



# Pontos AquaCycle

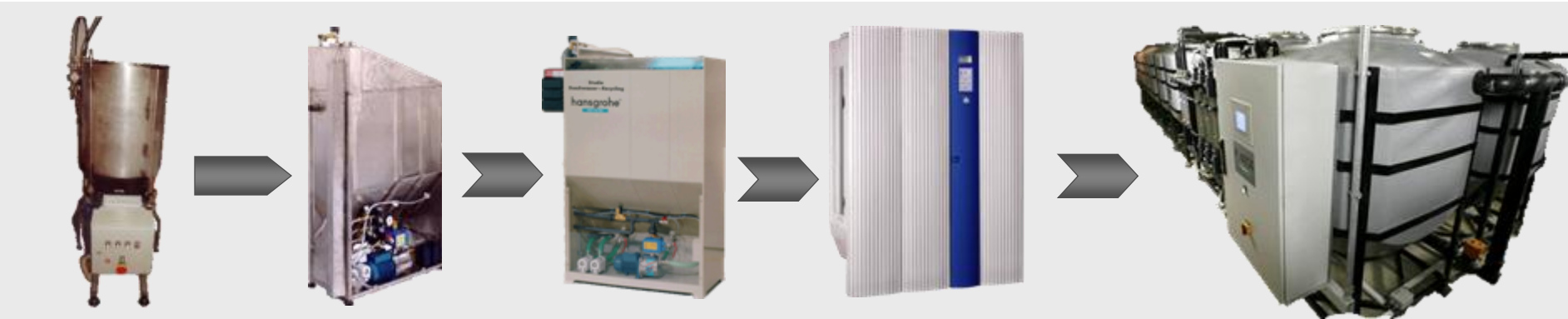
Use your water twice - it's the smart way.



## 1. Company

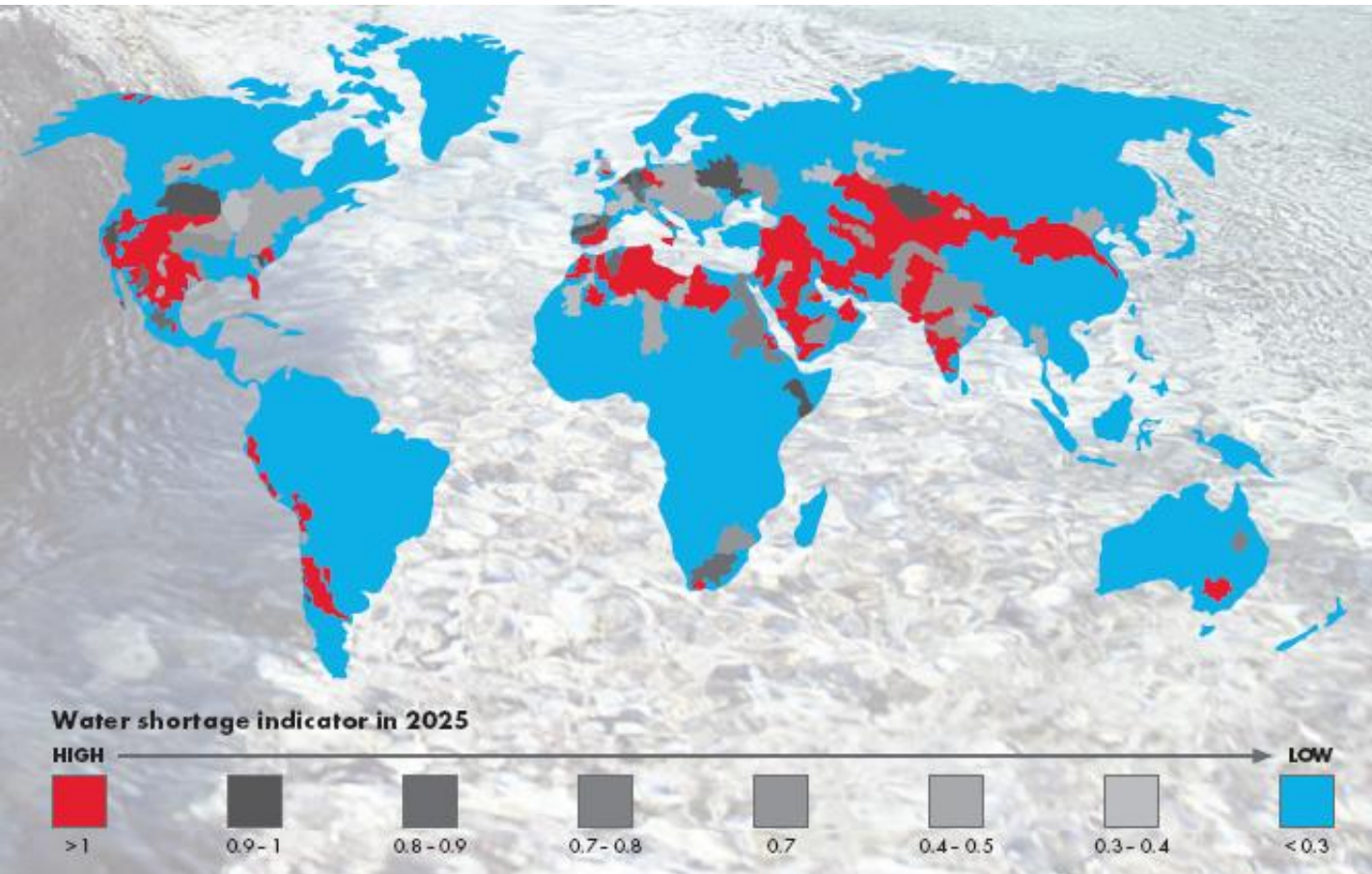


- 1994 idea for the recycling of shower water by Klaus Grohe
- 1997 first field tests
- 2001 formation of Pontos GmbH, 100% subsidiary of Hansgrohe AG
- 1200 plants in use so far



## 2. Background

### Global situation

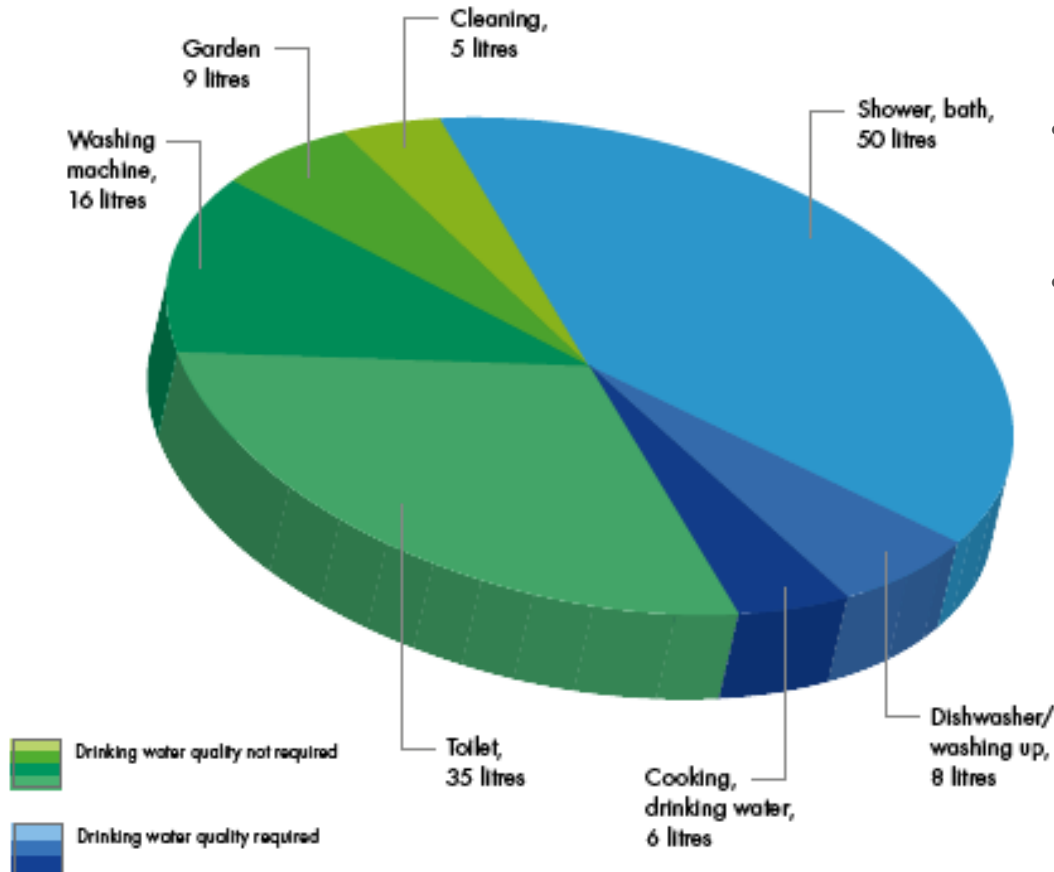


**Half the world's population will suffer extreme water shortages by 2025.**

**Water shortages also slow down economic growth.**

## 2. Background

### How much drinking water do we really need?



- Only 50% of our daily consumption need to be drinking water.
- Contribution to ecological sustainability with Pontos AquaCycle:

