



SENSE

Engineering that makes sense

Rational use of resources 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 than I do.

Disclaimer

Toutes les valeurs mentionnées dans cette présentation 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...



What do breweries need water for?

Here's a list:

1. BREWING WATER/BREWING LIQUOR (2.7HL/HL OF BEER)
BREWING WATER REQUIRES A CERTAIN AMOUNT OF TREATMENT AND ADJUSTMENTS TO ACHIEVE THE CORRECT COMPOSITION RELEVANT TO THE BEERS BEING BREWED.

2. PROCESS WATER (2.1HL/HL)
THIS IS THE WATER THAT'S REQUIRED FOR WASHING AND STERILIZING VESSELS, PIPES, CIPS AND REFRIGERATION ((WATER + GLYCOL).

3. GENERAL PURPOSE WATER (1HL/HL)
THIS IS FOR GENERAL WASHING AND MAINTAINING THE OVERALL HYGIENE OF THE SITE.

4. SERVICE WATER (0.2HL/HL)
THIS WATER IS REQUIRED FOR THE BOILER FEED AND NEEDS TO BE DEMINERALIZED BEFORE USE.

BREWER WORLD.



www.brewer-world.com | content for legal drinking age+

Water Use Ratio

La bière, c'est de l'eau...

Average : 6 liters per liters

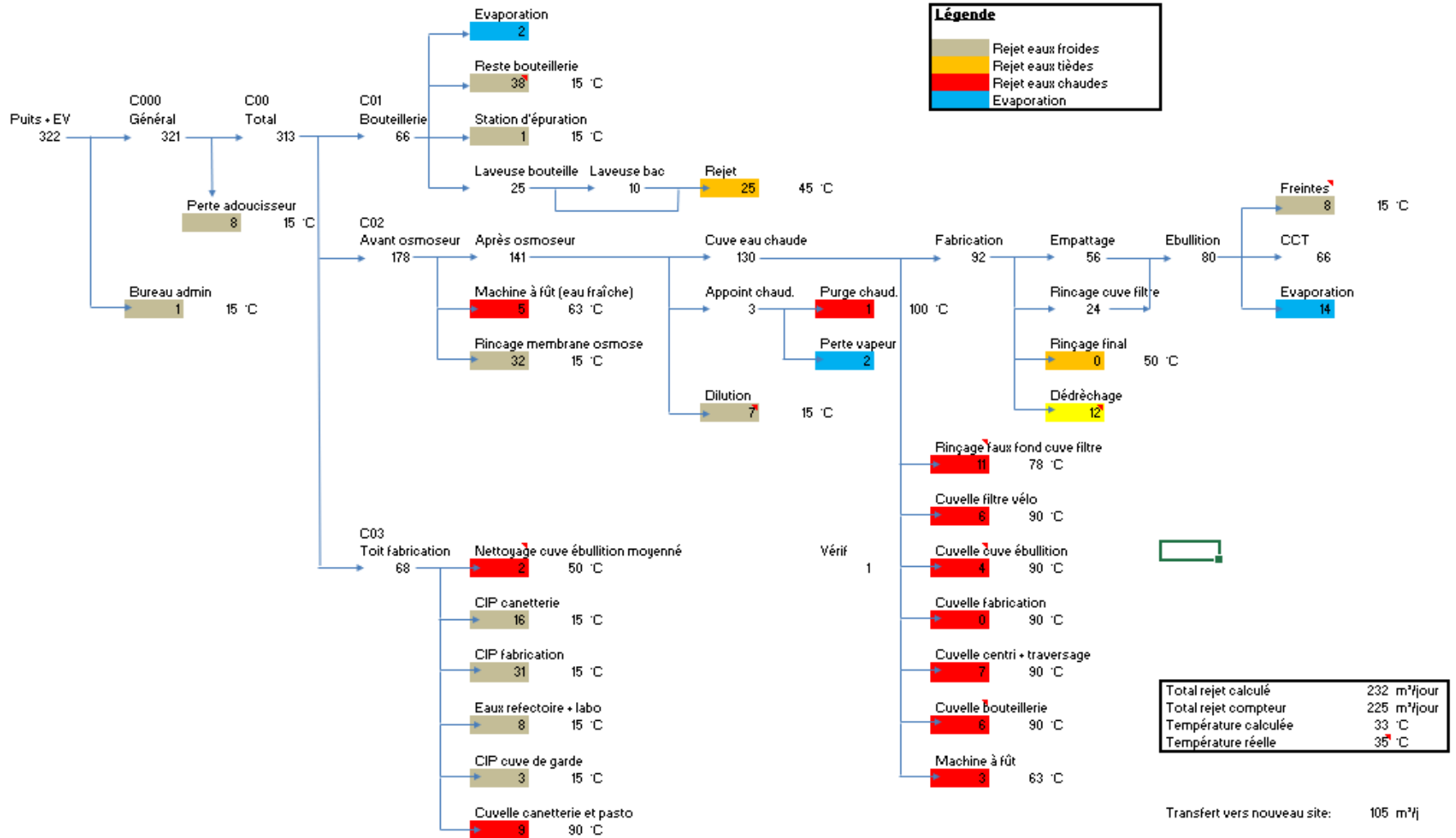
We are not equal toward our WUR...



