

## FACTSHEET #FS2.1-01

vertECO® green wall  
wastewater treatment  
for on-site reuse  
in market gardening

[georgia-horizon.eu](http://georgia-horizon.eu)



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# //01. QUICK FACTS

## TECHNOLOGY TYPE

Nature-based wastewater treatment and green wall with on-site reuse

## INPUTS

Domestic wastewater  
(showers, sinks, kitchen, toilets)

## OUTPUTS

Nutrient rich treated wastewater for safe agricultural reuse

## INDICATIVE MATURITY LEVEL

TRL 7

## CONTEXT & SCALE

Small-scale applications in market gardens, urban farming systems and eco-villages (household to farm-level reuse)

## KEY BENEFITS

Water reuse and nutrient recovery; reduced freshwater and fertilizer demand; improved soil fertility and drought resilience

## MAIN CONSTRAINTS

Access to suitable pre-treated wastewater; structural support; regulatory compliance; monitoring irrigation demand; seasonal variability of condensate production

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## CATEGORY

Wastewater recycling

## //02. WHAT IT IS

The vertECO® system is a decentralized, nature-based wastewater treatment solution that enables the safe reuse of domestic wastewater for agricultural irrigation, and potentially other non-potable urban uses such as toilet flushing or street cleaning. It integrates wastewater treatment into a compact, planted vertical system that can be installed close to buildings and cultivation areas.

Following this biological treatment a final disinfection step ensures that the water meets the requirements of the EU Water Re-use Regulation (Class B) and can be reused locally - alone or blended with harvested rainwater - supporting circular water management and reducing freshwater use at farm or community scale.



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## //03. WHY IT MATTERS

In many small-scale farms and eco-communities, water scarcity, irregular supply, and nutrient loss pose significant challenges. This solution enables local wastewater reuse and nutrient recovery, reducing both water demand and dependency on external fertilizers.

By closing local water and nutrient cycles, the system increases irrigation reliability, supports on-site food production, and strengthens farm resilience under drought and climate stress.

## //04. DESIGN AND SIZING

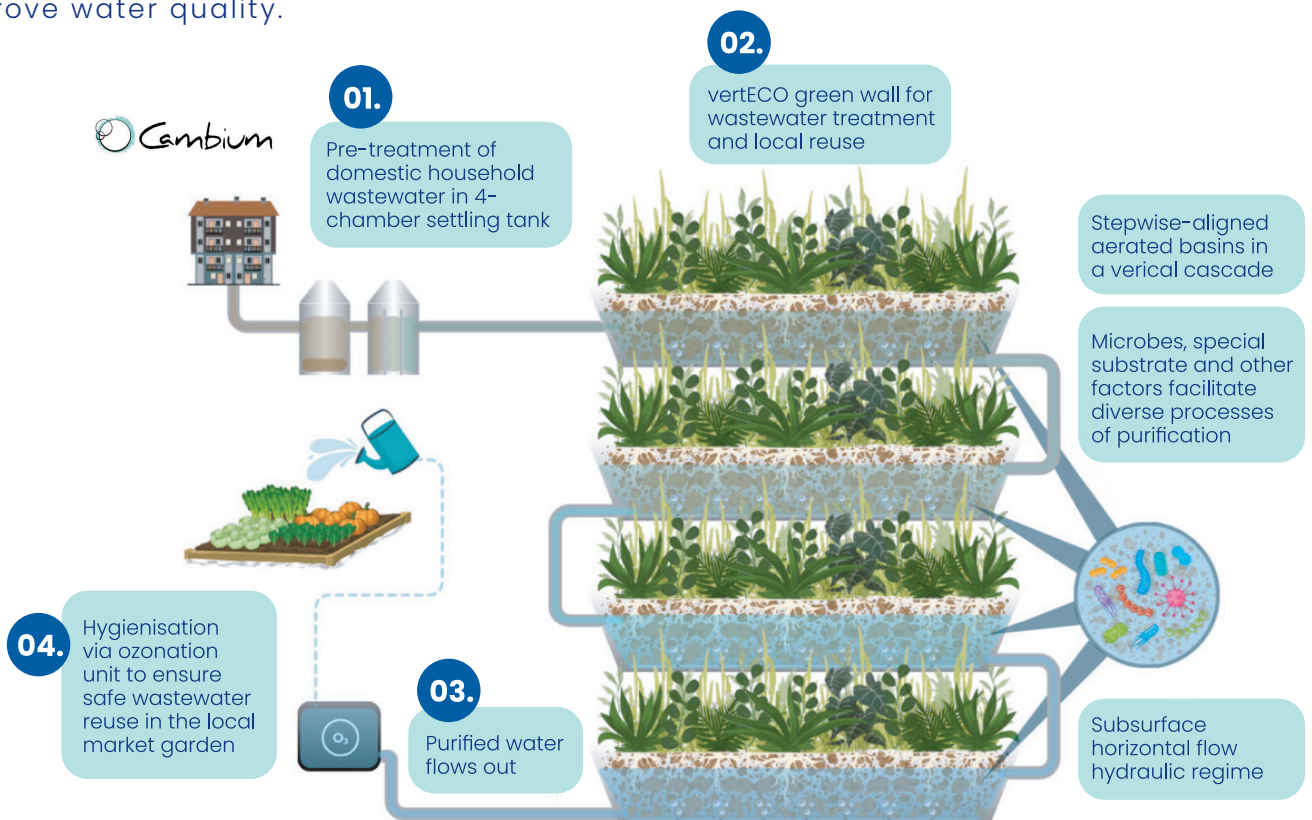
The vertECO® system is designed as a vertical green wall, enabling space-efficient installation in urban, peri-urban and land-limited contexts. Sizing is based on expected wastewater loads: typically,  $\sim 30 \text{ L m}^{-2} \text{ day}^{-1}$  for domestic wastewater, and  $\sim 175 \text{ L m}^{-2} \text{ day}^{-1}$  or  $\sim 100 \text{ L m}^{-2} \text{ day}^{-1}$  for lightly and more concentrated greywater, respectively.