➡ Reduction of water usage

➡ 2nd use for toilet flushing, cleaning and irrigation



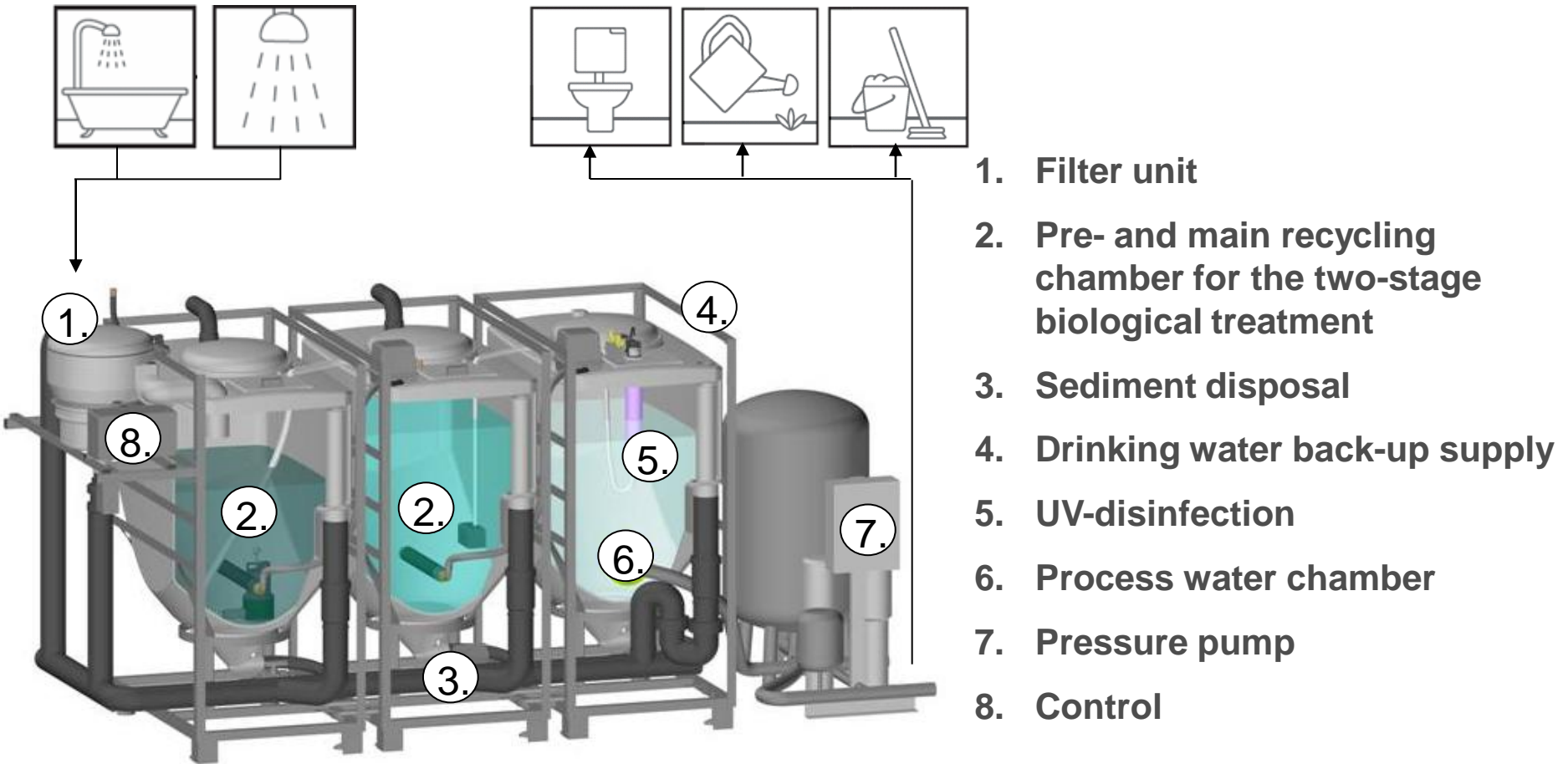
### 3. Idea

#### How does the Pontos AquaCycle work?



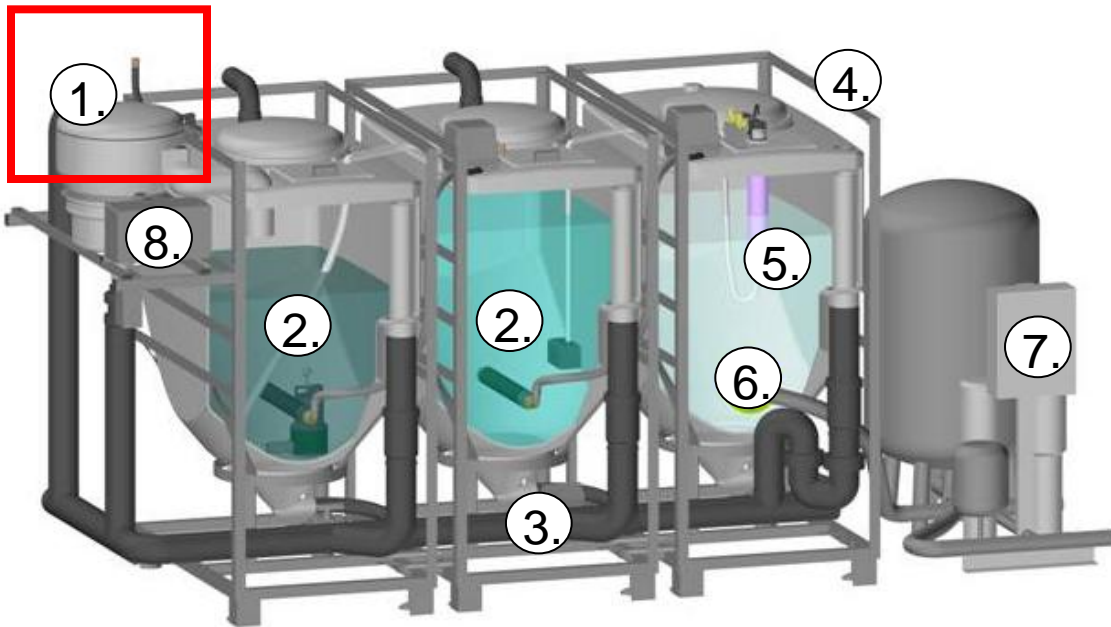
- **Water from shower and bath tub...**
- **...is recycled in the Pontos AquaCycle with the aid of a complete biological-mechanical process...**
- **...and reused a second time for applications that do not require drinking water quality such as toilet flushing, cleaning purposes, irrigation.**