Can you link the beer to the WUR

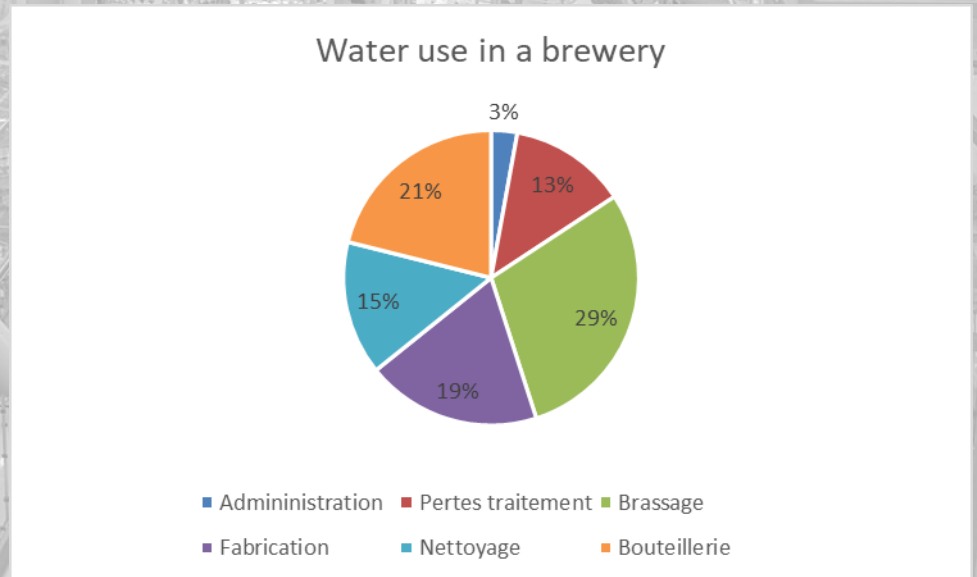
2.8 3.6 5 8 9 14 12

Understand what is going on...



Understand what is going on...

	m ³ /j	
Administration	9	3%
Pertes traitement	40	13%
Brassage	92	29%
Fabrication	60	19%
Nettoyage	46	15%
Bouteillerie	66	21%
Total	314	



Biere	66	21%
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Freintes : 8 m³/j (12%)

