Consultative Paper

Indonesia Taxonomy for Sustainable Finance (TKBI) version 3
Water Supply, Sewerage and Waste Management (WSSWM) Sector

The Indonesia Taxonomy for Sustainable Finance (TKBI) is a classification of economic activities that support Indonesia's Sustainable Development Goals and efforts, encompassing economic, environmental, and social aspects. The taxonomy is used as a guidance to increase the allocation of capital and sustainable financing to support the achievement of Indonesia's net-zero emissions target.

This Consultative Paper will serve as an update to Annex 3 – Technical Screening Criteria for the Indonesia Taxonomy for Sustainable Finance and will form an integral part of the TKBI Book, which was published on 11 February 2025 and can be accessed via http://gapura.ojk.go.id/tkbi2025.

The series of Public Consultations will be held starting October 11, 2025 to November 21, 2025. Responses can be submitted via: https://gapura.ojk.go.id/TanggapanCPTKBIV3 or sustainablefinance@ojk.go.id

Annex 3 – Technical Screening Criteria for the Indonesia Taxonomy for Sustainable Finance

[Sub Cover]
Water Supply, Sewerage and Waste Management (WSSWM)

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Scope and Consultation Approach

The Indonesia Taxonomy for Sustainable Finance (*Taksonomi untuk Keuangan Berkelanjutan Indonesia*/TKBI) is a classification of economic activities that support Indonesia's Sustainable Development Goals and efforts, encompassing economic, environmental, and social aspects. The taxonomy is used as a guidance to increase the allocation of capital and sustainable financing to support the achievement of Indonesia's net-zero emissions target.

To achieve these objectives, OJK, in collaboration with various Ministries/Agencies and relevant stakeholders, will issue TKBI version 3, which is a development of TKBI versions 1 and 2. TKBI version 3 will cover focus sectors comprising Agriculture, Forestry, and Fishing (AFF) – Continued, Manufacturing/IPPU, and Water Supply, Sewerage and Waste Management (WSSWM), as well as enabling sectors comprising Information and Communication and Professional, Scientific and Technical (PST) sectors.

OJK, along with K/L and relevant stakeholders, held a kickoff meeting on May 26, 2025, to discuss the development of all Technical Screening Criteria (TSC). Each activity underwent further discussion through closed consultations with K/L and representatives of industry players to gather insights and the feasibility analysis of its implementation.

The Financial Services Authority (OJK) recognizes that the development of the TKBI cannot be achieved without involving public perspectives; therefore, we encourage the public to provide feedback through the Public Consultation process. Through this process, OJK aims to:

- Gather relevant technical input to optimize the taxonomy design in accordance with the core principles of the taxonomy, namely interoperability, credibility, usability, and being science-based.
- Ensure that all stakeholders involved in the development of TKBI version 3 could provide input; and
- Raise awareness of the taxonomy among various stakeholder groups while enhancing broader understanding of its functions.

The Public Consultation is part of the development process of TKBI version 3, which will be published in February 2026, with the scope of discussion including:

- TSC for EO1 - climate change mitigation, EO2 - climate change adaptation, EO3 - protection of healthy ecosystem and biodiversity, as well as EO4 - resource resilience and the transition to a circular economy (EO1 – EO4) regarding the five industrial sectors that are the focus of discussion in this TKBI version 3;
- The sunsetting and grandfathering mechanisms; and
- The assessment of the TKBI using an entity and portfolio assessment approach.

Description	Scope of Sectors
Technical Screening Criteria for EO1 – EO4 The TSC is applied to each activity covered by the taxonomy. The TSC comprises the requirements that must be met for an activity to be assessed as making a substantial contribution to EO1 – EO4.	**Focus Sector** ➢ Agriculture, Forestry, and Fishing (AFF) ➢ Manufacturing/IPPU ➢ Water supply, sewerage and waste management (WSSWM) **Enabling Sector** ➢ Information, and Communication ➢ Professional, scientific and technical activities (PST)

Sunsetting Mechanism

Sunsetting is the process by which a TSC for a particular classification expires and can no longer be used from a specified year. For example, the “Transition” TSC for the Electricity Generation Activity with life-cycle emissions of 510 gCO_2/kWh is no longer valid in 2040, because based on developments in science, technology, and applicable policy, the activity has transitioned toward the 1.5°C pathway. Sunsetting aims to prevent transition activities from being permanently labeled “sustainable,” avoid greenwashing, and provide certainty to investors and issuers regarding planned changes to the requirements, thereby preventing stranded assets.

Grandfathering Mechanism

Grandfathering is a mechanism that sets out how the classification of financial instruments, used to finance certain activities or assets, retains its 'financial instrument classification' when changes occur in the TSC and result in the lower classification of those activities compared to the initial classification based on the previous TSC. Grandfathering also aims to preserve market stability or minimize market disruption following the review and update of the TSC, encourage more effective capital flows to support decarbonization, and facilitate monitoring of the classification of financial instruments throughout their lifespan..

Entity Level Assessment

Entity-level assessment is relevant for evaluating companies that have multiple distinct activities. The assessment is conducted by assessing how each activity is Taxonomy-aligned*, followed by aggregating contributions using the percentage of total revenue, capital expenditure (CapEx), or operational expenditure (OpEx).

Portfolio Level Assessment

Portfolio-level assessment is relevant for evaluating a portfolio managed by an institution that consists of multiple financial assets (such as equity and debt instruments). The assessment is conducted by assessing how each investment in different companies is Taxonomy-aligned*, followed by aggregating the contributions of each company using the percentage of total revenue, capital expenditure (CapEx), or operational expenditure (OpEx).

***) Taxonomy-aligned:** Activities that meet the requirements of TKBI classification as “Green” or “Transition”

Guidelines for Participation in Public Consultation Process

The Public Consultation Process will take place from October 11, 2025, to November 21, 2025.

The Financial Services Authority (OJK) will consider all inputs from stakeholders through responses provided at the following link https://gapura.ojk.go.id/TanggapanCPTKBIV3

The feedback received during this round of Public Consultation will be used to refine TKBI version 3, which is currently under development, and will be published in February 2026.

OJK appreciates your participation in the development of TKBI version 3

A. Sectoral Context

Emission Share

The Water Supply, Sewerage, and Waste Management (WSSWM) sector accounts for approximately 3–5% of global greenhouse gas (GHG) emissions.[1] These emissions primarily stem from high energy consumption in water and wastewater treatment processes, as well as methane released by waste management facilities and inadequately managed wastewater systems.

Water Supply and Sewerage

Access to clean water and safe sanitation is a basic human need and a key pillar of public health and economic development. However, water demand is projected to exceed its supply by up to 40% by 2030,[2] driven by population growth, urbanization, and the impacts of climate change. This sector faces two main challenges. First, aging infrastructure leads to significant leakage and water losses. Second, the disposal of untreated wastewater and poor waste management cause water pollution, ecosystem degradation, and exacerbates the global plastic pollution crisis. The sector is also highly vulnerable to the impacts of climate change. Extreme weather events such as droughts and severe floods threaten the availability of clean water and can damage vital infrastructure.

Waste Management

The waste management subsector globally presents both challenges and opportunities in realizing a sustainable, low-carbon society. Waste-related emissions accounted for 3.4% of total GHG emissions in 2024 (solid waste 2.0%, wastewater 1.3%, other waste 0.1%). This makes the waste sector the fourth-largest emissions contributor after energy, agriculture, and industry.[3] The primary GHG constituents include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Methane has a global warming potential (GWP) 28–36 times higher than CO_2 over a 100-year time horizon, as established by the Intergovernmental Panel on Climate Change (IPCC).[4] Despite having lower concentration level, methane remains a significant contributor to the greenhouse effect.[4] Approximately 20% of global methane emissions originate from waste, primarily from landfills.[5] A report by the Climate and Clean Air Coalition (CCAC) states that to achieve the target of limiting global temperature rise to 1.5°C, anthropogenic methane emissions need to be reduced by 35–40% from baseline levels by 2030.**Error! Bookmark not defined.**

Indonesian Context

In the Indonesian context, the WSSWM sector contributes approximately 3.4%[6] of total national GHG emissions, primarily from methane (CH_4) emitted by landfills (*Tempat Pemrosesan Akhir*/TPA). The sector with the highest GHG emissions intensity during the 2019–2023 period was the WSSWM sector. This sector exhibits very high emissions intensity. In 2023, GHG emissions intensity for this sector was recorded at 2.913 million tons CO_2e per billion rupiah, reflecting a decrease of only about 9% compared to 2019 intensity.[6] This indicates that GHG emissions intensity remains significantly high despite management and efficiency efforts.

GHG emissions from the WSSWM sector have shown a consistent upward trend between 2019 and 2023. By the end of this period, total emissions reached 31.29 million tCO_2e. As shown in Figure 1, there were increases across all major greenhouse gases, with carbon dioxide (CO_2) at 3.27 million tCO_2e, methane (CH_4) at 24.22 million tCO_2e, and nitrous oxide (N_2O) at 3.79 million tCO_2e in 2023. Methane accounts for 77.4% of total emissions in this sector, indicating its significant impact on the industry.[6]

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[1] Ritchie, H., Roser, M., & Rosado, P, "GHG Emissions by Sector", Our World in Data, 2023. [Online]. Available at: https://ourworldindata.org/ghg-emissions-by-sector

[2] GWSP. "GWSP Annual Report 2024". p.14. 2024. [Online]. Available at: https://www.worldbank.org/en/topic/water/publication/the-gwsp-2024-annual-report

[3] U.S. Environmental Protection Agency. "Technical documentation: Global greenhouse gas emissions", 2024. [Online]. Available at: https://www.wri.org/insights/4-charts-explain-greenhouse-gas-emissions-countries-and-sectors

[4] Intergovernmental Panel on Climate Change (IPCC). "AR6 Climate Change 2021: The Physical Science Basis", 2021. [Online]. Available at: https://www.ipcc.ch/report/ar6/wg1/

[5] Climate & Clean Air Coalition. (n.d.) "Short-Lived Climate Pollutants – Methane. Climate & Clean Air Coalition", 2021. [Online]. Available at: https://www.ccacoalition.org/short-lived-climate-pollutants/methane

[6] Statistics Indonesia. "*Neraca Arus Energi dan Neraca Emisi Gas Rumah Kaca Indonesia 2019-2023*", 2025 [Online]. Available at: https://www.bps.go.id/id/publication/2025/06/30/33b7eb7531a02c8c7eb9594f/neraca-arus-energi-dan-neraca-emisi-gas-rumah-kaca-indonesia-2019-2023.html

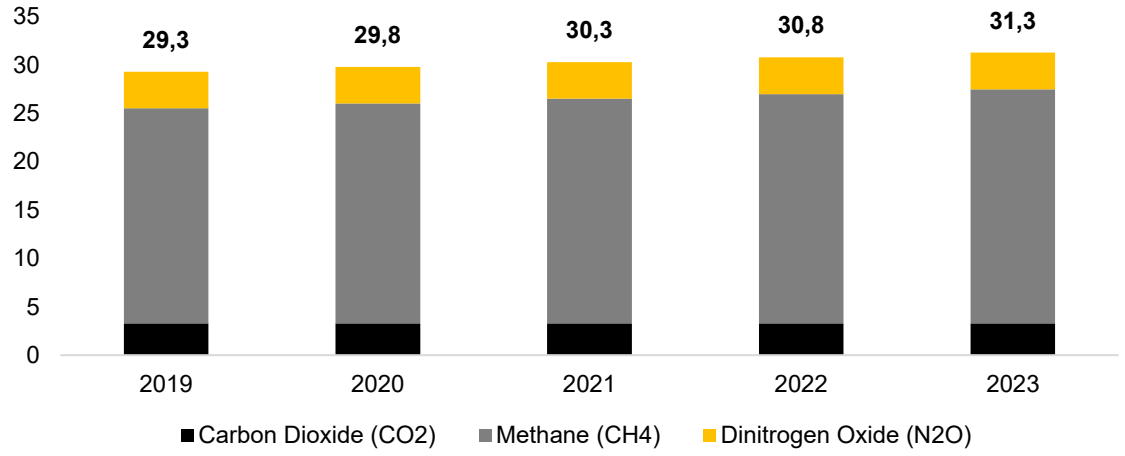

Figure 1. Distribution of Greenhouse Gas Emissions in Water Supply, Sewerage, Waste Management and Recycling in Indonesia (in million tCO_2e) by Type, 2019-2023[6]

Although the WSSWM sector plays an important role in managing water and waste resources, its operational and production processes still generate very high GHG emissions relative to the value produced. This underscores the urgent need for cleaner technologies, improved energy efficiency, and more innovative and environmentally friendly waste management practices. Given the sector's importance in preserving environmental sustainability, significantly reducing its emissions intensity is a crucial step to support sustainable development goals and reduce the impacts of climate change.

Alignment with National Policies and Strategies

Indonesia has recognized the importance of waste management within the broader climate, environmental, and sustainable development agenda. Aligning effective waste-sector initiatives with national policies and strategies is essential to achieving Indonesia's climate commitments, including its pledge under the Paris Agreement to reach Net Zero Emissions by 2060.

The mandate of the National Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah Nasional*/RPJMN) 2025–2029[7] targets that 100% of waste in Indonesia must be managed by 2029. This requires all waste to be properly managed from the point of generation through to the landfill. All landfills in Indonesia are also required to be managed using a sanitary landfill system in accordance with the mandate of Law Number 18 of 2008 on Waste Management[8]. The law requires the cessation of open dumping practices no later than five years after its promulgation. After 17 years, however, open dumping practices at landfills are still carried out. The Ministry of Environment (*Kementerian Lingkungan Hidup*/KLH), through Circular Letter SE.14/MENLHK/PSLB3/PLB.0/2/2025, issued official warning letters to cities/regencies in Indonesia to terminate open dumping practices. The government targets that all landfill operations will no longer use the open dumping method by 2026.

In addition to the above policies, the government has developed a comprehensive regulatory framework and strategic roadmap to promote waste reduction, management, and resource recovery. One initiative launched is the Circular Economy Roadmap and Action Plan in Indonesia 2025–2045 coordinated by Bappenas, which designates waste as a priority sector. This roadmap promotes resource efficiency, recycling, and reuse, aligned with the national development plans (RPJMN and RPJPN) in supporting the transition from a linear economy to a green economy.[9]

[7] Government of the Republic of Indonesia, Presidential Regulation of the Republic of Indonesia Number 12 of 2025 concerning the National Medium-Term Development Plan for 2025–2029, Jakarta: State Secretariat, 2025. [Online]. Available at: https://peraturan.bpk.go.id/Download/375623/Perpres%20Nomor%2012%20Tahun%202025.pdf
[8] Government of the Republic of Indonesia, Law of the Republic of Indonesia Number 18 of 2008 concerning Waste Management, Jakarta: State Secretariat, 2008. [Online]. Available at: https://peraturan.bpk.go.id/Download/28462/UU%20Nomor%2018%20Tahun%202008.pdf
[9] National Development Planning Agency (*Bappenas*). "National Roadmap and Action Plan Circular Economy Indonesia 2025 – 2045". p.11, 2025. [Online]. Available at: https://lcdi-indonesia.id/wp-content/uploads/2025/06/ranes-en.pdf

B. Approach

B.1. Rationale for Selecting TSC Activities in the WSSWM Sector

Climate change mitigation, climate change adaptation, protection of healthy ecosystem and biodiversity, and resource resilience and the transition to a circular economy (EO1 – EO4) in the WSSWM sector can be achieved through a systemic approach. This approach can demonstrate how an interconnected series of sustainable activities can contribute effectively.

Figure 2. Criteria for Activities Selection in the WSSWM Sector

Prioritized activities are economic activities that have a positive impact on environmental objectives that are clear and scalable. By focusing on activities that have a direct and scalable impact on the environment, the taxonomy aims to facilitate the allocation of capital and investment to areas that have the potential to generate environmental benefits optimally.

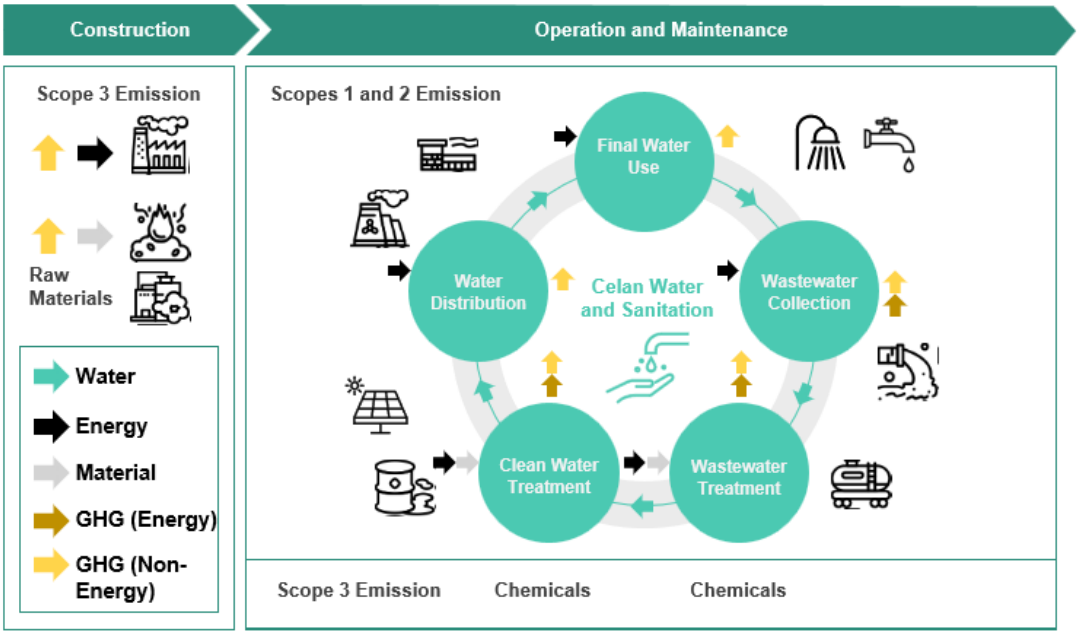

Figure 3. Carbon Footprint of Clean Water and Wastewater Treatment Systems

In clean water and wastewater treatment systems, activity selection is based on the carbon footprint as shown in Figure 3. GHGs are generated starting from the construction phase through the operation and maintenance phases, encompassing the treatment and collection of clean water and wastewater. In addition, emissions from wastewater and clean water treatment systems are generated from electricity use. In this case, the technology applied will

significantly affect energy efficiency. This underpins the selection of activities in clean water and wastewater treatment systems, including construction activities considering its role in determining the technology used.

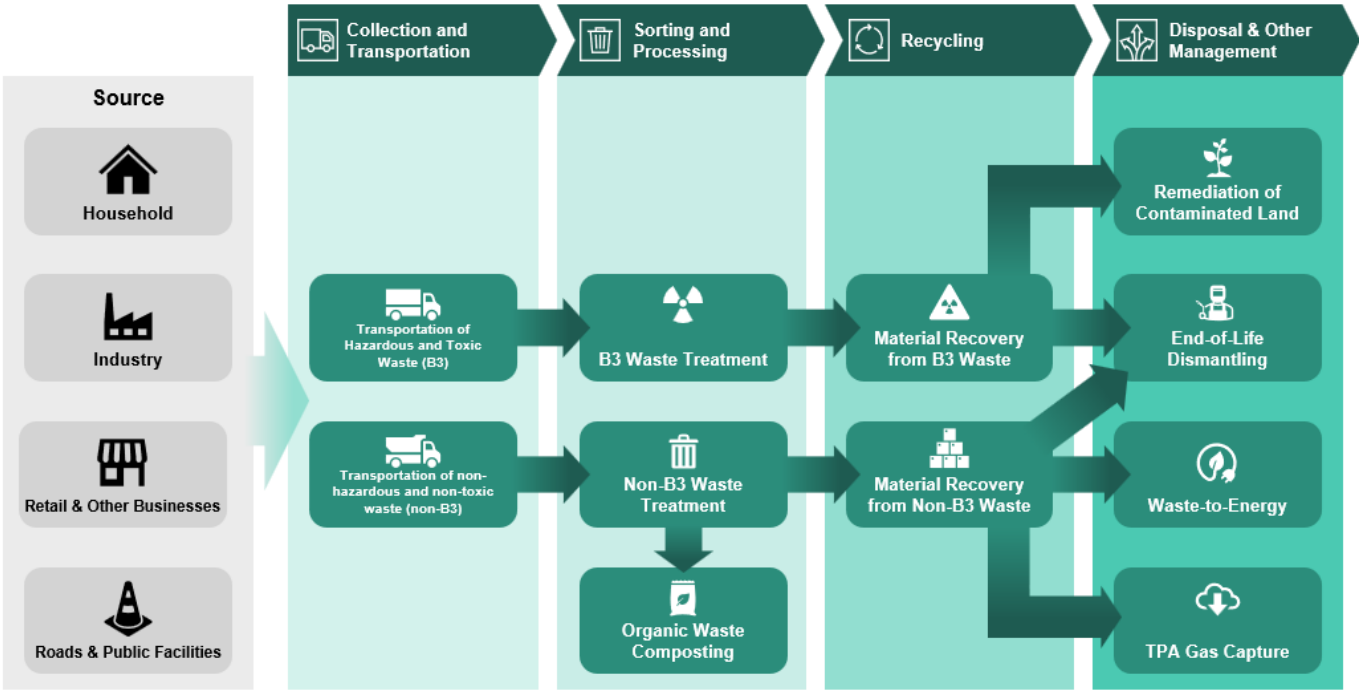

Figure 44. Waste Management Value Chain

In waste management, the selection of activities is based on the value chain, as shown in Figure 4. To achieve the Environmental Objectives (EOs), the waste management subsector needs to be viewed as a single, inseparable value chain. This underpins the selection of activities in waste management, from waste collection through to final treatment and disposal.

For further details, activities in the WSSWM sector covered in the TKBI have been aligned with those covered in the ASEAN Taxonomy for Sustainable Finance (ATSF), considering relevance to the Indonesian context, namely:

1. **Water, Wastewater Management and Nature-Based Solutions**

   In 2024, average water loss (Non-Revenue Water/NRW) in Indonesia reached 33%,[10] far above the government target of 20%.[11] High NRW causes economic losses of Rp9.7 trillion per year, increases energy consumption, and reduces the quality of distributed water.[12]

   Domestic wastewater management in Indonesia remains very limited, with most wastewater (especially greywater) discharged directly into water bodies without treatment. This leads to a decline in surface water quality and contributes to environmental pollution.[13] In addition, other studies indicate that only about 3% of wastewater in Indonesia is centrally treated, while 96.8% uses on-site systems such as septic tanks, and 0.2% is discharged directly into the environment. This low coverage worsens water body conditions and hinders the achievement of environmental targets.[13]

[10] Ministry of Public Works and Public Housing of the Republic of Indonesia. *Buku Evaluasi Kinerja BUMD Air Minum Tahun 2024*. Directorate General of Job Creation. Directorate of Drinking Water. Jakarta. Indonesia, 2025. [Online]. Available at: https://data.pu.go.id/sites/default/files/Buku%20Summary_2024.pdf

[11] Ministry of Public Works and Public Housing of the Republic of Indonesia, "Regulation of the Minister of Public Works and Public Housing Number 13/PRT/M/2013 of 2013 concerning National Policies and Strategies for Developing the Drinking Water Supply System." BPK RI Legal Documentation and Information Network. Jakarta. Indonesia, 2013. [Online]. Available at: https://peraturan.bpk.go.id/Details/144728/permen-pupr-no-13prtm2013-tahun-2013

[12] World Bank. "Improving water supply performance in Indonesia: Reducing non-revenue water and improving energy efficiency". World Bank Group, 2021. [Online]. Available at: https://openknowledge.worldbank.org/server/api/core/bitstreams/4d249342-1ce0-5565-8f5d-e12c22c4b9f0/content

[13] Suryawan, I. W. K., Rahman, A., Lim, J.-W., & Helmy, Q. "Environmental impact of municipal wastewater management based on analysis of life cycle assessment in Denpasar City". Desalination and Water Treatment, *244*, 55-62, 2021. [Online]. Available at: https://www.deswater.com/DWT_articles/vol_244_papers/244_2021_55.pdf

2. Collection of Non-Hazardous and Hazardous Waste

In 2024, Indonesia generated 35 million tons of waste, and 6.9 million tons of it was still disposed of at landfills using open dumping practices.[14] Poorly managed waste often ends up in the open environment, is burned, or is discharged into water bodies such as rivers and the ocean. These practices not only cause GHG emissions from open burning but also contribute significantly to water and marine pollution and exacerbate the marine plastic pollution problem.

Additionally, even when waste is successfully collected, its transport is often carried out by aging, inefficient vehicle fleets. These old waste-hauling fleets produce high GHG emissions, exacerbating the environmental impacts of waste management systems that are supposed to be solutions. Consequently, both unmanaged waste and environmentally unfriendly transport systems contribute to increased GHG emissions, water pollution, and damage to marine ecosystems.

