

Upscaling low-tech treatment technologies in urban Switzerland

zirkulierBAR-Kolloquium

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Association Founded in December 2020

Three main points of action:

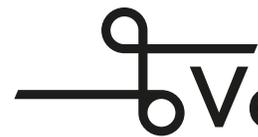
Installation of
Decentralized
Treatment plants

Research &
Development

Awareness
Raising & Lobbying

Objectives:

- Reduce our impact on the environment and aquatic systems
- Close the cycles (water, nutrients) locally
- Contribute to local agriculture and reduce the production of standard fertilizers
- Save energy related to wastewater treatment

 VaLoo

*Circular Sanitation Network Switzerland
Réseau suisse pour un assainissement circulaire
Netzwerk für kreislauffähige Sanitärsysteme Schweiz*



Agenda

- From theory to action : examples of low-tech sanitation systems from Equilibre :
 - Cressy
 - Soubeyran
 - Vergers
- Upcoming Projects

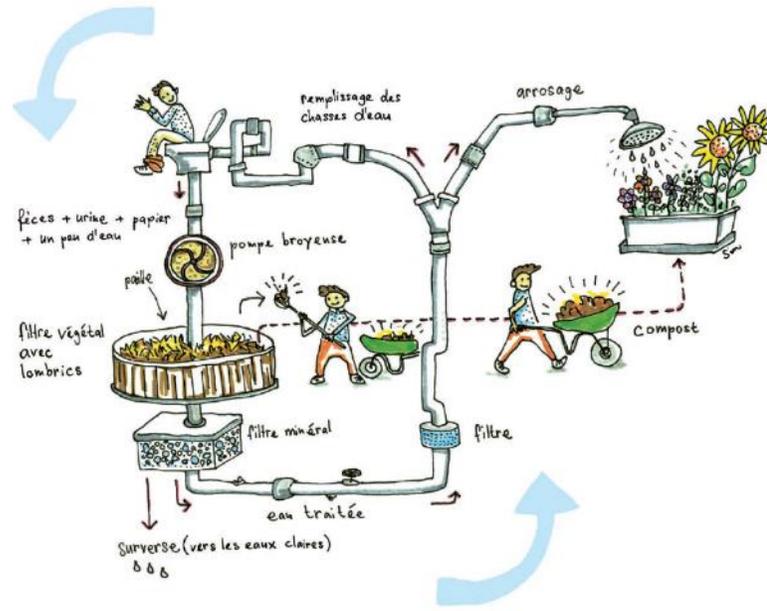


Cressy - 2011



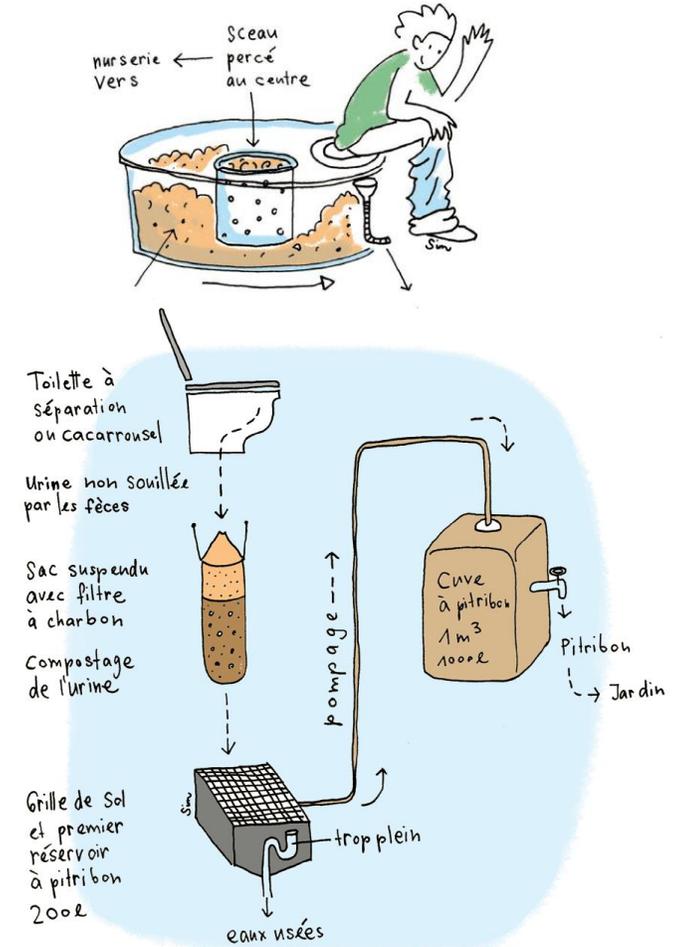
Compost production
Liquid fertilizer production