How to save water



Use the appropriated quality



Water softening : yield 90 / 95%

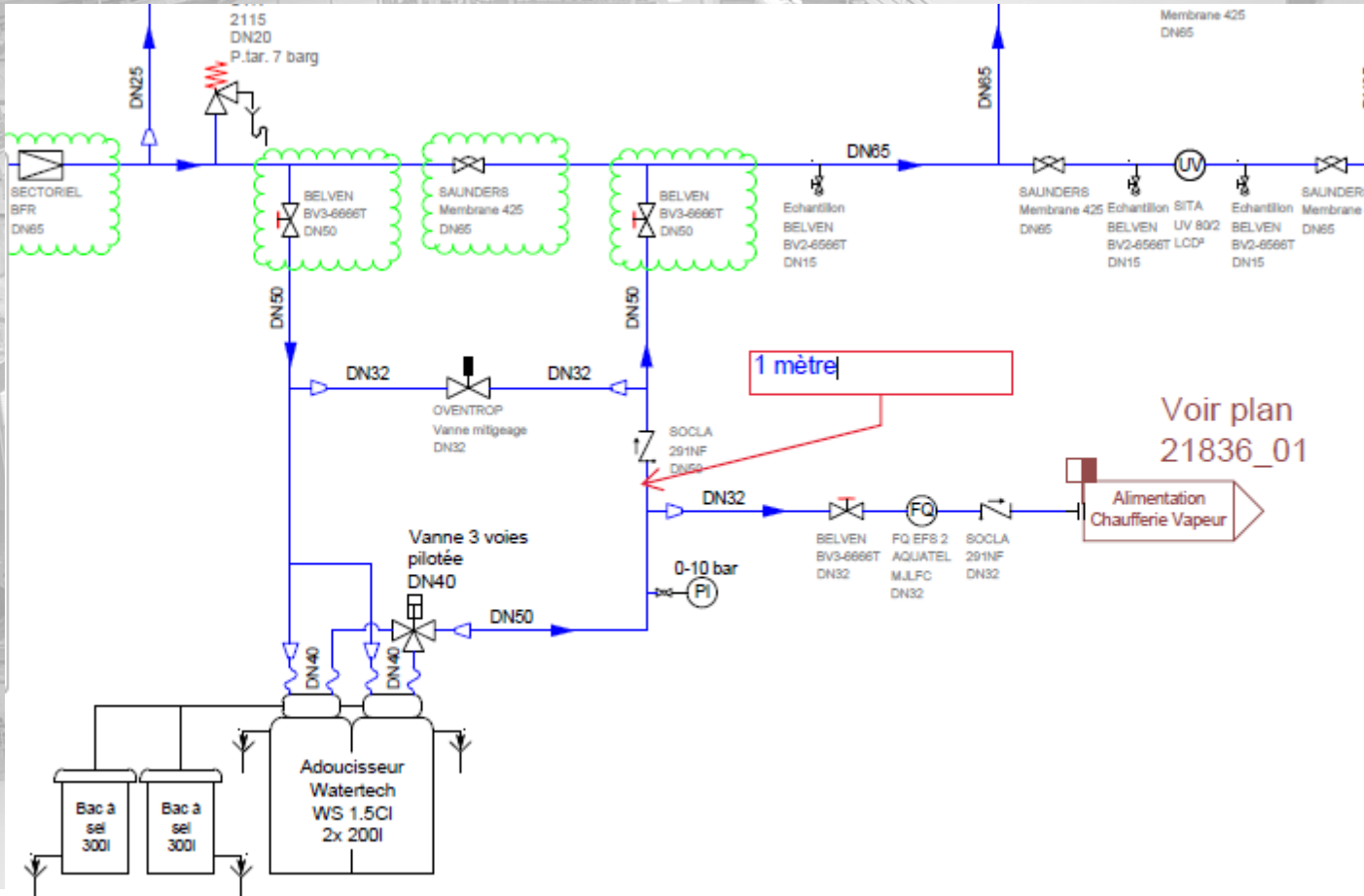


Reverse osmosis : yield 60 / 75%

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

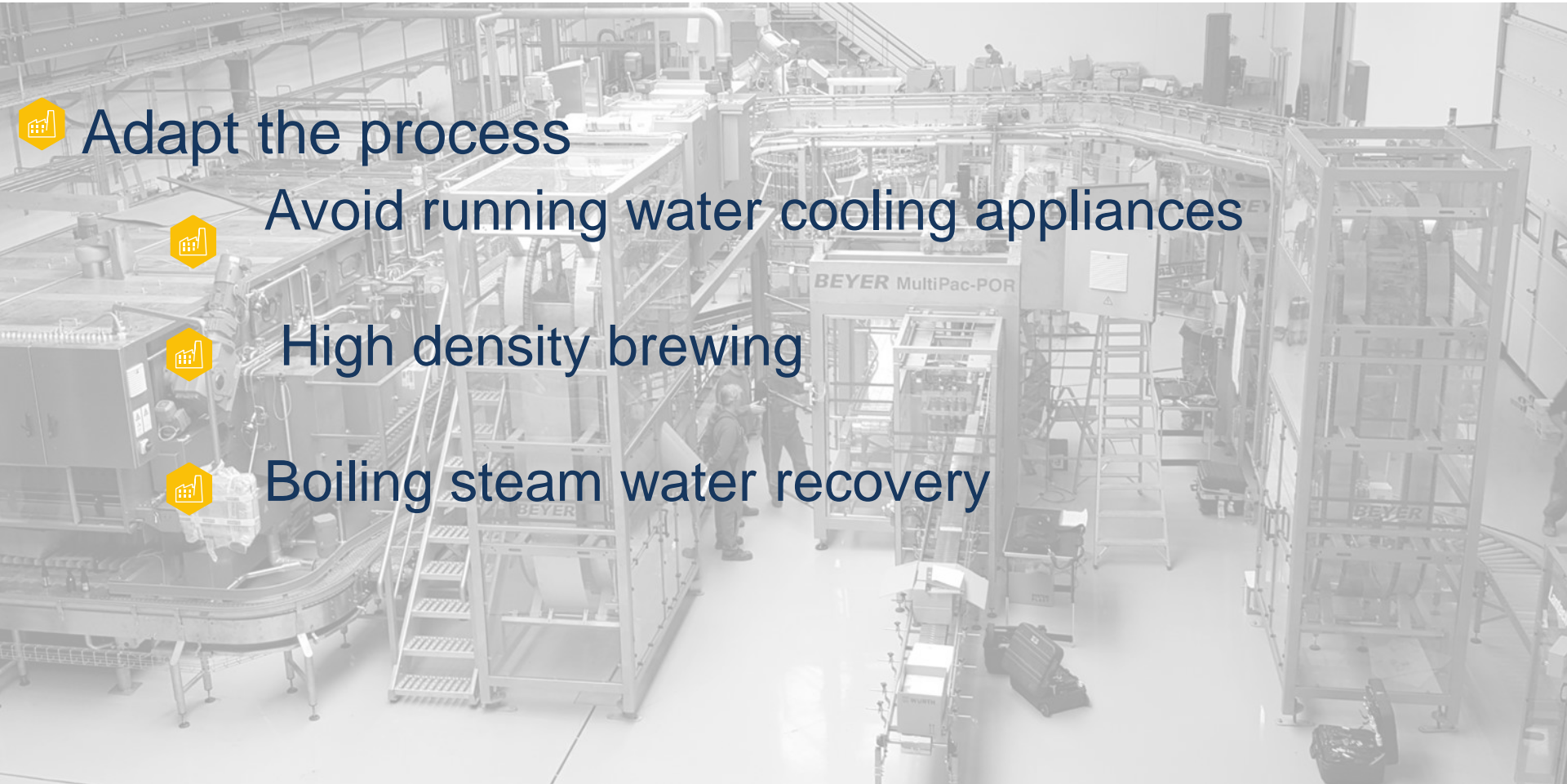


CIPS : Closed loop
 Tank dimensionning
 Choose the location
 Recovery tank on CIPs



Réduction de la consommation d'eau chaude rincage faux fond cuve filtre	
Eau consommée par rincage faux fond	11m ³ /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

