

REQUIREMENTS



Space

0.7 m²/p.e. in the basement (in total 30 m²)
1.7 m²/p.e. outside (in total 50 m²)
Needed for all treatments



Energy use

4.4 - 11.1 kWh/p.e./year
(in total 200 - 500 kWh/year)
Heating system urine treatment & small pumps for compost leachate



Cost

CAPEX: 889 - 3,111 CHF/p.e.
(in total 40,000 - 140,000 CHF)
OPEX: 100 CHF/p.e./year



Operations & Maintenance

Operation by inhabitants: 100 h/year
Maintenance by aneco: 30-40 h/year
Each apartment operates its own composting chamber

TARGET OUTPUT



(Vermi)Compost

Used onsite in the garden after maturation



Urine based fertilizer (Pitribon)

Part (1.5 m³/year) is used onsite in the garden. Once certified, rest (up to 20 m³/year) could be used as fertilizer in agriculture and/or urban public spaces



Treated water

The treated water is not reused on site but reenters water cycle via to stormwater drains



Urine & feces treatment



Feces & greywater treatment

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Graphic: Delia Gregori

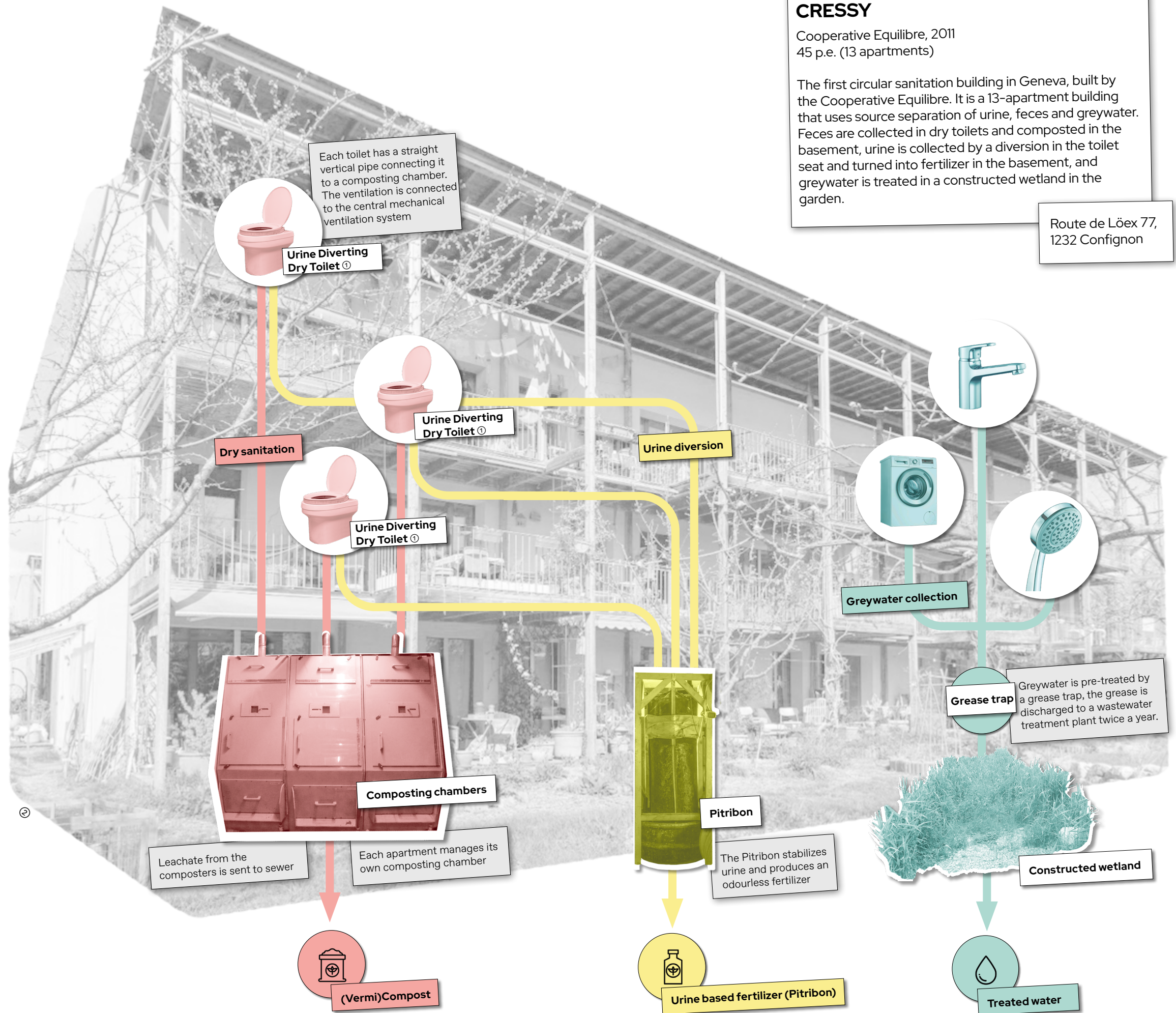
p.e. = Population Equivalent
CAPEX = Capital Expenses
OPEX = Operating Expenses

