

Stakeholder Feedback Form

Scientific Support to the GHG emissions and energy neutrality: Energy neutrality

This form invites stakeholders to provide feedback on the draft report for Task D. Your input will help ensure the report is accurate, comprehensive, and reflective of current scientific and technical knowledge.

Please identify any clear omissions, errors, or gaps in the report that challenge the key conclusions or figures provided.

If applicable, please in a Table:

- Specify the section/page/line/figure/table where the omission/error occurs.
- Propose alternative formulations, corrections, or additions.
- Provide rationale, data, or references to support your revisions.

Technical Feedback: Draft Report on Energy Neutrality

General Support and Strategic Alignment

We fully support the approach outlined in Chapter 4.1.1 (Energy equivalence), which establishes that 1 kWh of thermal energy is equal to 1 kWh of electrical energy ($1 \text{ kWh}_{\text{th}} = 1 \text{ kWh}_{\text{el}}$). The strategic importance of weighting and utilizing thermal energy is becoming increasingly significant, as evidenced by regional frameworks towards climate neutrality.

Furthermore, we express our agreement with Chapter 4.1.4 (Wastewater effluent embedded energy). In our pursuit to exploit the full energy potential of the wastewater treatment plant, we intend to collaborate with external partners to develop and provide new renewable energy sources on-site, including large-scale heat pumps, wind and photovoltaic (PV) installations. This collaborative approach also aligns with the UWWT requirements.

While we support the goals, several chapters require correction to ensure technical accuracy. In Chapter 2.2.1 and the Introduction, the definition of pumping energy is contradictory.

In Chapter 2.2.3, we criticize volume-based metrics (kWh/m^3) in biological treatment, these should transition exclusively to population equivalents (kWh/PE) to avoid distortions caused by dilution and infiltration water.

Finally, Chapter 2.2.11 lacks precision regarding sludge types for thickening and target dry matter content for dewatering, making the provided benchmarks questionable.

We view the inclusion of embedded energy in operational resources (Chapter 4.1.2) with skepticism due to a lack of operational control and the fact that some precipitants (Fällmittel) are by-products of other industry processes. Consequently, these products are not manufactured specifically for the wastewater treatment plant.

Regarding Chapter 4.2, differing legal requirements for sludge disposal pathways lead to a lack of comparability. Therefore, the system boundary should be defined as liquid sludge after stabilization. All subsequent steps are site-specific. All feasible and permitted disposal routes must be considered, as mandatory incineration for phosphorus recovery (required in Germany and Austria) is not comparable with agricultural use or landfilling.

Section / Page	Issue / Omission / Error	Proposed Formulation / Correction	Rationale & References
Intro footnote	1 population equivalent' or '1 p.e.' means the organic biodegradable load per day, having a five-day biochemical oxygen demand (BOD ₅) of 60 g of oxygen per day.	..., having a five-day biochemical oxygen demand (BOD ₅) of 60 g of oxygen per day or a chemical oxygen demand (COD) of 120 g of oxygen per day.	Both the BOD ₅ (60 g O ₂ /day) and COD (120 g O ₂ /day) metrics are recognized as valid equivalent standards for defining one population equivalent (1 p.e.).
Intro footnote		All specific energy values should be given as kWh/(PE·y)!	
2.2 vs 2.2.9.2 & ANNEX	Quaternary treatment. 2.2.9.2 Ozone generation 15 - 23 kWh/PE/y for in-site ozone generation. These figures represent a doubling of current energy requirements. How is energy neutrality to be achieved here?	As quaternary treatment is implemented on behalf of producers of pharmaceuticals and other chemicals, also energy consumption for this treatment stage should count in the balance of these producers and not in the balance of the wastewater treatment plant.	Technology neutrality should be guaranteed between different processes, for example activated carbon and ozone (2-2.5 kWh/PE vs 15 - 23 kWh/PE)
Intro & 2.2.1	Inconsistency in Scope: Intro excludes sewer pumping, but later sections (table 2.2.1) provide calculation methods.	Clearly define boundaries for internal lifting (inlet, intermediate, outlet, bypass). Exclude all pumping prior to the first treatment stage.	To ensure comparability between gravity-fed and pump-fed facilities.
2.2.3	Methodological Error: Volume based metrics (kWh/m ³) are misleading for load dependent processes.	Transition methodology exclusively to population equivalents (kWh/PE).	Energy use is driven by pollutant load (organic/nitrogen), not volume.
2.2.11.2 & 2.2.11.4	Lack of Technical Specification: No differentiation between sludge types or target dry matter content. Benchmark in the table appears implausibly high compared to previous industry reports	Specify sludge type (Primary vs. Surplus sludge) for thickening and define target dry matter content (% DM) for dewatering.	Energy demand differs fundamentally between sludge types. Energy for dewatering cannot be evaluated without knowing the % DM result. (cf. Lindtner, 2008 ¹)

¹ https://www.bmluk.gv.at/dam/jcr:d5d0c5c5-78a4-45d6-813f-6a89849eafb3/Leitfaden_Endbericht_20080523.pdf

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4.1.1	Support: Energy equivalence weighting.	Maintain $1 \text{ kWh}_{\text{th}} = 1 \text{ kWh}_{\text{el}}$.	Aligns with regional frameworks
4.1.2	Lack of operational control and complexity: Inclusion of embedded energy in operational resources (chemicals). Benchmark figures in the table appear implausibly high.	Exclude Life Cycle Assessment (LCA) for chemicals and greenhouse gas emissions. Classify by-products (e.g., precipitants) according to their primary process.	Production is outside WWTP control. Full LCA creates undue administrative burden. Limited comparability due to diverse precipitant production processes; standardized LCA not feasible/ fair.
4.1.4	Support: Wastewater effluent embedded energy.	Fully recognize contributions from the development and provision of energy sources on-site (Large-scale heat pumps/PV) to exploit the full energy potential.	These are essential components to exploit the full energy potential of the WWTP and should be recognized within the neutrality assessment regardless of whether the energy is utilized internally or marketed through third parties.
4.2	Differing legal requirements regarding disposal pathways lead to a lack of comparability.	System boundary: wastewater and sludge treatment up to liquid sludge after stabilization; subsequent steps are site-specific to ensure comparability.	All permissible disposal routes must be considered. Mandatory P-recovery and incineration (e.g., DE, AT) are not comparable to agricultural use or landfilling in other countries

Contact Information to be shared

- Organisation: Österreichischer Wasser- und Abfallwirtschaftsverband (ÖWAV)
- Affiliation (e.g., industry, academia, policy): Water and waste management association
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Submission Guidelines

Deadline for Feedback: **15 January**

Eligible file types: .doc(x)/pdf for text; .xlsx for data

Format file name: Organisation_TaskD_filename (E.g. BE_TaskD_feedback.docx)

How to Submit: upload on CIRCABC

Confidentiality: All submissions will be considered non-sensitive, unless otherwise indicated.

Thank you for your contributions,

Emanuele Quaranta and Alberto Pistocchi

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