3. Non-Hazardous Waste Treatment

Indonesia generated 35 million tons of waste in 2024, but only 38.63% was managed, while the remaining 61.37% was unmanaged.[14] This unmanaged bio-waste can decompose and produce methane. On the other hand, open burning waste produces toxic substances such as dioxins and furans that are harmful to health.

Unmanaged waste increases budget burdens for environmental and health impacts, which could otherwise be allocated to preventive investments and more efficient management systems. In addition, uncertainty over the volume of waste managed and system inefficiencies make private investment in treatment infrastructure (such as Refuse-Derived Fuel/RDF, composting, or recycling) less economically attractive.

4. Hazardous Waste Treatment

In 2023, 15.2% of hazardous and toxic waste remained improperly managed.[15] Hazardous waste such as heavy metals (mercury, cadmium, lead) and toxic chemical compounds can seep into soil and contaminate groundwater. Leachate from untreated hazardous waste can pollute water bodies, causing eutrophication, aquatic life mortality, and ecosystem disruption, thereby increasing the risk of soil, water, and air pollution and heightening the potential for toxic exposure to communities and ecosystems.

5. Recycling

Indonesia's recycling rate remains low, at only around 13% in 2022.[16] This low rate indicates that Indonesia still relies on a linear economy model (take–make–dispose), which is unsustainable and increases pressure on natural resources. In addition, materials that are not recycled also contribute to GHG emissions from decomposition, incineration, or transportation, and increase the environmental footprint of the consumption and production sectors.

6. Remediation

In 2024, out of a total of 550 landfills in Indonesia, 306—or about 54.44%—still applied open dumping systems.[17] These open dumping practices can cause groundwater contamination from leachate, methane (CH_4) emissions from the decomposition of bio-waste, and public health threats such as respiratory problems and skin diseases. Therefore, landfill remediation is needed to remove contaminants from soil and water, reduce GHG emissions from methane, restore the land's ecological functions, and prevent further damage.

[14] Ministry of Environment and Forestry of the Republic of Indonesia. National Waste Management Information System (SIPSN), 2024. [Online]. Available at: https://sipsn.menlhk.go.id/sipsn/

[15] Statistics Indonesia. *Statistik Lingkungan Hidup Indonesia 2024*. Jakarta: BPS, Nov. 2024. [Online]. Available at: https://www.bps.go.id/id/publication/2024/11/29/f24c83748852c605dd2c73cb/statistik-lingkungan-hidup-indonesia-2024.html. [Data processed from the cited source]

[16] Ministry of National Development Planning/National Development Planning Agency (*Bappenas*). National Medium Term Development Plan (RPJMN) 2025–2029. Jakarta: Bappenas, 2025. [Online]. Available at: https://perpustakaan.bappenas.go.id/elibrary/file_upload/koleksi/dokumenbappenas/konten/Dokumen%202025/Konten/20250523165349RPPLN%202025-2029.pdf

[17] Ministry of Environment and Forestry of the Republic of Indonesia. National Waste Management Information System (SIPSN), 2024. [Online]. Available at: https://sipsn.menlhk.go.id/sipsn/

Table 1. List of Activity Mapping

No.	Activity	Green	Transition	Remarks
1	Water, Wastewater Management and Nature-based Solutions	**X**	**X**	**Covers construction, system updates, collection, and treatment activities**
2	Waste and Garbage Collection	**X**	**X**	
3	Non-Hazardous Waste Management	**X**	**X**	**Includes bio-waste composting**
4	Hazardous Waste Management	**X**	**N/A**	
5	Recycling	**X**	**X**	
6	Remediation	**X**	**N/A**	

Notes:
X signifies that the activity includes related classifications
N/A signifies that the activity is not applicable or does not include related classifications

B.2. General Principles for Setting TSC

This section outlines the basis and considerations in setting Technical Screening Criteria (TSC) for each Environmental Objective (EO) for each activity in the WSSWM sector.

EO1: Climate Change Mitigation

Classification	Description
Green	1. The Technical Screening Criteria (TSC) are designed to ensure that activities achieve specific GHG emissions levels, which refer to credible, 1.5°C-aligned science-based pathways consistent with the Paris Agreement. Or in certain specific cases where a 1.5°C-aligned target is not viable are compatible with a 2-degree decarbonization trajectory. 2. In practice, unless otherwise specified using carbon intensity measures (i.e., gCO2e/kWh) the TSC are typically expressed as quantitative thresholds that limit GHG emissions per unit of waste managed or water produced. For example, tCO_2e per ton of water produced.
Transition	1. The activity supports a transition towards a Green pathway within a defined time frame; **AND** 2. Perform at least as well as the lowest-emission technology currently feasible for broad use in Indonesia, with a prescribed sunset date; **OR** 3. Enables or promotes the implementation of a Green Activity in the context of this EO; **OR** 4. The activity aligns with or supports Indonesia's Nationally Determined Contributions (NDC) targets; **OR** 5. The activity meets the "Green" classification but has been assessed to cause a certain degree of significant harm to other EOs; which is expected to be remediated within 5 years.

EO2: Climate Change Adaptation

Classification	Description
Green	1. The activity implements measures to enhance its own resilience to climate change, thereby contributing to overall local, national or regional resilience; **OR** 2. The activity enables other Activities to increase resilience to climate change.
Transition	N/A

EO3: Protection of Healthy Ecosystem and Biodiversity

Classification	Description
Green	To qualify, activities shall implement measures that prioritize land rehabilitation and ecological restoration through: a. Restoring or enhancing natural habitat b. Reintroducing native vegetation and species to improve ecological functions c. Implementing green infrastructure solutions that promote ecological connectivity and water retention; **OR** Activities shall implement measures that prioritize supporting ecosystem-based adaptation and resilience through: a. Utilizing nature-based solutions (e.g., constructed wetlands, permeable surfaces, bio-swales) to mitigate the impacts of extreme weather events, such as floods and droughts. b. Enhancing soil and water retention capacity while preventing erosion and sedimentation in water bodies. c. Supporting the natural purification and filtration functions of ecosystems to maintain water quality.

EO3: Protection of Healthy Ecosystem and Biodiversity	
Classification	**Description**
Transition	1. To qualify, activities shall implement measures that prioritize maintaining ecological integrity and preventing further degradation, while supporting biodiversity,through: a. Maintaining existing natural habitats to prevent further loss of biodiversity and ecological function. b. Supporting the persistence of native vegetation and species to sustain ecological stability. c. Implementing infrastructure solutions that maintain ecological connectivity and maintain natural hydrological cycles.

EO4: Resource Resilience and the Transition to a Circular Economy	
Classification	**Description**
Green	1. Activity implements measures to ensure: a. Waste segregation are promoted b. Material/resource recovery and reuse are maximized c. Disposal to Final Disposal Sites (landfill) are reduced; **OR** 2. Activity implements measures to ensure: a. Sanitation and hygiene are improved b. Water efficiency is optimized c. Non-revenue water losses are reduced d. Water stress are reduced, a condition where clean water needs far exceeding availability.
Transition	1. The activity supports a transition towards a Green pathway within a defined time frame; **AND** 2. Perform at least as well as the lowest-emission technology currently feasible for broad use in Indonesia, with a prescribed sunset date; **OR** 3. Enables or promotes the implementation of a Green Activity in the context of this EO.

B.3. Rationale for Selecting Environmental Objectives (EO)

The selection of Environmental Objectives (EO) for each activity is based on the principle of making a substantial contribution to the most relevant environmental objectives, considering the impact of each activity on Climate Change Mitigation (EO1), Climate Change Adaptation (EO2), Ecosystem and Biodiversity Protection (EO3), and Resource Resilience and the Transition to a Circular Economy (EO4).

Table 2. List of Environmental Objectives

Activity	Selected EO	Rationale
Water, Wastewater Management and Nature-Based Solutions	EO1, EO2, EO3, EO4	EO1, EO2, EO3, and EO4 are relevant because these activities: (1) contribute to emissions reduction through energy efficiency in water and wastewater treatment and distribution systems, (2) have direct relevance to facility resilience to climate risks such as floods and droughts, (3) impact the quality of water bodies and connected ecosystems, and (4) support the use of recycled water and treated sludge as part of the circular economy.
Collection of Non-Hazardous and Hazardous Waste	EO1, EO3, EO4	EO1, EO3, and EO4 are relevant because these activities contribute to emissions reduction through efforts such as: (1) waste separation and transport in accordance with standards that prevent increases in emissions from downstream processes such as incineration or disposal to landfills, (2) separation and handling of hazardous waste that prevent environmental contamination and protect ecosystems, and (3) supporting material recovery and transport to recycling or waste-to-energy facilities. EO2 is not applicable because these activities do not directly involve facility resilience to climate risks.
Non-Hazardous Waste Management	EO1, EO4	EO1 and EO4 are relevant because these activities: (1) avoid emissions from incineration and disposal to landfills through more targeted and standardized waste management and processing, and (2) support material recovery from non-hazardous waste and the use of bio-waste as fertilizer or soil amendments as part of the circular economy. EO2 and EO3 are not applicable because there are no climate adaptation elements within the scope of these activities. In addition, the impacts on ecosystems are indirect and insufficient.
Hazardous Waste Management	EO3, EO4	EO3 and EO4 are proposed because these activities play a role in ecosystem protection through the safe treatment of hazardous waste and support circular economic activities through the recovery of secondary raw materials from hazardous waste. EO1 and EO2 are not applicable because emissions reduction is not the focus of these activities, and these activities do not have a direct linkage to facility resilience to climate change risks.
Recycling	EO4	EO4 is relevant because these activities directly support circular economic activities through material recovery and reduced material use. EO1, EO2, and EO3 are not applicable because these activities do not directly contribute to emissions reduction, climate adaptation, and ecosystem protection.

Activity	Selected EO	Rationale
Remediation	EO3	EO3 is relevant because these activities aim to restore environmental conditions from pollution and damage. EO1, EO2, and EO4 are not applicable because these activities do not directly contribute to emissions reduction, resilience to climate risks, and circular economy principles.

B.4. Rationale for Setting Technical Screening Criteria (TSC)

The development of the TSC is based on the draft ATSF Version 4 using a comprehensive approach, namely both quantitative and qualitative. The combination of these two approaches drives the development of TSC that is not only ambitious in achieving measurable targets, but also realistic to implement based on the capabilities of each industry, while considering other qualitative parameters that can support the established EOs.

The TSC for the WSSWM sector is developed in accordance with the EO relevant to each activity. The following section explains the approach used and the rationale for establishing the requirements, references, indicators, and thresholds determined for each group of activities in the WSSWM sector.

*) The naming of sub-activities is a simplification. For more complete naming, please refer to the descriptions in the section below.

Figure 5. Indicators Used in Developing TSC for the WSSWM Sector (Non-exhaustive)

1. Water, Wastewater Management and Nature-based Solutions

This activity consists of the following sub-activities: (a) construction, expansion, and operation of water collection, treatment, and supply systems; (b) desalination; (c) renewal of water collection, treatment, and supply systems; (d) flood or drought risk prevention and protection, including nature-based solutions; (e) construction, extension and operation of wastewater collection and treatment; and (f) renewal of wastewater collection and treatment, which cover the same Environmental Objectives, namely EO1 – Climate Change Mitigation, EO2 – Climate Change Adaptation, EO3 – Protection of Healthy Ecosystem and Biodiversity, and EO4 – Resource Resilience and the Transition to a Circular Economy.

a. EO1 – Climate Change Mitigation

For this activity, the main indicators used are energy efficiency (for clean water and wastewater management), distribution loss, and emissions intensity. These three indicators reflect efficiency, where energy efficiency indicates direct energy consumption, distribution loss indicates efficiency related to water losses, and emissions intensity indicates GHG per unit of production output.

i. Energy Efficiency

Energy Efficiency for Clean Water Management

The energy efficiency indicator in clean water abstraction and treatment processes is intended to ensure efficient and sustainable water production, while allowing room for innovation and operational adaptation. In the operational phase, efficiency is measured through net energy consumption per cubic meter of water (kWh/m³) over 12 months to avoid seasonal bias.

For clean water treatment, this energy efficiency is measured in the operational phase through net energy consumption per unit of water produced (kWh per cubic meter) over a twelve-month period. This is done to avoid seasonal bias, such as fluctuations in energy consumption due to the rainy or dry season.

Global studies show that modern systems such as membrane technologies, gravity-based systems, and reuse with energy optimization can achieve energy consumption between 0.2–0.4 kWh/m³, depending on scale, technology, and operational practices.[18] This underpins the establishment of a maximum threshold of 0.5 kWh/m³ for "Green" classification and a maximum of 0.7 kWh/m³ for "Transition" classification for clean water treatment system activities.

The indicator for improving the performance of clean water treatment systems can be calculated using the reduction in net energy consumption per unit of water produced. In the case of system renewal, this performance improvement (as a percentage comparing the baseline and the improvement) must be demonstrated after the commissioning and optimization phase. In the operational phase, the indicator can be measured at a single point without the need to show a baseline and improvement comparison.

Specifically for desalination activities, studies indicate that the average Specific Energy Consumption (SEC) for reverse osmosis processes can reach as low as 2.0 kWh/m³ under optimum conditions, and can reach 3.5–4.5 kWh/m³ when pre-treatment and post-treatment are included.[19] This underpins the phased setting of desalination energy consumption thresholds through 2035 (<3.5 kWh/m³ to <3.0 kWh/m³ and then to <2.5 kWh/m³) under the "Transition" classification.

Energy Efficiency for Wastewater Management

Centralized wastewater treatment installations require energy to run processes such as aeration, pumping, sludge treatment, and system control. Net energy consumption per population equivalent (p.e.) per year serves as an indicator of the installation's operational efficiency and environmental sustainability. Therefore, net energy consumption limits under the "Green" classification are set as follows:

Table 3. Energy Efficiency Threshold for Wastewater Management under "Green" Classification

Wastewater Management Installation Capacity	Threshold
<10,000 p.e.	≤35 kWh/p.e./year
10,000 – 100,000 p.e.	≤25 kWh/p.e./year
>100,000 p.e.	≤20 kWh/p.e./year

The setting of energy consumption limits considers the principles of economies of scale and system efficiency. Larger installations tend to have higher energy efficiency due to distributing energy loads across more population units, the use of more advanced technologies, and the potential to utilize renewable energy such as biogas from sludge treatment. Conversely, smaller installations have limitations in technology and energy recovery capacity, resulting in higher energy consumption limits.

Based on global studies and practices, energy efficiency in wastewater treatment activities can be achieved by modern installations through the application of various energy-saving technologies, such as efficient biological processes (e.g., Anammox), low-pressure aeration systems, utilization of energy from biogas generated in sludge treatment, co-digestion with external bio-waste, heat recovery systems, as well as the use of efficient compressors and automated control systems. For example, large installations in Europe and Asia that implement efficient aeration technologies, automated process

[18] S. Bukhary, J. Batista, and S. Ahmad, "Global assessment of energy consumption in conventional drinking water treatment plants," *ResearchGate*, 2025. [Online]. Available at: https://www.researchgate.net/publication/391447772_Global_Assessment_of_Energy_Consumption_in_Conventional_Drinking_Water_Treatment_Plants

[19] J. R. Werber, M. Elimelech, and E. M. Warsinger, "Reducing desalination energy consumption," *Nature Chemical Engineering*, vol. 1, no. 1, pp. 1–10, Oct. 2024. [Online]. Available at: https://www.nature.com/articles/s44286-024-00133-2

control, and utilization of biogas from anaerobic processes have demonstrated energy consumption below 20 kWh/p.e./year.[20]

Global studies show that energy consumption for wastewater treatment installations ranges from 15 to 86 kWh/p.e./year,[21] indicating that a threshold of ≤68 kWh per population equivalent (p.e.) per year is within a realistic range for many small and medium installations as a transition effort toward the "Green" classification. Under the "Transition" classification, the setting of a net energy consumption threshold of ≤68 kWh per population equivalent (p.e.) per year for all capacity scales of centralized wastewater treatment installations is based on credible international benchmarking and technical considerations.

Conversion of population equivalent (p.e.) units to m³/day can use the reference estimate of average domestic wastewater of 200 liters per person per day as set by the International Water Association (IWA), to facilitate the calculation of wastewater system capacity.[22]

ii. Distribution Loss

Distribution loss is an indicator that shows the proportion of clean water lost during the distribution process. The lower the loss rate, the more efficient the energy use, thereby directly contributing to the reduction of GHG emissions. A low water loss rate in the operational phase reflects that the piping system has been optimally designed and maintained.

The Water Loss Specialist Group (WLSG) of the International Water Association (IWA) emphasizes that setting a universal threshold for water loss (e.g., <15%) may not be suitable for all conditions. However, the best water utilities in the world often succeed in maintaining loss levels below 15% of the total water entering the system, especially when measured using the Infrastructure Leakage Index (ILI) indicator[23]. This underpins the establishment of a distribution loss threshold of <15% for the "Green" classification and <20% for the "Transition" classification.

iii. Emissions Intensity

Global practice shows that sustainable desalination activities generally use clean energy sources such as solar, wind, or other renewables, and apply energy-efficient technologies such as reverse osmosis (RO) with pressure recovery systems and membrane distillation. IPCC and UNECE studies indicate that low-carbon energy technologies such as wind, solar, and nuclear have average emissions well below 100 gCO_2e/kWh[24, 25]. Assuming desalination energy consumption of 3.5 kWh per cubic meter,**Error! Bookmark not defined.** the resulting emissions intensity reaches 350 gCO_2e per cubic meter of water. per cubic meter of water. This value forms the basis for setting the emissions threshold for the "Green" classification of desalination activities, which requires the use of indicators for the carbon intensity of energy (gCO_2e/kWh) and total emissions per cubic meter of clean water (gCO_2e/m^3) in the operational phase by operators that have the capacity to choose or develop low-carbon energy sources, such as through renewable energy contracts or self-generation.

b. EO2 – Climate Change Adaptation

For this activity, the main indicator used is the implementation of a Climate Risk and Vulnerability Assessment (CRVA). A CRVA can provide a comprehensive overview of vulnerability, exposure, and adaptive capacity of a region or sector to climate impacts.

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[20] A. G. Capodaglio and A. Callegari. "Energy use and recovery in wastewater treatment facilities." in Proc. 18th Int. Conf. Renewable Energies and Power Quality (ICREPQ'20). Renewable Energy and Power Quality Journal, vol. 18, 2020. [Online]. Available at: https://icrepq.com/icrepq20/368-20-capodaglio.pdf

[21] I. Clos, J. Krampe, J. P. Alvarez-Gaitan, C. P. Saint, and M. D. Short, "Energy benchmarking as a tool for energy-efficient wastewater treatment: Reviewing international applications," *Water Conservation Science and Engineering*, vol. 5, pp. 115–136, Mei 2020. [Online]. Avalaible at: https://link.springer.com/article/10.1007/s41101-020-00086-6

[22] M. Henze, M. C. M. van Loosdrecht, G. A. Ekama, and D. Brdjanovic. Biological Wastewater Treatment: Principles, Modelling and Design. London. UK: IWA Publishing, 2008. [Online]. doi: 10.2166/9781780401867.

[23] International Water Association, *Position Statement: Water Loss Specialist Group*, IWA, 2022. [Online]. Available at: https://iwa-website-assets.s3.eu-west-2.amazonaws.com/blogs_1750245155507_6757b78552.pdf

[24] Intergovernmental Panel on Climate Change, "Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the IPCC", Chapter 6: Energy Systems, IPCC, 2022. [Online]. Available at: https://www.ipcc.ch/report/ar6/wg3/chapter/chapter-6/

[25] United Nations Economic Commission for Europe. "Life Cycle Assessment of Electricity Generation Options". UNECE, Sep. 2021. [Online]. Available at: https://unece.org/sites/default/files/2021-09/202109_UNECE_LCA_1.2_clean.pdf

i. Climate Risk and Vulnerability Assessment (CRVA)

The implementation of a **CRVA** aims to identify climate-related physical risks that are material to the activity. In the WSSWM context, particularly water supply, this assessment is important for understanding potential disruptions to the operation of water systems, both in terms of supply and distribution. The assessment also aims to determine critical points that require adaptive interventions, such as elevating infrastructure, diversifying water sources, and increasing storage capacity, as well as non-physical solutions such as early warning systems, water conservation policies, and strengthening institutional capacity.

c. EO3 – Protection of Healthy Ecosystem and Biodiversity

For this activity, the main indicators used are nature-based solutions and sludge treatment with efficient technologies. These two indicators reflect the protection of ecosystems and biodiversity, where nature-based solutions demonstrate the integration of natural approaches into water management that support ecosystem functions, while sludge treatment with efficient technologies demonstrates the reduction of environmental pollution impacts through environmentally friendly and sustainable residual management.

i. Nature-based Solutions

In water supply, the implementation of nature-based solutions needs to be carried out to mitigate flood and/or drought risks. Physical solutions such as wetland restoration, reforestation, or ecosystem-based watershed management can reduce flood and drought risks while providing additional ecological benefits. This has been demonstrated through wetland restoration and reforestation, which enhance the "sponge function" of watersheds, helping to reduce and delay peak flows and increase groundwater infiltration.[26] This process is directly related to flood and drought risk mitigation, while also supporting biodiversity.

ii. Sludge Treatment with Efficient Technologies

In large-scale domestic wastewater treatment, installations with a capacity of ≥100,000 population equivalent (p.e.) or receiving a Biological Oxygen Demand 5-day (BOD5) load of more than 6,000 kg per day generate very high volumes of biologically active sludge. The sludge contains unstable organic matter, as well as potential pathogens and hazardous compounds that can contaminate the environment if not properly managed.[27] Anaerobic digestion or other technologies with equivalent net energy consumption enable sludge stabilization while producing renewable energy in the form of biogas.[28] Therefore, to ensure safe and sustainable sludge management, wastewater treatment installations with a capacity of ≥100,000 p.e. or a BOD5 load >6,000 kg are **required to use sludge treatment technologies** such as anaerobic digestion or other technologies with equal or better net energy efficiency.

d. EO4 – Resource Resilience and the Transition to a Circular Economy

For this activity, the main indicator used is integration with the Drinking Water Safety Plan (*Rencana Pengamanan Air Minum*/RPAM). RPAM promotes optimization of water use, including reuse and conservation, which aligns with circular economic principles, namely maximizing resource utilization.

i. Integration with Drinking Water Safety Plan (RPAM)

Projects for water reuse, such as reclaimed water, rainwater harvesting, and greywater, need to be approved by the competent authorities as part of integrated water management through RPAM. This is important because the utilization of water resources must follow principles of efficiency, sustainability, and appropriate use, and comply with national regulations.[29] RPAM, as a national framework based on the WHO Water Safety Plan and compatible with ISO 9001 and 14001, not only identifies risks of

[26] Acreman, M., & Dunford, R. Nature-based solutions for floods and droughts and biodiversity: Do we have sufficient proof of their functioning? Cambridge Prisms: Water, *1*, e14. 2023. [Online]. Available at: https://doi.org/10.1017/wat.2023.14
[27] A. M. Alqaralleh, A. Al-Mashaqbeh, and M. Al-Omari. "Anaerobic digestion of sewage sludge: Current status and challenges." Processes, vol. 13, no. 4, p. 940, Apr. 2023. [Online]. Available at: https://www.mdpi.com/2227-9717/13/4/940
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[29] Ministry of Public Works and Public Housing of the Republic of Indonesia. Regulation of the Minister of Public Works and Public Housing Number 09/PRT/M/2015 concerning General Guidelines for Urban Drainage Systems. Jakarta: Kementerian PUPR, 2015. [Online]. Available at: https://peraturan.bpk.go.id/Details/159865/permen-pupr-no-09prtm2015-tahun-2015

drought and limitations in raw water, but also opens opportunities to integrate reuse as an adaptive and sustainable strategy to climate change.