CRESSY

Cooperative Equilibre, 2011
45 p.e. (13 apartments)

The first circular sanitation building in Geneva, built by the Cooperative Equilibre. It is a 13-apartment building that uses source separation of urine, feces and greywater. Feces are collected in dry toilets and composted in the basement, urine is collected by a diversion in the toilet seat and turned into fertilizer in the basement, and greywater is treated in a constructed wetland in the garden.

Route de Lœx 77,
1232 Confignon



REQUIREMENTS



Space

0.4 m²/p.e. for the vermifilter
(in total 20 m²)
1.2 m²/p.e. for the constructed wetland
(in total 50 m²)



Energy use

None



Cost

CAPEX: 2,000 CHF/p.e.
(in total 80,000 CHF)
OPEX: 1,000 CHF/year



Operations & Maintenance

Twice a year sampling and control of the infiltration and of the worm population. Removal of compost from the vermifilters once every 5 or more years

(TARGET) OUTPUT



(Vermi)Compost

Small amounts of vermicompost. Can be used as compost after maturation or hygenisation step (e.g. thermophilic composting)



Treated water

Appr. 10 m³/p.e./season (in total 400 m³/season). The treated wastewater is infiltrated in the national parc, a sensitive alpine environment. It could be reused in a different setting



Mixed wastewater treatment
by Vuna LLC

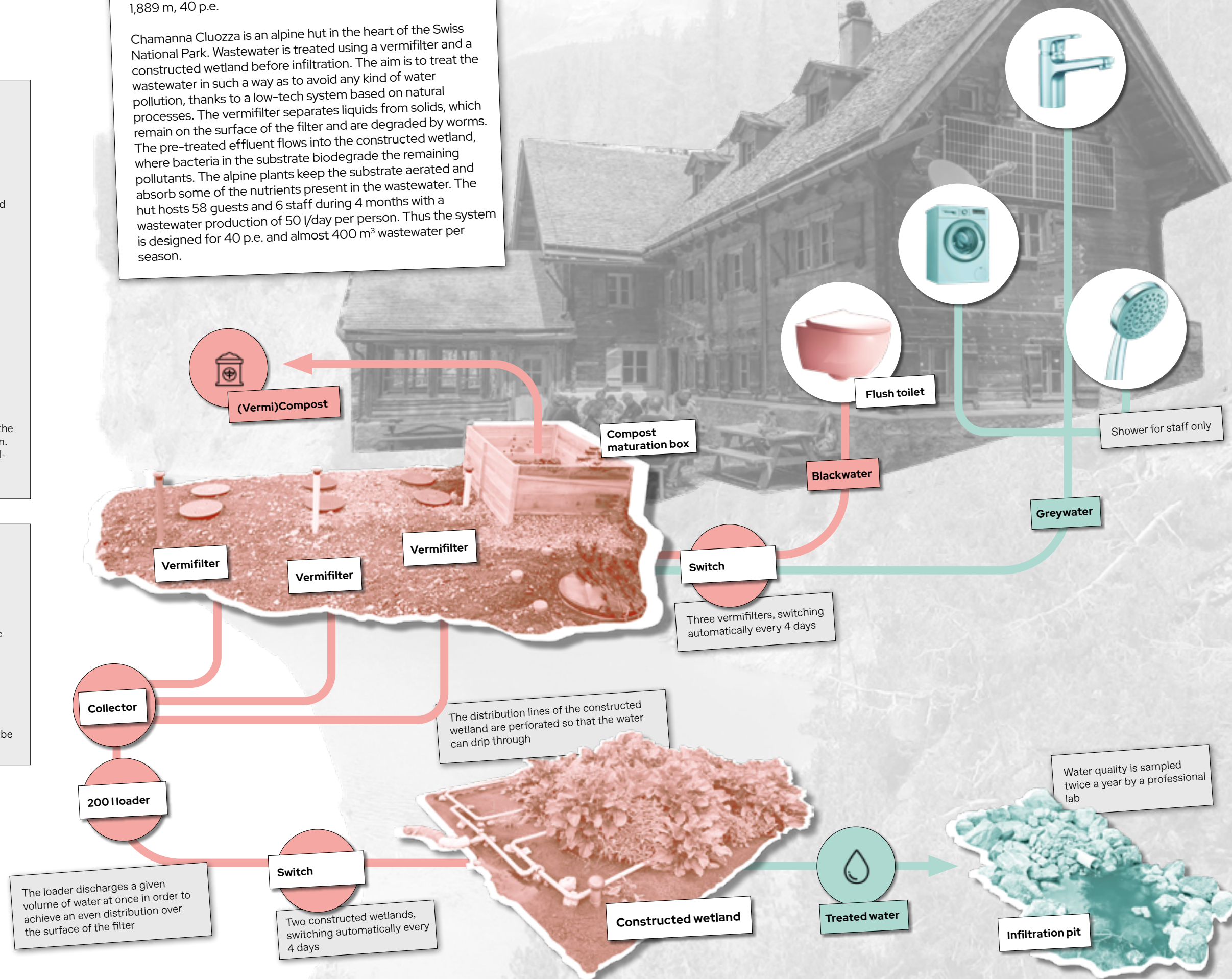
Graphic: Delia Gregori

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Chamanna Cluozza

Swiss National Park, 2022
1,889 m, 40 p.e.