Soubeyran - 2017



Compost production
Reuse of treated wastewater
Reuse of rain water

Les Vergers - 2018



Compost production
Liquid fertilizer production

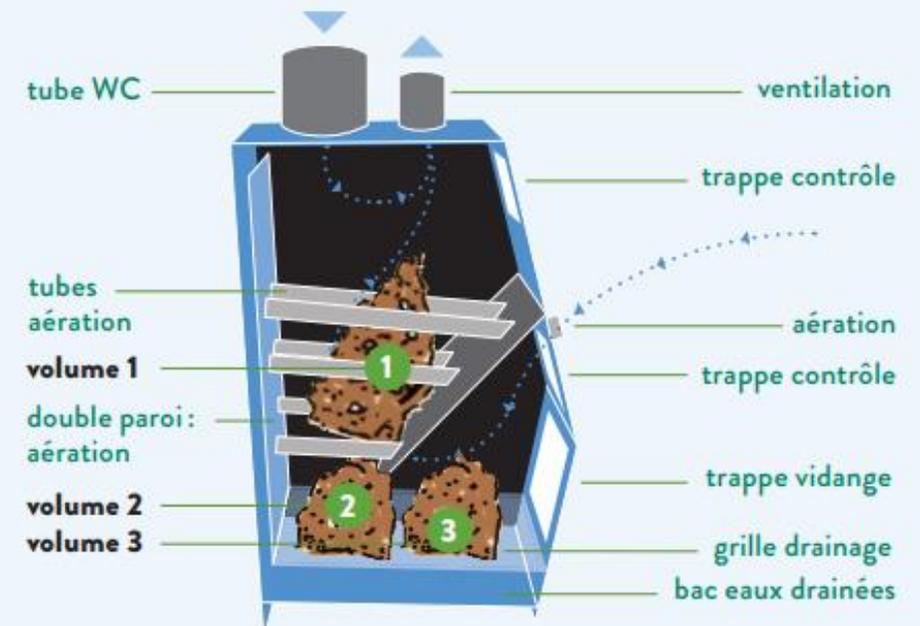
Cressy

2011 - 13 apartments
Urban Geneva

- Toilets: Berger-Biotechnik (DE) (2021 toilets modified to include la Separette for urine diversion)
- Architectural Constraints :
 - Vertical descents to composters – 1 composter per toilet
 - Space in basement (3m² surface, 7m² SIA)
 - Excess liquid evacuation &/or treatment (to sewer until 2019)
- Sizes & Volumes :
 - 65 to 77 cm width
 - 1 to 1.3 m³ (used volume from 0.8 to 1m³ - ~300 L compost / P)



Schéma d'un composteur



Cressy

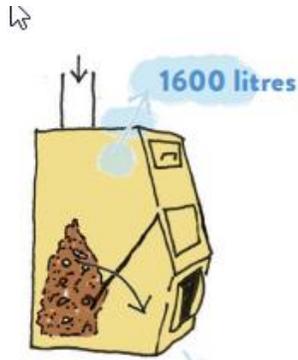
Maintenance & Mass Balance

- **2 X per month** : Verify that all is going well in the composter
 - Add water if too dry
 - Add straw if too humid
 - Add leaves if flies
 - Add worms if necessary
 - Clean air filter if blocked
- **1 X per year** : empty compost

Toilettes sèches à Cressy (mélange fèces, urine, papier et copeaux de bois)



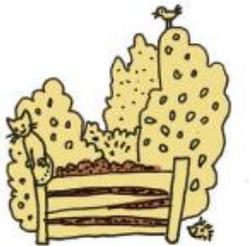
2800 litres



800 litres 400 litres



120 litres



Bilan annuel
d'une famille
de quatre
personnes.

Arrivée →
3-4 minutes
par session
Au total en
une année:
Urines ~1500 l.
Fèces ~300 l.
Copeaux ~1000 l.
Total ~2800 l.

1er Compostage →
1 année
Dégradation par
les bactéries
Évaporation ~1600 l.
Excès de liquide:
~ 400 l. à filtrer pour
produire de l'engrais.
Il reste ~800 l.

Lombrics →
1 année
Digestion par
les lombrics
Évaporation
~680 l.
il reste ~120 l.