## 4. Function



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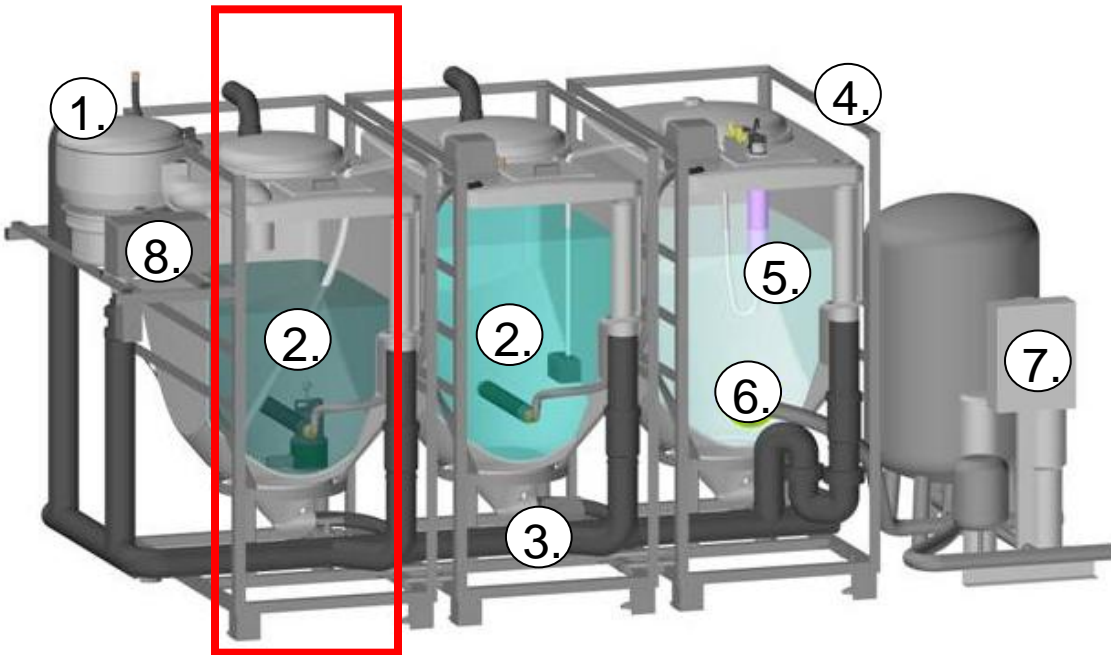
### Phase 1: Pre-filtration within the inlet of tank 1



- Removal of hair, solids, etc.
- Automatically backwashed (time controlled)
- Cleaning interval between 12 hours and 4 days (dependent on the application and type of system)

## 4. Function

### Phase 2: Biological pre-recycling

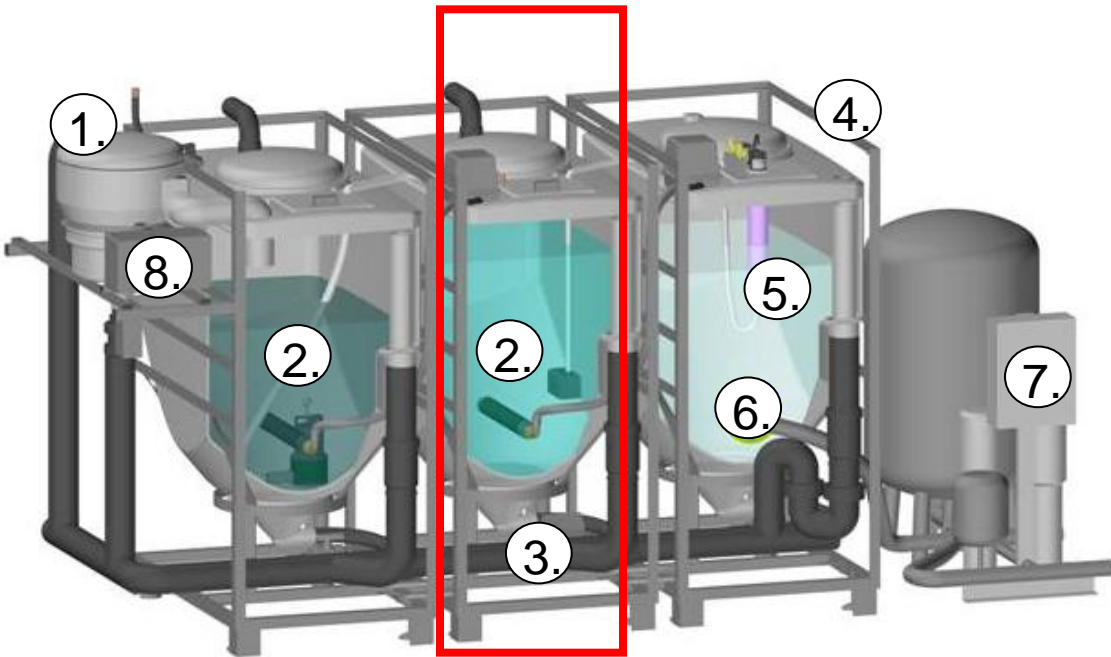


- Microorganismes break down the waste content in the water
- The carrier material provides high inner surface for the growth of microorganisms
- Periodic aeration over several hours
- Sedimentation phase
- Time controlled pumping to tank 2
- 80% of the biological break down process takes place in tank 1



## 4. Function

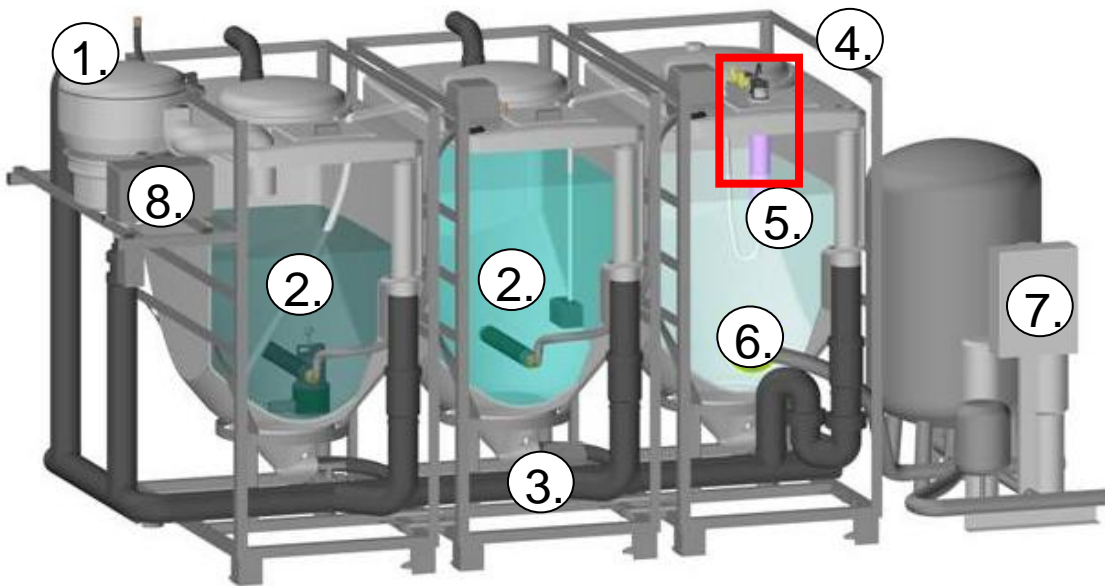
### Phase 3: Biological main recycling



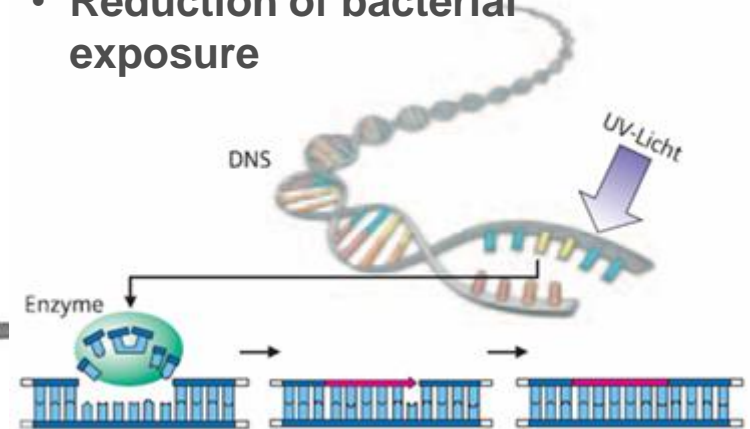
- Microorganismes break down the waste content in the water
- The carrier material provides high inner surface for the growth of microorganisms
- Periodic aeration over several hours
- Sedimentation phase
- Time controlled pumping to tank 2
- Completion of the biological process