2. Collection of Non-hazardous and Hazardous Waste

This activity includes the sub-activities of Collection and Transport of Non-Hazardous and Hazardous Waste, which cover only EO1 – Climate Change Mitigation, EO3 – Protection of Healthy Ecosystem and Biodiversity, and EO4 – Resource Resilience and the Transition to a Circular Economy.

a. EO1 – Climate Change Mitigation

For this activity, the main indicators used are the sorting of non-hazardous waste and the emissions from the transport vehicles. Both indicators reflect contributions to GHG emissions, where sorting non-hazardous waste has the potential to reduce GHG emissions, while emissions from transport vehicles represent direct GHG emissions.

i. Sorting of Non-hazardous Waste

In the collection and transport of non-hazardous waste, **sorting of non-hazardous waste must be carried out at the source**. Furthermore, ensuring that waste is transported to recycling or reuse processes will strengthen material efficiency and the circular economy. This will **reduce reliance on landfills and incineration**, thereby lowering GHG emissions from methane combustion. This approach aligns with national policy that mandates the separate sorting, collection, and utilization of non-hazardous waste to promote waste reduction.[30]

ii. Emissions from Transport Vehicles

In the waste transport process, climate change mitigation can also be achieved through the transport vehicles themselves. This can be measured by the greenhouse gas emissions produced by vehicles, thus **compliance with motor vehicle emission standards is required**. This indicator aligns with national policy that sets emission standards for motor vehicles in categories M, N, O, and L (including goods and waste-transport vehicles).[31]

b. EO3 – Protection of Healthy Ecosystem and Biodiversity

For this activity, the main indicators used are the sorting of non-hazardous waste and the handling of hazardous waste. These two indicators reflect the protection of ecosystems and biodiversity, where sorting non-hazardous waste demonstrates efforts to separate non-hazardous waste to prevent mixing with hazardous waste, while handling hazardous waste demonstrates the safe and controlled management of hazardous waste to prevent environmental pollution.

i. Sorting of Hazardous Waste

In the collection and transport of hazardous and toxic waste, hazardous waste **must be sorted at the source** and collected separately from non-hazardous waste to **prevent cross-contamination**. Hazardous waste that is not properly sorted and managed can contaminate soil, water, and air, cause physiological disturbances in plants, poison fauna, and damage food chains.[32] This indicator aligns with national policy on procedures for hazardous waste management.[33]

ii. Handling of Hazardous Waste

In the collection and transport of hazardous and toxic waste, hazardous waste **must be handled properly**, including using leak-proof containers appropriate to the waste type, secondary containment

[30] Ministry of Environment and Forestry of the Republic of Indonesia. Regulation of the Minister of Environment and Forestry Number 19 of 2021 concerning Procedures for the Management of Non-Hazardous and Non-Toxic Waste. Jakarta: KLHK, 2021. [Online]. Available at: https://peraturan.bpk.go.id/Details/235343/permen-lhk-no-19-tahun-2021

[31] Ministry of Environment and Forestry of the Republic of Indonesia. Regulation of the Minister of Environment and Forestry Number 8 of 2023 concerning the Application of Emission Standards for Motor Vehicles of Category M, Category N, Category O, and Category L. Jakarta, August 4, f2023. [Online]. Available at: https://peraturan.bpk.go.id/Details/262504/permen-lhk-no-8-tahun-2023

[32] M. Njewa, M. M. Momba, and T. M. Mulaudzi. "Emerging contaminants and nanoplastics in Southern African dumping sites: A review of environmental and health risks," *Water Emerg. Contam. Nanoplastics*, vol. 3, no. 1, pp. 1–17, 2024. [Online]. Available at: https://www.oaepublish.com/articles/wecn.2024.71

[33] Ministry of Environment and Forestry of the Republic of Indonesia. Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste, Jakarta, April 1, 2021. [Online]. Available at: https://peraturan.bpk.go.id/Details/211000/permen-lhk-no-6-tahun-2021

systems, routine inspections, proper loading and secure procedures, emergency preparedness such as equipping vehicles with spill response equipment, and employee training.

Proper handling aims **to prevent leaks, spills, and environmental pollution** that may occur during the collection and transportation of hazardous waste. The bioaccumulation and biomagnification effects of leaks of toxic substances in hazardous waste can cause nervous system damage and death in apex predators, as well as declines in populations of endemic and rare species.[34] This indicator aligns with national policy that establishes procedures for hazardous waste management, including the obligation to use leak-proof containers, secondary containment systems, and safe transport procedures to prevent leaks of hazardous substances.**Error! Bookmark not defined.**

c. EO4 – Resource Resilience and the Transition to a Circular Economy

For this activity, the main indicator used is the transport of non-hazardous and hazardous waste for recovery purposes. This indicator ensures that waste is transported for recovery purposes such as recycling or waste-to-energy.

i. Transportation of Non-Hazardous and Hazardous Waste for Recovery Purposes

Sorting waste at the source and transporting it to recovery facilities are key steps in turning waste into a resource rather than an environmental burden. Circular economy principles emphasize “refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, and recover”, which can only be achieved if waste is sorted and directed to recovery processes for reuse, recycling, or conversion to waste-to-energy. Waste sorting and recovery **support resource resilience** by reducing dependence on new raw materials and preventing excessive exploitation of natural resources.

3. Non-Hazardous Waste Management

This activity includes the sub-activities of (a) Anaerobic Digestion of Bio-Waste, (b) Waste-to-Energy, Excluding Bio-Waste, (c) landfill Gas Capture and Utilization, and (d) Composting of Bio-Waste, which cover EO1 – Climate Change Mitigation for (a) and (c), and EO4 – Resource Resilience and the Transition to a Circular Economy for (b) and (d).

a. EO1 – Climate Change Mitigation

For this activity, the main indicators used are biogas utilization and feedstock utilization. These two indicators demonstrate the activity’s contribution to GHG emissions, where biogas utilization aims to reduce methane, while feedstock utilization ensures the efficiency of the treatment facility.

i. Biogas Utilization

Biogas produced from waste or landfills must be utilized, for example for electricity/heat generation, upgrading to biomethane, or as fuel for industry and transportation. This utilization is categorized as a “Green” measure because, in addition to reducing waste volume through anaerobic processes, it also contributes to the clean energy transition and carbon emissions reduction. This is possible because directly utilized biogas produces renewable energy and avoids the release of methane into the atmosphere, which has a much higher global warming impact than CO_2.

Flaring, or the direct combustion of biogas, can be identified as a Transition step toward “Green.” Although flaring still produces greenhouse gases from CO_2, its global warming impact is lower than the combustion of methane.

ii. Feedstock Utilization

In anaerobic digestion installations, restricting the use of food crops and livestock feed as feedstock is intended to prevent conflicts between waste management and food security, and to ensure **the facility remains focused on waste treatment rather than converting food into energy**. This restriction is consistent with national policy on the principle of prioritizing resource use for basic human needs.

b. EO4 – Resource Resilience and the Transition to Circular Economy

[34] R. Renuka and D. Patyal. “Toxic metals in the environment: Bioaccumulation and biomagnification.” in Global Perspectives of Toxic Metals in Bio Environs. Springer, 2025. [Online]. Available at: https://link.springer.com/chapter/10.1007/978-3-031-40341-4_2

For this activity, the main indicators used are energy conversion efficiency and bottom ash recovery. Both indicators demonstrate recovery efficiency, where energy conversion efficiency reflects energy recovery, while bottom ash recovery reflects material recovery.

i. Energy Conversion Efficiency

Global technical studies show that modern waste-to-energy facilities using advanced thermal technologies such as CHP (Combined Heat and Power) and gasification can achieve efficiencies above 25%, especially when equipped with energy recovery systems.[35] Conversely, facilities with efficiencies below 10% are considered to have low energy input output ratios and be less favorable from a sustainability perspective. Other global practices indicate that technologies such as gasification and pyrolysis deliver higher efficiencies and lower environmental impacts compared to conventional incineration.[36] Therefore, at waste-to-energy facilities, net energy efficiency must be ≥25% for the "Green" classification and 10–25% for the "Transition" classification.

ii. Bottom Ash Recovery

There are differences in characteristics between bottom ash and fly ash, in terms of technical aspects, recovery potential, and environmental risks. Bottom ash is more chemically stable and contains metals such as iron, aluminum, and copper in forms that can be mechanically recovered, with recovery rates of ≥90% using technologies such as magnetic separation and eddy current separation[37]. Conversely, fly ash has high toxicity potential and complex contaminant content, so its management focuses more on emission control and waste stabilization rather than material recovery. This approach aligns with national policy that differentiates the management of bottom ash and fly ash from thermal waste processing.[38]

The TSC focuses on metal recovery from bottom ash, with targets of ≥75% for the "Green" classification and ≥50% for the "Transition" classification. Meanwhile, no similar obligation is imposed for fly ash. This approach is considered more relevant to supporting resource resilience and the transition to a circular economy, given the technical characteristics of bottom ash that enable efficient and environmentally friendly metal recovery.

4. Hazardous Waste Treatment Activities

This activity includes the sub-activity of Treatment of Hazardous Waste, which covers EO3 – Protection of Healthy Ecosystem and Biodiversity and EO4 – Resource Resilience and the Transition to a Circular Economy.

a. EO3 – Protection of Healthy Ecosystem and Biodiversity

For this activity, the main indicators used are compliance of all hazardous and toxic waste management processes with regulations and leachate quality. These two indicators are needed to ensure that hazardous waste does not pollute the environment, where compliance across all processes reflects the procedures, while leachate quality reflects the pollutant quality standards.

i. Compliance of Hazardous Waste Management Processes with Regulations

Hazardous waste has characteristics such as being **toxic, corrosive, explosive, carcinogenic, and reactive**, which can cause **serious impacts on human health and the environment** if not managed properly. Therefore, hazardous waste management must comply with applicable national regulations on the procedures and requirements for hazardous waste management, including waste treatment, incineration, and safe final disposal.[31]

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[35] I. U. Rahman, H. J. Mohammed, and A. Bamasag, "An exploration of recent waste-to-energy advancements for optimal solid waste management," *Discover Chemical Engineering*, vol. 5, no. 7, Mar. 2025. [Online]. Available at: https://link.springer.com/article/10.1007/s43938-025-00079-8

[36] P. N. Y. Yek, A. A. Ghani, M. R. M. Zain, M. R. A. Kadir, and M. A. A. Aziz, "Co-processing plastics waste and biomass by pyrolysis–gasification: a review," *Environmental Science and Pollution Research*, vol. 30, pp. 62000–62027, 2023. [Online]. Available at: https://link.springer.com/content/pdf/10.1007/s10311-023-01654-7.pdf

[37] Adhiwiguna, I. B. G. S., Ramalingam, K., Becker, K.-H., Khoury, A., Warnecke, R., & Deike, R. Extended material recovery from municipal solid waste incinerator bottom ash using magnetic, eddy current, and density separations. Recycling, 10(1), 16, 2025. [Online]. Available at: https://doi.org/10.3390/recycling10010016

[38] Ministry of Environment and Forestry of the Republic of Indonesia. Regulation of the Minister of Environment and Forestry Number 26 of 2020 concerning the Management of Bottom Ash and Fly Ash Resulting from Thermal Waste Processing, Jakarta, December 23, 2020. [Online]. Available at: https://peraturan.bpk.go.id/Home/Details/163449/permen-lhk-no-26-tahun-2020

ii. Leachate Quality

Leachate quality at landfills **must meet standards in accordance with national regulations** to prevent environmental pollution.[39] Leachate is the liquid effluent from waste deposits that contains organic matter (measured through Biological Oxygen Demand/BOD and Chemical Oxygen Demand/COD) as well as heavy metals such as mercury and cadmium. High BOD and COD indicate potential depletion of dissolved oxygen, which can harm aquatic ecosystems. Heavy metals risk accumulating in the food chain through biomagnification. The prescribed standards include pH (6–9), BOD (≤150 mg/L), COD (≤300 mg/L), and heavy metal concentrations within very low limits. By ensuring that leachate meets these standards, the risk of aquatic habitat degradation and species loss can be reduced.

b. EO4 – Resource Resilience and the Transition to a Circular Economy

For this activity, the main indicator used is material recovery from hazardous waste. This indicator shows that materials can be recovered from hazardous waste to support the circular economy.

i. Material Recovery from Hazardous Waste

In the process of managing hazardous and toxic waste, materials are often successfully recovered. Materials recovered from this hazardous waste **must be used as substitutes for primary raw materials or chemicals in production processes**. These production processes refer to various types of industrial processes that use chemicals or materials as production inputs, for example the use of heavy metal residues from galvanization or electronic waste for the recovery of metals such as lead, copper, or nickel.

Reusing these materials not only reduces dependence on limited natural resources but also mitigates the environmental impacts of extracting and producing new materials.

This indicator aligns with national policy, which stipulates that hazardous waste that has been processed and meets technical standards may be reused as raw materials or substitute materials in production processes, provided it does not create new risks to the environment or human health.**Error! Bookmark not defined.**

5. Recycling Activities

This activity includes the sub-activities of (a) Materials Recovery from Non-hazardous Waste Activities and (b) Depollution and Dismantling of End-of-life Products Activities, which cover EO4 – Resource Resilience and the Transition to a Circular Economy.

a. EO4 – Resource Resilience and the Transition to a Circular Economy

For this activity, the main indicator used is the material recovery efficiency target. The efficiency target indicates the proportion of material successfully recovered and reused from the total incoming waste, so this indicator reflects the effectiveness of recycling.

i. Material Recovery Efficiency Target

In recycling processes, a material recovery efficiency of ≥50% is an indicator that waste treatment facilities truly contribute to reducing residual waste and reusing materials, rather than merely disposing of them. In a circular economy, waste such as PET, paper, and organics can be processed into recycled products that replace primary raw materials, thereby extending material lifecycles and reducing the exploitation of natural resources. This indicator aligns with national policy, which stipulates that waste utilization must be carried out safely and efficiently, encourages reuse as substitute materials,[40] and targets increased utilization of waste as a resource.[41]

[39] Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. Peraturan Menteri Lingkungan Hidup dan Kehutananomor 59 Tahun 2016 tentang Baku Mutu Lindi bagi Usaha dan/atau Kegiatan Tempat Pemrosesan Akhir Sampah, Jakarta, 12 Juli 2016. [Online]. Available at: https://peraturan.bpk.go.id/Home/Details/168713/permen-lhk-no-59-tahun-2016 [Diakses: 17 September 2025].
[40] Government of the Republic of Indonesia. Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management, Jakarta, February 2, 2021. [Online]. Available at: https://peraturan.bpk.go.id/Home/Details/161852/pp-no-22-tahun-2021
[41] Ministry of National Development Planning/National Development Planning Agency (*Bappenas*). *Peta Jalan dan Rencana Aksi Nasional Ekonomi SIRKULAR 2025-2045*, Jakarta, June 2024.

6. Remediation Activities

This activity includes the sub-activities of (a) Remediation of Contaminated Sites and Areas and (b) Remediation of Legally Non-Conforming Landfills and Abandoned or Illegal Waste Dumps that do not comply with legal requirements and of abandoned or illegal dumpsites, which cover EO3 – Protection of Healthy Ecosystem and Biodiversity.

a. EO3 – Protection of Healthy Ecosystem and Biodiversity

In remediation activities, three main indicators are used: accountability, remediation methods, and post-remediation monitoring. These three indicators reflect the effectiveness of environmental protection. Accountability indicates the responsibility of the actors; remediation methods show the approach to ecosystem restoration; post-remediation monitoring demonstrates the sustainability of biodiversity protection.

i. Accountability

In developing the TSC, remediation activities must not be carried out by the operator that caused the pollution or any party acting on its behalf, **to maintain accountability** of the remediation process. The main principle underlying the development of this TSC is the "polluter pays" principle, which is stipulated in national policy stating that polluters are obliged to undertake environmental restoration. This principle affirms that the party that caused the pollution is responsible for the costs of environmental restoration.[42]

ii. Restricted Remediation Methods

Remediation methods **must not use dilution or flushing** to reduce pollutant concentrations, as this merely spreads pollutants to other media without removing them from the environment. This practice risks contaminating groundwater, harming microorganisms, disrupting nutrient balance, polluting water sources, and endangering flora and fauna that depend on those sources. In the long term, this contamination burden is difficult to remediate and threatens ecosystem sustainability.[43]

iii. Post-Remediation Monitoring

In the remediation process, **post-remediation monitoring is required**. Contaminants that have been controlled during the active remediation phase can exhibit dynamic behavior in the environment, such as migration through groundwater, changes in chemical form, or interactions with local geological and biological conditions. Without continued monitoring, potential contamination rebounds, leaks, or control system failures may not be detected early.[44] This can cause contaminants to spread to wider areas, pollute water sources, damage soil microorganism habitats, and disrupt ecosystem balance.

This indicator aligns with national policy, which has established mandatory stages in contaminated land remediation, including identification of contamination sources, geological surveys and contaminant characterization, setting environmental targets, prohibition of dilution methods, and post-remediation monitoring.[45]

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[42] House of Representatives of the Republic of Indonesia and the President of the Republic of Indonesia. Law Number 32 of 2009 concerning Environmental Protection and Management, Jakarta, October 3, 2009. [Online]. Available at: https://jdih.esdm.go.id/common/dokumen-external/UU%2032%20Tahun%202009%20(PPLH).pdf.pdf)

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B.5. Sunsetting Criteria and Timeline

Sunset Dates for the WSSWM Sector

Definition and Purpose

Sunsetting means gradually terminating the validity period of the "Transition" classification on a predetermined date. The purpose of setting a sunset date is to provide time certainty for businesses to adjust the established standards, and to ensure that the criteria used remain relevant to technological developments, decarbonization plans, market dynamics, policies, and international best practices.

The overall mechanism for periodic review of the TSC, including the setting of sunset dates, for all sectors in the TKBI is currently under development. The detailed scheme under consideration regarding Grandfathering and Sunsetting is contained in the Consultative Paper, which is a separate part of this document.

Proposed Sunset Dates

In the WSSWM sector, there are two activities that have a sunset date under the "Transition" classification, namely:

1. Water, Wastewater Management and Nature-based Solutions activities, namely:
    a. **December 31, 2035**
    This sunset date applies only to the sub-activities of Desalination; Construction, Expansion, and Operation of Wastewater Collection and Treatment Systems; and Renewal of Wastewater Collection and Treatment Systems.
2. Non-Hazardous Waste Management activities, namely:
    a. **December 31, 2030**
    This sunset date applies only to the sub-activities of Anaerobic Digestion of Bio-Waste and landfill Gas Capture and Utilization.

After the sunset date, only the TSC under the "Green" classification will apply.

Rationale

The setting of sunset dates is intended to maintain **alignment and interoperability** with international taxonomies, including the ASEAN Taxonomy for Sustainable Finance (ATSF). The sunset date is determined based on various considerations in the ATSF, including:

1. Projections for the development and availability of new technologies;
2. The need to ensure alignment and interoperability with other internationally applicable taxonomies;
3. The existence of globally recognized decarbonization pathways for certain industrial sectors;
4. A realistic timeframe for implementing improved processes across the ASEAN region;
5. Alignment with the activity evaluation cycle within the ATSF framework.

The setting of the December 31, 2035, sunset date for the desalination sub-activity and for the construction, expansion, and renewal of wastewater treatment systems is aligned with Indonesia's energy decarbonization roadmap. The Government of Indonesia, through its commitment in the Enhanced Nationally Determined Contribution (ENDC) document, targets a 23% reduction in carbon emissions by 2035 compared to 2019 levels. This target is part of a long-term strategy toward Net Zero Emissions (NZE) in 2060, with peak energy sector emissions planned to be reached in 2030. As most emissions from sub-activities in the water supply subsector originate from electricity consumption for treatment and pumping processes, the transition to low-carbon technologies is crucial. Setting a deadline through 2035 provides room for sector actors to adapt to more efficient, renewable energy-based technologies, while supporting the gradual and measurable achievement of national decarbonization targets.

The setting of sunset dates for several sub-activities in non-hazardous waste management has been aligned with Indonesia's decarbonization roadmap, particularly for the waste sector. In the Enhanced Nationally Determined Contribution (ENDC) document, the Government of Indonesia targets a reduction of 40–43.5 million tons CO_2e in greenhouse gas (GHG) emissions from the waste sector by 2030. This target will be achieved through various mitigation measures, including the application of 3R principles (reduce, reuse, recycle) and recovery of methane gas from bio-waste. Therefore, December 31, 2030, is determined as the sunset date for the sub-activities of anaerobic decomposition of organic waste and the capture and utilization of landfill gas. Given that emissions from

these activities largely originate from energy consumption and methane release, this time limit is an important instrument to encourage the adoption of cleaner, more efficient technologies before 2030.

Discussion Points

1	**General**	Is the proposed sunset date concept sufficiently clear, and is the proposed setting of the sunset date appropriate to Indonesia's context? If not, please provide recommendations for a more relevant sunset date based on industry practice, along with its justification.
2	**General**	Will there be any potential challenges or obstacles that may arise concerning the sunset date? If yes, please provide suggestions on the types of support that may be needed to achieve the sunset date target.

B.6. Definitions of Terminology Related to the TSC

This section provides definitions of the terminology used in various activities within the TSC. The definitions included here apply across multiple activities and are provided for easy reference.

Table 4. Terminologies Used in the TSC

Terminology	Description
Segment of the Network	Defined section or part of the overall water distribution system, typically bounded by physical, operational, or administrative limits, over which distribution losses are measured and reported.
Distribution Loss	An aspect of NRW that represents actual physical water loss from the distribution system. It does not include broader NRW features such as apparent losses like water theft and inaccurate metering, which are not directly related to the physical state of the distribution system.
Produced Water Supply	total volume of potable or treated water that has been abstracted, processed through the treatment system, and is ready for distribution or delivery to end users.
Other Appropriate Methods	Specifically, for the "Transition" classification of the Renewal of Water Collection, Treatment and Supply System Activity, other appropriate methods are considered valid and recognized approaches for calculating the level of water leakage in the distribution system, aside from the distribution loss method. Examples include: **a. Minimum night flow analysis:** Measuring water flow during low-use nighttime hours to estimate leakage. **b. Water balance auditing:** Using the IWA (International Water Association) Water Balance methodology. c. **Component analysis:** Estimating losses based on physical characteristics of the network (e.g. pipe length, age, material). **d. Advanced metering and monitoring systems:** Using smart meters or pressure loggers to identify and quantify leaks.
Completion of Commissioning and Optimization Phase	The point at which a renewed or newly installed water collection, treatment, and/or supply system has undergone all required testing, calibration, and performance verification to ensure it is operating safely, efficiently, and in line with design specifications and regulatory standards
Net Energy Consumption	The total amount of energy used by the wastewater treatment plant for all treatment processes and supporting systems, minus any on-site renewable energy or energy recovered and reused within the facility.
Source Control	Measures implemented at or near the point where wastewater or stormwater is generated, aimed at reducing the volume or pollutant load entering the wastewater treatment system.
Good Status of Water Bodies	Good status is a classification for surface and groundwater bodies that reflects both ecological and chemical or quantitative health. Achieving good status means that the water body meets the minimum requirements for supporting aquatic life, safe use, and natural ecosystem functioning.
Ecological Potential	The best achievable ecological condition of an affected water body.
Material Change	In the context of Renewal of Wastewater Collection and Treatment Activity, a 'material change' is any alteration in external conditions that could reasonably be expected to cause a measurable or
Own Baseline	In the context of the Renewal of Wastewater Collection and Treatment System Activity, own baseline refers to the historical energy performance of a specific wastewater treatment facility being assessed, calculated as the average over the last three years. This indicator shows the average annual energy consumption calculated during a defined reference period, prior to the renewal or upgrade. This baseline is unique to each facility and is used as a benchmark to measure future improvements in energy efficiency (for example, a reduction of 20%).

Terminology	Description
Agglomeration	Population center (including residential, industrial, and commercial zones) where wastewater is collected and conveyed to a treatment facility, either through a centralized sewerage system or a network of collection systems.
Waste Segregation	The waste is not mixed with other waste or materials with different properties.
Different Properties	In the context of Collection and Transport of Non-Hazardous and Hazardous Waste Activity, different properties refer to differences in the physical, chemical, or biological characteristics of materials that affect how they are handled, treated, or recycled.
Feedstock Management	The process of controlling characteristics of incoming materials to support effective composting.
Residual Waste	Non-recyclable fraction of waste.
Pre-Sorting	Process where the input waste has undergone sorting of recyclables at an intermediate facility such as a Material Recovery Facility (MRF) or undergone segregation prior to any waste treatment or disposal.
Net Energy Efficiency	Percentage of the energy content in the waste that is converted into usable electricity.
Meteorological Monitoring	Monitoring of weather parameters including precipitations (rain), temperature, wind direction and speed, humidity and evaporation.
Recovery Efficiency	Percentage of material recovered (for reuse, recycling, or recovery) from the total input waste.
Output Quality Management System	A structured set of procedures, controls, monitoring activities, and documentation designed to ensure that the materials produced by a materials recovery facility consistently meet applicable quality requirements, standards, and end-of-waste criteria.
Potential Environmental Pollution	The possibility of introducing into or onto waters, land or air any matter, whether solid, liquid or gaseous: • that causes or is likely to cause the physical, chemical or biological condition of the waters, land or air to be adversely affected, or • that causes or is likely to cause harm to the health or safety of human beings or to any other aspect of the environment.

For each activity covered, evidence is required to demonstrate that the Technical Screening Criteria (TSC) have been met. The following is a list of types of evidence that may be requested, but are not limited to:

Environmental Licenses and Permits

Copies of relevant licensing documents and environmental permits, including but not limited to:

1. Plant operating permits, license, and other legal documents
2. Fertilizer or soil amendment registration certificates from the regulatory authority, if used for commercial purposes
3. Proof of annual vehicle inspection as compliance with national emissions regulations
4. Valid operating permits for activities involving the collection, transport, handling, recovery, and/or treatment of certain types of waste, such as hazardous waste and electrical and electronic equipment waste (EEE).