Sortie →
2-3 heures
Transfert
des ~120 l.
de terreau
au jardin.

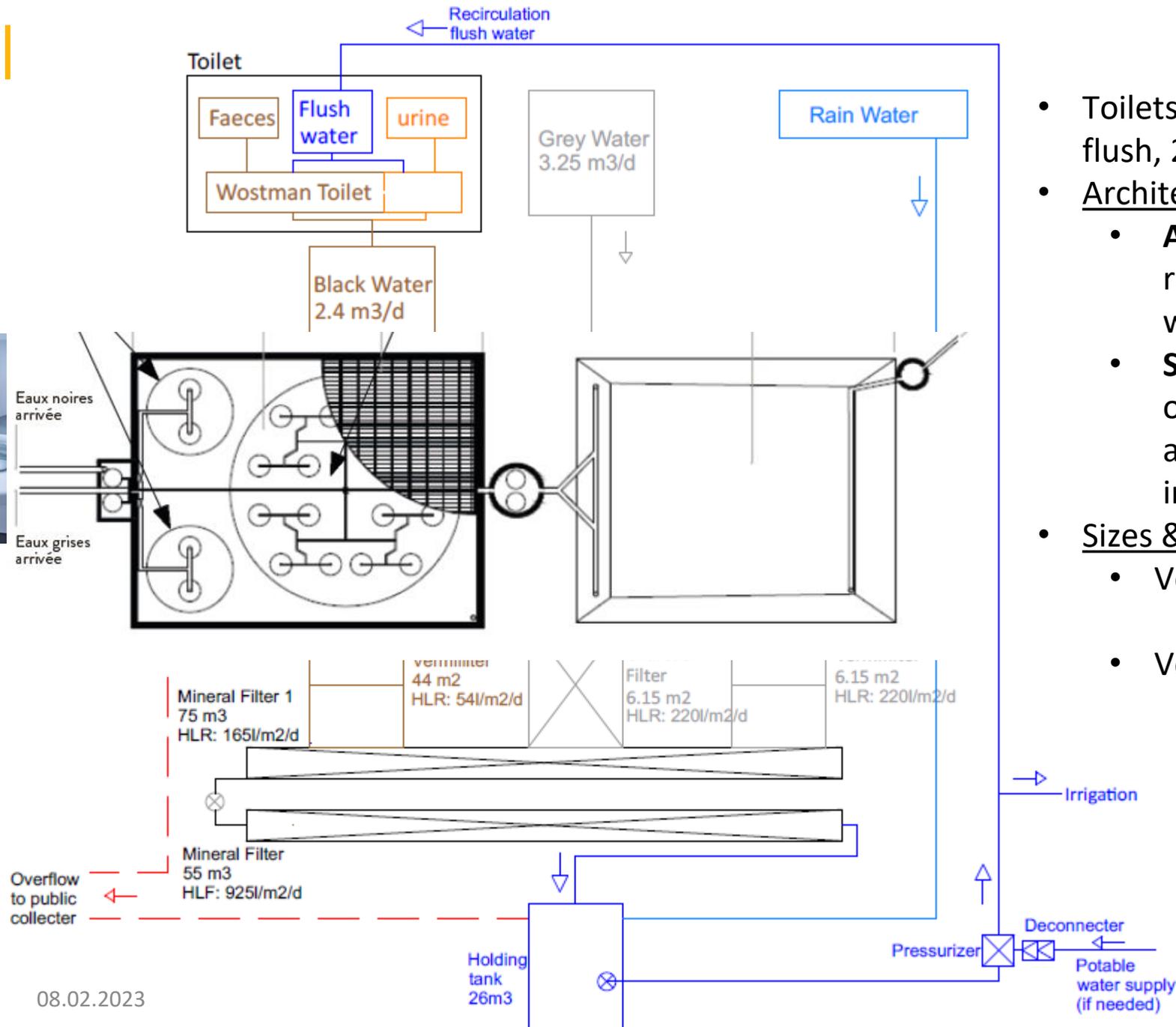
Maturation
6 mois - 1 année
Digestion par
la micro-faune
extérieure.
Apport carboné
pour le jardin.
Plantation
de courges.