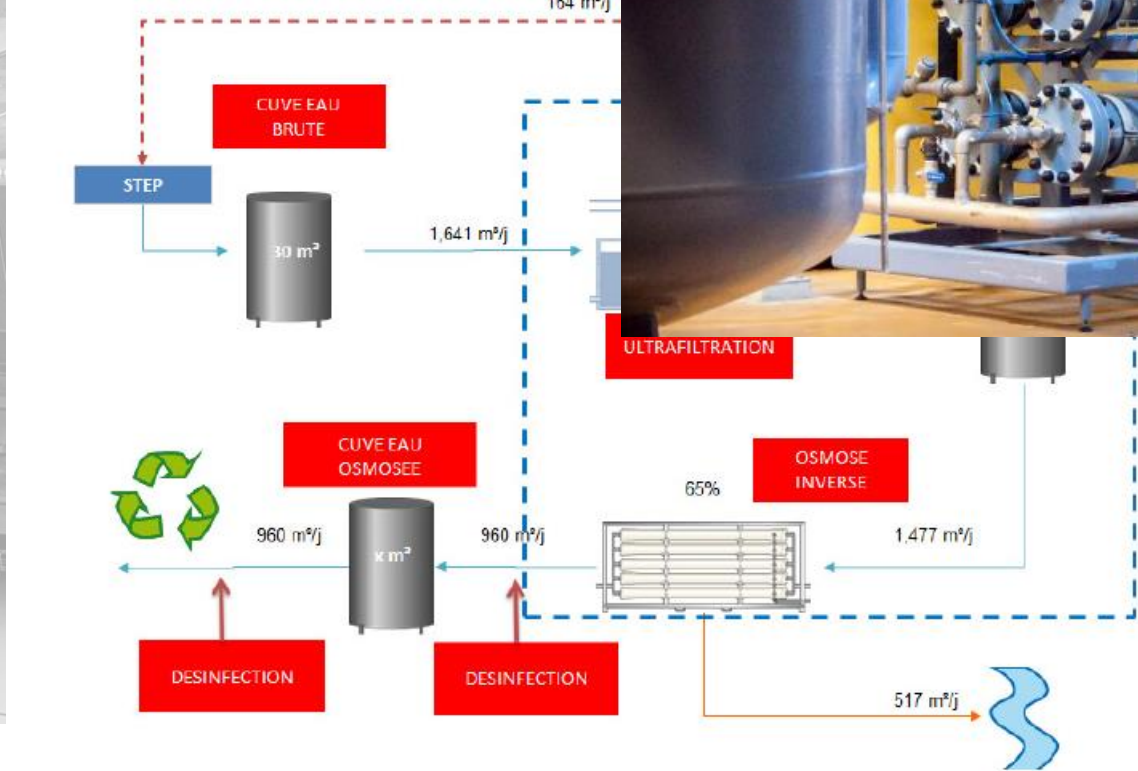
 High efficiency bottle washer



How to save water



Water re-use



Don't forget what is going out.