## 4. Function

### Phase 4: UV-disinfection



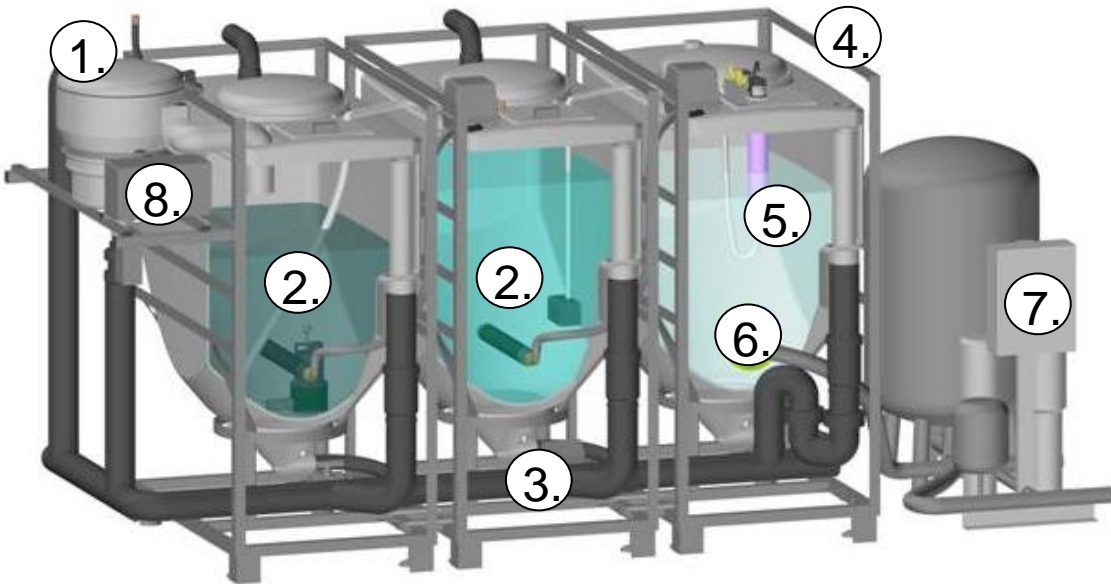
- Disinfection during pumping from tank 2 to the process water chamber\*
- Radiation with UV-C-light
- Deactivation of bacteria and viruses
- Reduction of bacterial exposure



\* Process water complies with category 5 according to EN 1717

## 4. Function

### System characteristics



- **4-step** biological mechanical treatment
- **14 days running in period** for the establishment of the biological treatment capacity. After this period the unit switches automatically to the automatic mode.
- **Automatic sediment removal**
- **Automatic drinking water back-up** on demand according to EN 1717.
- **Overflow** for self-protection in each tank

[video](#)

## 5. Water quality

**Comparison of the values given in the Berlin Requirements and the EU guideline for bathing water with the values obtained with the Pontos AquaCycle:**

Berlin Requirements		EU-GL bathing water	Pontos AquaCycle
Parameter	Max. value	Max. value for „excellent“	Obtained values*
<b>BOD<sub>7</sub></b>	<5 mg/l	k.A.	3 - <5 mg/l
<b>Oxygen saturation</b>	>50%	k.A.	>50-70%
<b>Total coliform bacteria <sup>A)</sup></b>	<100/ml	k.A.	0,09 – 23/ml
<b>Fecal coliform bacteria <sup>A)</sup></b>	<10/ml	50/ml	< 0,03
<b>Pseudomonas aeruginosa <sup>B)</sup></b>	<1/ml	k.A.	< 0,03

A) Analysis according to EU guideline 76/160EWG

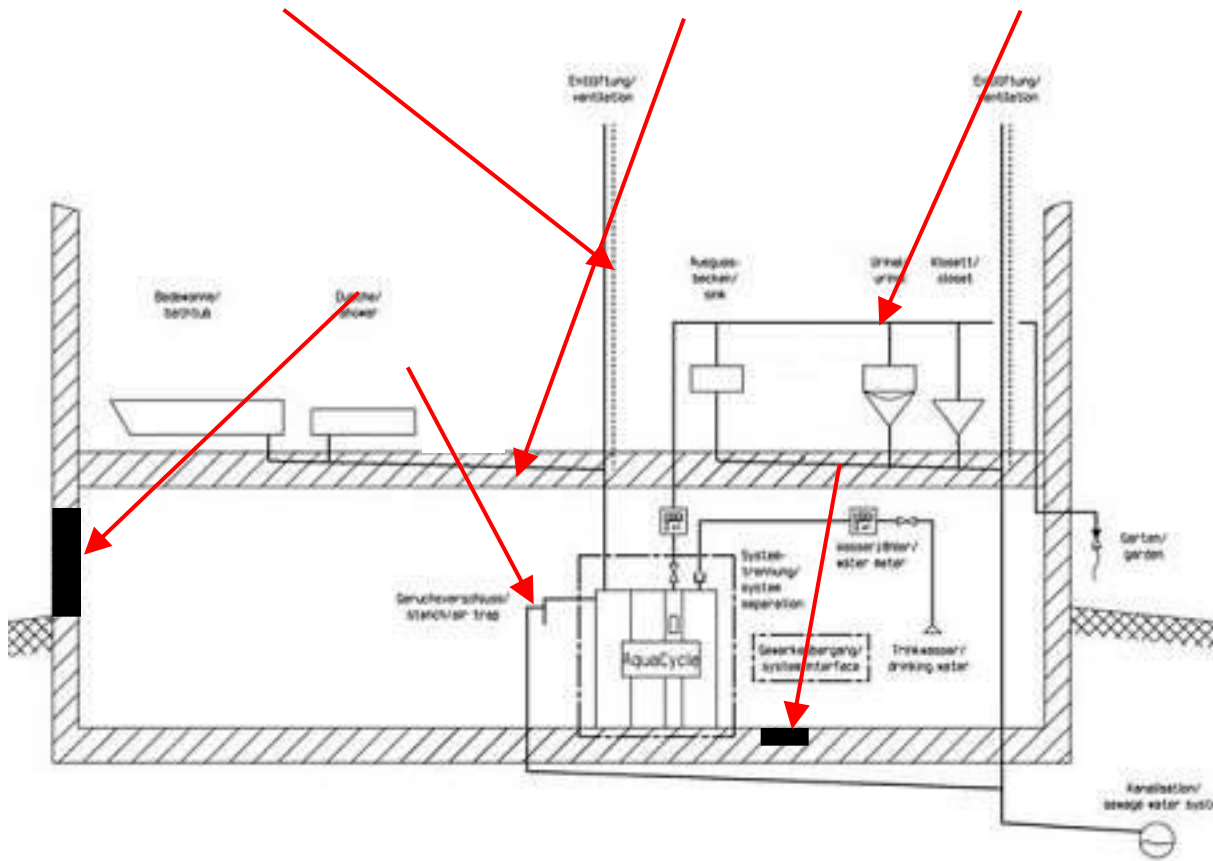
B) Analysis compared to TrinkwV 2001 (German drinking water regulation)

\* Values measured during TÜV- inspection 2008 at the Pontos AquaCycle



## 6. Installation requirements

The following requirements need to be fulfilled to install a Pontos AquaCycle:



- **Separate piping system** for collection and supply pipes
- **Separate ventilation** of the inlet above the roof
- **Overflow with integrated stench trap** (overflow, sediment removal)
- **Drainage of the installation room** according to EN 12056
- **Ventilation** of the installation room

## 7. Fields of application



- **Multi family houses**
- **Hotels**
- **Swimming pools**
- **Residential homes**
- **Fitness center / gymnasias**
- **Manufacturing sites**