Soubeyran

2016 – 38 apartments

Urban Geneva





- Toilets: Wostmann EcoFlush (0.5 L/small flush, 2.5 L/ big flush)
- Architectural Constraints :
 - **Additional canalisation** needed for recirculation and separation of wastewater streams
 - **Surface** (80 m² X 3m deep) needed outside or in the basement (and additional constraints when located in basement)
- Sizes & Volumes :
 - Vermifilter :
 - 0.45 m² / PE
 - Volume of secondary treatment:
 - ~50 m³ 1st mineral filter (68m²)
 - ~55 m³ 2nd mineral filter (BW & GW) (70m²)

Soubeyran



Implications:

- Use of ecological & biodegradable cleaning and hygiene products
- Urinating while seated
- Particular cleaning of toilet to avoid struvite accumulation

Advantages :

- Decrease potable water consumption
- Water consumption of an inhabitant in Soubeyran: ~75 L/P/D (140 L/P/J for average Swiss)
 - 30% of this water is reused water, so only **~55L/P/D** potable water
- Production of compost for the vegetable garden (1-2m³ per year)

Maintenance :

- Alternating filter supplies (every 2 to 6 weeks)
- Add straw (when alternating system)

Vergers

2018 – 3 buildings, 67 apartments

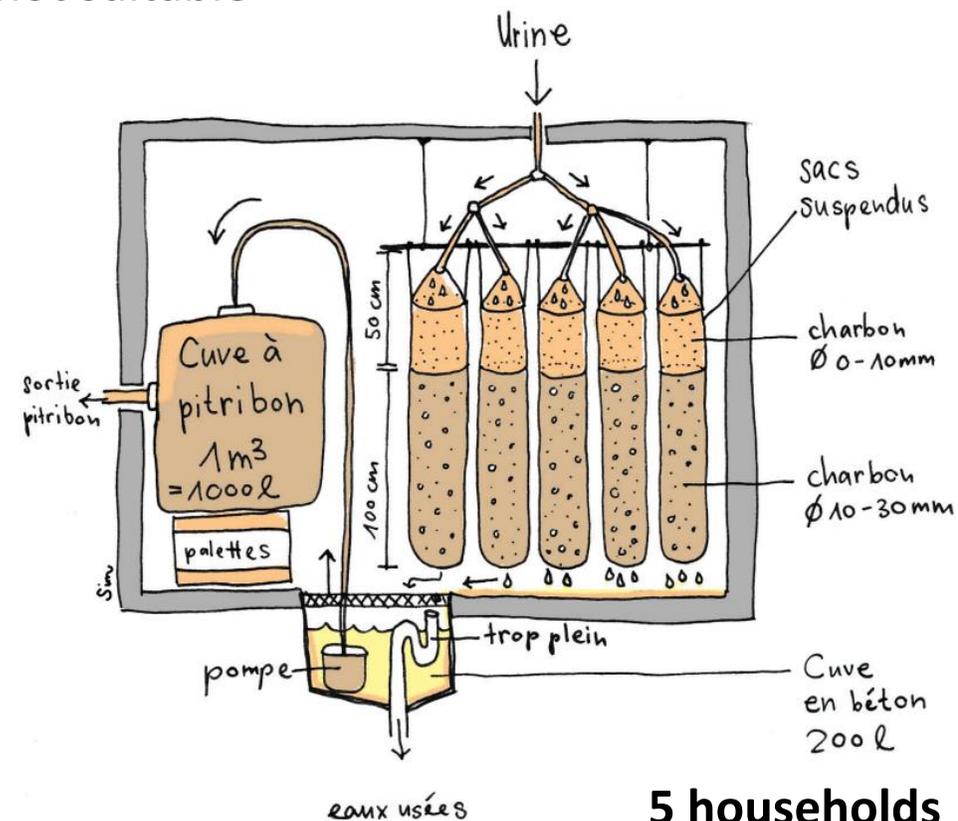
The challenge:

- No outdoor space like at Soubeyran
- 6 story buildings – composters from Cressy are also not suitable

And so :



4 households



5 households

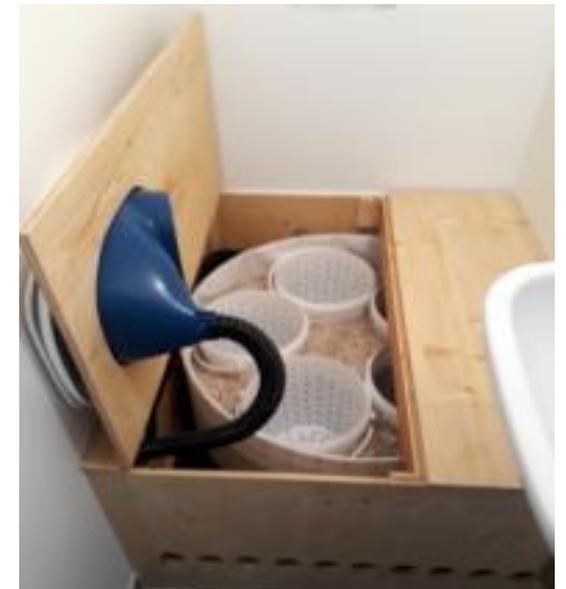
The Cacarrousel

- Architectural Constraints :