Standard Operating Procedures (SOP)

Relevant SOP documentation for all aspects of the activity, including but not limited to:

1. Procedures for waste acceptance, sorting, and tracking
2. Procedures for handling waste rejects
3. Procedures for preventing and controlling leachate leaks
4. Procedures for biogas utilization
5. Procedures for the utilization of digestate or compost that ensure material recovery is prioritized
6. Procedures for preventing methane leaks
7. Procedures for the safe handling, transport, and storage of EEE waste

Records and Documentation

Supporting documents demonstrating the implementation of SOPs, including but not limited to:

1. Employee training records related to environmental regulations, safety procedures, and best practices

2. Contract documents showing that recovered materials are used as substitutes for primary raw materials
3. Contract documents showing that transported waste will be sent to recycling or reuse facilities
4. Records of quantities of waste collected and the destination of waste by stream
5. Recent photographs of waste transport, storage, and collection facilities
6. [For Waste-to-Energy facilities or waste treatment] Reports on the types and quantities of pollutants discharged from industrial plants
7. Climate Risk and Vulnerability Assessment (CRVA)
8. Watershed management plans or water resource area plans for wastewater-related activities
9. Operational logs showing daily or hourly wastewater flow rates, as well as records of influent and effluent water quality
10. Energy consumption details showing per-unit energy use in the wastewater treatment installation, including documentation of energy generation within the system
11. GHG Emissions Assessment Report

Audits and Inspections

Internal and/or external audit records and facility inspection results, including but not limited to:

1. SNI ISO 14001:2015: Environmental Management System
2. Third-party inspection results on effluent quality
3. Independent assurance on GHG emissions and energy savings

C. List of Water Supply, Sewerage, and Waste Management Sector Activity

This section maps the available TSC to KBLI 2017 and 2020 codes covered under the WSSWM sector in TKBI. As a first step, taxonomy users can identify the relevant economic activity based on the list of activities in the KBLI. For example, if a user is engaged in raw water supply under KBLI code 36002, they can find the corresponding activity group in TKBI, such as the Clean Water Management, Wastewater, and Nature-Based Solutions group. Next, taxonomy users can refer to Section D to explore the relevant TSC for that activity group.

Table 5. List of Water Supply, Sewage, and Waste Management Sector Activities

KBLI 2017		KBLI 2020		Remarks
Code	**Activities**	**Code**	**Activities**	
1. Water, Wastewater Management and Nature-Based Solutions				
42211	Construction of Irrigation Networks	42201	Construction of Irrigation and Drainage Networks	Using **TSC ATSF v4** and **national policies:** • ***Construction, extension and operation of water collection, treatment and supply systems*** EO1: Green, Transition EO2, EO4: Green EO3: N/A • ***Desalination*** EO1: Green, Transition EO2: Green EO3, EO4: N/A • ***Renewal of water collection, treatment and supply systems*** EO1: Green, Transition EO2, EO3, EO4: N/A • ***Flood or drought risk prevention and protection, including nature-based solutions*** EO2: Green EO3: Green, Transition EO1, EO4: N/A • ***Construction, extension and operation of water collection, treatment and supply systems*** EO1, EO3: Green, Transition EO4: Green
42212	Construction of Water Treatment, Distribution and Storage Facilities, Wastewater and Drainage Systems	42202	Civil Construction of Clean Water Treatment Buildings	
42911	Construction of Water Resources Infrastructure	42911	Construction of Water Resources Infrastructure	
42915	Dredging	42914	Dredging	
36001	Storage, Purification, and Distribution of Drinking Water	36001	Storage, Purification, and Distribution of Drinking Water	
36002	Storage and Distribution of Raw Water	36002	Storage and Distribution of Raw Water	
36003	Water Treatment Support Activities	36003	Water Treatment Support Activities	
37011	Collection of Non-Hazardous Wastewaters	37011	Collection of Non-Hazardous Wastewaters	
37012	Collection of Hazardous Wastewaters	37012	Collection of Hazardous Wastewaters	

KBLI 2017		KBLI 2020		Remarks
Code	**Activities**	**Code**	**Activities**	
37021	Treatment and Disposal of Non-Hazardous Wastewater	37021	Treatment and Disposal of Non-Hazardous Wastewater	EO2: N/A • ***Renewal of wastewater collection and treatment*** EO1: Green, Transition EO2, EO3, EO4: N/A
37022	Treatment and Disposal of Hazardous Wastewater	37022	Treatment and Disposal of Hazardous Wastewater	
2. Waste Collection				
38110	Collection of Non-Hazardous Waste	38110	Collection of Non-Hazardous Waste and Garbage	Using **TSC ATSF v4** ***Collection and transport of non-hazardous and hazardous waste*** and **national policies:** EO1, EO4: Green, Transition EO3: Green EO2: N/A
38120	Collection of Hazardous Waste	38120	Collection of Hazardous Waste	
3. Non-Hazardous Waste Treatment				
35203	Procurement of Bio Gas	35203	Procurement of Bio Gas	Using **TSC ATSF v4** and **national policies:** • ***Anaerobic digestion of bio-waste*** EO1: Green, Transition EO2, EO3, EO4: N/A • ***Waste-to-Energy, not including bio-waste*** EO4: Green, Transition EO1, EO2, EO3: N/A • ***Landfill gas capture and utilization*** EO1: Green, Transition EO2, EO3, EO4: N/A • ***Composting of bio-waste*** EO4: Green, Transition EO1, EO2, EO3: N/A
38211	Treatment and Disposal of Non-Hazardous Waste	38211	Treatment and Disposal of Non-Hazardous Waste and Garbage	
38212	Production of Organic Waste Compost	38212	Production of Organic Waste Compost	
4. Hazardous Waste Treatment				
38220	Hazardous Waste Treatment and Disposal	38220	Hazardous Waste Treatment and Disposal	Using **TSC ATSF v4** ***Treatment of hazardous waste*** and **national policies** EO3, EO4: Green EO1, EO2: N/A

KBLI 2017		KBLI 2020		Remarks
Code	**Activities**	**Code**	**Activities**	
5. Recycling				
38301	Metal Scrap Recycling	38301	Metal Scrap Recovery	Using **TSC ATSF v4** and **national policies**: • ***Materials recovery from non-hazardous waste*** EO4: Green, Transition EO1, EO2, EO3: N/A • ***Depollution and dismantling of end-of-life products*** EO4: Green EO1, EO2, EO3: N/A
38302	Non-Metallic Material Recycling	38302	Non-Metallic Material Recovery	
6. Remediation				
39000	Remediation and Other Waste Management Activities	39000	Remediation and Management of Hazardous Waste and Other Waste Activities	Using **TSC ATSF v4** and **national policies**: • ***Remediation of contaminated sites and areas*** EO3: Green EO1, EO2, EO4: N/A • ***Remediation of legally non-conforming landfills and abandoned or illegal waste dumps*** EO3: Green EO1, EO2, EO4: N/A

Discussion Points

1	**General**	Are there any other activities not covered in the activity list table above that are relevant for consideration for inclusion in the activity list? If yes, please specify the activity (if possible, indicate the KBLI code of the relevant activity), along with the reasons why its inclusion is important.
2	**General**	Is the mapping and grouping of those activities already appropriate? If not, please provide recommendations for more relevant activity groupings along with their justification.

D. TSC for the Water Supply, Sewerage, and Waste Management Sector

This section outlines TSC for Activities within the WSSWM sector. Here are some guidelines to navigate this section.

- Once the corresponding activity group is identified using the mapping in Section C, taxonomy users can determine the specific activity that is relevant by double-checking the scope of the activity in the activity notes. For example, if a user has identified KBLI 36002 and seeks to apply taxonomy for clean water provision through desalination, then the user only needs to refer to the TSC for the Desalination activity.
- Furthermore, taxonomy users can determine the most relevant entry point EO or the one with the primary contribution to the economic activity, based on the available EOs. For example, for Desalination activities, users can determine whether EO1–Climate Change Mitigation or EO2–Climate Change Adaptation is morerelevant.
- Based on the selected EO, users can evaluate the economic activity or related assets using the available TSC to classify them as "Green" or "Transition." During this evaluation process, users may refer to the list of national regulations cited as references in each TSC table. Since the references in the TSC tables apply to the entire activity group, users can refer to the activity notes to identify which references are relevant to the criteria of the specific activity selected. However, it should be noted that these regulations are not the basis for the development of TSC but rather serve as references for alignment with applicable national policies.

1. Water, Wastewater Management and Nature-Based Solutions

Water, Wastewater Management and Nature-Based Solutions	
KBLI 2017	**Description**
E	Water, Wastewater, Waste Management and Recycling, and Remediation Activities
36	Water Management
360	Water Management
3600	Water Management
36001	**Storage, Purification, and Distribution of Drinking Water** This group includes activities involving the direct extraction of water from springs and groundwater, as well as the treatment of surface water from water sources, and the distribution of drinking water directly from water terminals through pipelines or tanker trucks (provided that the tanker trucks remain under the same administrative management of the water utility company) for sale to consumers or customers, such as households, government institutions/agencies, social organizations, state-owned enterprises, and private businesses, including hotels, manufacturing industries, and retail establishments.
36002	**Storage and Distribution of Raw Water** This group includes activities related to the provision and distribution of raw water for industrial purposes, power generation, and other uses. It also covers the management of irrigation networks but excludes the operation of irrigation equipment such as sprinklers for agricultural purposes.
36003	**Water Treatment Support Activities** This group includes activities directly related to the provision and distribution of clean water, such as meter reading services, billing, and other supporting activities. It also covers water distribution carried out by individuals, such as water vendors using shoulder poles, carts, or tanker trucks.

Water, Wastewater Management and Nature-Based Solutions	
KBLI 2017	**Description**
37	Wastewater Management
370	Wastewater Management
3701	Wastewater Management
37011	**Collection of Non-Hazardous Wastewaters** This group includes activities involving the collection and transportation of industrial or household wastewater that is non-hazardous through sewer networks, wastewater collectors, and other transport facilities (such as waste/sludge transport vehicles). It also covers septic tank (latrine) emptying and cleaning, as well as the cleaning of pits and waste/sludge disposal tanks, and the collection of wastewaters from chemical toilets (e.g., portable toilets, aircraft toilets, train toilets).
37012	**Collection of Hazardous Wastewaters** This group includes activities related to the collection and transportation of hazardous industrial wastewater or hazardous household wastewater through sewer systems, wastewater collectors, and other transportation facilities (waste/sewage transportation vehicles). It also encompasses activities related to the suction and cleaning of tanks, pits, and facilities used for hazardous wastewater disposal.
3702	Wastewater Management and Disposal
37021	**Treatment and Disposal of Non-Hazardous Wastewater** This group includes the operation of wastewater disposal systems or facilities for the treatment of non-hazardous wastewater; treatment of non-hazardous wastewater (including industrial and household wastewater, swimming pool water, and others) through physical, chemical, and biological processes such as dilution, filtration, sedimentation, and others. This group also includes the management and cleaning of non-hazardous wastewater channels and their drainage systems.
37022	**Treatment and Disposal of Hazardous Wastewater** This group includes the operation of wastewater disposal systems or facilities for the treatment of hazardous wastewater; treatment of hazardous wastewater (including industrial and household wastewater, and others) through physical, chemical, and biological processes such as dilution, filtration, sedimentation, and others. This group also includes the management and cleaning of hazardous wastewater channels and their drainage systems.
F	Construction
42	Civil Construction
422	Construction of Irrigation, Communication, and Waste
4221	Construction of Irrigation, Communication, and Waste
42211	**Construction of Irrigation Networks** This group includes activities related to the construction, upgrading, maintenance, and repair of water networks, irrigation systems (canals), reservoirs, siphons, and irrigation drainage systems.
42212	**Construction of Water Treatment, Distribution and Storage Facilities, Wastewater and Drainage Systems**

Water, Wastewater Management and Nature-Based Solutions	
KBLI 2017	**Description**
	This group includes activities related to the construction, maintenance, and repair of raw water intake and distribution structures, raw water treatment facilities, water towers and reservoirs, distribution and supply networks, and drinking water tanks; urban wastewater networks (domestic and industrial wastewater collection systems) and wastewater treatment facilities; residential drainage systems, retention ponds, pumping stations, and similar structures.
429	Other Civil Construction
4291	Other Civil Construction
42911	**Construction of Water Resources Infrastructure** This group includes activities related to the construction, upgrading, maintenance, and repair of water resource infrastructure such as dams, weirs, retention basins, sluice gates, aqueducts, check dams, flood control levees, seawalls, groins, reservoirs, and similar structures**.**
42915	**Dredging** This group includes dredging and maintenance of rivers, ports, swamps, lakes, navigation channels, ponds, and canals, whether light, medium, or heavy work. It also includes dredging for the construction of water transportation routes.

Activity Notes for Construction, Extension and Operation of Water Collection, Treatment and Supply Systems

1. Includes:
   a. Construction, expansion, and operation of new water collection and treatment systems, including the provision of potable water.
   b. Construction, extension, operation and renewal of facilities for producing reclaimed water, facilities for harvesting rain and storm water and facilities for collection and treatment of grey water.
   c. These alternative water resources are used to replace water from abstraction or from the drinking water supply systems and can be used for aquifer recharge, irrigation, industrial reuse, recreation and any other municipal use.
   d. Activity only includes the facilities and processes that make it possible for the water to be reused, such as facilities for recharging aquifers or surface water storages, and does not include the previous steps, such as primary and secondary steps in the wastewater treatment plant or the subsequent steps, necessary for the final reuse of these alternative water resources, such as irrigation systems.
2. Excludes:
   a. Desalination
3. KBLI codes 42211 and 42911 cover Construction of Civil Building activities and are included in the Construction and Real Estate (C&RE) sector within TKBI. However, the selection of the TSC in the taxonomy assessment must be aligned with the purpose of the activity:
   a. If the activity focuses on aspects of water collection, treatment, and supply, then use the TSC from the WSSWM sector.
   b. If the activity focuses on aspects of sustainable construction, then use the TSC from the C&RE sector.
4. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Reclaimed water standards

Minister of Health Regulation No. 2 of 2023 on the Implementation of Government Regulation No. 66 of 2014 concerning Environmental Health; regulates the final quality of reclaimed water through standards for drinking water, water for hygiene and sanitation purposes, and swimming pool water.

b. Greywater standards
   i. Minister of Environment Regulation No. 5 of 2014 on Wastewater Quality Standards; regulates the quality standards for domestic wastewater.
   ii. Minister of Environment / Environmental Control Agency Regulation No. 11 of 2025 on Wastewater Quality Standards and Wastewater Treatment Technology Standards for Domestic Wastewater; regulates domestic wastewater quality standards.
   iii. Minister of Health Regulation No. 2 of 2023 on the Implementation of Government Regulation No. 66 of 2014 concerning Environmental Health; regulate drinking water quality standards.

c. Rainwater harvesting guidelines
   Minister of Public Works Regulation No. 11/PRT/M/2014 on Rainwater Management in Buildings and Their Premises; regulates the management of rainwater harvesting.

Activity Notes for Desalination

1. Includes:
   a. Construction, extension, operation and renewal of facilities designed to remove salt and other impurities from saline water, including seawater and brackish water to produce freshwater suitable for human consumption, agricultural use or industrial applications requiring high quality water.
2. Examples of emissions to water include, but may not be limited to:
   a. Brine
   b. Heat
   c. Residual chemicals
3. Examples of emissions to air include, but may not be limited to:
   a. Nitrogen oxides (NO_x)
   b. Sulphur oxides (SO_x)
   c. Carbon monoxide (CO)
4. Substantial reductions in material physical climate risks can be demonstrated through quantitative or qualitative evidence.
5. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   Standards for technology, discharge processes, and emissions to air and water
   Minister of Health Regulation No. 2 of 2023 on the Implementation of Government Regulation No. 66 of 2014 concerning Environmental Health; regulates the final quality of reclaimed water through standards for drinking water, water for hygiene and sanitation purposes, and swimming pool water.

Activity Notes for Renewal of Water Collection, Treatment and Supply Systems

1. Renewal of water collection, treatment and supply systems including renewals to water collection, treatment and distribution infrastructures for domestic and industrial needs, including drinking water.
2. It implies no material changes to the volume of flow collected, treated or supplied.

3. The Activity only includes the facilities and processes that make it possible for the water to be reused, such as facilities for recharging aquifers or surface water storages, and does not include the previous steps, such as primary and secondary steps in the wastewater treatment plant or the subsequent steps, necessary for the final reuse of these alternative water resources, such as irrigation systems.
4. KBLI codes 42911 cover Construction of Civil Building activities and are included in the Construction and Real Estate (C&RE) sector within TKBI. However, the selection of the TSC in the taxonomy assessment must be aligned with the purpose of the activity:
    a. If the activity focuses on aspects of water collection, treatment, and supply, then use the TSC from the WSSWM sector.
    b. If the activity focuses on aspects of sustainable construction, then use the TSC from the C&RE sector.

Activity Notes for Flood or Drought Risk Prevention and Protection, Including Nature-Based Solutions

1. Activity refers to structural (including civil engineering structures) and nature-based measures aimed at protection of people, ecosystems, cultural heritage and infrastructure against floods and droughts.
2. The primary goal of this Activity is to support protection and prevention efforts against flood and drought risks.
3. Includes:
    a. The design, construction, extension, rehabilitation, upgrade and operation of structural measures, including planning, construction, extension; and
    b. Planning, construction, extension and operation of large-scale nature-based flood or drought management and coastal, transitional or inland aquatic ecosystem restoration measures contributing to preventing and protecting against flooding or droughts, and enhancing natural water retention, biodiversity and water quality.
4. Structural measures undertaken include:
    a. Dikes, river embankments;
    b. Sea defense dikes, storm-surge barriers, seawalls, groins and breakwaters;
    c. On-line and off-line buffer basins for flood detention and control in natural and artificial drainage networks
    d. Measures to control floods by increasing the retention capacity of catchment areas, such as implementing distributed buffer basins or sewer overflow structures;
    e. Hydraulic structures to regulate water flow such as pumping stations, sluices, gates;
    f. Sediment control structures.
    g. Large-scale nature-based flood or drought management measures applied in peri-urban, rural and coastal areas and are coordinated at river basin, regional or local, such as municipal, scale.
5. Nature-based solutions may include:
    a. River or lake related measures, including riparian or floodplain vegetation development or floodplain restoration, including re-connection of a river or lake with its floodplain or off-channel/lateral connectivity improvement to restore the retention capacity of the floodplain and its ecosystem's function;
    b. Re-meandering river courses by creating a new meandering course or reconnecting cut-off meanders or reconnecting a lake or group of lakes to a river;
    c. Restoration of the longitudinal and lateral connectivity of a river (including oxbow lakes) by removing obsolete barriers, including dams and weirs or small barriers across or along the river;
    d. Substitution of artificial riverbank or lake shore protection with nature-based solutions for bank or bed stabilization as measures for river or lake restoration;
    e. Measures aimed to improve the diversification of river or lake depth and width to increase habitat variety.
    f. Wetland restoration to enhance floodwater retention and groundwater recharge;
    g. Riparian buffer zones to restore vegetation along waterways to reduce erosion and slow floodwaters;
    h. Mangrove and coastal ecosystem restoration to protect coastal areas from storm surge and sea level rise;

i. Sustainable urban drainage such as bioswales;
j. Urban wetlands and retention ponds;
k. Soil restoration.

6. Excludes:
   a. Non-structural measures, such as those listed below.
      I. flood awareness raising campaigns;
      II. flood modelling and forecasting, flood hazard and risk mapping;
      III. spatial planning in flood-prone areas aimed at reducing flood risks, such as by applying restrictions to land uses and enforcing protection criteria through building codes;
      IV. flood early warning systems.
   b. Non-structural measures must be classified, as relevant, under Programming and Broadcasting Activities in the Information and Communication sector within TKBI, and under Professional Engineering Services and Related Technical Consultancy for Environmental-Related Services and Energy Performance of Industries Activities in the Professional, Scientific, and Technical (PST) sector within TKBI.
   c. Infrastructure for water transport such as waterways, harbors and marinas, emergency response in case of a flood event, consultancy of physical climate risk management and adaptation, and software enabling structural and non-structural measures for flood and drought risk prevention and protection.
   d. Construction, modification or removal of on-line water retaining structures that result in impoundment primarily for the purposes of hydropower use or irrigation.
7. Substantial reductions in material physical climate risks can be demonstrated through quantitative or qualitative evidence.
8. KBLI codes 42911 and 42915 cover Construction of Civil Building activities and enabling activities and are included in the Construction and Real Estate (C&RE) sector within TKBI. However, the selection of the TSC in the taxonomy assessment must be aligned with the purpose of the activity:
   a. If the activity focuses on aspects of flood or drought risk prevention and protection, then use the TSC from the WSSWM sector.
   b. If the activity focuses on aspects of sustainable construction, then use the TSC from the C&RE sector.
5. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. National Biodiversity Strategy and Action Plan in setting conservation and nature restoration targets
      Indonesia Biodiversity Strategy and Action Plan (IBSAP) 2025–2045, coordinated by Bappenas; serves as a strategic framework for sustainable biodiversity management in Indonesia, aligned with long-term national development goals.
   b. National Disaster Risk Management Plan
      National Disaster Management Agency (BNPB) Regulation No. 1 of 2025 on the National Disaster Management Plan 2025–2029; outlines the national strategy for disaster risk reduction and resilience, based on the Disaster Management Master Plan 2020–2044.

Activity Notes for Construction, Extension and Operation of Wastewater Collection and Treatment

1. Construction, extension and operation of centralized wastewater systems including collection (sewer network) and treatment.
2. This Activity also includes the construction, extension, upgrade, and operation of decentralized wastewater infrastructure including treatment plants, sewer networks, connections to the wastewater infrastructure, decentralized wastewater treatment facilities, including individual and other appropriate systems, and discharge structures for treated effluent. The Activity may include innovative and advanced treatments, including the removal of micropollutants.
3. Decentralized treatment plants consist of on-site and cluster wastewater treatment plants. Sources of wastewater include human, industrial, and agricultural wastewater.

4. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Requirements for the size of decentralized wastewater treatment systems
      Minister of Public Works and Housing Regulation No. 04/PRT/M/2017 on the Implementation of Domestic Wastewater Management Systems; regulates the design and capacity of domestic wastewater treatment systems.
   b. Requirements for discharge by authorized authorities
      i. Minister of Environment and Forestry Regulation No. 5 of 2021 on Procedures for Issuing Technical Approvals and Operational Eligibility Letters in the Field of Environmental Pollution Control; regulates technical licensing procedures for wastewater discharge.
      ii. Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates technical and administrative requirements for managing hazardous waste that may arise from wastewater treatment processes.
   c. Contribution to the bodies of water quality
      Minister of Health Regulation No. 2 of 2023 on the Implementation of Government Regulation No. 66 of 2014 concerning Environmental Health; regulates standards for drinking water, water for hygiene and sanitation purposes, and swimming pool water.
   d. Treatment of sludge from wastewater processing
      iii. Minister of Public Works and Housing Regulation No. 04/PRT/M/2017 on the Implementation of Domestic Wastewater Management Systems; regulates the management of fecal sludge and sludge from domestic wastewater treatment
      iv. Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates the management of sludge categorized as hazardous and toxic waste (B3).
   e. Quality of water from treatment
      Minister of Health Regulation No. 2 of 2023 on the Implementation of Government Regulation No. 66 of 2014 concerning Environmental Health; regulates standards for drinking water, water for hygiene and sanitation purposes, and swimming pool water.

Activity Notes for Renewal of Wastewater Collection and Treatment

1. Renewal of centralized wastewater systems including collection (sewer network) and treatment. It implies no material change related to the load or volume of flow collected or treated in the wastewater system.
2. This Activity also includes the renewal of wastewater infrastructure including treatment plants, sewer networks, connections to the wastewater infrastructure, decentralized wastewater treatment facilities, including individual and other appropriate systems, and discharge structures for treated effluent. The Activity may include innovative and advanced treatments, including the removal of micropollutants.