Charges entrantes

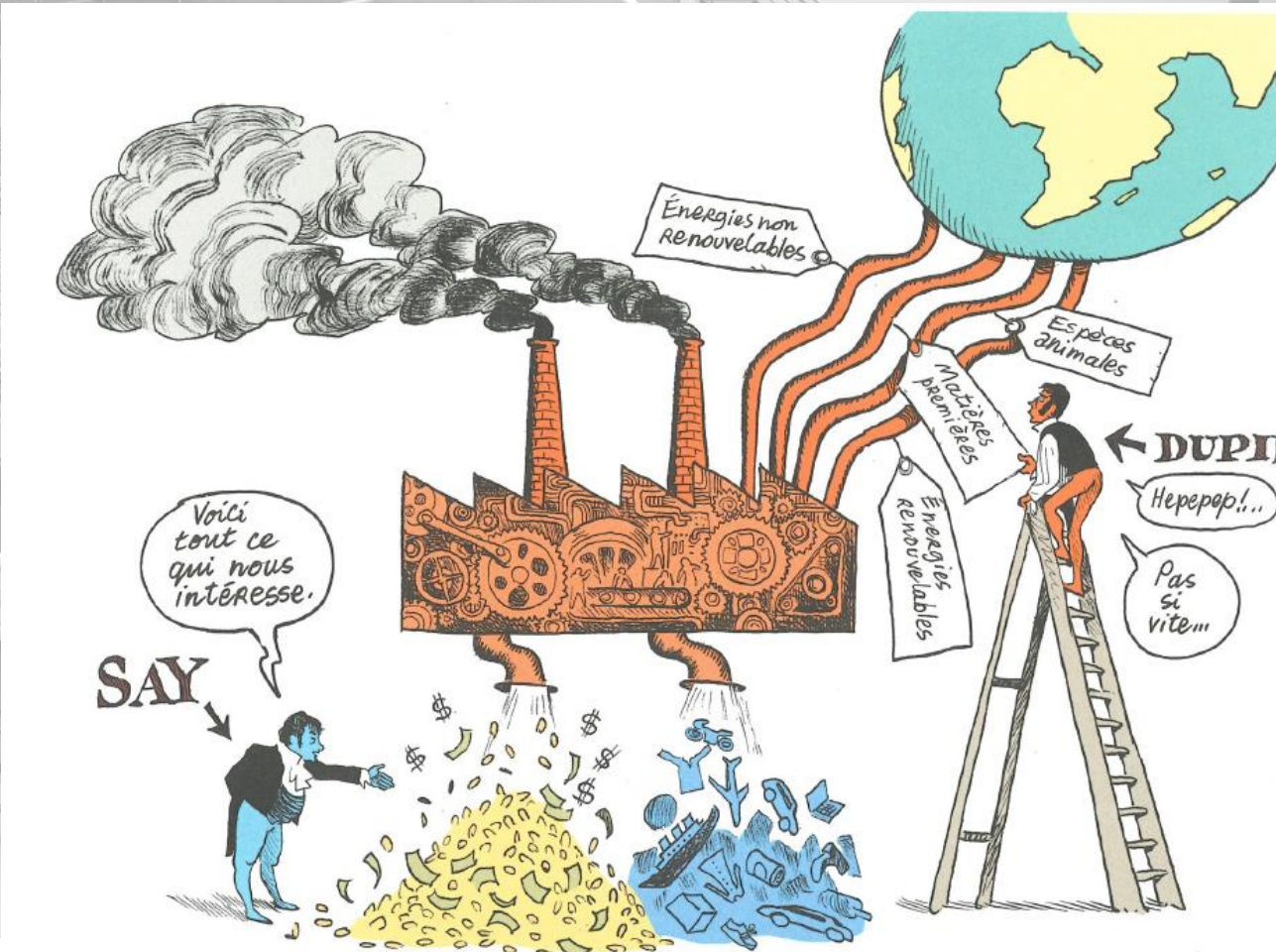
Airoxy® P90	Concentrations maximales en entrée de traitement		
	DBOs	13,2	kgO ₂ /jour
	DCO	18	kgO ₂ /jour
	MES	4,8	kg/jour
	Débit journalier	4,16	m ³ /jour

Performances

Paramètres	Concentrations maximales en sortie de traitement	
DBOs	25	mgO ₂ /l
DCO*	125	mgO ₂ /l
MES	35	mg/l



Let's talk about energy...