Chamanna Cluozza is an alpine hut in the heart of the Swiss National Park. Wastewater is treated using a vermifilter and a constructed wetland before infiltration. The aim is to treat the wastewater in such a way as to avoid any kind of water pollution, thanks to a low-tech system based on natural processes. The vermifilter separates liquids from solids, which remain on the surface of the filter and are degraded by worms. The pre-treated effluent flows into the constructed wetland, where bacteria in the substrate biodegrade the remaining pollutants. The alpine plants keep the substrate aerated and absorb some of the nutrients present in the wastewater. The hut hosts 58 guests and 6 staff during 4 months with a wastewater production of 50 l/day per person. Thus the system is designed for 40 p.e. and almost 400 m³ wastewater per season.



REQUIREMENTS



Space

0.85 m²/p.e. in the basement (in total 280 m²)
0.42 m²/p.e. outside (in total 140 m²)



Energy use

127 kWh/p.e./year (in total 42,000 kWh/year)
Estimation: 10,000 kWh for recirculation,
30,000 kWh for the Aurin production
and 2,000 kWh for pumps



Cost

CAPEX : 4,545 CHF/p.e.
(in total 1,500 000 CHF)
Infrastructure: 1,220,000 CHF, material: 280,000 CHF
OPEX: 176 CHF/p.e./year
(in total 58,000 CHF/year)
Operation: 28,000 CHF/year, energy: 8,000 CHF/year



Operations & Maintenance

150 h/year, carried out by residents
Maintenance by technology providers

TARGET OUTPUT



Vermicompost

Used onsite in the cooperative garden after
maturation, about 0.006 m³/p.e./year
(in total 2 m³/year)