Table 6. TSC for Water, Wastewater Management, and Nature-Based Solutions

Classification	Technical Screening Criteria (TSC)	References
	EO1: Climate Change Mitigation	
Green	**If the Activity is Construction, Extension and Operation of Water Collection, Treatment and Supply Systems:** 1. The Activity must comply with either of the following criteria: a. The net average energy consumption for abstraction and treatment equals to or is lower than 0.5 kWh/m^3 produced water supply over a twelve-month period; **OR** b. The distribution loss (%) is less than 15% for the segment of the network; **AND** 2. Monitoring systems to measure data for energy consumption and water loss must be in place. **If the Activity is Desalination:** To meet the TSC below, either criteria (1), (2), **OR** (3) must be satisfied; criterion (4) is mandatory in all cases: 1. The average carbon intensity of energy used to power the plant must be at or below 350 gCO2e/m3 of potable water produced; **OR** 2. The energy used for the desalination plant must have carbon intensity less than 100 gCO2e/kWh over the remaining lifetime of the asset; **OR** 3. The carbon intensity threshold is based on the trajectory established in the relevant national-level trajectories which are aligned to science-based pathways; **AND** 4. Where applicable, technology used and plant discharges, including emissions to air and emissions to waterways, comply with the relevant national regulations and emission standards. **If the Activity is Renewal of Water Collection, Treatment and Supply Systems:** 1. The renewal of the water supply system leads to improved energy efficiency in one of the following ways: a. The renewal results in the net annual average energy consumption for abstraction and treatment being equal to or lower than 0.5 kWh/m^3 produced water supply; **OR** b. By decreasing the net annual average energy consumption of the system by at least 20% compared to own baseline performance averaged for three years, including abstraction and treatment, measured in kWh per cubic meter produced water supply; **OR** c. By closing the gap by at least 20% between the current leakage level averaged over three years, calculated using distribution loss. The current leakage level averaged over three years is calculated across the extent of water supply (distribution) network where the works are carried out, i.e., for the	• Draft ATSF *version* 4 • Regulation of the Minister of Health Number 2 of 2023 concerning the Implementation of Government Regulation Number 66 of 2014 on Environmental Health • Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management

Classification	Technical Screening Criteria (TSC)	References
	EO1: Climate Change Mitigation	
	renewed water supply (distribution) network at district metered area(s) (DMAs) or pressure managed area(s) (PMAs); **AND** 2. The efficiency for either criterion (1.a), (1.b) or (1.c) must be achieved after the completion of commissioning and optimization phase. **If the Activity is Construction, Extension and Operation of Wastewater Collection and Treatment:** 1. The net energy consumption of the wastewater treatment plant equals to or is lower than: a. 35 kWh per population equivalent (p.e.) per annum for treatment plant capacity below 10,000 p.e.; b. 25 kWh per population equivalent (p.e.) per annum for treatment plant capacity between 10,000 p.e. and 100,000 p.e.; c. 20 kWh per population equivalent (p.e.) per annum for treatment plant capacity above 100,000 p.e.; Net energy consumption of the operation of the wastewater treatment plant may take into account measures decreasing energy consumption relating to source control (reduction of storm water or pollutant load inputs), and, as appropriate, energy generation within the system (such as hydraulic, solar, thermal and wind energy); **AND** 2. For the construction and extension of a wastewater treatment plant or a wastewater treatment plant with a collection system, which are substituting more GHG-intensive treatment systems (such as anaerobic lagoons), an assessment of the direct GHG emissions is performed. The results are disclosed to investors and clients on demand. **If the Activity is Renewal of Wastewater Collection and Treatment:** 1. The renewal of a wastewater collection system improves energy efficiency by decreasing the average energy consumption by 20% compared to own baseline performance averaged over three years on a rolling basis, demonstrated annually. That decrease of energy consumption can be accounted for at the level of the project (i.e. the collection system renewal) or, across the downstream wastewater agglomeration (i.e. including the downstream collection system, treatment plant or discharge of wastewater); **OR** 2. The renewal of a wastewater treatment plant improves energy efficiency by decreasing the average energy consumption of the system by at least 20% compared to own baseline performance averaged over three years on a rolling basis, demonstrated annually; **AND** 3. For the purposes of criteria (1) and (2), the net energy consumption of the system can be calculated in either: a. kWh per population equivalent per annum of the wastewater collected or effluent treated; **OR**	

Classification	Technical Screening Criteria (TSC)	References
	EO1: Climate Change Mitigation	
	b. kWh per m^3 per annum of wastewater collected or effluent treated; Taking into account measures decreasing energy consumption relating to source control (reduction of storm water or pollutant load inputs) and, as appropriate, energy generation within the system (such as hydraulic, solar, thermal and wind energy); **AND** 4. For the purpose of criteria (1) and (2), the operator demonstrates that there are no material changes relating to external conditions, including modifications to discharge authorization(s) or changes in load to the agglomeration that would lead to a reduction of energy consumption, independent of efficiency measures taken.	
Transition	**If the Activity is Construction, Extension and Operation of Water Collection, Treatment and Supply Systems:** 1. The Activity must comply with either of the following criteria: a. The net average energy consumption for abstraction and treatment equals to or is lower than 0.7 kWh/m^3 produced water supply over a twelve-month period; **OR** b. The distribution loss (%) is less than 20% for the segment of the network; **AND** 2. Monitoring systems to measure data for energy consumption or water loss must be in place. **If the Activity is Desalination:** 1. The energy consumption of desalination plants must be less than 3.5 kWh/m^3 of potable water produced till 31 December 2025. Between 1 January 2026 and 31 December 2030, energy consumption must be less than 3 kWh/m^3; and Between 1 January 2031 to 31 December 2035, energy consumption must be less than 2.5 kWh/m^3. The sunset date for "Transition" classification for this Activity is 31 December 2035, after which the facilities must meet the "Green" classification. Sunset dates will be reviewed and possibly revised periodically based on emerging science and technology; **AND** 2. The Activity must demonstrate that it has a road map in place for the plant to meet "Green" classification beyond 2035; **AND** 3. Where applicable. technology used and plant discharges, including emissions to air and emissions to waterways, comply with the relevant national regulations and emission standards. **If the Activity is Renewal of Water Collection, Treatment and Supply Systems:** 1. The renewal of the water supply system leads to improved energy efficiency in either of the following ways: a. The renewal results in the net annual average energy consumption for abstraction and treatment being equal to or lower than 0.7 kWh/m^3 produced water supply; **OR**	

Classification	Technical Screening Criteria (TSC)	References
	EO1: Climate Change Mitigation	
	b. By closing the gap by at least 20% either between the current leakage level averaged over three years, calculated using distribution loss, or calculated using another appropriate method. The current leakage level averaged over three years is calculated across the extent of water supply (distribution) network where the works are carried out, i.e. for the renewed water supply (distribution) network at district metered area(s) (DMAs) or pressure managed area(s) (PMAs); **AND** 2. The efficiency for either criteria (1.a) or (1.b) must be achieved after the completion of commissioning and optimization phase. **If the Activity is Construction, Extension and Operation of Wastewater Collection and Treatment:** The net energy consumption of the wastewater treatment plant equals to or is lower than 68 kWh/p.e. per annum and is applicable for all treatment plant capacities. Net energy consumption of the operation of the wastewater treatment plant may take into account measures decreasing energy consumption relating to source control (reduction of storm water or pollutant load inputs), and as appropriate, renewable energy generation. The sunset date for his Activity under the "Transition" classification is 31 December 2035 after which the facilities must meet the "Green" classification. Criteria and sunset dates are not fixed and will be reviewed and possibly revised periodically based on emerging science and technology. **If the Activity is Renewal of Wastewater Collection and Treatment:** 1. The renewal of a wastewater collection system improves energy efficiency by decreasing the average energy consumption by 10% compared to own baseline performance averaged over three years on a rolling basis, demonstrated annually. That decrease of energy consumption can be accounted for at the level of the project (i.e. the collection system renewal) or, across the downstream wastewater agglomeration (i.e. including the downstream collection system, treatment plant or discharge of wastewater); **OR** 2. The renewal of a wastewater treatment plant improves energy efficiency by decreasing the average energy consumption of the system by at least 10% compared to own baseline performance averaged over three years on a rolling basis, demonstrated annually; **AND** 3. For the purposes of criteria (1) and (2), the net energy consumption of the system can be calculated in either: a. kWh per population equivalent per annum of the wastewater collected or effluent treated; **ATAU** b. kWh per m^3 per annum of wastewater collected or effluent treated;	

Classification	Technical Screening Criteria (TSC)	References
	EO1: Climate Change Mitigation	
	Taking into account measures decreasing energy consumption relating to source control (reduction of storm water or pollutant load inputs) and, as appropriate, energy generation within the system (such as hydraulic, solar, thermal and wind energy); **AND** 4. For the purpose of criteria (1) and (2), the operator demonstrates that there are no material changes relating to external conditions, including modifications to discharge authorization(s) or changes in load to the agglomeration that would lead to a reduction of energy consumption, independent of efficiency measures taken; **AND** The sunset date for his Activity under the "Transition" classification is 31 December 2035 after which the facilities must meet the "Green" classification. Criteria and sunset dates are not fixed and will be reviewed and possibly revised periodically based on emerging science and technology.	

Classification	Technical Screening Criteria (TSC)	References
	EO2: Climate Change Adaptation	
Green	**If the Activity is Construction, Extension and Operation of Water Collection, Treatment and Supply Systems:** 1. The Activity complies with the following criteria: a. Where data is available, the physical climate risks that are material to the Activity have been identified by performing a robust Climate Risk and Vulnerability Assessment (CRVA) in accordance with the guidance provided in Annex 12; **AND** b. The Activity has implemented physical and non-physical solutions ('adaptation solutions') that substantially reduce the most important physical climate risks that are material to that Activity; **AND** c. Acceptable residual risk thresholds should be defined for the Activity; **AND** d. Specific and measurable key performance indicators (KPIs) must be developed to track the reduction of material climate risks; **AND** 2. It must be shown that the Activity is necessary for the provision of water security. **If the Activity is Desalination:** 1. The Activity complies with the following criteria:	• Draft ATSF *version* 4

Classification	Technical Screening Criteria (TSC)	References
	EO2: Climate Change Adaptation	
	a. Where data is available, the physical climate risks that are material to the Activity have been identified by performing a robust Climate Risk and Vulnerability Assessment (CRVA) in accordance with the guidance provided in Annex 12; **AND** b. The Activity has implemented physical and non-physical ('adaptation solutions') that substantially reduce the most material physical climate risks identified through the project-specific CRVA, in accordance with the project's defined thresholds of acceptable residual risk; **AND** 2. Specific measurable key performance indicators (KPIs) must be developed to track the reduction of material climate risks; **AND** 3. Acceptable residual risk thresholds should be defined for the Activity; these thresholds shall be established using a structured risk management process consistent with recognized international frameworks, such as ISO 31000; **AND** 4. It must be shown that the Activity is necessary for the provision of water security and/or drought risk prevention and protection. **If the Activity is Flood or Drought Risk Prevention and Protection, Including Nature-Based Solutions:** 1. The Activity complies with the following criteria: a. Where data is available, the physical climate risks that are material to the Activity have been identified by performing a robust Climate Risk and Vulnerability Assessment (CRVA) in accordance with the guidance provided in Annex 12; **AND** b. The Activity has implemented physical and non-physical ('adaptation solutions') that substantially reduce the most material physical climate risks identified through the project-specific CRVA, in accordance with the projects defined thresholds of acceptable residual risk; **DAN** 2. Specific measurable key performance indicators (KPIs) must be developed to track the reduction of material climate risks; **AND** 3. Acceptable residual risk thresholds should be defined for the Activity; these thresholds shall be established using a structured risk management process consistent with recognized international frameworks, such as ISO 31000; **AND** 4. It must be shown that the Activity is necessary for flood and drought risk prevention and protection.	
Transition	N/A	

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
Green	**If the Activity is Flood or Drought Risk Prevention and Protection, Including Nature-Based Solutions:** 1. The Activity complies with the following criteria: a. A baseline assessment of pre-existing ecological conditions is completed; **AND** b. An assessment of flood and/or drought risk for the location is completed; **AND** c. The Activity has implemented physical nature-based solutions that reduce flood or drought risks, and in turn reduce adverse consequences, where applicable for human health, the environment, cultural heritage and economic activity, whilst demonstrating specific ecosystem co-benefits. These commitments are to be measured against the ecological baseline assessment, as required in criterion (1.a) and the flood/drought risk assessment described in criterion (1.b); **AND** 2. The Activity must demonstrate that it will achieve one or more of the following criteria: a. Restoration or significant enhancement of natural habitat; **OR** b. Improve water quality**; OR** c. Improve soil quality; **OR** d. Improve ecological function through the reintroduction of native vegetation and species; **OR** e. Enable ecological connectivity; **AND** 3. The Activity must demonstrate that it will achieve one or more of the following criteria: a. Maintain existing natural habitat and ecological stability; **OR** b. Preserve water quality and avoid water stress; **OR** c. Preserve soil quality and avoid degradation; **OR** d. Maintain ecological connectivity; **AND** 4. The commitments for criteria (2) and (3) are to be measured against the baseline assessment, as required in criterion (1.a); **AND** 5. The Activity contains clear and binding targets on nature restoration or conservation over a clearly defined timeframe and describes measures to achieve those targets. Local stakeholders are involved from the outset in the planning and design phase. The Activity is based on the principles outlined by the IUCN Global Standard for nature-based solutions. These targets are to be set against the baseline assessment, as required in criterion (1.a); **AND** 6. The Activity takes into account: a. National Biodiversity Strategies and Action Plans for the setting of nature conservation and restoration targets and for the description of the measures to achieve these targets; **AND** b. National Disaster Risk Management Plans and where relevant Transboundary Disaster Risk Management Plans; **AND**	• Draft ATSF *version* 4 • Presidential Instruction of the Republic of Indonesia Number 1 of 2023 concerning the Mainstreaming of Biodiversity Conservation in Sustainable Development, which serves as the basis for the National Long-Term Development Plan 2025–2045 and the National Medium-Term Development Plan 2025–2029, and as a reference for the Indonesian Biodiversity Strategy and Action Plan (IBSAP) 2025–2045 • Regulation of the National Disaster Management Agency Number 1 of 2025 concerning the National Disaster Management Plan for 2025–2029 • Regulation of the Minister of Public Works and Housing Number 04/PRT/M/2017 of 2017 concerning the Implementation of Domestic Wastewater Management Systems • Regulation of the Minister of Environment and Forestry Number 5 of 2021 concerning Procedures for Issuing Technical Approvals and Operational Eligibility Letters in the Field of Environmental Pollution Control

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
	7. A monitoring program is in place to evaluate the effectiveness of a nature-based solution scheme in improving the status of the affected water body, achieving the conservation and restoration targets and in adapting to changing climate conditions. The monitoring program is to be based against the ecological baseline assessment, as required in criterion (1.a), the flood/drought risk assessment described in criterion (1.b), and the specific targets required by criterion (2.c). **If the Activity is Construction, Extension and Operation of Wastewater Collection and Treatment:** 1. The wastewater treatment system does not result in a deterioration of the good status and good ecological potential of any of the affected water bodies and it contributes significantly to the achievement of good status and potential of the affected water bodies; **AND** a. The wastewater treatment system complies with the: i. relevant, size-specific requirements for discharges from wastewater treatment plants where set out in local and/or national regulations; **AND** ii. fulfils the discharge requirements set up by the competent local and/or national authorities; **AND** b. The information related to the status of water bodies, to the activities potentially impacting the status and to the measures taken to avoid or minimize such impacts, is included in a river basin management plan or an equivalent water use and protection management plan; **AND** 2. The wastewater treatment system has a collecting system and the provision of secondary treatment; **AND** 3. Where the wastewater treatment plant has a capacity of 100,000 population equivalent (p.e.) or more, or of a daily inflow of a five-day biochemical oxygen demand (BOD5) load of more than 6,000 kg, It uses a sludge treatment such as anaerobic digestion or a technology with the same or a lower net energy demand (considering both energy generation and consumption), to stabilize the sludge.	• Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste • Regulation of the Minister of Environment Number 5 of 2014 concerning Wastewater Quality Standards • Regulation of the Minister of Environment and Forestry Number 16 of 2019 concerning the Second Amendment to the Regulation of the Minister of Environment Number 5 of 2014 on Wastewater Quality Standards • Regulation of the Minister of Health Number 2 of 2023 concerning the Implementation of Government Regulation Number 66 of 2014 on Environmental Health • Regulation of the Minister of Environment / Environmental Control Agency of the Republic of Indonesia Number 11 of 2025 concerning Wastewater Quality Standards and Wastewater Treatment Technology Standards for Domestic Wastewater
Transition	**If the Activity is Flood or Drought Risk Prevention and Protection, Including Nature-Based Solutions:** 1. The Activity complies with the following criteria: a. A baseline assessment of pre-existing ecological conditions is completed; **AND** b. An assessment of flood and/or drought risk for the location is completed; **AND** c. The Activity has implemented physical nature-based solutions that reduce flood or drought risks, and in turn reduce adverse consequences, where applicable for human health, the environment, cultural heritage and economic activity, whilst demonstrating specific ecosystem co-benefits. These commitments are to be measured against the ecological baseline assessment, as required in criterion (1.a) and the flood/drought risk assessment described in criterion (1.b); **AND**	

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
	2. The Activity must demonstrate that it will achieve one or more of the following criteria: a. Maintain existing natural habitat and ecological stability; **OR** b. Preserve water quality and avoid water stress; **OR** c. Preserve soil quality and avoid degradation; **OR** d. Maintain ecological connectivity; **AND** 3. These commitments are to be measured against the baseline assessment, as required in criterion (1.a); **AND** 4. The Activity takes into account National Biodiversity Strategies and Action Plans, National Disaster Risk Management Plans and where relevant Transboundary Disaster Risk Management Plans; **AND** 5. The Activity must set a commitment and achieve within five years, one or more of the following: a. Restoration or enhancement of natural habitat; **OR** b. Improved water quality; **OR** c. Enable ecological connectivity; **AND** 6. These commitments are to be measured against the baseline assessment, as required in criterion (1.b). **If the Activity is Construction, Extension and Operation of Wastewater Collection and Treatment:** 1. The wastewater treatment system contributes to the achievement of good status of the water bodies, in accordance with applicable national law or international standards which pursue objectives of good water status and good ecological potential, through a water use and protection management plan; **AND** 2. Sludge is treated in accordance with national requirements, provided these meet or exceed a minimum environmental threshold aligned with recognized regional or international best practices.	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
Green	**If the Activity is Construction, Extension and Operation of Water Collection, Treatment and Supply Systems:** 1. For production of reclaimed water for purposes other than human consumption, the Activity complies with the following criteria: a. The reclaimed water is suitable for reuse. The final quality of reclaimed water is fit for purpose and compliant with existing national legislation and standards; **AND**	• Draft ATSF *version* 4 • Regulation of the Minister of Environment Number 5 of 2014 concerning Wastewater Quality Standards

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	b. The water reuse project has been authorized by the competent authority, in the framework of integrated water management, having as a priority taken into account viable water demand management and efficiency measures, in consultation with the water management authorities. This may be proven by its inclusion in a water management plan or drought management plan; **AND** c. For reuse in agriculture, the assessments of the environmental risks, including those related to the quantitative status of water bodies, are fully taken into account and documented in risk management plans; **AND** d. For agricultural reuse of reclaimed water or treated wastewater, relevant internationally recognized risk-based water quality guidelines and standards must be followed; examples include the WHO Guidelines for the Safe Use of Wastewater in Agriculture, ISO 16075 series, FAO Guidelines on Wastewater Use in Agriculture; **AND** 2. Where facilities are for harvesting rain and storm water, the Activity complies with the following criteria: a. The resource (rain or storm water) is segregated at source and does not include wastewater; **AND** b. The water is suitable for use after proper treatment depending on the level of contamination and subsequent use; **AND** c. The facility is included in an instrument of urban planning or permitting, such as Master Plan or municipal planning; **AND** d. Where applicable, compliance with national rainwater harvesting standards should be followed; **AND** e. For reuse of rain and stormwater, relevant internationally recognized guidelines and standards must be followed, examples include ISO 30500, ISO 24521, UNEP guidance for Wastewater Reuse, IWA Water Reuse; **AND** 3. For facilities for collection and treatment of grey waters, the Activity complies with the following criteria: Greywater refers to domestic wastewater from households or office dwellings, including wastewater from baths, showers, bathroom sinks, laundry and washing machines. Importantly greywater does not include effluent wastewater bathrooms and kitchens that contain fecal matter, urine, pathogens and grease. These are classified under blackwater and addressed under Activities of Construction, extension and operation of wastewater collection and treatment and Renewal of wastewater collection and treatment. a. The resource (greywater) is segregated at source; **AND** b. The water is suitable for reuse after proper treatment depending on the level of contamination and subsequent reuse; **AND** c. The performance is attested by a building certification or is available in the technical design documents; **AND** d. Where applicable, compliance with national greywater standards should be followed; **AND**	• Regulation of the Minister of Environment and Forestry Number 16 of 2019 concerning the Second Amendment to the Regulation of the Minister of Environment Number 5 of 2014 on Wastewater Quality Standards • Regulation of the Minister of Environment / Environmental Control Agency of the Republic of Indonesia Number 11 of 2025 concerning Wastewater Quality Standards and Wastewater Treatment Technology Standards for Domestic Wastewater • Regulation of the Minister of Health Number 2 of 2023 concerning the Implementation of Government Regulation Number 66 of 2014 on Environmental Health • Regulation of the Minister of Public Works of the Republic of Indonesia Number 11/PRT/M/2014 concerning Rainwater Management in Buildings and Their Plots • Regulation of the Minister of Public Works and Housing Number 04/PRT/M/2017 of 2017 concerning the Implementation of Domestic Wastewater Management Systems

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	e. Relevant internationally recognized guidelines and standards must be followed, examples include WHO Guidelines for the Safe Use of Wastewater, ISO 30500, ISO 24521, UNEP guidance for Wastewater Reuse, IWA Water Reuse. **If the Activity is Construction, Extension and Operation of Wastewater Collection and Treatment:** 1. For facilities for collection and treatment of wastewater for the production of water, the Activity complies with the following criteria: a. Water is for purposes other than human consumption; **AND** b. Water is suitable for reuse after proper treatment depending on the level of contamination and subsequent reuse purposes in accordance with national regulations; **AND** c. Fit for purpose treatment targets, appropriate to the intended reuse application must be established. Targets must be developed in line with relevant national regulations and international best practices; **AND** 2. Relevant national and international recognized guidelines and standards must be followed.	
Transition	N/A	

Discussion Points

5	**General**	Are the proposed TSC credible and science-based to demonstrate contributions to the Environmental Objectives (EO)? If not, please provide input or alternative approaches that are more relevant, along with supporting scientific or technical references. (Example: EO1 – Climate Change Mitigation aligned with the Paris Agreement target)
6	**General**	Are the TSC for this activity clear, objective, and easy to understand? If not, please explain the parts that need improvement and provide suggestions to enhance understanding of these TSC.
7	**General**	Are there specific terms in these TSC that are difficult to understand? If yes, please provide alternative terms that are easier to understand.
8	**General**	Are there challenges to implement these TSC on the ground? If yes, please provide TSC recommendations based on industry practice, along with their justification.

9	**General**	Are there differences between the TSC and widely adopted international taxonomies? Please provide recommendations to make the TSC approach more interoperable.
10	**"…energy consumption ≤0.5 kWh/m³"**	What is the typical energy consumption (kWh/m³) for water distribution systems in Indonesia?
11	**"…distribution loss <15%"**	What is the most recent national average for water distribution loss percentage in Indonesia?
12	**"Where data is available, material climate-related physical risks to the Activity have been identified through the conduct of a Climate Risk and Vulnerability Assessment (CRVA), in accordance with the guidance provided in Annex 12."**	Have any industries in Indonesia conducted a Climate Risk and Vulnerability Assessment (CRVA)? If CRVA is not yet commonly conducted, what approaches or methods are currently used by industry to assess physical climate risks?
13	**"…adaptation solutions, whether physical or non-physical, that are capable of reducing material climate-related physical risks."**	Do industries in Indonesia generally have implementation plans for physical or non-physical adaptation solutions to address material climate-related physical risks? If not yet common, what approaches or strategies are currently used by industry to manage physical climate risks?
14	**"…energy consumption ≤3.5 kWh/m³ until 2025, ≤3 kWh/m³ until 2030, ≤2.5 kWh/m³ until 2035."**	What is the typical energy consumption (kWh/m³) for desalination processes in Indonesia?
15	**"…reduction in energy consumption of at least 10 percent compared to the baseline; reduction in distribution loss of at least 20 percent; evidence of commissioning and optimization must be provided."**	Are there national policies or specific technical standards (e.g., SNI) that govern the upgrading of wastewater infrastructure in Indonesia? Specifically, are there policies that address the upgrading of pipeline networks and the retrofitting of Wastewater Treatment Plants (WWTPs)?
16	**"…evidence of claimed energy savings"**	This criterion requires evidence of the claimed energy savings. What types of reporting are generally considered valid to verify such performance improvements in Indonesia? For example, would these be electricity bills, audit reports from certified third parties, or other documentation? In addition, are there any policies that specifically stipulate the types of reporting required?
17	**"…material climate-related physical risks to the Activity have been identified through the conduct of a Climate Risk and**	What are the current practices for conducting CRVA for flood or drought risk prevention and protection infrastructure projects in Indonesia?

	Vulnerability Assessment (CRVA), in accordance with the guidance provided in Annex 12."	If CRVA is not yet commonly conducted, what risk assessment methods are commonly in such projects?
18	**"…treated wastewater is used for purposes other than human consumption; it must be suitable for use and must meet the standards set by WHO, ISO, UNEP, and IWA."**	What types of documentation are commonly used and considered acceptable in Wastewater Treatment Plants (WWTPs) as evidence of compliance with the criteria above?

