | kg/jour |
| | Débit journalier | 4,16 | m³/jour |

Performances

| Paramètres | Concentrations maximales en sortie de traitement | |
|---|---|---|
| DBO5 | 25 | mgO2/l |
| DCO* | 125 | mgO2/l |
| MES | 35 | mg/l |



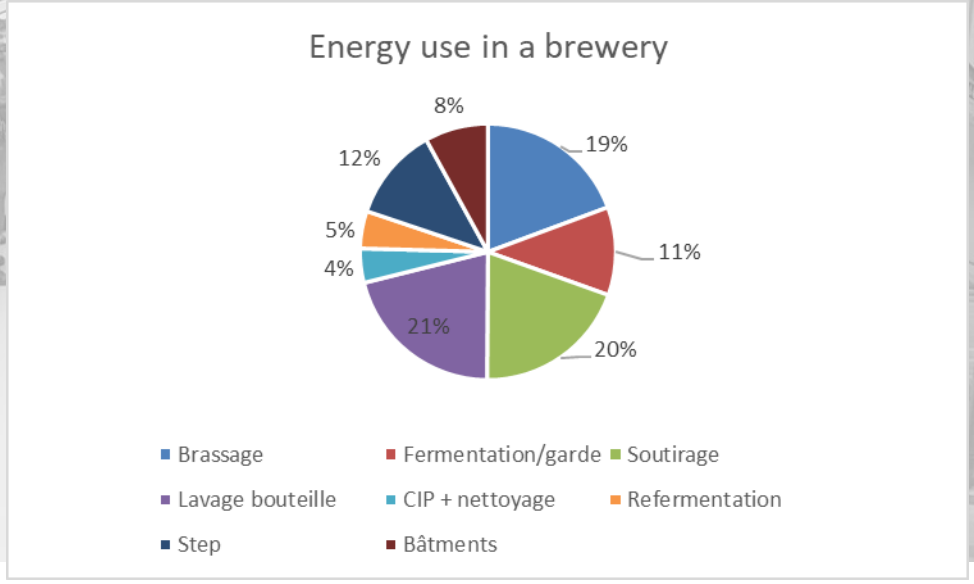
Let’s talk about energy...



# Where does the energy go

| Vecteur | Elec | Gasoil | Total |
|---|---|---|---|
| Energie (MWh/litres) | 1 981 | 578 417 | - |
| Energie finale (MWh) | 1 981 | 5 871 | 7 852 |
| Energie primaire (GJp) | 17 828 | 21 141 | 38 970 |
| Emission $CO_2$ ($tCO_2$) | 995 | 1 550 | 2 544 |

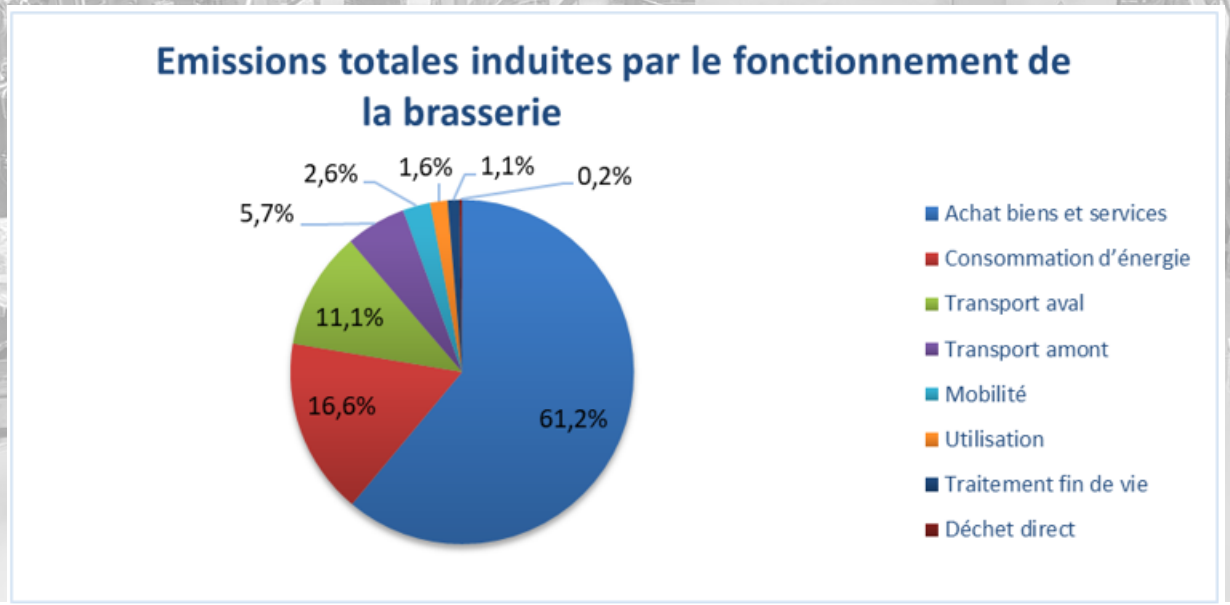
| | | |
|---|---|---|
| Brassage | 7406.077 | 19% |
| Fermentation/garde | 4263.652 | 11% |
| Soutirage | 7520.124 | 20% |
| Lavage bouteille | 8043.028 | 21% |
| CIP + nettoyage | 1651.453 | 4% |
| Refermentation | 1810.116 | 5% |
| Step | 4527.065 | 12% |
| Bâtments | 3071.816 | 8% |
| | | |
| | 38293.33 | |