- Minimalized – same constraints as a standard toilet (space & ventilation)
- Urine
 - Connected to WWTP
 - Treated in situ (need for separate canalization)

- Sizes & Volumes :

- Can vary & adapt to bathroom space;
- minimum surface space required: 86 X 86 cm
- Height : 50 cm
- ~25 – 50 L compost / P



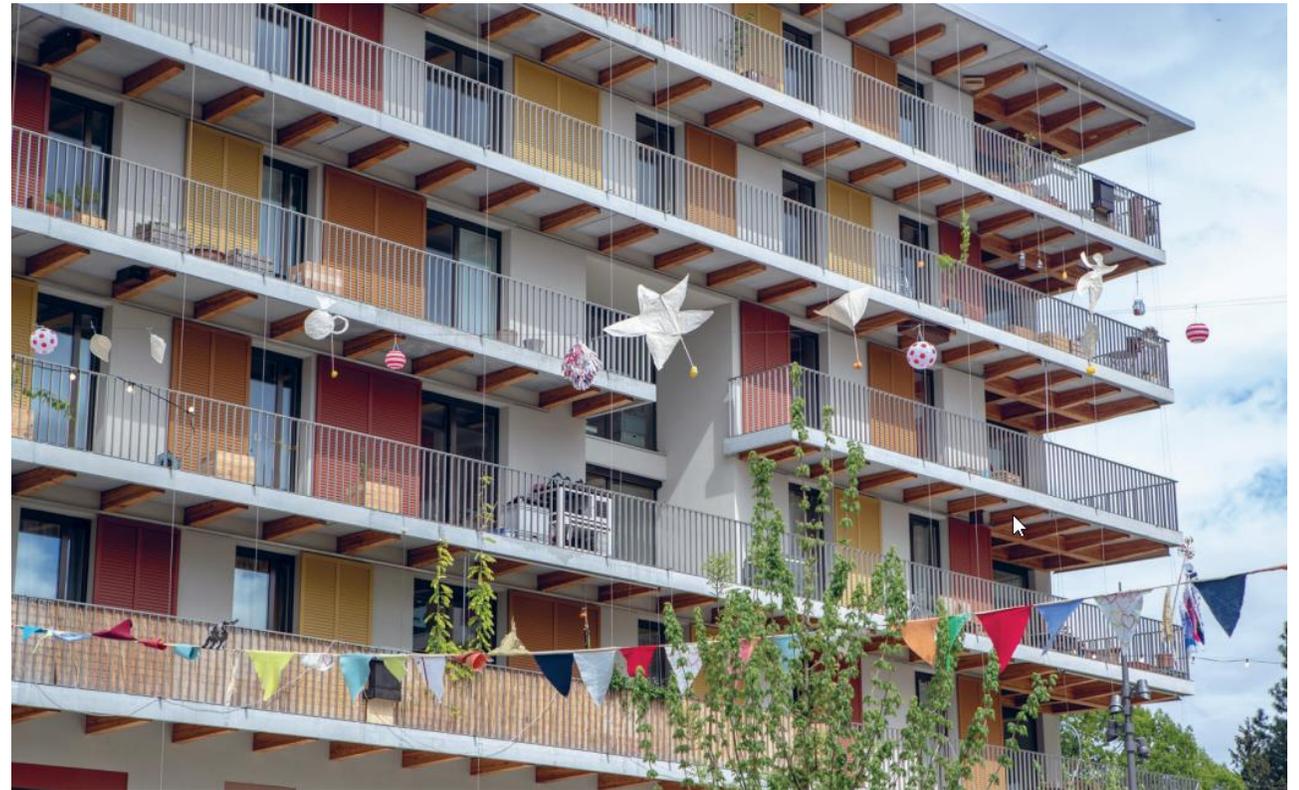
The Cacarrousel

Maintenance & Challenges

No need to remove compost – ever !