2. Collection of Non-Hazardous and Hazardous Waste

Waste Collection	
KBLI 2017	**Description**
E	Water, Wastewater, Waste Management and Recycling, and Remediation Activities
38	Waste Management and Recycling
381	Waste Collection
3811	Collection of Non-Hazardous Waste
38110	**Collection of Non-Hazardous Waste** This group includes the collection of solid non-hazardous waste within a given area, such as household and commercial waste collection using bins, wheeled containers, waste containers, and other means. It includes the collection of mixed recoverable materials, recyclable materials, used cooking oils and fats, and waste from public bins. Also included are activities such as the collection of construction and demolition waste, debris and rubble cleanup, waste collection from textile factories, and the operation of transfer stations for non-hazardous waste.
3812	Collection of Hazardous Waste
38120	**Collection of Hazardous Waste** This group includes the collection of hazardous solid and non-solid waste, such as explosives, oxidizing agents, flammable substances, toxins, irritants, carcinogens, corrosives, infectious materials, and other substances and preparations that pose risks to human health and the environment. This activity also requires identification, handling, packaging, and labeling of the waste. Included in this group are businesses involved in the collection of hazardous waste, such as used oil from ships or workshops, bio-hazardous waste, and used batteries.

Activity Notes for Collection and Transport of Non-Hazardous and Hazardous Waste

1. Includes:
   a. Separate collection and transport of non-hazardous and hazardous waste aimed at preparing for re-use or recycling, and the transport of hazardous waste prior to treatment, material recovery or disposal, including the construction, operation and upgrade of facilities involved in the collection and transport of such waste, such as civic amenity centers and waste transfer stations, as a means for material recovery and additionally for hazardous waste as a means for appropriate treatment.
   b. Collection and transport of waste streams such as hazardous waste fractions produced by households, waste oils, batteries, non-depolluted waste from electrical and electronic equipment (WEEE), non-depolluted end-of-life vehicle, certain healthcare waste, such as infectious and cytotoxic waste and other waste streams that meet the classifications outline under Annex I of Regulation of the Minister of Environment and Forestry Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Substances and Hazardous and Toxic Waste
2. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Emission standards for waste vehicle transport
      Minister of Environment and Forestry Regulation No. 8 of 2023 on the Implementation of Emission Standards for Motor Vehicles in Categories M, N, O, and L; regulates emission standards for goods transport vehicles.
   b. Standards for the collection and handling of hazardous waste (B3) to prevent leakage

Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates the collection and handling of hazardous waste to prevent leakage.

c. Standards for packaging and labeling of hazardous waste (B3) during collection and transportation
   i. Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates labeling and packaging standards for hazardous waste.
   ii. Minister of Environment and Forestry Regulation No. 9 of 2024 on the Management of Waste Containing Hazardous and Toxic Materials and Hazardous Waste; regulates standards for hazardous waste sorting containers.

d. Standards for the separation of hazardous (B3) and non-hazardous waste
   i. Government Regulation No. 81 of 2012 on the Management of Household Waste and Similar Waste; regulates the obligation of waste separation by various parties.
   ii. Minister of Environment and Forestry Regulation No. 9 of 2024 on the Management of Waste Containing Hazardous and Toxic Materials and Hazardous Waste; regulates the obligation of hazardous waste separation by various parties.

Table 7. TSC for Collection of Non-Hazardous and Hazardous Waste

Classification	Technical Screening Criteria (TSC)	References
	EO1: Climate Change Mitigation	
Green	1. All separately collected and transported non-hazardous waste that is segregated at source is intended for preparation for reuse or recycling operations. This excludes waste segregated for Waste to Energy; **AND** 2. The transportation vehicle conforms to national emission regulations with a sunset date of 2030. After that, the transport vehicles should be classified under TSC EO1 with a "Green" classification under Freight Transport Services by Road in the Transportation and Storage (T&S) sector within TKBI (cross-referencing).	• Draft ATSF *version* 4 • Regulation of the Minister of Environment and Forestry Number 8 of 2023 concerning the Application of Emission Standards for Motor Vehicles in Categories M, N, O, and L
Transition	To meet the TSC, criterion (1) is mandatory; either criteria (2) OR (3) must be satisfied. 1. All separately collected and transported non-hazardous waste that is segregated at source is intended for preparation for reuse or recycling operations. This excludes waste segregated for Waste to Energy; **AND** 2. The transportation vehicle conforms to national emission regulations; **OR** 3. Alternative initiatives to reduce emissions associated with collection and transportation of waste are demonstrated. For example, the use of route optimization software.	

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystem and Biodiversity	
Green	1. Hazardous waste is source segregated and collected separately from non-hazardous waste to prevent cross-contamination. Appropriate measures are taken to ensure that during separate collection and transport, hazardous waste is not mixed nor diluted either with other categories of hazardous waste or with other waste, substances or materials. Examples of appropriate measures include clear labelling, suitable packaging that is compatible with the type of waste. Separate dedicated containers for each hazardous waste type, physical separation in transport such as separate compartments, dedicated vehicles, physical barriers and employee training; **AND** 2. Proper collection and handling to prevent leakage of hazardous waste during collection, transport, storage and delivery to the treatment facility, which is permitted to treat hazardous waste, according to national legislation. Examples of proper collection and handling include leakproof and compatible containers for the type of waste, secondary containment systems, regular inspections, proper loading and securing, emergency preparedness such as equipping vehicles with spill response kits and employee training; **AND** 3. Where a given waste classified as hazardous has also a transport status of dangerous goods, the transport complies with the relevant national requirements for transport of dangerous goods; **AND** 4. During collection and transport, hazardous waste is packaged and labelled in accordance with the international and national standards in force; **AND** 5. The operator collecting hazardous waste complies with record-keeping obligations including as regards quantity, nature, origin, destination, frequency of collection, mode of transport and treatment method; **AND** 6. For the collection and transport of waste from electrical and electronic equipment (WEEE) the integrity of WEEE must be preserved and leakage of hazardous substances prevented, such as ozone-depleting substances, fluorinated greenhouse gases or mercury contained in fluorescent lamps; **AND** 7. The transportation vehicle conforms to national emission regulations.	• Draft ATSF *version* 4 • Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Substances and Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry Number 8 of 2023 concerning the Application of Emission Standards for Motor Vehicles in Categories M, N, O, and L
Transition	N/A	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
Green	1. For hazardous and non-hazardous waste: a. Waste is segregated: i. At source; **OR**	• Draft ATSF *version* 4

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	ii. At an intermediate sorting facility; **OR** iii. At waste collection or transport facility; For options (ii) and (iii), Activities must adhere to applicable national regulations on waste segregation, with a sunset date of 2030 established for both options; **AND** b. Source segregated waste consisting of waste from electrical and electronic equipment (WEEE) or any type of hazardous waste is collected separately (i.e. in single fractions) and not commingled with other waste streams. The transport of source-segregated hazardous waste must be to facilities that engage in material recovery of hazardous substances; **AND** c. Waste is to be transported to a location with the intention of preparation for material recovery (reuse or recycling) or energy recovery; **AND** d. The transportation vehicle conforms to national emission regulations.	• Government Regulation Number 27 of 2020 concerning Specific Waste Regulations • Government Regulation of the Republic of Indonesia Number 81 of 2012 concerning the Management of Household Waste and Waste Similar to Household Waste • Regulation of the Minister of Public Works and Housing Number 03/PRT/M/2013 of 2013 concerning the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Waste Similar to Household Waste • Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Substances and Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry Number 19 of 2021 concerning
Transition	1. Waste is segregated: a. At an intermediate sorting facility; **OR** b. At waste collection or transport facility; **AND** c. Source segregated waste consisting of waste from electrical and electronic equipment (WEEE) or any type of hazardous waste is collected separately (i.e., in single fractions) and not commingled with other waste streams; **AND** 2. Waste is to be transported to a location with the intention of preparation for material recovery (reuse or recycling) or energy recovery; **AND** 3. The transportation vehicle conforms to national emission regulations.	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
		Procedures for the Management of Non-Hazardous and Non-Toxic Waste • Regulation of the Minister of Environment and Forestry Number 8 of 2023 concerning the Application of Emission Standards for Motor Vehicles in Categories M, N, O, and L

Discussion Points

19	**General**	Are the proposed TSC credible and science-based to demonstrate contributions to the Environmental Objectives (EO)? If not, please provide input or alternative approaches that are more relevant, along with supporting scientific or technical references. (Example: EO1 – Climate Change Mitigation aligned with the Paris Agreement target)
20	**General**	Are the TSC for this activity clear, objective, and easy to understand? If not, please explain the parts that need improvement and provide suggestions to enhance understanding of these TSC.
21	**General**	Are there specific terms in these TSC that are difficult to understand? If yes, please provide alternative terms that are easier to understand.
22	**General**	Are there challenges to implement these TSC on the ground? If yes, please provide TSC recommendations based on industry practice, along with their justification.
23	**General**	Are there differences between the TSC and widely adopted international taxonomies? Please provide recommendations to make the TSC approach more interoperable.

3. Non-Hazardous Waste Treatment

Non-Hazardous Waste Treatment	
KBLI 2017	**Description**
D	Electricity, Gas, Steam/Hot Water, and Cold Air Supply
35	Electricity, Gas, Steam/Hot Water, and Cold Air Supply
352	Natural and Manufactured Gas Supply and Distribution
3520	Procurement and Distribution of Natural and Synthetic Gas
35203	**Procurement of Bio Gas** This group includes the processing of gas fuels that can be used directly as fuel, which are produced from agricultural, plantation, livestock, or waste by-products, with efforts to enhance the gas quality, such as purification, mixing, and other processes.
E	Water, Wastewater, Waste Management and Recycling, and Remediation Activities
38	Waste Management and Recycling
382	Waste Treatment and Disposal
3821	Treatment and Disposal of Non-Hazardous Waste
38211	**Treatment and Disposal of Non-Hazardous Waste** This group includes businesses engaged in the operation of landfills for the disposal of non-hazardous waste, the disposal of non-hazardous waste through incineration or other methods, with or without the generation of by-products such as electricity or steam, substitute fuels, biogas, ash, or other secondary products for further use, and the management of bio-waste for disposal.
38212	**Production of Organic Waste Compost** This group includes businesses engaged in the production of compost from bio-waste and plant ash (natural organic fertilizer).

Activity Notes for Anaerobic Digestion of Bio-waste

1. Construction and operation of dedicated facilities for the treatment of separately collected bio-waste, including sewage waste, through anaerobic digestion with the resulting production and utilization of biogas and digestate and/or chemicals.
2. Further processing in the context of this TSC may include:
   a. Composting
   b. Nutrient recovery and fertilizer production
   c. Thermal drying to create biosolids
3. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Definition of food crops and animal feed
      Annex to Minister of Agriculture Regulation No. 15 of 2021 on Business Activity Standards and Product Standards in the Implementation of Risk-Based Business Licensing in the Agricultural Sector; regulates business activity and product standards for food crops and animal feed.
   b. Composting and other appropriate treatment methods:

Government Regulation No. 22 of 2021 on the Implementation of Environmental Protection and Management; stipulates that non-hazardous waste (non-B3) can be treated through composting or other methods to be utilized as products such as fertilizers

c. Monitoring and contingency to minimize methane leakage
Minister of Environment and Forestry Regulation No. 13 of 2021 on the Continuous Industrial Emission Monitoring Information System; regulates air emission control through a continuous monitoring information system

Activity Notes for Waste-to-Energy, Not Including Bio-waste

1. Includes:
   a. The use of residual waste streams to generate energy from pre-sorted residual waste (non-recyclable fraction of waste) incineration.
2. Excludes:
   a. R&D investments related to the development and testing of new technologies such as pyrolysis and gasification that can produce alternative and sustainable fuels or chemicals. These activities are covered under Research, Development, and Innovation related to the Environment and Direct Air Carbon Capture Activities in the Professional, Scientific, and Technical (PST) sector within TKBI.
   b. Co-processing activity does not belong to this Activity; refer to Manufacture of Cement Activities in the Manufacture sector within TKBI.
   c. Activities covered under Production of Heating/Cooling Activities (with sources derived from fossil gas) in the Energy sector within TKBI.
3. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Recovery of bottom ash
   Minister of Environment and Forestry Regulation No. P.26/MENLHK/SETJEN/KUM.1/12/2020 on the Management of Bottom Ash and Fly Ash from Thermal Waste Processing; regulates the handling and utilization of bottom ash.
   b. Air and water emission quality standards
      i. Government Regulation No. 22 of 2021 on the Implementation of Environmental Protection and Management; regulates emission quality standards for air and water.
      ii. Minister of Environment and Forestry Regulation No. P.70/MENLHK/SETJEN/KUM.1/8/2016 on Emission Standards for Thermal Waste Processing Activities; regulates air emission standards from thermal waste processing activities.

Activity Notes for Landfill Gas Capture and Utilization

1. This activity includes the installation and operation of infrastructure for capturing and utilizing gas from landfills.
2. The activity is carried out at landfills or landfill cells that have been permanently closed, using new or additional specialized technical facilities and equipment installed during or after the closure of the site or cell.
3. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   Standards for landfill gas capture and utilization facilities
   Minister of Public Works and Housing Regulation No. 03/PRT/M/2013 on the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Similar Waste; regulates the provision of waste management facilities, including the handling and control of landfill gas.

Activity Notes for Composting of Bio-waste

1. Includes construction and operation of dedicated facilities that employ the use of technology for the treatment of separately collected bio-waste through composting (aerobic digestion) with the resulting production and utilization of compost.

2.	Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references Standards for fertilizers and soil conditioners derived from compost Minister of Agriculture Decree No. 261/KPTS/SR.310/M/4/2019 on Minimum Technical Requirements for Organic Fertilizers, Biofertilizers, and Soil Conditioners; regulates the technical requirements for fertilizers and soil conditioners.

Table 8. TSC for Non-Hazardous Waste Treatment

Classification	Technical Screening Criteria (TSC)	References
	EO1*:* Climate Change Mitigation	
Green	**If the Activity is Anaerobic Digestion of Bio-waste:** 1. The bio-waste is segregated at source and collected separately; **AND** 2. In the dedicated bio-waste treatment plants, the share of food and feed crops used as input feedstock, measured in weight, as an annual average, is less than or equal to 10% of the input feedstock. Food and feed crops should be defined in line with the relevant national bio-waste definitions; **AND** 3. Woody waste must be segregated before or after processing and sent to an appropriate treatment plant (such as composting or biomass-based energy plants); **AND** 4. The produced biogas is used directly for the generation of electricity or heat or upgraded to bio-methane for injection in the natural gas grid or used as vehicle fuel or as feedstock in chemical industry; **AND** 5. The produced digestate from: a. Biowaste (excluding sewage sludge) from single digestion facilities is used as fertilizer or soil improver either directly or after composting or any other treatment as permitted by the applicable regulations; **OR** b. Anaerobic digestion of sewage sludge will be further processed and not disposed directly in landfills. Incineration is also acceptable because it allows energy recovery, and after incineration this gets converted to ash which can be landfilled; **OR** c. Co-digestion facilities must be processed further to ensure resource recovery and cannot be disposed directly; **AND** 6. A monitoring and contingency plan is in place in order to minimize methane leakage at the facility, consistent with recognized standards or regulatory frameworks; **AND** **If the Activity is Landfill Gas Capture and Utilization:** 1. The landfill or landfill cell where the gas capture system is implemented is permanently closed and is not taking in further biodegradable waste; **AND** 2. Methane emissions from the landfill and leakages from the landfill gas collection and utilization facilities are subject to control and monitoring procedures. At a minimum monitoring and control procedures should include: a. Meteorological monitoring;	• Draft ATSF *version* 4 • Annex to the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 15 of 2021 concerning Business Activity Standards and Product Standards in the Implementation of Risk-Based Business Licensing in the Agricultural Sector • Government Regulation of the Republic of Indonesia Number 22 of 2021 concerning the Implementation of Environmental Protection and Management • Regulation of the Minister of Public Works and Housing Number 03/PRT/M/2013 of 2013 concerning the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Waste Similar to Household Waste • Government Regulation Number 81 of 2012 concerning the Management of Household Waste

Classification	Technical Screening Criteria (TSC)	References
	EO1*: Climate Change Mitigation	
	b. GHG emissions monitoring (including CH_4 and conducted at least every six months); c. GHG emissions monitoring must be carried out in line with recognized standards Where on-site monitoring is not feasible, approved modelling methods may be utilized; **AND** 3. The produced biogas is used directly for the generation of electricity or heat, or upgraded to bio-methane for injection in the natural gas grid, or used as vehicle fuel, or as feedstock in chemical industry; **AND** 4. Where applicable facilities must comply with nationally imposed standards/guidelines.	and Waste Similar to Household Waste
Transition	**If the Activity is Anaerobic Digestion of Bio-waste:** 1. The bio-waste is segregated (a) at source; **OR** (b) at an intermediate sorting facility; **OR** (c) at anaerobic digestion facility; **AND** 2. A monitoring and contingency plan is in place in order to minimize methane leakage at the facility, consistent with recognized standards or regulatory frameworks; **AND** 3. The produced biogas is flared directly without use of energy, whilst avoiding the release of incomplete combustion products, in line with national standards and regulations or other recognized standards; **AND** 4. The produced digestate from: a. Biowaste (excl. sewage sludge) from single digestion facilities is used as fertilizer or soil improver, either directly or after composting or any other treatment as permitted by the applicable regulations; **OR** b. Sewage sludge will be further processed and not disposed directly in landfills. Incineration is also acceptable because it allows energy recovery, and after incineration this gets converted to ash which can be landfilled; **OR** c. Co-digestion facilities must be processed further to ensure resource recovery and cannot be disposed directly; **AND** 5. Rejects from the pre-sorting facility are directed to disposal routes that meet, or are progressing toward, TKBI eligibility criteria (which include, but are not limited to, Collection and Transport for Non-Hazardous and Hazardous Waste Activities, or Materials Recovery from Non-Hazardous Waste Activities) or other recognized best practice standards, where available. The sunset date for his Activity under the “Transition” classification is 31 December 2030 after which the facilities must meet the “Green” classification. Criteria and sunset dates are not fixed and will be reviewed and possibly revised periodically based on emerging science and technology. **If the Activity is Landfill Gas Capture and Utilization:** 1. The landfill or landfill cell where the gas capture system is implemented is permanently closed and is not taking in further waste; **AND**	

Classification	Technical Screening Criteria (TSC)	References
	EO1*:* Climate Change Mitigation	
	2. Methane emissions from the landfill and leakages from the landfill gas collection and utilization facilities are subject to control and monitoring procedures. At a minimum monitoring and control procedures should include: a. Meteorological monitoring; b. GHG emissions monitoring (including CH_4 and conducted at least every six months); c. GHG emissions monitoring must be carried out in line with recognized standards. Where on-site monitoring is not feasible, approved modelling methods may be utilized; **AND** 3. The produced biogas is flared directly without use of energy, whilst minimizing the release of incomplete combustion products, such as carbon monoxide (CO) and particulate matter (PM), into the atmosphere; **AND** 4. Where applicable facilities must comply with nationally imposed standards/guidelines; **AND** The sunset date for his Activity under the "Transition" classification is 31 December 2030 after which the facilities must meet the "Green" classification. Criteria and sunset dates are not fixed and will be reviewed and possibly revised periodically based on emerging science and technology.	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
Green	**If the Activity is Waste-to-Energy, Not Including Bio-waste:** 1. The Activity uses residual or pre-sorted waste (so that high-quality recyclables are recovered); **AND** 2. Plant net energy efficiency is not less than 25%; **AND** 3. Partial bottom ash recovery (in as much as permitted by national law) with at least 75% recovery of metal from ash. This Activity could take place in an off-site location; **AND** 4. Based on the location of the plant, technology used and plant discharges, including emissions to air and emissions to waterways, comply with the relevant national regulations and emission standards. **If the Activity is Composting of Bio-waste:** 1. The bio-waste that is composted is source segregated and collected separately; **AND** 2. The produced compost is used as fertilizer or soil improver as permitted by the applicable national regulations and/or in line with ISO standards relevant to environmental technology verification, biodegradable materials, and compostable soil improvers; **AND**	• Draft ATSF *version* 4 • Regulation of the Minister of Environment and Forestry Number 26 of 2020 concerning the Management of Bottom Ash and Fly Ash Resulting from Thermal Waste Treatment • Regulation of the Minister of Environment and Forestry Number P.70/MENLHK/SETJEN/KUM.1/8/2016 concerning Emission Standards for Businesses and/or Activities Related to Thermal Waste Management

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	3. The facility applies best available techniques to ensure aerobic conditions during composting to avoid and reduce methane leakage. Examples of measures include: a. Aeration and oxygen management; **OR** b. Moisture content control; **OR** c. Temperature monitoring and management; **OR** d. Feedstock management; **OR** e. Pile design and turn frequency; **AND** 4. Measures to prevent and mitigate odor and water pollution from leachate are in place Examples of measures include: a. Enclosed systems or covered piles; **OR** b. Biofilters; **OR** c. Feedstock management; **OR** d. Leachate collection systems; **OR** e. Runoff diversion channels; **AND** 5. Where applicable composting facilities must comply with nationally imposed standards/guidelines.	• Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management • Decree of the Minister of Agriculture of the Republic of Indonesia Number 2261/KPTS/SR.310//M/4/2019 concerning Minimum Technical Requirements for Organic Fertilizers, Biofertilizers, and Soil Conditioners • Regulation of the Minister of Public Works and Housing Number 03/PRT/M/2013 of 2013 concerning the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Waste Similar to Household Waste
Transition	**If the Activity is Waste-to-Energy, Not Including Bio-waste:** 1. The Activity uses residual or pre-sorted waste (so that high-quality recyclables are recovered); **AND** 2. Plant net energy efficiency between 10% and 25%; **AND** 3. Partial bottom ash recovery (in as much as permitted by national law), with at least 50% recovery of metal from ash. This Activity could take place in an off-site location; **AND** 4. Based on the location of the plant, technology used and plant discharges, including emissions to air and emissions to waterways, comply with the relevant national regulations and emission standards. **If the Activity is Composting of Bio-waste:** 1. The bio-waste is segregated: (a) at source; **OR** (b) at an intermediate sorting facility prior; **OR** (c) at composting facility; **AND** 2. Rejects from the segregation are directed to disposal routes that meet, or are progressing toward, TKBI eligibility criteria (which include, but are not limited to, Collection and Transport for Non-Hazardous and Hazardous Waste Activities, or Materials Recovery from Non-Hazardous Waste Activities) or other recognized best practice standards, where available; **AND** 3. The produced compost is used as fertilizer or soil improver as permitted by the applicable national regulations and/or in line with ISO standards relevant to environmental technology verification,	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	biodegradable materials, and compostable soil improvers, for example, SNI 19-7030-2004 Specification of Compost from Domestic Organic Waste.; **AND** 4. The facility applies best available techniques to ensure aerobic conditions during composting to avoid and reduce methane leakage. Examples of measures include: a. Aeration and oxygen management; **OR** b. Moisture content control; **OR** c. Temperature monitoring and management; **OR** d. Feedstock management; **OR** e. Pile design and turn frequency; **AND** 5. Measures to prevent and mitigate odor and water pollution from leachate are in place. Examples of measures include: a. Enclosed systems or covered piles; **OR** b. Biofilters; **OR** c. Feedstock management; **OR** d. Leachate collection systems; **OR** e. Runoff diversion channels; **AND** 6. Where applicable composting facilities must comply with nationally imposed standards/guidelines.	

Discussion Points

24	**General**	Are the proposed TSC credible and science-based to demonstrate contributions to the Environmental Objectives (EO)? If not, please provide input or alternative approaches that are more relevant, along with supporting scientific or technical references. (Example: EO1 – Climate Change Mitigation aligned with the Paris Agreement target)
25	**General**	Are the TSC for this activity clear, objective, and easy to understand? If not, please explain the parts that need improvement and provide suggestions to enhance understanding of these TSC.
26	**General**	Are there specific terms in these TSC that are difficult to understand? If yes, please provide alternative terms that are easier to understand.

27	**General**	Are there challenges to implement these TSC on the ground? If yes, please provide TSC recommendations based on industry practice, along with their justification.
28	**General**	Are there differences between the TSC and widely adopted international taxonomies? Please provide recommendations to make the TSC approach more interoperable.
29	**“Net energy efficiency of the Waste-to-Energy facility is ≥25%.”**	Have the current Waste-to-Energy facilities in Indonesia achieved a net energy efficiency of ≥25%? If not, what is the national average?
30	**“The validity period of the “Transition” classification for this Activity is until 31 December 2030. After this date, facilities must comply with the ‘Green’ classification.** **It should be noted that these criteria and the end date are not fixed, and will be reviewed and may be updated periodically in line with scientific and technological developments.”**	Is there a plan for landfill sites (TPAs) in Indonesia to have gas capture and utilization facilities in place after 31 December 2030?