Urine based fertilizer

Liquid fertilizer Aurin: 0.039 m³/p.e./year:
sold outside the cooperative
(in total 13 m³/year)



Treated brown, treated grey and rain water

Is valorized for toilet flushing of all
buildings, on the terrasses, on the
balcony and on the ground floor
for irrigation



Brownwater treatment
by the Aneco association



Urine treatment
by Vuna Nexus Ltd



Graywater treatment
by Atelier Reeb & Vuna LLC

Graphic: Delia Gregori

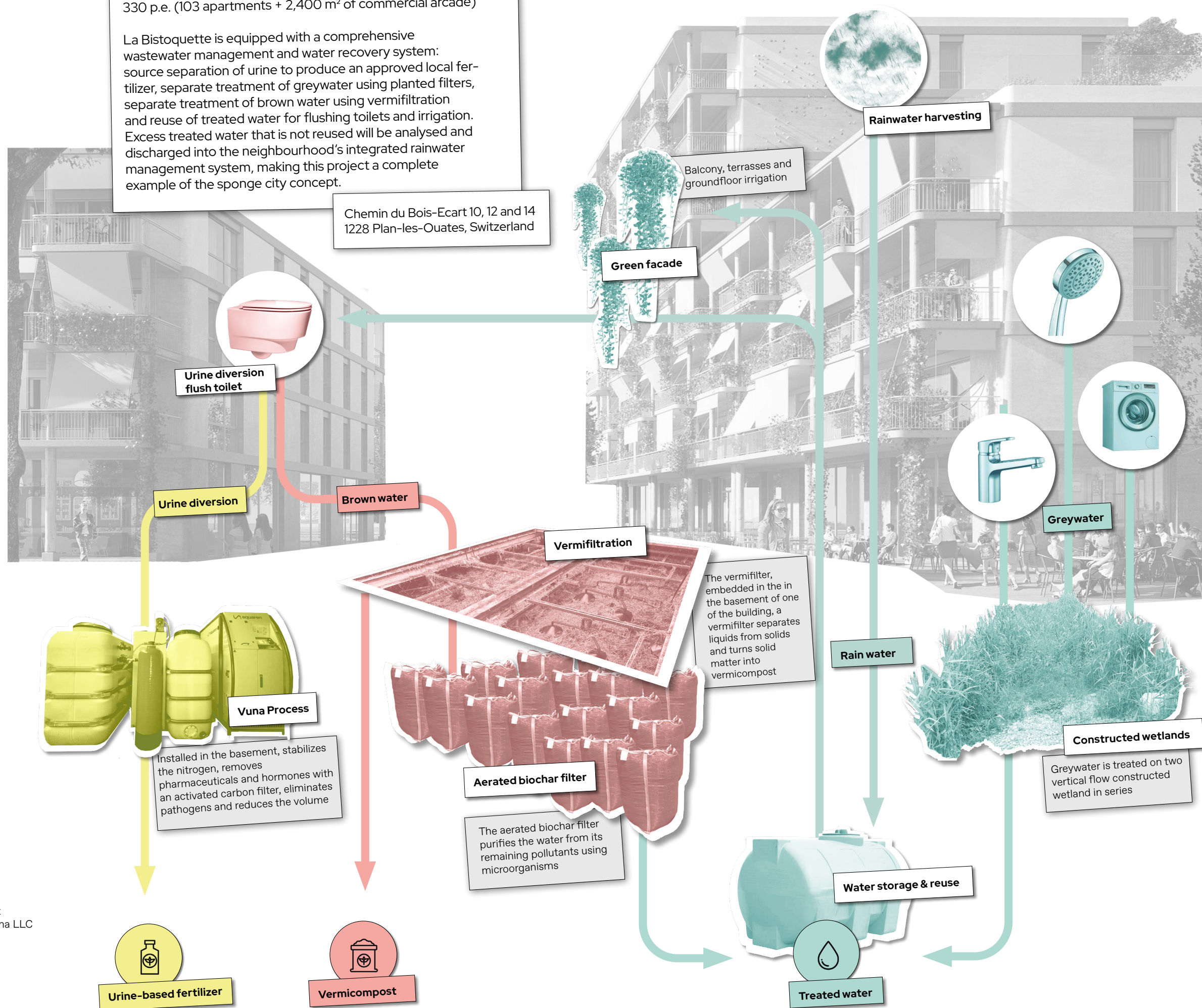
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La Bistoquette