1 X per week:

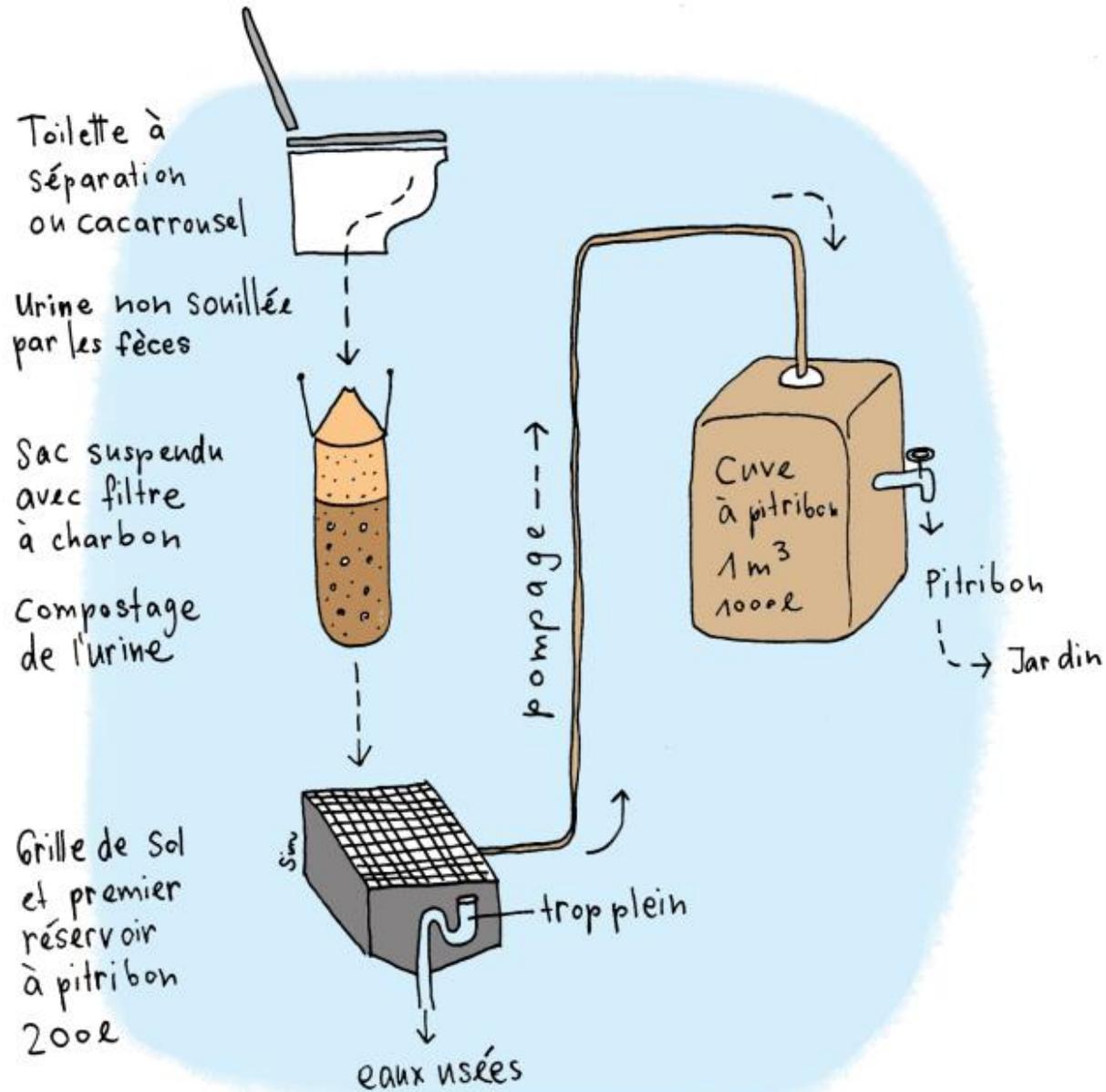
- Turn the inner drum, dig a new hole and cover up “business” from previous week
 - Verify humidity – add water if too dry, remove excess water in bottom plate if necessary
 - Verify urine canalization and clean with vinegar if necessary
- 2 X per year
- Lixiviating compost : addition of 20L of water
- Challenge: fruit flies !



The Pitribon



Toilet :
Laufen Save !