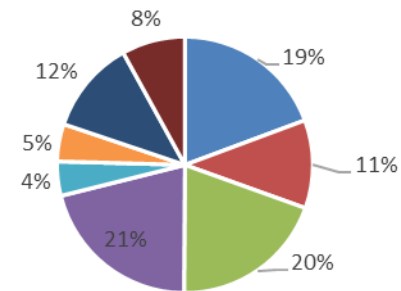


Where does the energy go

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	

Energy use in a brewery



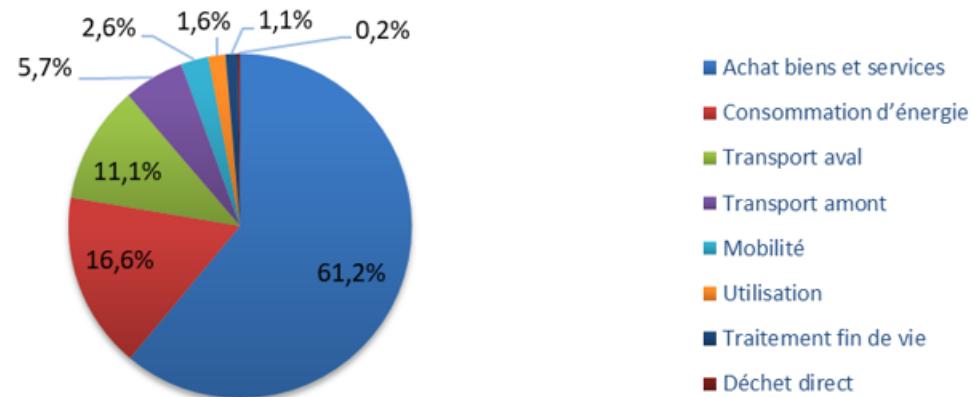
- Brassage
- Fermentation/garde
- Soutirage
- Lavage bouteille
- CIP + nettoyage
- Refermentation
- Step
- Bâtments

What is the impact ?

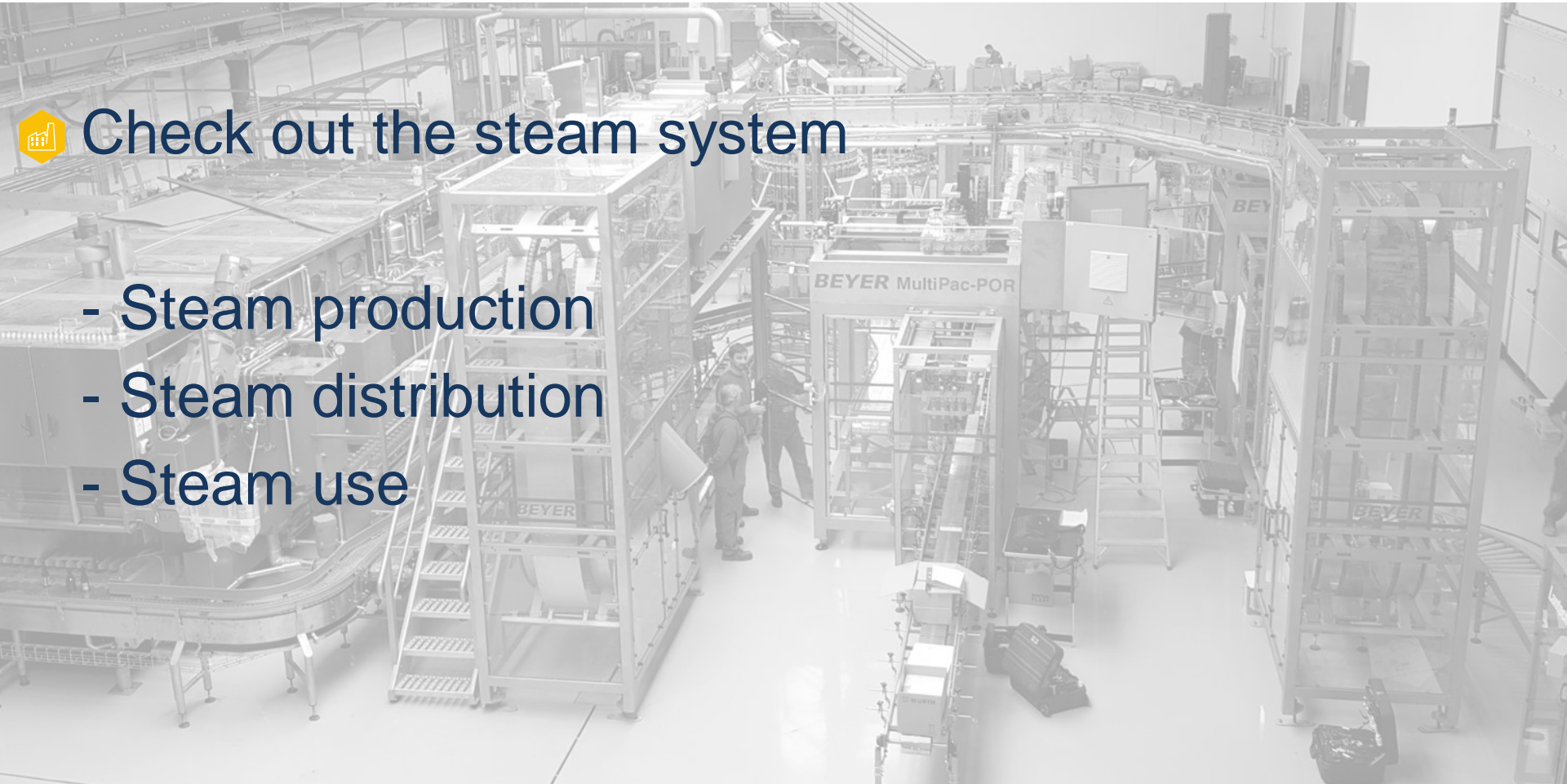
Financial weight : 3 – 6% of the turnover