The system can handle fluctuating inflows, including longer periods without wastewater generation. Design considerations include structural support, climate-adapted plant selection, and integration of storage and disinfection in line with local reuse regulations.

## //05. HOW IT WORKS

After mechanical pre-treatment, the wastewater enters the vertECO® green wall system. It flows horizontally through subsurface basins filled with substrate and planted with vegetation. Microbial biofilms and plant roots facilitate biological breakdown of contaminants, while physical processes like filtration and adsorption further improve water quality.

Following this, the water undergoes final disinfection to ensure it is safe for reuse. This treated water can then be used for irrigation or other non-potable applications—helping to reduce water stress and recycle nutrients on-site.



Schematic illustration of vertECO® green wall © Alchemia Nova 2025

## //06. OPERATION, MAINTENANCE AND MONITORING

Operation and maintenance are based on simple, routine procedures. A trained user carries out a weekly visual inspection to check general system conditions, hydraulics, odors, leaks, plant health, and alarms. Monthly, a simple strip test is performed to verify effluent ammonia concentrations and ensure stable treatment performance.

In addition, twice per year basic plant maintenance is conducted, including prun-

ing, removal of dead biomass, and a functional check of the automation and control systems. Once per year, wastewater sampling and laboratory analysis are carried out by a certified laboratory to document treatment performance and compliance and ensure safe water reuse.

## //07. RISKS & MITIGATION

Health, environmental, and technical risks - such as pathogen exposure, clogging, or pollutant accumulation - are effectively mitigated through appropriate system design, regular operation and maintenance,

final disinfection, and controlled irrigation. Continuous monitoring ensures safe reuse in compliance with the EU Water Reuse Regulation (Class B).

## //08. GOOD FIT FOR

Small-scale farms, market gardens and urban farming systems seeking decentralized water reuse and improved drought resilience. Within the GEORGIA project this

solution is implemented in the pilot at the CAMBIUM ecovillage in southeastern Austria ([see link](#)).

## //09. KEYWORDS

Vertical green wall; Compact NbS; Decentralized; Wastewater reuse; Nutrient recovery

For more information visit: [GEORGIA EU Project](#)

## //10. REFERENCES

1. T. Vobruba, M. Wirth, M. Hartl, J. Kisser, D. Podmirseg, E. Gebetsroither-Geringer, M. Huber-Humer, G. Langergraber "Analysis of material flows and resource potential of decentralized water management: On-site water and nutrient reuse in an Austrian eco-village and its upscaling to urban environments" Environ. Sustain. Indic. Vol. 26, 2025.

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2. T. Vobruba, M. Hartl, G. Langergraber, B. Pucher, H. Gattringer, G. Bertino, F. Panzenböck, J. Kisser "vertECO® vertical green wall system demonstration for domestic wastewater treatment and on-site reuse in an Austrian eco-village" Ecol. Eng. Vol. 211, 2025.

DOI: <https://doi.org/10.1016/j.ecoleng.2024.107460>

## //11. FURTHER READING RESOURCES

1. RecoLab - "Decentralised treatment for greywater using nature-based solutions public spaces". Online at:

<https://www.recolab.se/the-untapped-potential-of-greywater/>

2. Sustainable Sanitation and Water Management (SSWM) "Decentralised Wastewater Treatment Systems (DEWATS) and Sanitation in Developing Countries" Online at:

[https://sswm.info/sites/default/files/reference\\_attachments/DEWATS\\_Guidebook\\_small.pdf](https://sswm.info/sites/default/files/reference_attachments/DEWATS_Guidebook_small.pdf)

3. A. Galvão, M. Rodrigues, J. Mata, C.M. Silva "Green walls for greywater treatment: A comprehensive review of operational parameters and climate influence on treatment performance" Water Research, Vol. 272, 2025.

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