## 8. Plant layout

### Pontos AquaCycle Planning sheet:

**hangrohe**

**Planungshilfe Pontos HeatCycle und/oder AquaCycle**  
Tel: +49 7836 511926 - Fax: +49 7836 511936

Grauwasserzirkulierung und Wärmerrückgewinnung A, B und C      Grauwasserzirkulierung A und B      Wärmerückgewinnung A und C

**Kunde**

Firma \_\_\_\_\_ Rückantworttermin bis \_\_\_\_\_

Ansprechpartner, wohn. Beifügen \_\_\_\_\_

Strasse \_\_\_\_\_ Projekt \_\_\_\_\_

PLZ/Ort \_\_\_\_\_ Name \_\_\_\_\_

Telefon \_\_\_\_\_ Straße \_\_\_\_\_

Fax/Alt \_\_\_\_\_ PLZ/Ort \_\_\_\_\_

**Charakteristika des Pontos AquaCycle/HeatCycle:**

☐ Wohnanlage      ☐ Mehrfamilienhaus      ☐ Anlagengröße in l/s \_\_\_\_\_

☐ Sportstätte      ☐ Hotel \_\_\_\_\_

☐ Industrieanlage      ☐ Campingsite \_\_\_\_\_

☐ Andere \_\_\_\_\_

Anzahl der Einheiten \_\_\_\_\_

**ist mit einer nahezu gleichartigen Anlagenauslastung zu rechnen?**

☐ Ja ☐ Nein

Wann wird betrieben (z.B. sonntags Betrieb) \_\_\_\_\_

**Welches Wasser möchten Sie aufbereiten bzw. aus welchem Wasser möchten Sie die Wärme zurückgewinnen?**

☐ Oberflächenwasser \_\_\_\_\_ ☐ Abwasser \_\_\_\_\_

☐ Regenwasser \_\_\_\_\_ ☐ Brauchwasser \_\_\_\_\_

**Aufstellungs- und Zugangsmaße (Türen)**

Kanalarbreite \_\_\_\_\_ m      Zugangsmasse \_\_\_\_\_ m<sup>2</sup>      Einbaubehälter vorhanden ☐ Ja ☐ Nein

**Wofür soll das aufbereitete Wasser (Bettbeckenwasser) verwendet werden?**

☐ Toiletten, ca. \_\_\_\_\_ l/Person/Tag      ☐ Bewässerung, ca. \_\_\_\_\_ m<sup>2</sup>

☐ Spülkäsen, ca. \_\_\_\_\_ l/Tag      ☐ Reinigung, ca. \_\_\_\_\_ l/Tag

☐ Druckspüler, ca. \_\_\_\_\_ l/Tag      ☐ Sonstiges \_\_\_\_\_

☐ Urinal, ca. \_\_\_\_\_ l/Tag      ☐ Sonstiges \_\_\_\_\_

**Welche Haushaltschemikalien (außer Shampoo, Seife, Badewasser, Waschmittel und Badreinigungsmittel) sollen in die Anlage eingebracht werden?**

☐ Keine ☐ Folgende Produkte sollen wegen möglicher Eingangsleistung werden:

**Druckeinstellungsanforderungen:**

Erforderliche Pumpenleistung \_\_\_\_\_ m<sup>3</sup>/h bei \_\_\_\_\_ mW      Höhenunterschied von Anlagenstand zum „tiefsten“ Verbraucher \_\_\_\_\_ m

Erhöhter Leistung von Anlagenstand zum weitesten Verbraucher \_\_\_\_\_ m

**Wärmerrückgewinnung:**

Min. Wärmewasserspeichergröße \_\_\_\_\_ l/min      Mittlere Temperatur des Grauwassers \_\_\_\_\_ °C

Maximale, auf die die Wärme übertragen werden soll \_\_\_\_\_ °C

Mittlere Temperatur des Frischwassers \_\_\_\_\_ °C

Schwankungsbereich von \_\_\_\_\_ °C bis \_\_\_\_\_ °C

**Fachplaner/Architekt/Seiten Sie können die Planungshilfe mit weiteren Daten anfordern.**

Datum: \_\_\_\_\_ Unterschrift: \_\_\_\_\_

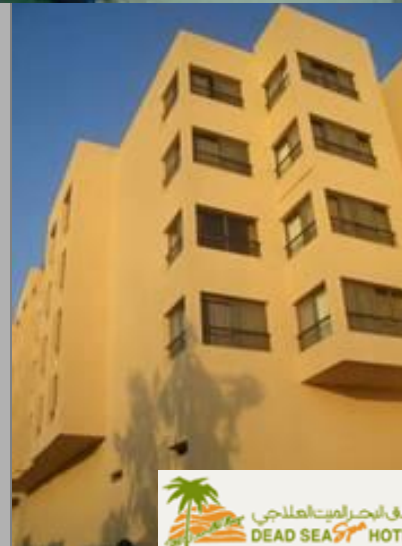
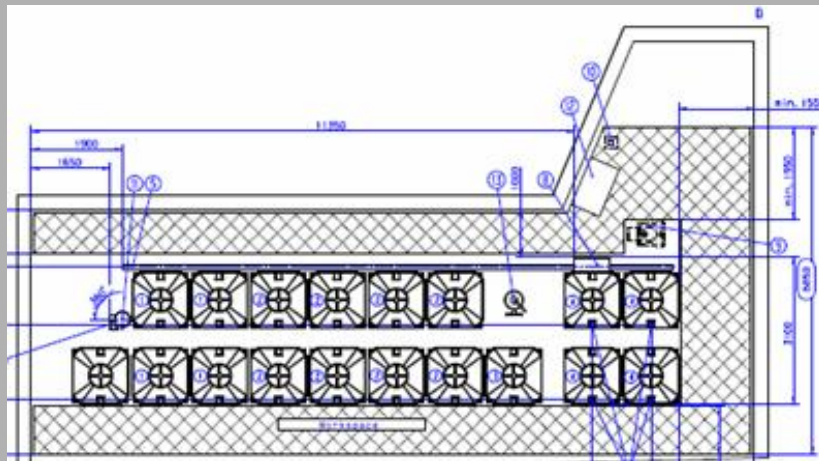
\*Hier kann eine Anlage in der Größe bestimmt werden. Bitte setzen Sie die Anlage in der Größe fest.

Plant layout based on individual customer request and planning sheet.

Planning sheet also online available:  
[www.hangrohe-int.com/pontos](http://www.hangrohe-int.com/pontos)

## 9. Pontos - References Hotels

Dead Sea Spa Hotel, Jordan



### Pontos AquaCycle 27000

#### Water used:

- showers
- and bathtubs 160 rooms of building extension

#### Water use:

- toilet flushing

#### specialty:

Water is used 3 times with the help of an onsite sewage treatment plant:  
showers ⇌ toilet ⇌ irrigation



## 9. Pontos - References Hotels

### Scarlet Hotel, Cornwall, United Kingdom



### Pontos AquaCycle 9000

#### Water used:

- 37 showers
- 35 bathtubs

#### Water use:

- 40 toilets
- 5 Urinals

#### Specialty:

Ecological luxury hotel

## 9. Pontos - References Hotels

### Yeatman Hotel 5\*, Oporto, Portugal



### Pontos AquaCycle 6000-2

#### Water used:

- shower water from 102 rooms

#### Water use:

- toilet flushing

#### specialty:

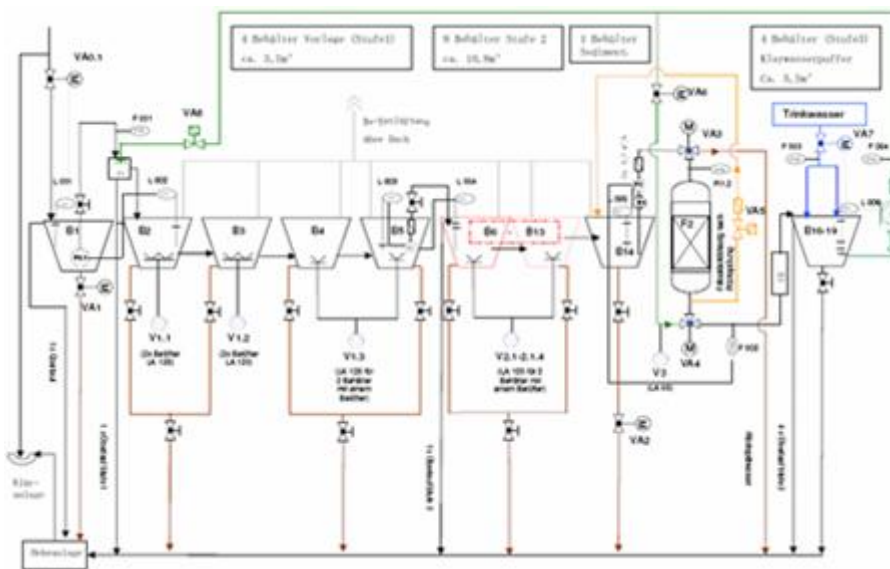
Clear water is directly pumped to a cistern where it is stored together with rain-water and groundwater