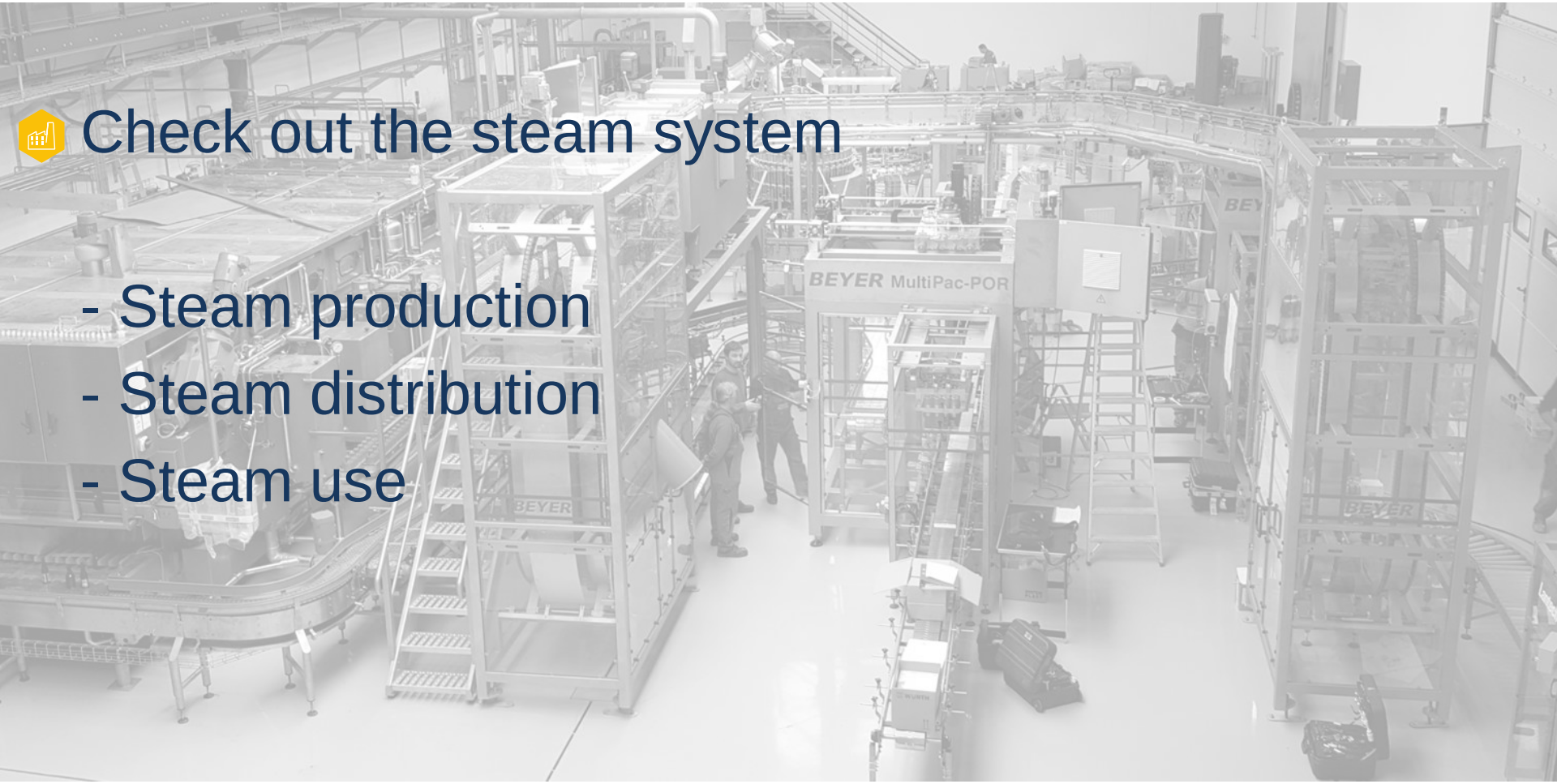
# What is the impact ?