To be inhabited in 2025
330 p.e. (103 apartments + 2,400 m² of commercial arcade)

La Bistoquette is equipped with a comprehensive
wastewater management and water recovery system:
source separation of urine to produce an approved local fer-
tilizer, separate treatment of greywater using planted filters,
separate treatment of brown water using vermifiltration
and reuse of treated water for flushing toilets and irrigation.
Excess treated water that is not reused will be analysed and
discharged into the neighbourhood's integrated rainwater
management system, making this project a complete
example of the sponge city concept.

Chemin du Bois-Ecart 10, 12 and 14
1228 Plan-les-Ouates, Switzerland



REQUIREMENTS



Space
0.05 m², 0.1 m³/p.e. for backend technologies
(in total 1 m², 2 m³)



Energy use
0.05 kWh/day/p.e.
(in total 1 kWh/day)



Cost
n/a



Operations & Maintenance
By exhibition curation team on-site (architects), monthly maintenance (development engineers)

TARGET OUTPUT



Compost
To be used as a soil improvement on local farmers fields
(16 kg/p.e./year)



Dry NPK fertilizer
Could be used as a fertilizer for local greenery
(25 kg/p.e./year)



Treated water
The treated water is reused on site to wash hands
(About 60 l/day)

eawag
aquatic research
Greywater treatment by Eawag

Idro
GROUP
Greywater treatment by IDRO Group s.r.l.

ogmo
sanitation anywhere
Urine treatment by ogmo

finizio
Feces & urine collection by Finizio GmbH

urin*all
Urine collection by Leonie Roth and Luisa Tschumi

Feces treatment by local farmer

© Image: Juliane Gerb (Arch+ and Summacumfemmer)
Graphic: Delia Gregori

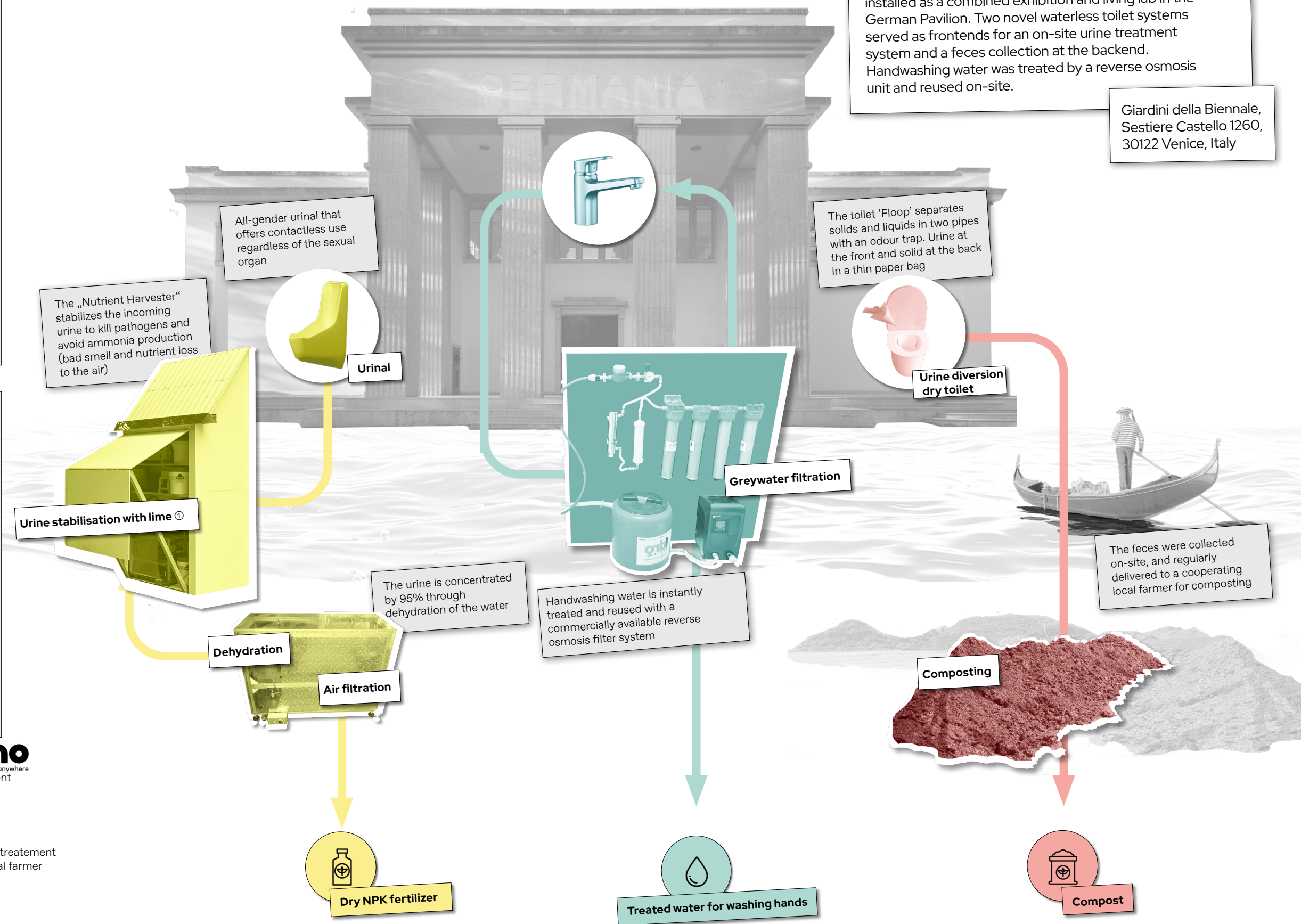
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German Pavilion at the Venice Biennale