The Pitribon

Dimensions & Maintenance

Maintenance:

- Regular cleaning with vinegar or citric acid (struvite formation)

Sizes & Volumes:

- The hydraulic retention time of the urine is what counts !
 - For dry toilets - ~20 L charcoal / person
 - For flush toilets - ~30 L charcoal / person
- Dimension of geotextile bags : 35 X 35 X 170

Architectural Constraints:

- Space : ~8m² / 20 people (ideally heated)
- Additional canalization for urine
- Good ventilation (1 renewal / hour)
- Retention tank for fertilizer & accessibility

Constant Evolution



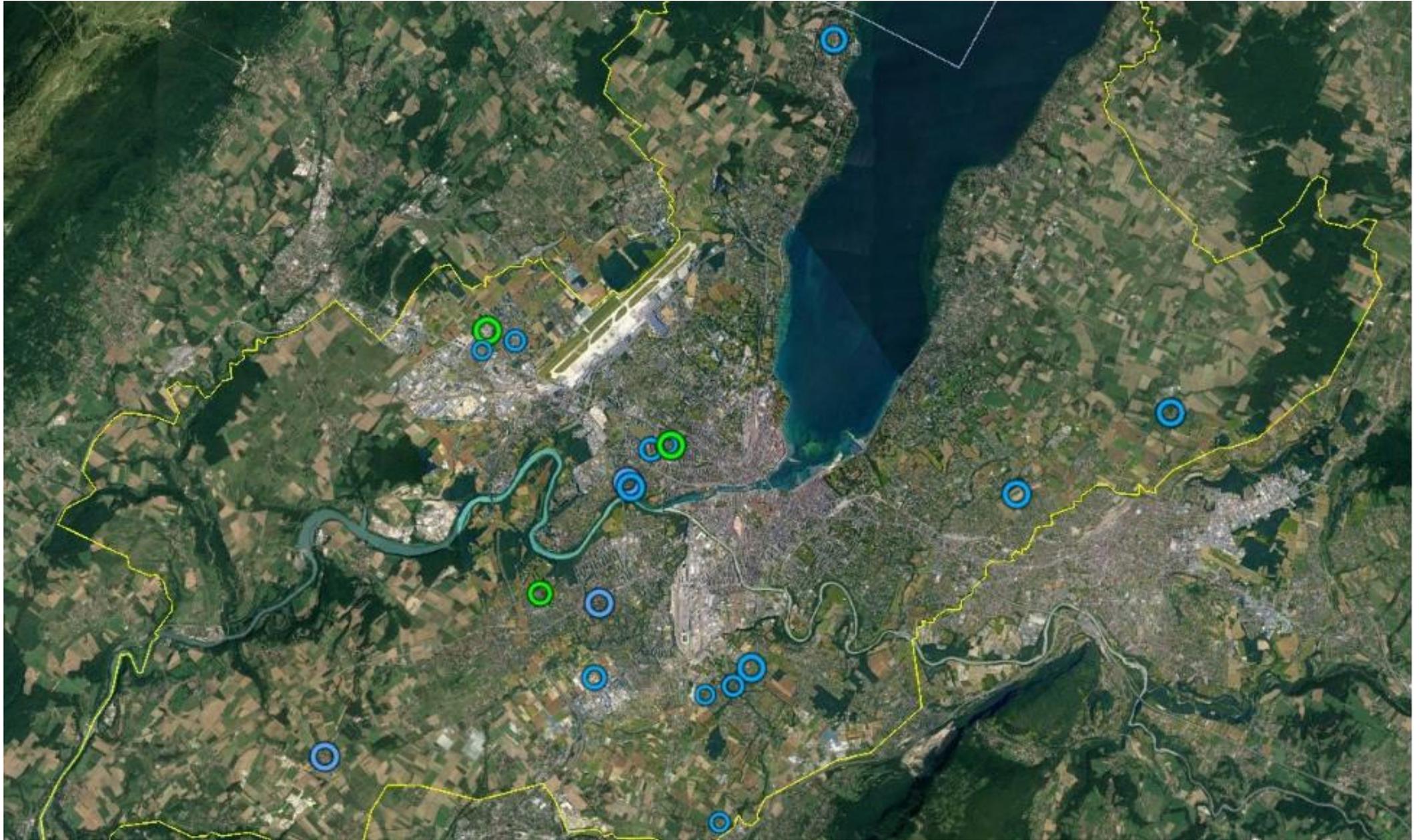
Cressy:

- Long battle against fruit flies → addition of leaves
- Odours from ventilation → Black water -> Brown Water + Pitribon (2021)