4. Hazardous Waste Treatment

Hazardous Waste Treatment	
KBLI 2017	**Description**
E	Water, Wastewater, Waste Management and Recycling, and Remediation Activities
38	Waste Management and Recycling
382	Waste Treatment and Disposal
3822	Hazardous Waste Treatment and Disposal
38220	**Hazardous Waste Treatment and Disposal** This group includes cleaning services managed by both public and private entities, such as the disposal and management of solid or non-solid hazardous waste. This includes waste that is explosive, oxidizing, flammable, toxic, irritant, carcinogenic, corrosive, or infectious, as well as other substances and preparations that pose risks to human health and the environment. Activities in this group include the operation of facilities for hazardous waste disposal, the management and disposal of toxic live or dead animals and other contaminated waste, incineration of hazardous waste, and the management, disposal, and storage of radioactive nuclear waste. This includes the handling and disposal of transitional radioactive waste, covering decay during the disposal period, packaging, preparation, and other management processes for nuclear waste intended for storage.

Activity Notes for Treatment of Hazardous Waste

1. Activity encompasses both criteria for material recovery operations of waste classified as hazardous waste as well as the treatment of hazardous waste.
2. Activity covers both in-situ and ex-situ material recovery operations of waste classified as hazardous waste.
3. Includes:
    a. Recovery operations of waste classified as hazardous waste: Construction, upgrade, and operation of dedicated facilities for the treatment of hazardous waste as a means for material recovery operations and of controlled disposal aim at preventing pollution.
    b. Treatment of hazardous waste: construction, repurposing, upgrading, and operation of dedicated facilities for the treatment of hazardous waste, including the incineration of non-recyclable hazardous waste, biological treatment of hazardous waste and physico-chemical treatment.
    c. The treatment of residual waste materials generated from the depollution of waste electrical and electronic equipment (WEEE).
4. Excludes:
    a. The reuse of substances that do not qualify as waste, such as by-products or residues from production activities.
    b. Materials recovery from WEEE. Any dismantling of end-of-life products including WEEE should be managed under Activity Depollution and Dismantling of End-of-life Products.
    c. Recovery of materials from batteries, end-of-life vehicles (ELV), inorganic materials from incineration processes, such as ashes, slags or dust.
    d. Disposal operations of hazardous waste such as landfilling or permanent storage.
    e. Incineration of recyclable hazardous waste and incineration of non-hazardous waste.
    f. Treatment and recovery of nuclear waste.
    g. Treatment and disposal of toxic live or dead animals and other contaminated waste.
5. Examples of approaches for ‘maximizing recovery’ could include:

a. The application of best available techniques suitable for the waste type, with clear documentation to show why chosen technologies represent best practice for recovery.
b. Maintain a mass balance system, tracking input, recovered material and residual waste for each stream, providing a periodic performance report.
c. Establish and report on recovery targets for specific waste streams in line with recognized sector benchmarks such as the Basel Convention.
d. Participate in periodic independent verification to assess recovery performance is consistent with maximizing recovery potential.

6. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Requirements for hazardous waste (B3) management and incineration
      Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates the requirements for hazardous waste management and waste incineration.
   b. Treatment level of hazardous waste (B3) prior to final disposal
      Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates the treatment requirements for hazardous waste prior to disposal.
   c. Leachate quality standards
      Minister of Environment and Forestry Regulation No. 59 of 2016 on Leachate Quality Standards for Final Waste Processing Facilities; regulates the quality standards for leachate
   d. Standards for recovered materials
      Minister of Environment and Forestry Regulation No. 6 of 2021 on Procedures and Requirements for the Management of Hazardous and Toxic Waste; regulates the standards for recovered materials from waste.

Table 9. TSC for Hazardous Waste Treatment

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
Green	1. For all waste treatment processes, the Activity complies with the following criteria: a. According to the type of activity, the Activity complies with the requirements set out in national regulations for either waste treatment or waste incineration. Facilities that have been granted exemptions from pollution limits are not considered as compliant with the TSC; **AND** b. During the pre-acceptance procedures, at least the following information is gathered: i. expected date of arrival at the waste treatment plant; ii. contact details of the waste producer, the sector which the waste originates from and the nature of process producing the waste, including the variability of the process; iii. to be delivered to the operator per delivery and per year; iv. description of the waste, including composition, hazardous properties of the waste, waste code and the suitable treatment route; **AND** c. During the acceptance procedures, the following elements are in place:	• Draft ATSF *version* 4 • Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry Number 9 of 2024 concerning the Management of Waste Containing

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
	i. a reception facility equipped with a laboratory to analyze samples on site and documented analytical standard operating procedures, with the option to sub-contract analyses to accredited external contract laboratories; ii. documented sampling procedure consistent with relevant standards; iii. documented analysis of the relevant physico-chemical parameters for the treatment; iv. a dedicated quarantine waste storage area, as well as written procedures to manage non-accepted waste; **AND** d. The personnel dealing with the pre-acceptance and acceptance procedures is able, due to their profession or experience, to deal with all necessary questions relevant for the treatment of the wastes in the waste treatment facility. The procedures are intended to pre-accepting and accepting wastes at the waste treatment plant only if a suitable treatment route is available and the disposal or recovery route for the output of the treatment is determined; **AND** e. For 'blending or mixing activities' the operator is not using dilution to lower the concentration of one or more hazardous substances present in the waste, with the aim for the resulting waste mix to be declassified and become 'non-hazardous waste' and thus be subsequently treated in facilities non-dedicated to the treatment of hazardous waste. Dilution is not used as a 'substitute' to the adequate treatment of the waste; **AND** f. Where blending or mixing activities are to occur documented records to describe the purpose of blending and technical justification that this is required for the treatment process is required. This documentation must include provisions for periodic third-party independent sampling to verify; **AND** 2. Prior to final disposal, hazardous waste is treated to the level specified by national law and in alignment with international best practice; **AND** 3. For final disposal, hazardous waste is treated in accordance with national law and in alignment with international best practice. When secured landfill is identified as the disposal method, ensure that leachate qualifications comply with the thresholds set out in national law and in alignment with international best practice.	Hazardous and Toxic Substances and Hazardous and Toxic Waste • Government Regulation Number 27 of 2020 concerning Specific Waste Management • Regulation of the Minister of Environment and Forestry Number 59 of 2016 concerning Leachate Quality Standards for Businesses and/or Activities at Final Waste Disposal Sites
Transition	N/A	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
Green	1. The activities consist of maximizing the recovery of secondary raw materials (including chemical substances) from source segregated hazardous waste; **AND** 2. Maximizing recovery of secondary raw materials must be demonstrated; **AND** 3. A documented plan must be in place to describe approaches to be taken to maximize the recovery of secondary raw materials and track implementation measures; **AND** 4. The recovered materials are substituting primary raw materials, or chemicals in production processes; **AND** 5. Evidence of clear documentation from the end-users of the recovered materials confirming their use as a substitute for primary raw materials or chemicals is required; **AND** 6. The recovered materials comply with the applicable industry specifications, harmonized standards, as well as relevant applicable national legislation.	• Draft ATSF *version* 4 • Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Substances and Hazardous and Toxic Waste • Government Regulation Number 27 of 2020 concerning Specific Waste Management
Transition	N/A	

Discussion Points

31	**General**	Are the proposed TSC credible and science-based to demonstrate contributions to the Environmental Objectives (EO)? If not, please provide input or alternative approaches that are more relevant, along with supporting scientific or technical references. (Example: EO1 – Climate Change Mitigation aligned with the Paris Agreement target)
32	**General**	Are the TSC for this activity clear, objective, and easy to understand? If not, please explain the parts that need improvement and provide suggestions to enhance understanding of these TSC.
33	**General**	Are there specific terms in these TSC that are difficult to understand? If yes, please provide alternative terms that are easier to understand.

34	**General**	Are there challenges to implement these TSC on the ground? If yes, please provide TSC recommendations based on industry practice, along with their justification.
35	**General**	Are there differences between the TSC and widely adopted international taxonomies? Please provide recommendations to make the TSC approach more interoperable.

5. Recycling

Recycling	
KBLI 2017	**Description**
E	Water, Wastewater, Waste Management and Recycling, and Remediation Activities
38	Waste Management and Recycling
383	Recycling
3830	Recycling
38301	**Metal Scrap Recycling** This group includes businesses engaged in the processing of used metal goods and metal scrap into secondary raw materials. The output of metal recycling consists of secondary raw materials in various forms, such as metal fragments, shavings, and other derivatives. Activities in this group include the separation and sorting of metal waste, mechanical crushing of metal waste, mechanical reduction of metal waste, dismantling, cutting and slicing of metal waste, ship breaking and dismantling of other floating equipment, and similar operations. The manufacturing of new metal products using secondary raw materials, used metal goods, and metal scrap is classified under the appropriate manufacturing industry group.
38302	**Non-Metallic Material Recycling** This group includes businesses engaged in the processing of used non-metal goods and non-metal scrap into secondary raw materials. The output of non-metal recycling consists of secondary raw materials in various forms, such as non-metal fragments, shavings, and other derivatives. Activities in this group include the separation and sorting of non-metal waste, reclamation of rubber and used tires, sorting of plastics, processing of plastic or rubber waste into granules, crushing, cleaning and sorting of glass, processing of used oils and fats into secondary materials, and processing of food, beverage, tobacco waste, and other non-metal waste. The manufacturing of new non-metal products using secondary raw materials, used non-metal goods, and non-metal scrap is classified under the appropriate manufacturing industry group.

Activity Notes for Materials Recovery from Non-hazardous Waste

1. Includes:
   a. Construction, upgrade and operation of facilities for the sorting and processing of separately collected non-hazardous waste streams into usable secondary raw materials involving mechanical reprocessing or mechanical transformation process, except for backfilling purposes.
   b. All facilities and equipment such as conveyor belts, compactors, pelletizers, air classifiers, magnetic belts, and other infrastructure required for material recovery are eligible.
2. Excludes:
   a. Materials recovery from Electrical and Electronic Equipment (EEE). Any dismantling of end-of-life products including EEE should be managed under Activity Depollution and Dismantling of End-of-life Products.
3. KBLI code 38302 covers activities related to the production of primary plastic from recycling and is included in the Manufacturing sector within TKBI. However, the selection of the TSC in the taxonomy assessment must be aligned with the purpose of the activity:
   a. If the activity focuses on waste material management and recycling, then use the TSC from the WSSWM sector.
   b. If the activity is aimed at producing primary plastic from recycled materials, then use the TSC from the Manufacturing sector.

4. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   Standards for material recovery facilities
   Minister of Public Works and Housing Regulation No. 03/PRT/M/2013 on the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Similar Waste; regulates the provision of waste management facilities, including recycling activities.

Activity Notes for Depollution and Dismantling of End-of-life Products

1. Includes:
   a. Construction, operation and upgrade of facilities dismantling and depolluting complex end-of-life products, movable assets and their components for materials recovery or preparation for re-use of components.
   b. The dismantling of end-of-life products and movable assets and their components of any type, such as automobiles, ships and electrical and electronic equipment (EEE) for material recovery.
2. Excludes:
   a. Transportation of EEE, this is covered under Activity **Error! Reference source not found.**
   b. Treatment of batteries stemming from separate collection or removed during dismantling and depollution activities
   c. Demolition and dismantling of buildings and other structures. These activities are covered under Demolition and Site Preparation activities in the Construction & Real Estate (C&RE) sector within TKBI.
3. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   Standards for material recovery facilities
   Minister of Public Works and Housing Regulation No. 03/PRT/M/2013 on the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Similar Waste; regulates the provision of waste management facilities, including recycling activities.

Table 10. TSC for Recycling

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
Green	**If the Activity is Materials Recovery from Non-hazardous Waste:** 1. The Activity results in a recovery efficiency of at least 50% by weight of all non-hazardous waste received by the facility into secondary raw materials (for example pet bales, paper bales and fertilizer) which are suitable for the substitution of primary raw materials; **AND** 2. The facility recovering non-hazardous waste has implemented best industry practice on improving overall environmental performance of the plant including: a. A waste characterization procedure and a waste acceptance procedure regarding the quality of incoming waste; **AND** b. A tracking system and inventory aiming to track the location and quantity of waste in the plant; **AND** c. An output quality management system to ensure that the output of the waste treatment is in line with applicable quality requirements or standards; **AND**	• Draft ATSF *version* 4 • Regulation of the Minister of Public Works and Housing Number 03/PRT/M/2013 of 2013 concerning the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Waste Similar to Household Waste • Regulation of the Minister of Environment and Forestry Number 19

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	d. The relevant waste segregation measures or procedures to ensure that waste, after separation, is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment; **AND** e. Implemented measures to prevent and control potential environmental pollutions are made publicly available. Examples of pollution prevention and control measures may include: i. Dust control ii. Odor management iii. Noise control iv. Water pollution prevention v. Litter control vi. Fire prevention To make measures publicly available, facilities can: i. Publish environmental management plans on company websites; ii. Include information in publicly available annual reports; iii. Display key information on site noticeboards that are accessible to the public; **AND** f. The facility has installed the sorting and material recovery technology and processes to meet relevant technical specifications or quality standards. The Activity uses state-of-the-art technologies suited to the waste fractions processed such as optical separation by near infrared spectroscopy or X-ray systems, density separation, magnetic separation, size separation and other semi-mechanized and manual methods; **AND** 3. Where applicable, materials recovery facilities must comply with nationally imposed standards/guidelines. **If the Activity is Depollution and Dismantling of End-of-life Products:** 1. The Activity dismantles and depollutes separately collected waste, complex end-of-life products, such as automobiles, waste electrical and electronic equipment (WEEE) or ships, in order to: a. Harvest parts and components that are suited for reuse; **AND** b. Separate non-hazardous and hazardous waste fractions suited for material recovery including recovery of critical raw materials; **AND** c. Remove hazardous substances, mixtures and components, so that these are contained in an identifiable stream or that are an identifiable part of a stream within the treatment process and send them to facilities permitted for proper treatment including disposal of hazardous waste. To support identification these streams should be:	of 2021 concerning Procedures for the Management of Non-Hazardous and Non-Toxic Waste • Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste • Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Substances and Hazardous and Toxic Waste • Government Regulation Number 81 of 2012 concerning the Management of Household Waste and Waste Similar to Household Waste • Government Regulation Number 81 of 2012 concerning the Management of Household Waste and Waste Similar to Household Waste

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	i. Separated into clearly labelled suitable containers; **AND** ii. Stored in dedicated areas, that have secondary containment and clear signage; **AND** d. Enclose documentation of the materials that are sent for further treatment or reuse; **AND** 2. The Activity dismantling and depolluting complex end-of-life products, such as automobiles, ships, or WEEE, including waste originating from collection points, complies with at least the following standards: a. SNI ISO 9001:2015: Quality Management Systems; **AND** b. SNI ISO 14001:2015: Environmental Management Systems; **AND** c. SNI ISO 45001:2018: Occupational health and safety management systems – Requirements with guidance for use; **OR** d. an equivalent national standard; **AND** 3. Where applicable, materials recovery facilities must comply with nationally imposed standards/guidelines.	
Transition	**If the Activity is Materials Recovery from Non-hazardous Waste:** 1. The Activity results in a recovery efficiency of at least 40% by weight of all non-hazardous waste received by the facility into secondary raw materials (for example pet bales, paper bales, and fertilizer) which are suitable for the substitution of primary raw materials; **AND** 2. Implemented measures to prevent and control potential environmental pollution are implemented and made publicly available. a. Examples of pollution prevention and control measures may include: i. Dust control; ii. Odor management; iii. Noise control; iv. Water pollution prevention; v. Litter control; vi. Fire prevention; b. To make measures publicly available, facilities can: i. Publish environmental management plans on company websites; ii. Include information in publicly available annual reports; iii. Display key information on site noticeboards that are accessible to the public; **AND** 3. Where applicable, materials recovery facilities must comply with nationally imposed standards/guidelines. **If the Activity is Depollution and Dismantling of End-of-life Products:** 1. The Activity dismantles and depollutes separately collected waste, complex end-of-life products, such as automobiles, ships, or WEEE, in order to:	

Classification	Technical Screening Criteria (TSC)	References
	EO4: Resource Resilience and the Transition to a Circular Economy	
	a. Harvest parts and components that are suited for reuse; **AND** b. Separate non-hazardous and hazardous waste fractions suited for material recovery including recovery of critical raw materials; **AND** c. Remove hazardous substances, mixtures and components, so that these are contained in an identifiable stream or that are an identifiable part of a stream within the treatment process and send them to facilities permitted for proper treatment including disposal of hazardous waste. To support identification these streams should be: i. Separated into clearly labelled suitable containers; **AND** ii. Stored in dedicated areas, that have secondary containment and clear signage; **AND** d. Enclose documentation of the materials that are sent for further treatment or reuse; **AND** 2. Where applicable, materials recovery facilities must comply with nationally imposed standards/guidelines.	

Discussion Points

36	**General**	Are the proposed TSC credible and science-based to demonstrate contributions to the Environmental Objectives (EO)? If not, please provide input or alternative approaches that are more relevant, along with supporting scientific or technical references. (Example: EO1 – Climate Change Mitigation aligned with the Paris Agreement target)
37	**General**	Are the TSC for this activity clear, objective, and easy to understand? If not, please explain the parts that need improvement and provide suggestions to enhance understanding of these TSC.
38	**General**	Are there specific terms in these TSC that are difficult to understand? If yes, please provide alternative terms that are easier to understand.
39	**General**	Are there challenges to implement these TSC on the ground? If yes, please provide TSC recommendations based on industry practice, along with their justification.
40	**General**	Are there differences between the TSC and widely adopted international taxonomies? Please provide recommendations to make the TSC approach more interoperable.
41	**"This Activity achieves a recovery efficiency of ≥50% by weight of all non-hazardous waste received by the facility, converted into secondary raw materials that are suitable for use as substitutes for primary raw materials."**	How prepared are waste recovery facilities in Indonesia to meet this 40% threshold? Are there national average data or studies that show the current efficiency level? If the recovery efficiency threshold is not commonly achieved, what are the main challenges facilities face in achieving that threshold?
42	**"The facility has implemented best industry practices to improve overall environmental performance, including tracking systems, output quality management, and separation technologies."**	Are there verification or audit mechanisms established to ensure the accuracy of recovery efficiency calculations and compliance with the criteria?

6. Remediation

Remediation	
KBLI 2017	**Description**
E	Water, Wastewater, Waste Management and Recycling, and Remediation Activities
39	Remediation and Other Waste Management Activities
390	Remediation and Other Waste Management Activities
3900	Remediation and Other Waste Management Activities
39000	**Remediation and Other Waste Management Activities** This group includes cleaning and other waste management services conducted by public and private entities, such as soil and groundwater decontamination at polluted sites, both in situ and ex situ, using mechanical, chemical, or biological methods; decontamination of industrial sites or facilities, including nuclear sites and installations; decontamination and cleaning of surface water due to pollution, for example from accumulated pollutants or chemical substances; oil spill cleanup and other pollution on land, surface water, oceans and seas, including coastal areas; asbestos removal, paint and other toxic substances; other specialized pollution control activities; and disinfection and other similar cleaning services.

Activity Notes for Remediation of Contaminated Sites and Areas

1. Includes:
    a. Decontamination or remediation of soils and groundwater in the polluted area, either in situ or ex situ, in particular using physical, chemical or biological methods;
    b. Decontamination or remediation of contaminated industrial plants or sites;
    c. Decontamination or remediation of surface water and its shores following accidental pollution, such as through collection of pollutants or through physical, chemical or biological methods;
    d. Cleaning up oil spills and other types of pollutants on or in:
        i. surface water including rivers, lakes, coastal waters or transitional waters;
        ii. groundwater;
        iii. marine water;
        iv. sediments (for all surface water types);
        v. aquatic ecosystems;
        vi. buildings;
        vii. soil;
        viii. terrestrial ecosystems;
    e. Material abatement of hazardous substances, mixtures or products, such as asbestos or lead-based paint;
    f. Other specialized pollution-control activities;
    g. Clean-up after disasters from natural hazards, such as flooding, or earthquake;
    h. Remediation of disused mining sites or legacies not associated with extraction revenues;
    i. Containment operations, hydraulic barriers, active and passive barriers intended to limit or prevent migration of pollutants.

2. All activities that are required to prepare, plan, monitor and follow up the decontamination or remediation activity itself, such as:
    a. Preparatory investigations, including data collection and surveying activities (in particular geological or hydrological), technical feasibility and environmental impact studies required to define the remediation project;
    b. Monitoring and control of the remediation measures, including: (1) sampling of soil, water, sediment, biota or other materials; (2) laboratory analysis of samples to identify the nature and concentration of pollutants; (3) installation, operation and maintenance of monitoring facilities and equipment such as observation wells in and outside the perimeter of the remediation site;
    c. Demolition of contaminated buildings or other structures, dismantling large-scale machinery and equipment (i.e., decommissioning) and removal of surface sealing and concreting.
    d. Earth moving or dredging, including excavation, landfilling, levelling, construction or reinforcement of perimeter walls or fences, primary access and internal roads and any other activities necessary to operate the decontamination.
    e. Implementation of other environmental protection and pollution prevention and control measures to comply with the conditions imposed in the environmental permit for the remediation project, including measures for safeguarding safety of operations on-site and health of workers (such as for fire control, flood, hazardous waste management), protection of workers, site access control, management of invasive species before or during decontamination or remediation, reinforcement operations carried out prior to or during decontamination.
3. Excludes:
    a. Pest control in agriculture;
    b. Purification of water for water supply purposes;
    c. Decontamination or remediation of nuclear plants and sites;
    d. Treatment and disposal of hazardous or non-hazardous waste unrelated to the site contamination problem;
    e. Morphological remediation;
    f. Remediation of legally non-conforming landfills and abandoned or illegal waste dumps unrelated to the site under remediation;
    g. Emergency services;
    h. Outdoor sweeping and watering of streets
4. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
    a. Standards for contaminant removal or control
    Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates standards for contaminant management
    b. Standards for the management of waste or soil from contaminated land
    Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates procedures for managing waste or soil from contaminated land
    c. Determination of the duration of control, monitoring, or maintenance activities in the post-treatment phase
    Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates post-remediation monitoring duration.
    d. Requirements for approval of specific remediation and monitoring plans detailing remediation actions
    Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates the approval process for remediation plans.

Activity Notes for Remediation of Legally Non-Conforming Landfills and Abandoned or Illegal Waste Dumps

1. Includes remediation of legally non-conforming landfills and of abandoned or illegal waste dumps that have been closed and are not taking in further waste other than possibly inert or biostabilized waste to be used as landfill cover material (as far as allowed in the environmental permit for the remediation project)
2. Includes remediation strategies and sub-activities typically implemented as part of projects aimed at removing, controlling, containing or diminishing polluting emissions from non-conforming landfills and abandoned or illegal dumpsites.
3. Remediation through environmental isolation of non-conforming or illegal landfills or dumpsites at the present site, including:
    a. Physical isolation, concentration, structural stabilization and protection of the non-conforming or illegal landfill or dumpsite, including application of hydraulic barriers, sealing, drainage and cover layers;
    b. Installation, operation and maintenance of drainage and separate collection and treatment systems for leachates and run-off water prior to discharge;
    c. Installation, operation and maintenance of landfill gas collection, abatement and control systems, including wells, piping and flaring systems;
    d. Application of top soil and vegetation cover for renaturation purposes
4. Remediation through excavation and removal of non-conforming or illegal landfills or dumpsites with subsequent treatment, recovery or disposal of excavated waste, including:
    a. Selective excavation of the waste deposited on the site, loading and transport to existing permitted treatment, recovery or disposal facilities with separate management of non-hazardous and hazardous waste.
    b. Sorting and recovery of materials and fuels from excavated non-hazardous waste, including the installation, operation and maintenance of dedicated facilities and equipment for the duration of the remediation project.
5. Remediation through decontamination of soils, surface and groundwater at the place of pollution, including the following:
    a. Selective excavation, loading, transport, temporary storage, backfilling of soil, with separate management of non-contaminated and contaminated soils;
    b. Treatment of contaminated soil or water, either in situ or ex situ, using in particular physical, chemical or biological methods, including the installation, operation and maintenance of dedicated facilities for the duration of the remediation project;
    c. Application of hydraulic barriers, active and passive barriers intended to limit/prevent migration of pollutants.
6. All of the following sub-activities that are required to prepare, plan, monitor and follow-up on the above remediation measures:
    a. Preparatory investigations, including data collection and surveying activities (in particular geological or hydrological), technical feasibility and environmental impact studies required to define the remediation project;
    b. Site preparation, including earth moving and levelling works, construction or reinforcement of perimeter walls or fences, primary access and internal roads, demolition of buildings or other structures on the landfill site;
    c. Monitoring and control of the remediation measures, including:
        i. Sampling of soil, water, sediment, biota or other materials;
        ii. Laboratory analysis of samples to identify the nature and concentration of pollutants;
        iii. Installation, operation and maintenance of monitoring facilities and equipment such as observation wells in and outside the perimeter of the landfill site;
    d. Implementation of other environmental protection and pollution prevention and control measures to comply with the conditions imposed in the environmental permit for the remediation project, including measures for safeguarding safety of operations on-site and health of workers, such as for fire control, flood protection, hazardous waste management.