May – November 2023
15–20 exhibition visitors per day

As part of the 18th Architectural Biennale di Venezia, a completely autonomous working washroom was installed as a combined exhibition and living lab in the German Pavilion. Two novel waterless toilet systems served as frontends for an on-site urine treatment system and a feces collection at the backend. Handwashing water was treated by a reverse osmosis unit and reused on-site.

Giardini della Biennale,
Sestiere Castello 1260,
30122 Venice, Italy



REQUIREMENTS (PER TOILET)



Space

Kompotoi Classic: 1.3 m²
Composting: off-site
Composting and urine treatment off-site
(1.3 m²/cabin)



Energy use

Kompotoi cabins do not need energy nor water. Solar light and wood shavings for „flushing“



Cost

OPEX around 200 CHF/month/toilet cabin rent. Includes off-site treatment for feces and urine



Operations & Maintenance

Toilet cabin emptied and cleaned after around 400 uses

TARGET OUTPUT IMPACT PROJECT



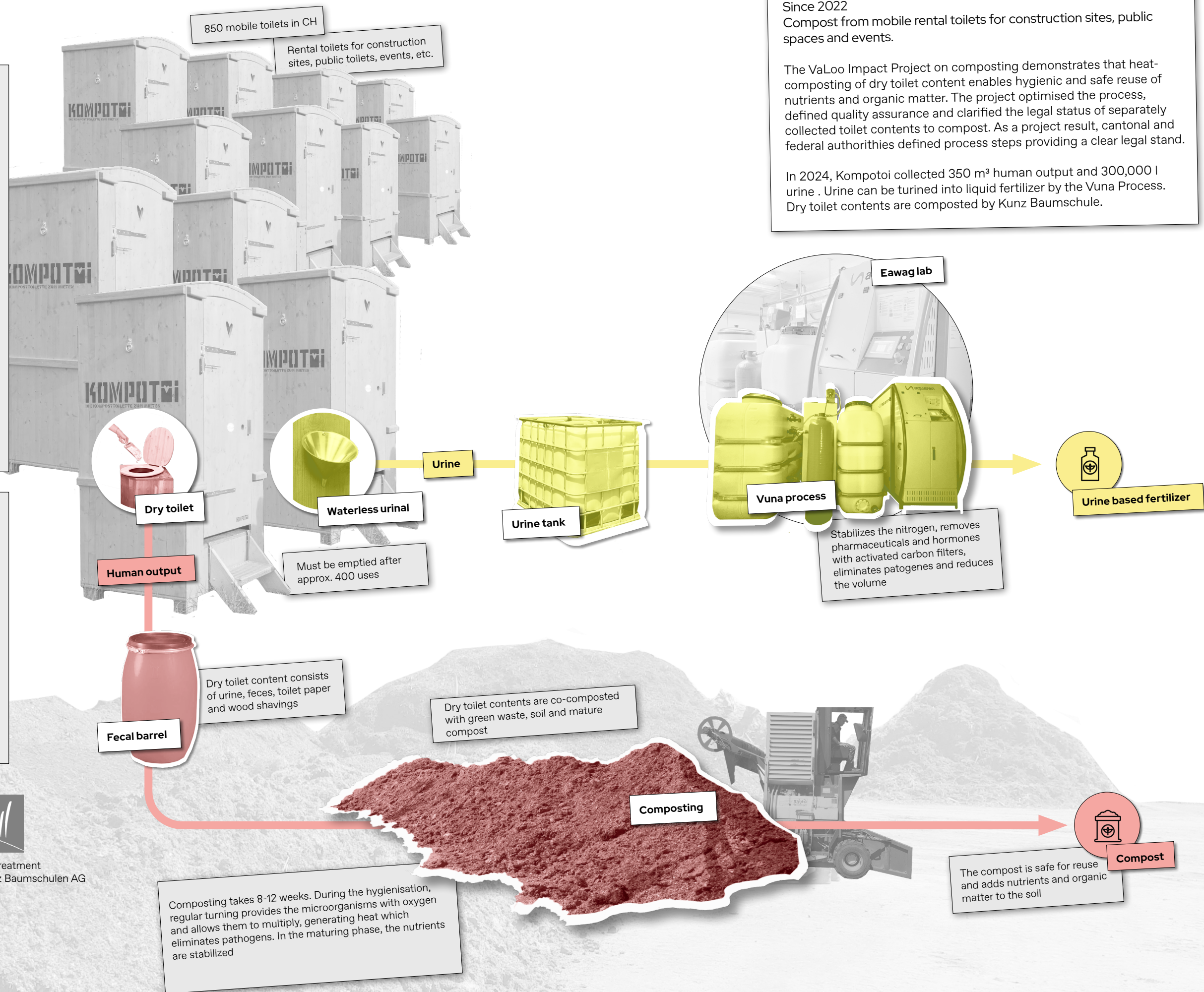
Compost

Up to 240 m³ compost/year with all toilets. Can be used in CH with cantonal permit



Urine based fertilizer

Up to 30 m³ urine fertilizer/year with all toilets. Holds fertilizer-permit (CH, EU)



Impact Project Composting

Since 2022

Compost from mobile rental toilets for construction sites, public spaces and events.

The VaLoo Impact Project on composting demonstrates that heat-composting of dry toilet content enables hygienic and safe reuse of nutrients and organic matter. The project optimised the process, defined quality assurance and clarified the legal status of separately collected toilet contents to compost. As a project result, cantonal and federal authorities defined process steps providing a clear legal stand.

In 2024, Kompotoi collected 350 m³ human output and 300,000 l urine. Urine can be turned into liquid fertilizer by the Vuna Process. Dry toilet contents are composted by Kunz Baumschule.

KOMPOTOI

Feces & urine collection
by Kompotoi AG

Graphic: Delia Gregori



Urine treatment
by Vuna GmbH



Feces treatment
by Kunz Baumschulen AG

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Composting takes 8-12 weeks. During the hygienisation, regular turning provides the microorganisms with oxygen and allows them to multiply, generating heat which eliminates pathogens. In the maturing phase, the nutrients are stabilized

The compost is safe for reuse and adds nutrients and organic matter to the soil