Financial weight : 3 – 6% of the turnover

Environmental weight :



# Energy saving opportunities

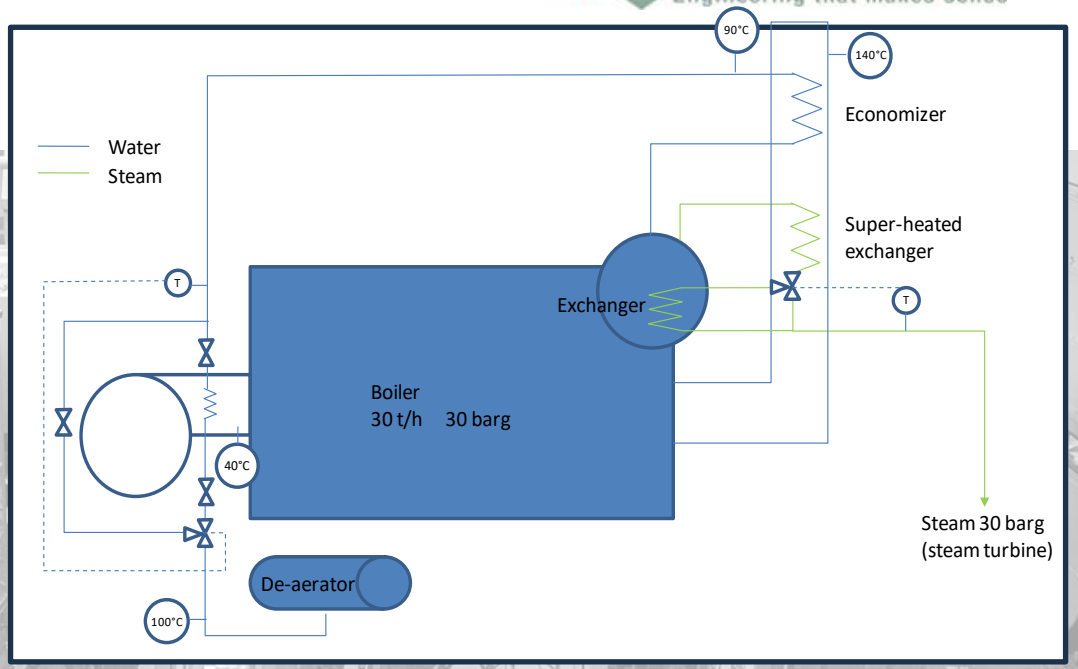



- Check out the steam system

  - Steam production
  - Steam distribution
  - Steam use

# Produce better

- Economizer
- Condenser
- Oxygen regulation
- Water preheating
- Flash recovery
- Improve water quality
- De-aerator regulation
- Preheating of combustion air
- Blow down management
- Burner regulation
- Cascade of boiler