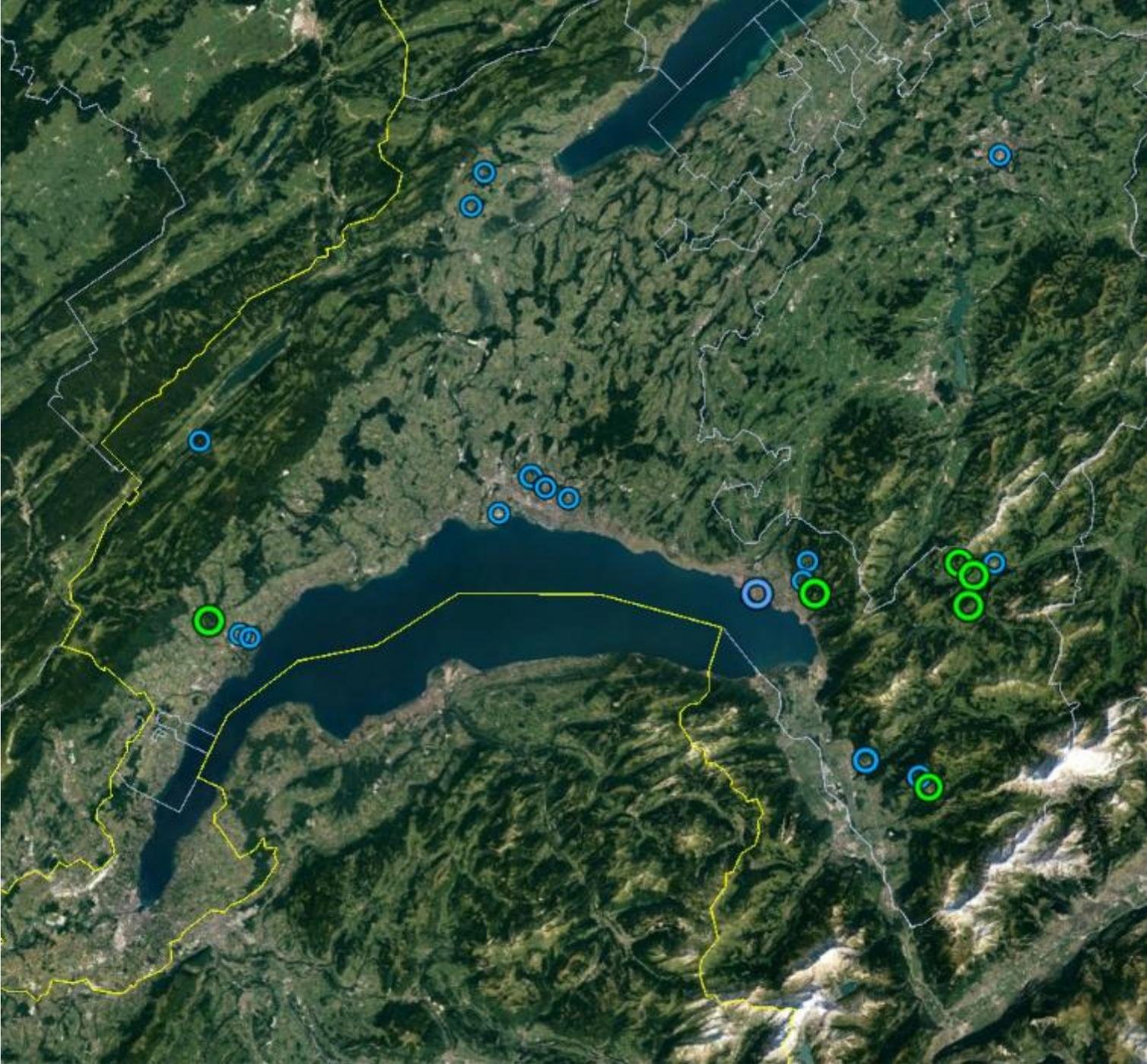
Soubeyran:

- 2019: change distribution of grey water & wood chips replaced with charcoal
- 2021: Degreaser for grey water implemented
Woodchips from half of blackwater filter replaced with charcoal
- 2022: Other half of blackwater filter replaced
- 2023: Further changes to greywater system are planned for spring 2023

Aneco's Future Projects: Geneva



Aneco's Future Projects: Switzerland



Thank you for your attention !

Questions ?

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Cacarrousel installé à la coopérative Equilibre aux Vergers à Meyrin