## 9. Pontos - References

Office building in combination with gym

ABSA Bank, Johannesburg, South Africa

Pontos AquaCycle 54000



### Water used:

- showers
- Hand wash basins

### Water use:

- toilet

### specialty:

Greywater is collected in the gym and reused in the office building

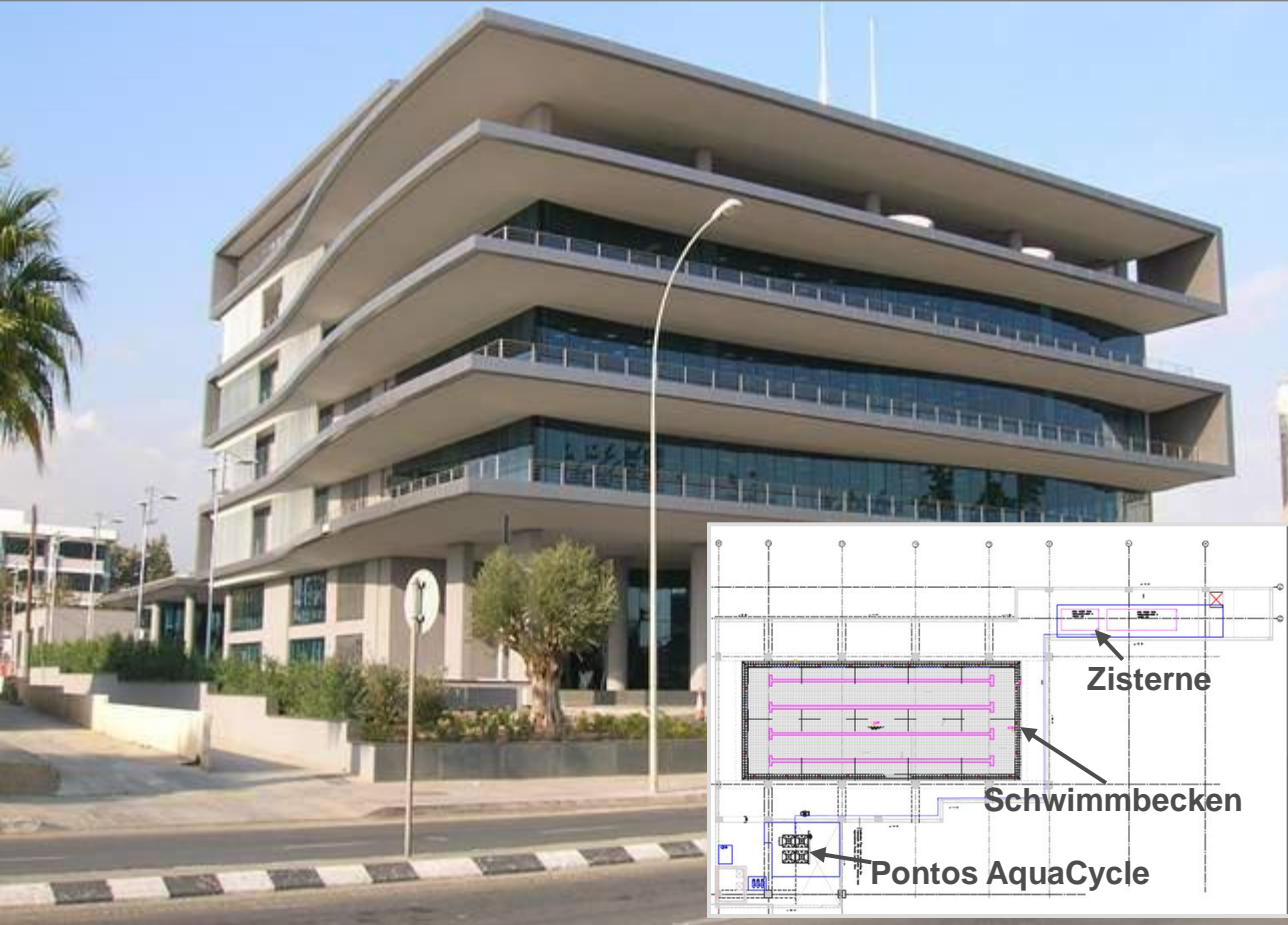




## 9. Pontos - References

Swimming pool – combination with rain water

### Interorient Navigation, Larnaca, Cyprus



### Pontos AquaCycle 6000-2

#### Water used:

- showers of swimming pool

#### Water use:

- 40 toilets
- Irrigation

#### Specialty:

- combination with rain water harvesting
- collection in one combined cistern
- Re-use in the attached office building



## 9. Pontos - References

### Municipal cleaning services

#### Municipal cleaning services, Hamburg, Germany



STADTREINIGUNG HAMBURG

#### Pontos AquaCycle 19500

Second uni

#### Water used:

- showers
- Hand wash basins

#### Water use:

- toilet flushing
- street cleaning
- Road salt wetting
- vehicle cleaning

#### specialty:

- Installation in 2 different areas
- clear water storage together with rain water in one cistern