Usual saving potential on a steam system : 10 – 30%

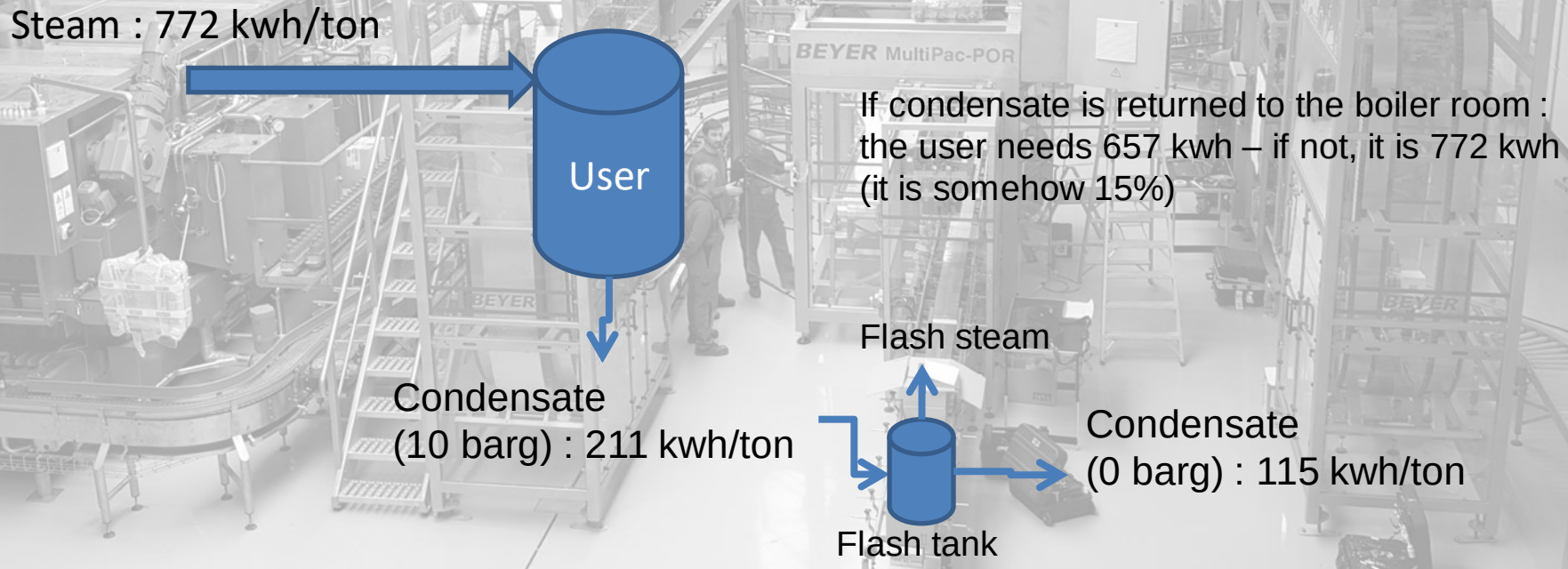
# Reducing the need

- At distribution level
  - Insulate !!!
  - Reduce leaks
  - Steam trap management

10 kg/h of steam = 2500€/year
10 kg/h of condensate = 340 €/year

# Recover the condensates

- The thermal  balance of the user is important




Return as much condensate as possible !

# Energy saving opportunities on process

## Heat recovery on boiling

| Récupération de la vapeur d'ébullition (85°C) | |
|---|---|
| Gain énergie vapeur | 251MWh/an |
| Gain financier max | 16864€/an |
| Gain AEE | 2.7% |
| Gain ACO2 | 3.3% |
| Investissement | 70800€ |
| Echangeur | 20000€ |
| Ventilateur d'extraction | 5000€ |
| Clapet | 7000€ |
| Piping | 15000€ |
| Electricité et automation | 12000€ |
| Etude et imprévus (20%) | 11800€ |
| Temps de retour | 4.2ans |