Environmental weight :

Emissions totales induites par le fonctionnement de la brasserie



Energy saving opportunities

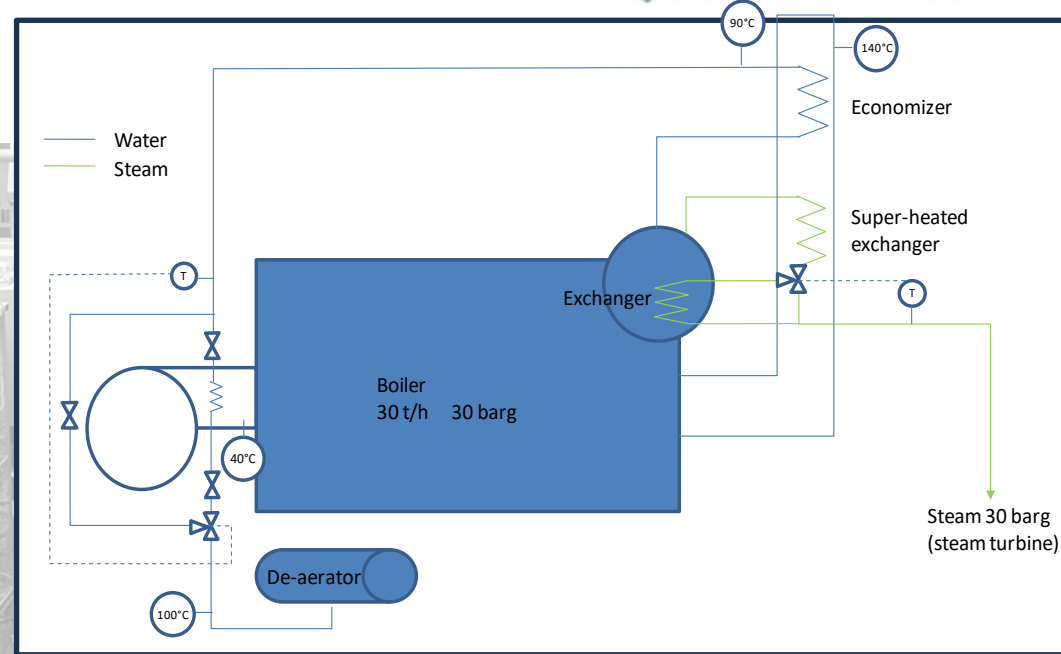


Check out the steam system

- 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

Steam : 772 kwh/ton



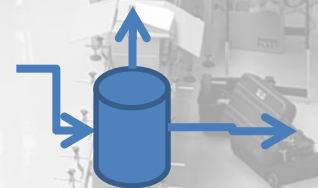
User

Condensate
(10 barg) : 211 kwh/ton



If condensate is returned to the boiler room :
the user needs 657 kwh – if not, it is 772 kwh
(it is somehow 15%)

Flash steam



Condensate
(0 barg) : 115 kwh/ton

Flash tank

Return as much condensate as possible !

Energy saving opportunities on process



Heat recovery on boiling

Heat recovery

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

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 !





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