## 9. Pontos - References

### Students' hall of residence

Collegio Enaudi, Turin, Italy



## Pontos AquaCycle 4500

### Project details:

- complete Renovation of the building from 1939

### Water used:

- showers from 140 rooms

### Water use:

- toilets

### specialties:

Ecological building concept

## 9. Pontos - References

### Students' hall of residence

Students' hall of residence, Freiburg, Germany



### Pontos AquaCycle 3000-6

#### Project data:

- New built
- 15 apartments
- Max. 65 residents

#### Water used:

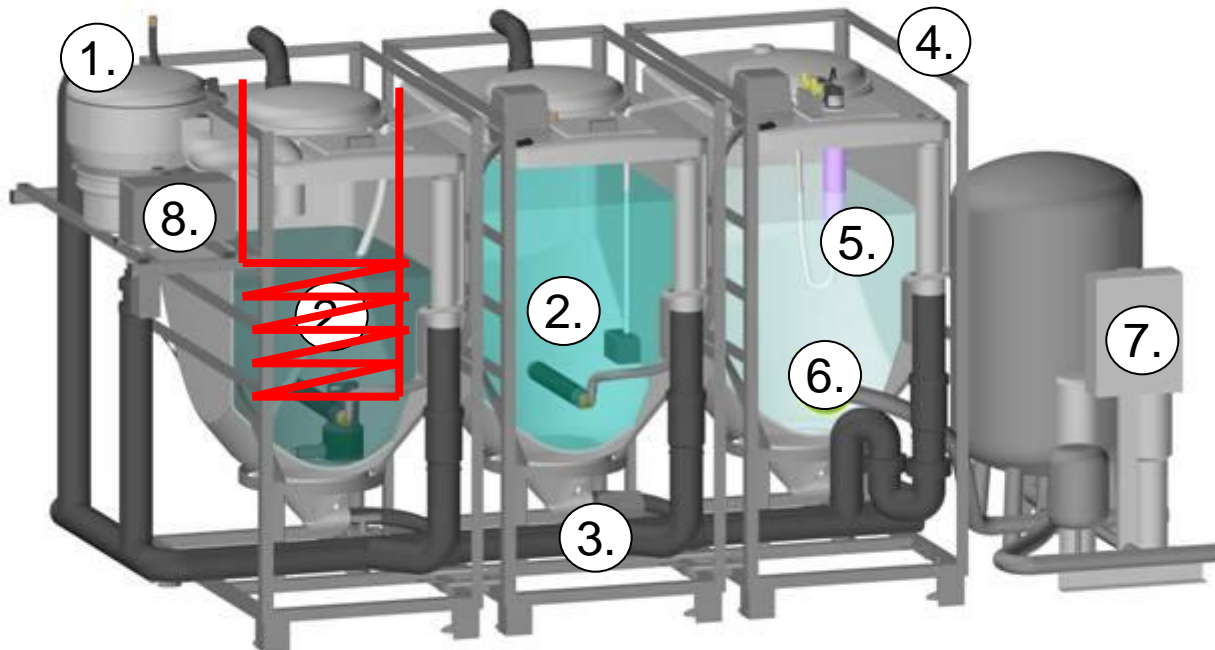
- 30 showers
- 30 hand wash basins

#### Water use:

- 30 toilets
- approx. 2000l need of process water/day



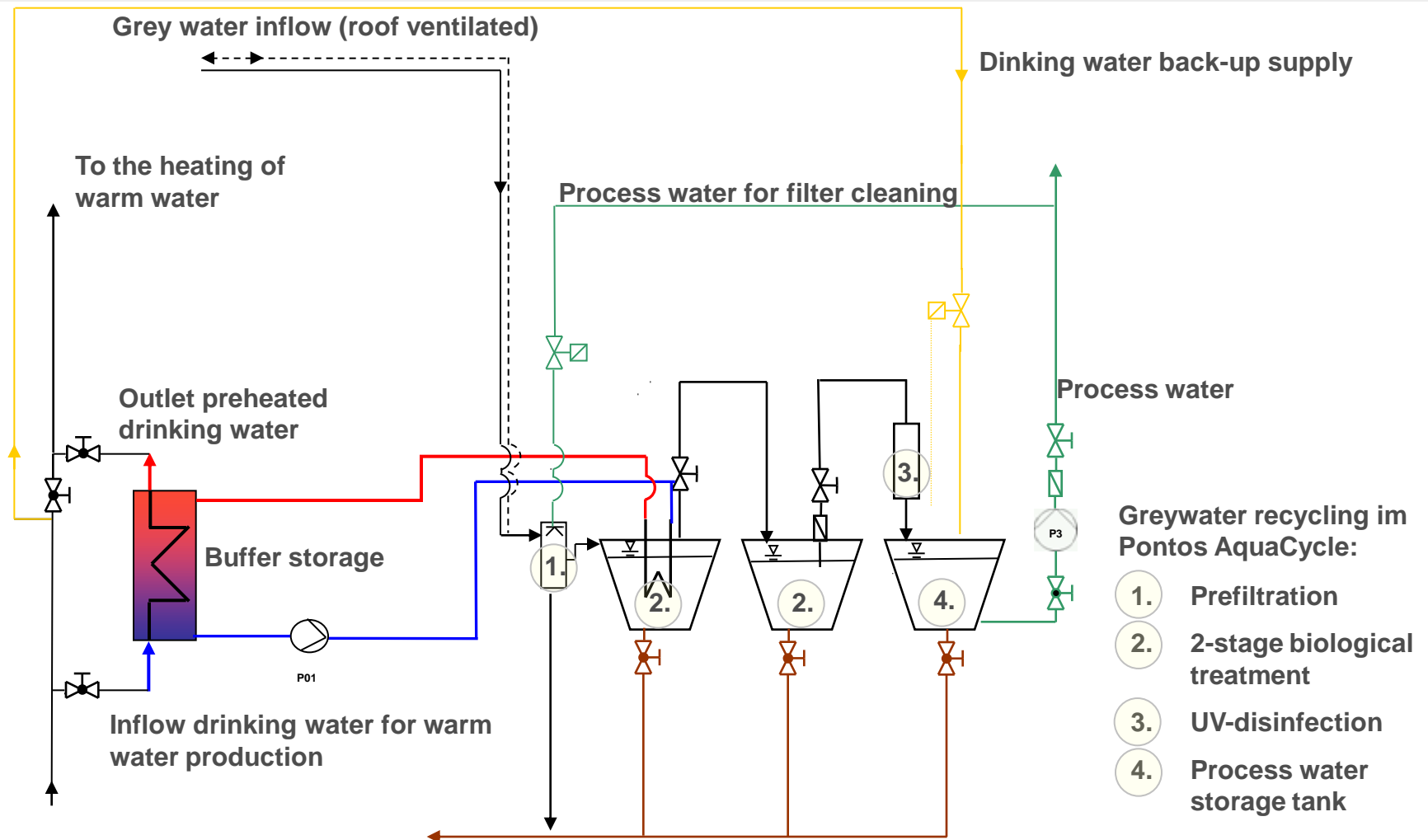
## 10. Heat recovery



1. Filter unit
2. Pre- and main recycling chamber for two-stage biological treatment
3. Sediment disposal
4. Drinking water back-up supply
5. UV-disinfection
6. Process water chamber
7. Pressure pump
8. Control