## Heat recovery

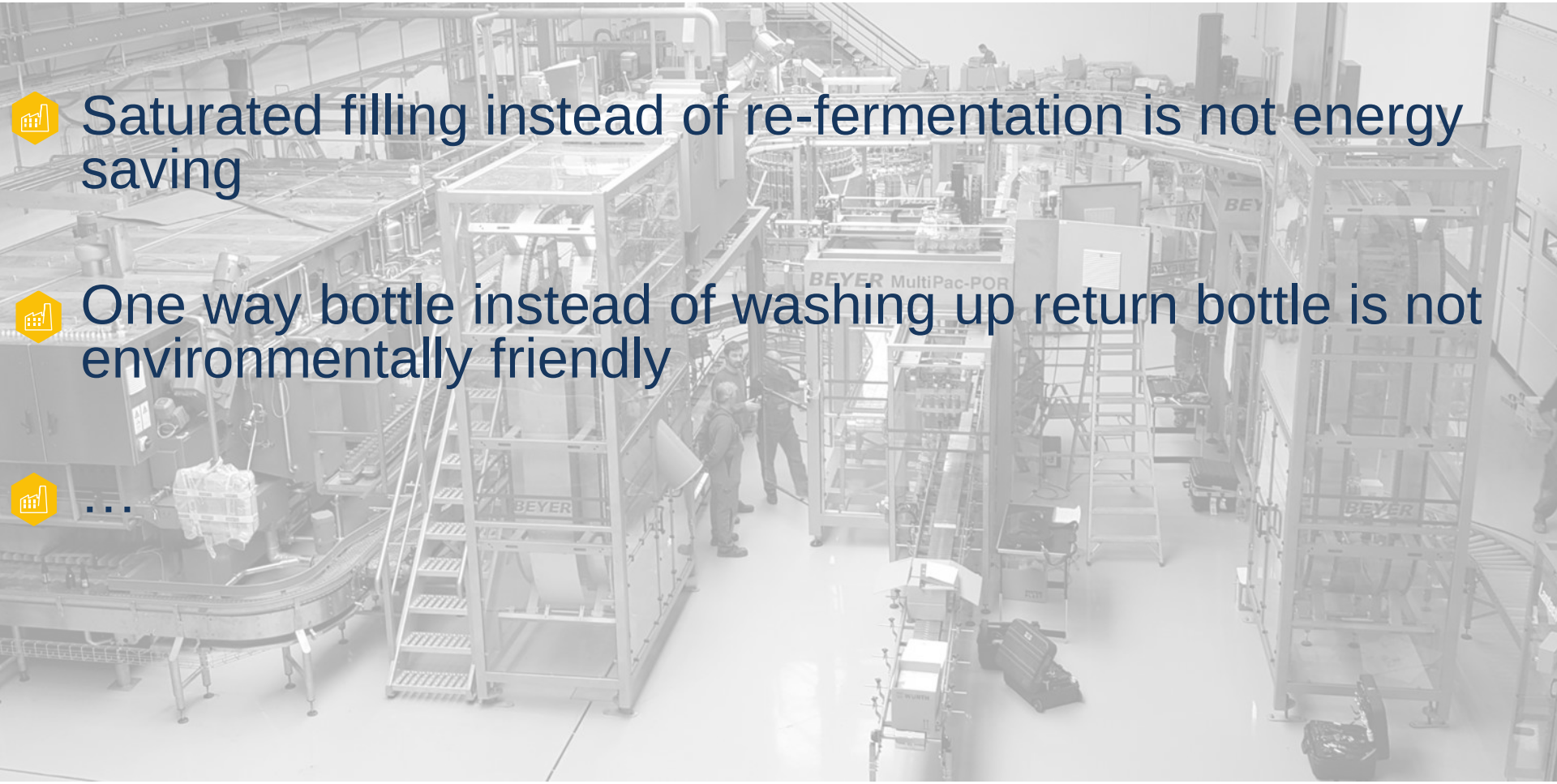
| Récupération de chaleur sur les groupes de froid (50°C) | |
|---|---|
| Gain énergie | 58MWh/an |
| Gain financier | 2893€/an |
| Gain AEE | 0.6% |
| Gain ACO2 | 0.8% |
| Investissement | 20000€ |
| Temps de retour | 7ans |

| Récupération de la chaleur des compresseurs (90°C) | |
|---|---|
| Consommation d'électricité pour AC | 132MWh/an |
| Gain énergie vapeur | 92.4MWh/an |
| Gain financier | 6205€/an |
| Gain AEE | 1.0% |
| Gain ACO2 | 1.2% |
| Investissement | 45000€ |
| Temps de retour | 7.3ans |

# When you have the choice


- Heat recovery = energy
- Hot water recovery = water + energy

# Beware of false good ideas




- Saturated filling instead of re-fermentation is not energy saving
- One way bottle instead of washing up return bottle is not environmentally friendly
- …

- There are plenty of opportunities
- Everystep brings you closer
- Start the process,… you will enjoy it !


Gérald Senden
0484 257 356
gse@sense-eng.be