▷ Heat exchanger

# 10. Heat recovery

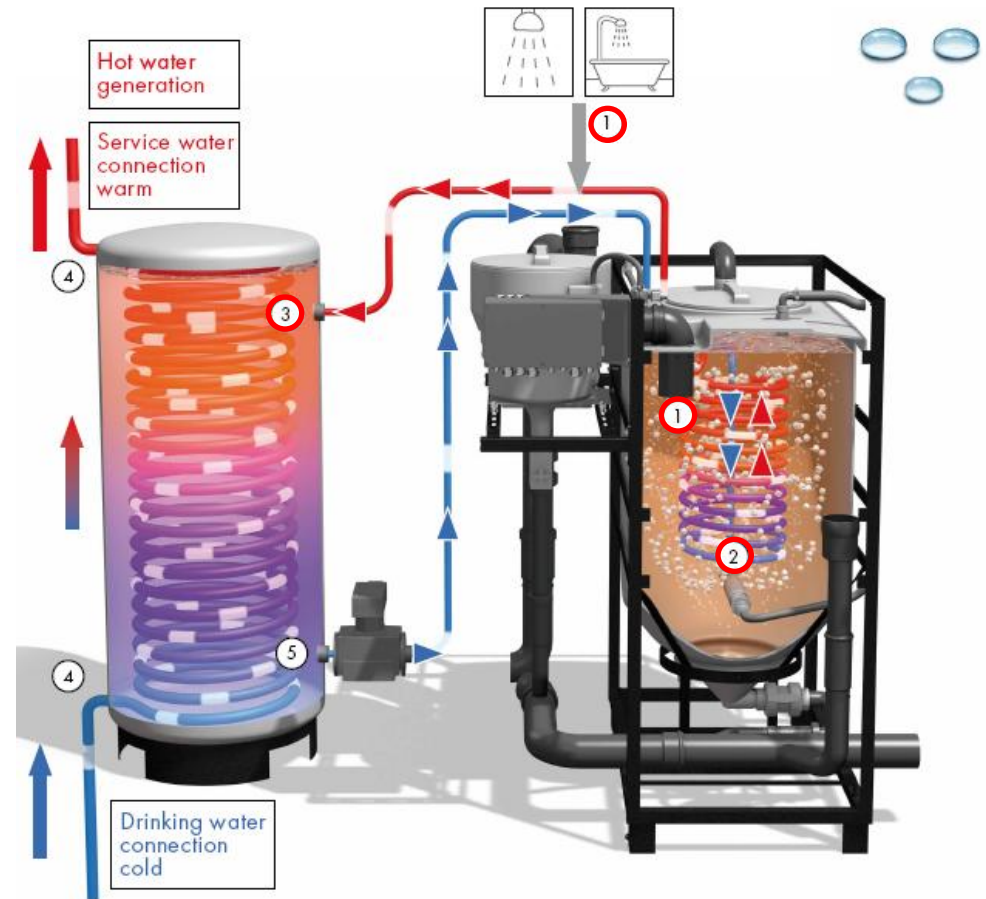




## 10. Heat recovery

### Heat recovery

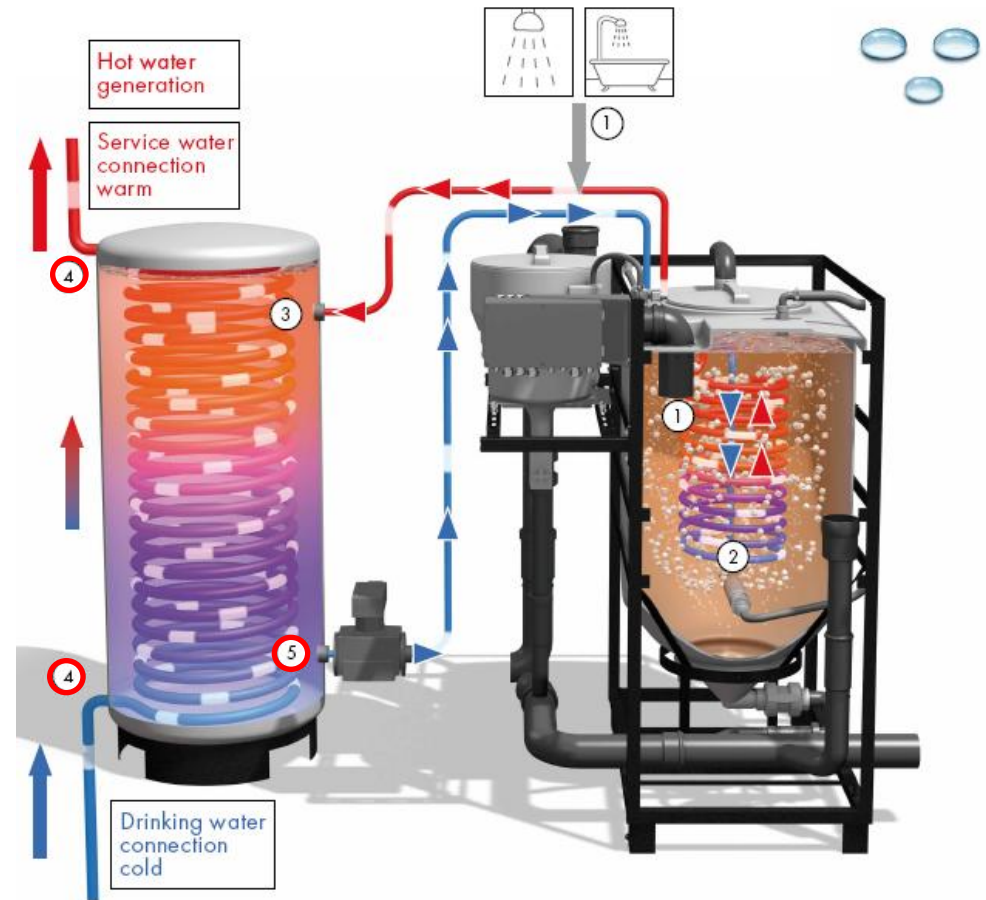
- ① Hot grey water from showers and bathtubs is fed to the first stage of the Pontos HeatCycle for biological treatment.
- ② The grey water heats up the heat carrier medium (water), which is pumped through the heat exchanger in the first stage of the plant.
- ③ The preheated heat carrier medium is fed to a stratified storage tank.



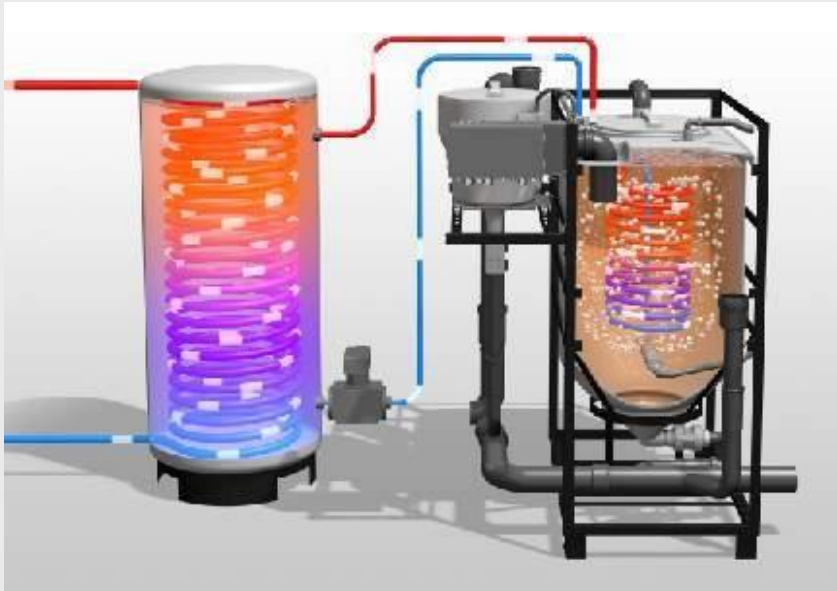
## 10. Heat recovery

### Heat recovery

- ④ Fresh, cold drinking water is piped through a second heat exchanger in the storage tank, where it is pre-heated before being fed to the hot water generation unit.
- ⑤ The cold heat carrier medium is discharged from the storage tank and pumped through the heat exchanger in the first stage of the Pontos HeatCycle system. The entire process is continuous.



## 10. Heat recovery



### Advantages of heat exchangers in a fluidized bed (patented process)

- ✓ cleaning of the heat exchanger surface with the carrier material
- ✓ prevention of biofilm formation on the heat exchanger surface
- ✓ enhancement of the heat transfer

[video](#)

## 10. Heat recovery combination with greywater recycling

### 4\* Hotel Mosaic House, Prague, Czech Republic



### Pontos AquaCycle 6000 HC

#### Water used:

- Showers
- Bath tubs

#### Water use:

- Toilets

#### Savings (planned):

- 900 m<sup>3</sup>/a
- 30,000 kWh/a

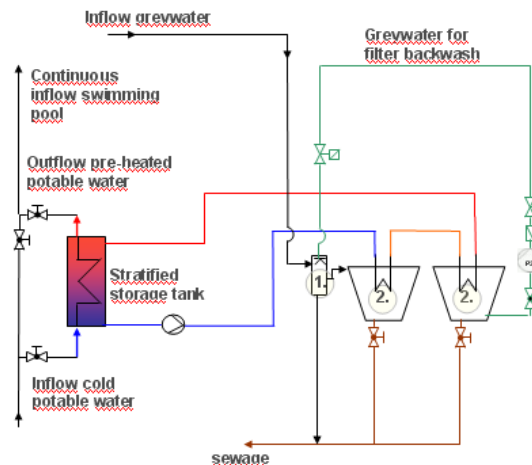
#### Specialty:

- Heat recovery from greywater to preheat the shower water
  - ⇒ Hotel with approx. 150 guests/day
  - ⇒ Incoming greywater: approx. 9m<sup>3</sup>/day
  - ⇒ Need of process water: approx. 3m<sup>3</sup>/day



# 10. Heat recovery without greywater recycling

## St. Pauli Swimming pool, Hamburg, Germany



## Pontos HeatCycle 3000

### Water used:

- Showers

### Heat reuse:

- Continuous inflow of swimming pool

### Specialty:

- Reduction of energy consumption by 20%
- No necessity for back up heating with fossil fuel

### Savings:

up to 70,000 kWh/year

1. Pre-filtration
2. Heat-extraction from greywater



# 11. Contribution to green building certificates



**Water efficiency** (Greywater)  
**Energy & Atmosphere** (Heat recovery)  
**Innovation and Design Process**



**Water** (Greywater)  
**Energy** (Heat recovery)



**criterion 14** (greywater)  
**criterion 16** (life cycle costs heat recovery)  
**criterion 10\*** (primary energy demand)  
**criterion 11\*** (primary energy demand from renewable energies)

\*under consideration

## 12. Options for Installation





Thank you!