7. Excludes:
   a. The permanent closure, rehabilitation and after care of existing or new landfills that comply with relevant regional legislation or otherwise aligned with recognized international industry standards;
   b. Landfill gas transformation for utilization as energy carrier or industry feedstock;
   c. Redevelopment of the remediated site for other economic use such as recreational, residential or commercial areas, installation of photovoltaic (PV) panels;
   d. Compensatory measures for pollution caused by the landfill or dumpsite such as the development and operation of alternative water supply systems for affected population living in the surrounding area.
8. Several criteria in this TSC are aligned with technical provisions regulated under the following laws and regulations, which serve as references
   a. Standards for contaminant removal or control
      Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates standards for contaminant management
   b. Standards for the management of waste or soil from contaminated land
      Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates procedures for managing waste or soil from contaminated land
   c. Determination of the duration of control, monitoring, or maintenance activities in the post-treatment phase
      Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates post-remediation monitoring duration.
   d. Requirements for approval of specific remediation and monitoring plans detailing remediation actions
      Minister of Environment and Forestry Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste; regulates the approval process for remediation plans.

Table 11. TSC for Remediation

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
Green	**If the Activity is Remediation of Contaminated Sites and Areas:** 1. Remediation activities are not carried out by the operator that caused the pollution or a person acting on behalf of that operator, with environmental liability provisions based on the 'polluter-pays' principle according to national law; **AND** 2. Remediation activities must fulfill the following criteria: a. Contaminant removal or control meets national regulatory standards; **OR** b. Where national regulatory standards for remediation are not available a site-specific risk assessment, considering contaminant properties and spread, to eliminate significant health and environmental risks to ensure that the contaminated area is safe for current or future use; **AND** 3. The remediation Activity is conducted in line with recognized standards or best available techniques and includes all of the following elements:	• Draft ATSF *version* 4 • Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.101/MENLHK/SETJEN/KUM.1/11/2018 concerning Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste • Regulation of the Minister of Public Works and Housing Number

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
	a. The original source that led to the contamination has been stopped or addressed so as not to be a potential source of further contamination before any assessment or remediation Activity is undertaken; **AND** b. Preparatory investigations including site-specific surveys are carried out in line with recognized standards or best available techniques to establish the following elements used to define the environmental targets for the remediation and evaluate the remedial options: i. The location, characteristics and extent of the contaminated site; **AND** ii. The underlying geological and hydrological conditions; **AND** iii. The likely quantity, composition and sources of contamination; **AND** iv. Soil and water pollution originating from it as well as the risks to human health and the environment; **AND** c. The remedial options are analyzed in line with recognized standards or best available techniques and the most suitable remedial measures are defined in a dedicated remediation and monitoring plan; **AND** d. Any hazardous or non-hazardous waste or contaminated soils extracted or otherwise produced by the remediation Activity is subject to appropriate collection, transport, treatment, recovery or disposal by an authorized operator, in accordance with legal requirements and care is taken to prevent any mixing of excavated contaminated soils and non-contaminated soils. Hazardous and non-hazardous waste management should be demonstrated to be compliant with the TSCs outlined in **Error! Reference source not found.** and **Error! Reference source not found.**; **AND** e. Remediation methods do not include reducing pollutant concentrations through dilution or watering down, unless a full justification, for reason other than cost considerations, is provided in the remediation plan; **AND** f. Control, monitoring or maintenance activities are carried out in the after-care phase of at least 10 years, unless a different duration sufficient to guarantee long-term risk control is defined in the national law or in the remediation and monitoring plan (see criterion (3.c)); **AND** 4. The specific remediation and monitoring plan, detailing the remediation actions, is approved by the competent authority in accordance with national legal requirements; **OR** 5. Where there is no designated competent authority in place, the plan shall be reviewed and endorsed by a suitably qualified, independent third party; **AND** 6. Surveillance of the control and monitoring plan takes place at least on an annual basis to ensure the plan's efficiency and relevance.	03/PRT/M/2013 of 2013 concerning the Provision of Waste Infrastructure and Facilities for the Management of Household Waste and Waste Similar to Household Waste

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
	If the Activity is Remediation of Legally Non-Conforming Landfills and Abandoned or Illegal Waste Dumps: To meet this TSC, criteria (1), (4), AND (7) are mandatory in all cases; one of (2) OR (3) applies; AND one of (5) OR (6) applies: 1. Remediation activities are not carried out by the operator responsible for the pollution or by any party acting on behalf of that operator, in accordance with the 'polluter-pays' principle; **AND** 2. Remediation activities must meet the following criteria: a. Contaminant removal or control complies with national regulatory standards; **OR** b. Where national regulatory standards are unavailable, a site-specific risk assessment is conducted, considering the properties and spread of contaminants, to eliminate significant risks to human health and the environment and ensure the site is safe for current or future use; **AND** 3. The remediation activity is conducted in accordance with recognized standards or Best Available Techniques (BAT) and includes all of the following elements: a. The landfill or illegal dumping site to be remediated has been closed and does not receive additional waste, except inert waste (non-hazardous waste that does not undergo physical, chemical, or biological reactions and does not harm the environment) or biologically stabilized waste used as landfill cover material (as permitted under the environmental permit for the remediation project); **AND** b. Preparatory investigations, including site-specific surveys, are conducted in accordance with recognized standards to establish the following elements used to define the environmental targets for the remediation and to evaluate the remedial options: i. The location, characteristics, and extent of the landfill and contaminated area; **AND** ii. The underlying geological and hydrological conditions; **AND** iii. The estimated quantity, composition, and sources of deposited waste; **AND** iv. Soil and water pollution originating from the waste, as well as the risks to human health and the environment; **AND** c. The results of the remediation investigation inform a feasibility study that defines the objectives, targets, and scope of the remediation and evaluates alternative remedial options; **AND** d. The remedial options are analyzed in accordance with recognized standards and are described in the feasibility study prepared for the landfill remediation project, demonstrating that the selected option is the most suitable overall solution to meet the defined remediation objectives and targets; **AND**	

Classification	Technical Screening Criteria (TSC)	References
	EO3: Protection of Healthy Ecosystems and Biodiversity	
	e. All materials and fuels recovered from landfill waste must meet relevant quality standards or user specifications for the intended recovery operations and must not pose risks to the environment or human health; **AND** f. Any hazardous waste or non-hazardous waste that is extracted or generated during the remediation activity must be collected, transported, treated, recovered, or disposed of by authorized operators, in accordance with legal requirements. The management of hazardous and non-hazardous waste must be demonstrated to be compliant with the technical screening criteria outlined in the activity "Treatment of hazardous waste" and the activity "Collection and transport of non-hazardous and hazardous waste"; **AND** g. Remediation methods must not include reducing pollutant concentrations through dilution or watering down, unless a full justification is provided in the remediation plan for reasons other than cost considerations; **AND** h. Control, monitoring, or maintenance activities are carried out during the after-care phase for a minimum of ten years, unless a different duration sufficient to guarantee long-term risk control is defined in national law or in the remediation and monitoring plan (see clause 3.c); **AND** 4. The remediation project, including the monitoring and control plan, is approved by the competent authority in accordance with national legal requirements; **OR** 5. Where no designated authority exists, the plan must be reviewed and endorsed by a suitably qualified, independent third party; **AND** 6. Surveillance of the control and monitoring plan is conducted at least annually to ensure its effectiveness and relevance.	
Transition	N/A	

Discussion Points

43	**General**	Are the proposed TSC credible and science-based to demonstrate contributions to the Environmental Objectives (EO)? If not, please provide input or alternative approaches that are more relevant, along with supporting scientific or technical references. (Example: EO1 – Climate Change Mitigation aligned with the Paris Agreement target)

44	**General**	Are the TSC for this activity clear, objective, and easy to understand? If not, please explain the parts that need improvement and provide suggestions to enhance understanding of these TSC.
45	**General**	Are there specific terms in these TSC that are difficult to understand? If yes, please provide alternative terms that are easier to understand.
46	**General**	Are there challenges to implement these TSC on the ground? If yes, please provide TSC recommendations based on industry practice, along with their justification.
47	**General**	Are there differences between the TSC and widely adopted international taxonomies? Please provide recommendations to make the TSC approach more interoperable.

E. Appendix

E.1. Relevant Government Regulations

Table 12. List of Relevant Government Regulations

No	KBLI 2017	Activities	Relevant Provisions (non-exhaustive list)
1	36001	Storage, Purification, and Distribution of Drinking Water	Government Regulation Number 16 of 2005 concerning the Development of Drinking Water Supply Systems (SPAM)
			Government Regulation Number 30 of 2024 concerning Water Resources Management
			Regulation of the Minister of Public Works and Public Housing Number 27 of 2016 concerning the Implementation of Drinking Water Supply Systems (SPAM)
			Regulation of the Minister of Public Works and Public Housing Number 4 of 2020 concerning Standard Operating Procedures for the Implementation of Drinking Water Supply Systems
			Regulation of the Minister of Industry Number 62 of 2024 concerning the Mandatory Enforcement of Indonesian National Standards (SNI) for Packaged Drinking Water
2	36002	Storage and Distribution of Raw Water	Law Number 17 of 2019 concerning Water Resources
			Presidential Regulation Number 37 of 2023 concerning the National Water Resources Policy
			Government Regulation Number 30 of 2024 concerning Water Resources Management
3	36003	Water Treatment Support Activities	Law Number 17 of 2019 concerning Water Resources
			Presidential Regulation Number 37 of 2023 concerning the National Water Resources Policy
			Government Regulation Number 30 of 2024 concerning Water Resources Management
4	37011	Collection of Non-Hazardous Wastewater	Presidential Instruction Number 1 of 2024 concerning the Acceleration of Drinking Water Provision and Domestic Wastewater Management Services
			Regulation of the Minister of Public Works and Public Housing Number 04/PRT/M/2017 concerning the Implementation of Domestic Wastewater Management Systems
5	37012	Collection of Hazardous Wastewater	Presidential Instruction Number 1 of 2024 concerning the Acceleration of Drinking Water Provision and Domestic Wastewater Management Services
			Regulation of the Minister of Public Works and Public Housing Number 04/PRT/M/2017 concerning the Implementation of Domestic Wastewater Management Systems
6	37021	Treatment and Disposal of Non-Hazardous Wastewater	Presidential Instruction Number 1 of 2024 concerning the Acceleration of Drinking Water Provision and Domestic Wastewater Management Services
			Regulation of the Minister of Public Works and Public Housing Number 04/PRT/M/2017 concerning the Implementation of Domestic Wastewater Management Systems
7	37022	Treatment and Disposal of Hazardous Wastewater	Presidential Instruction Number 1 of 2024 concerning the Acceleration of Drinking Water Provision and Domestic Wastewater Management Services
			Regulation of the Minister of Public Works and Public Housing Number 04/PRT/M/2017 concerning the Implementation of Domestic Wastewater Management Systems
8	38211		Law Number 18 of 2008 concerning Waste Management

No	KBLI 2017	Activities	Relevant Provisions (non-exhaustive list)
		Treatment and Disposal of Non-Hazardous Waste	Government Regulation Number 81 of 2012 concerning the Management of Household Waste and Waste Similar to Household Waste
			Government Regulation Number 27 of 2020 concerning the Management of Specific Waste
			Presidential Regulation Number 97 of 2017 concerning National Policies and Strategies for Waste Management
			Regulation of the Minister of Public Works and Public Housing Number 3 of 2013 concerning the Operation of Waste Infrastructure and Facilities
			Regulation of the Minister of Environment and Forestry Number 14 of 2021 concerning Waste Management through Waste Banks
9	38212	Production of Organic Waste Compost	Law Number 18 of 2008 concerning Waste Management
			Government Regulation Number 81 of 2012 concerning the Management of Household Waste and Waste Similar to Household Waste
			Government Regulation Number 27 of 2020 concerning the Management of Specific Waste
10	38110	Collection of Non-Hazardous Waste	Law Number 18 of 2008 concerning Waste Management
			Government Regulation Number 81 of 2012 concerning the Management of Household Waste and Waste Similar to Household Waste
			Government Regulation Number 27 of 2020 concerning the Management of Specific Waste
			Presidential Regulation Number 97 of 2017 concerning the National Policy and Strategy for the Management of Household Waste and Waste Similar to Household Waste
			Regulation of the Minister of Public Works and Public Housing Number 3 of 2013 concerning the Operation of Waste Infrastructure and Facilities
			Regulation of the Minister of Environment and Forestry Number 14 of 2021 concerning Waste Management through Waste Banks
11	38120	Collection of Hazardous Waste	Law Number 18 of 2008 concerning Waste Management
			Government Regulation Number 27 of 2020 concerning the Management of Specific Waste
			Regulation of the Minister of Environment and Forestry Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Materials and Hazardous and Toxic Waste
			Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste
12	38220	Hazardous Waste Treatment and Disposal	Law Number 18 of 2008 concerning Waste Management
			GR Number 27 of 2020 concerning the Management of Specific Waste
			Regulation of the Minister of Environment and Forestry Number 9 of 2024 concerning the Management of Waste Containing Hazardous and Toxic Materials and Hazardous and Toxic Waste
			Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for the Management of Hazardous and Toxic Waste
13	38301	Metal Scrap Recycling	Law Number 18 of 2008 concerning Waste Management
			Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management
14	38302		Law Number 18 of 2008 concerning Waste Management

No	KBLI 2017	Activities	Relevant Provisions (non-exhaustive list)
		Recycling of Non-Metal Materials	Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management
15	39000	Remediation and Other Waste Management Activities	Law Number 32 of 2009 concerning Environmental Protection and Management
			Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management

E.2. Relevant International Standards/Guidelines

Table 13. List of Relevant International Standards

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
1	36001	Storage, Purification, and Distribution of Drinking Water	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO Series 5667: Water Quality Sampling
			ISO 24516-1:2016: Asset Management for Drinking Water Distribution Networks
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24528:2021: Guidelines for Water Loss Investigation in Drinking Water Distribution Networks
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 9001:2015: Quality Management Systems
			ISO 14001:2015: Environmental Management Systems
			ISO 45001:2018: Occupational Health and Safety Management Systems – Requirements and Guidance for Use
			ISO 13205:2024: Marine Technology – Seawater Desalination – Terminology
			ISO 23446:2021: Marine Technology – Quality of Water from Seawater Reverse Osmosis (RO) Desalination – Guidelines for Urban Water Supply
			ISO 23044:2020: Guidelines for Softening and Desalination of Industrial Wastewater for Reuse
2	36002	Storage and Distribution of Raw Water	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO Series 5667: Water Quality Sampling
			ISO 24516-1:2016: Asset Management for Drinking Water Distribution Networks
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24528:2021: Guidelines for Water Loss Investigation in Drinking Water Distribution Networks
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 9001:2015: Quality Management Systems
			ISO 14001:2015: Environmental Management Systems

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
			ISO 45001:2018: Occupational Health and Safety Management Systems – Requirements and Guidance for Use
			ISO 13205:2024: Marine Technology – Seawater Desalination – Terminology
			ISO 23446:2021: Marine Technology – Quality of Water from Seawater Reverse Osmosis (RO) Desalination – Guidelines for Urban Water Supply
			ISO 23044:2020: Guidelines for Softening and Desalination of Industrial Wastewater for Reuse
3	36003	Water Treatment Support Activities	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO Series 5667: Water Quality Sampling
			ISO 24516-1:2016: Asset Management for Drinking Water Distribution Networks
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24528:2021: Guidelines for Water Loss Investigation in Drinking Water Distribution Networks
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 9001:2015: Quality Management Systems
			ISO 14001:2015: Environmental Management Systems
			ISO 45001:2018: Occupational Health and Safety Management Systems – Requirements and Guidance for Use
			ISO 13205:2024: Marine Technology – Seawater Desalination – Terminology
			ISO 23446:2021: Marine Technology – Quality of Water from Seawater Reverse Osmosis (RO) Desalination – Guidelines for Urban Water Supply
			ISO 23044:2020: Guidelines for Softening and Desalination of Industrial Wastewater for Reuse
4	37011	Collection of Non-Hazardous Wastewater	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO 24516-3:2017: Asset Management Guidelines for Wastewater Collection Networks
			ISO 24516-4:2019: Asset Management Guidelines for Wastewater Treatment Plants, Sludge Treatment Facilities, Pumps, Storage and Settling Facilities
			ISO Series 5667: Water Quality Sampling
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 30500:2018: Non-Sewered Sanitation Systems — Prefabricated Integrated Treatment Units — General Safety and Performance Requirements for Design and Testing
			WHO Guidelines for Safe Use of Wastewater
			UNEP Guidelines for Wastewater Reuse
			IWA Water Reuse
5	37012	Collection of Hazardous Wastewater	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
			ISO 24516-3:2017: Asset Management Guidelines for Wastewater Collection Networks
			ISO 24516-4:2019: Asset Management Guidelines for Wastewater Treatment Plants, Sludge Treatment Facilities, Pumps, Storage and Settling Facilities
			ISO Series 5667: Water Quality Sampling
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 30500:2018: Non-Sewered Sanitation Systems — Prefabricated Integrated Treatment Units — General Safety and Performance Requirements for Design and Testing
			WHO Guidelines for Safe Use of Wastewater
			UNEP Guidelines for Wastewater Reuse
			IWA Water Reuse
6	37021	Treatment and Disposal of Non-Hazardous Wastewater	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO 24516-3:2017: Asset Management Guidelines for Wastewater Collection Networks
			ISO 24516-4:2019: Asset Management Guidelines for Wastewater Treatment Plants, Sludge Treatment Facilities, Pumps, Storage and Settling Facilities
			ISO Series 5667: Water Quality Sampling
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 30500:2018: Non-Sewered Sanitation Systems — Prefabricated Integrated Treatment Units — General Safety and Performance Requirements for Design and Testing
			WHO Guidelines for Safe Use of Wastewater
			UNEP Guidelines for Wastewater Reuse
			IWA Water Reuse
7	37022	Treatment and Disposal of Hazardous Wastewater	ISO 31000: Risk Management – Principles and Guidelines
			ISO 24513:2019: Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO 24516-3:2017: Asset Management Guidelines for Wastewater Collection Networks
			ISO 24516-4:2019: Asset Management Guidelines for Wastewater Treatment Plants, Sludge Treatment Facilities, Pumps, Storage and Settling Facilities
			ISO Series 5667: Water Quality Sampling
			ISO 24516-2:2019: Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24523:2017: Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 30500:2018: Non-Sewered Sanitation Systems — Prefabricated Integrated Treatment Units — General Safety and Performance Requirements for Design and Testing
			WHO Guidelines for Safe Use of Wastewater
			UNEP Guidelines for Wastewater Reuse
			IWA Water Reuse
8	38110	Bio-Waste Compost Production	ISO 24161:2022 – Terminology for Waste Collection and Transportation
			ISO 24160:2022 – Waste Collection Vehicles: Odor and Leachate Prevention and Control

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
			ISO 24162:2022 – Test Methods for Energy Consumption of Waste Collection Vehicles
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems
			ISO 9001:2015 – Quality Management Systems
			Basel Convention – International Agreement on the Movement and Disposal of Hazardous Waste
9	38120	Bio-Waste Compost Production	ISO 24161:2022 – Terminology for Waste Collection and Transportation
			ISO 24160:2022 – Waste Collection Vehicles: Odor and Leachate Prevention and Control
			ISO 24162:2022 – Test Methods for Energy Consumption of Waste Collection Vehicles
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems
			ISO 9001:2015 – Quality Management Systems
			Basel Convention – International Agreement on the Movement and Disposal of Hazardous Waste
10	38211	Treatment and Disposal of Non-Hazardous waste	ISO 25140:2010: Emissions from Stationary Sources – Automated Method for Determining Methane Concentration Using Flame Ionization Detection (FID)
			ISO 25139:2011: Emissions from Stationary Sources – Manual Method for Determining Methane Concentration Using Gas Chromatography
			ISO 6974-3:2018: Natural Gas – Determination of Composition and Associated Uncertainty Using Gas Chromatography
			ACM0001 (latest version): Clean Development Mechanism methodology for landfill gas capture and flaring or use
			LandGEM: Landfill Gas Emissions Model
			2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 5: Waste)
			Other standards aligned with IPCC Guidelines, ISO 14064-1, or applicable national and regional standards and regulatory frameworks
11	38212	Production of Organic Waste Compost	ISO 19822:2018 – Soil Improvement and Growing Media – Extraction of Nutrients
			ISO 17088:2021 – Plastics — Organic Recycling — Specifications for Compostable Plastics
			ISO 14034:2016 – Environmental Management — Environmental Technology Verification (ETV)
			ISO 25140:2010 – Stationary source emissions: Automated method for determining methane concentration using flame ionization detection (FID)
			ISO 25139:2011 – Stationary source emissions: Manual method for determining methane concentration using gas chromatography
			ISO 6974-3:2018 – Natural gas: Determination of composition and associated uncertainty using gas chromatography
			Other standards aligned with IPCC Guidelines, ISO 14064-1, or applicable national and regional standards and regulatory frameworks

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
12	38220	Hazardous Waste Treatment and Disposal	ISO 24297:2022 – Guidelines for the Treatment and Reuse of Leachate from Municipal Solid Waste (MSW) Incineration Facilities
			ISO 24161:2022 – Waste Collection and Transportation Management — Vocabulary
			ISO 14001:2015 – Environmental Management Systems
			ISO 9001:2015 – Quality Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems
			Basel Convention – International Agreement on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
			Best Available Techniques (BAT) Conclusions for Waste Treatment
			Best Available Techniques (BAT) Conclusions for Waste Incineration
			EN 14899:2005 – Waste Characterization – Sampling of Waste Materials
			EN 12457-2:2002 – Waste Characterization – Leaching Test
			WHO Handbook on Safe Management of Waste from Health-Care Activities
13	38301	Metal Scrap Recycling	ISO 9001:2015 – Quality Management Systems
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems – Requirements with Guidance for Use
14	38302	Recycling of Non-Metal Materials	ISO 9001:2015 – Quality Management Systems
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems – Requirements with Guidance for Use
15	39000	Remediation and Other Waste Management Activities	ISO 24212:2024 – Remediation Techniques Applied to Contaminated Sites
			ISO 21365 – Conceptual Model for Potentially Contaminated Sites
			ISO 18400 – Soil Quality: Sampling
			ISO 18504 – Soil Quality: Sustainable Remediation
			ISO 15175 – Soil Quality
			ISO 11074 – Soil Quality: Vocabulary
			ISO 16000 Series – Indoor Air: Volatile Organic Compounds (VOCs), Molds, and Asbestos
			ASTM E1368 – Standard Practice for Visual Inspection of Asbestos Abatement Projects
			ASTM E2081-00 – Standard Guide for Risk-Based Corrective Action (RBCA)
			ASTM E2205-02 – Standard Guide for RBCA for the Protection of Ecological Resources
			ASTM E1527-21 – Standard Practice for Phase I Environmental Site Assessment (ESA)
			ASTM E1903-19 – Standard Practice for Phase II Environmental Site Assessment (ESA)
			ASTM E1528-14 – Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process
			ASTM E2435-05 – Standard Guide for Application of Engineering Controls at Environmental Remediation Sites

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
			ASTM E2091-00 – Standard Guide for Use of Activity and Use Limitations (AULs), Including Institutional and Engineering Controls
			ASTM E2060-06 – Standard Guide for Ensuring Quality of Environmental Site Characterization and Remediation
			ASTM E2557-07 – Standard Guide for Assessing and Remediating Vapor Intrusion into Buildings
			ASTM E1689-95 – Standard Guide for Developing Conceptual Site Models for Contaminated Sites
			BAT References Document for Waste Treatment – Best Available Techniques
			BAT References Document for Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector – Best Available Techniques
			ISO 18400 – Soil Quality: Sampling
			ISO 18504 – Soil Quality: Sustainable Remediation
			ISO 15175 – Soil Quality (general standard, title may vary slightly depending on context)
			ISO 11074 – Soil Quality: Vocabulary
			ISO 21365 – Conceptual Model for Potentially Contaminated Sites
			ISO 16000 (series) – Indoor Air: Volatile Organic Compounds (VOCs), Mold, and Asbestos
			ISO 31000 – Risk Management: Principles and Guidelines
16	42211	Construction of irrigation networks	ISO 31000 – Risk Management – Principles and Guidelines
			ISO 24513:2019 – Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO Series 5667 – Water Quality Sampling
			ISO 24516-1:2016 – Asset Management for Drinking Water Distribution Networks
			ISO 24516-2:2019 – Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24528:2021 – Guidelines for Water Loss Investigation in Drinking Water Distribution Networks
			ISO 24523:2017 – Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 9001:2015 – Quality Management Systems
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems – Requirements and Guidance for Use
			IUCN Global Standard for Nature-based Solutions (2020)
			ISO 37101 – Sustainable Development in Communities – Management System for Sustainable Development
			ISO 14006:2020 – Environmental Management Systems — Guidelines for Incorporating Eco-design
17	42212	Construction of water treatment, distribution and storage facilities, wastewater and drainage systems	ISO 31000 – Risk Management – Principles and Guidelines
			ISO 24513:2019 – Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO Series 5667 – Water Quality Sampling
			ISO 24516-1:2016 – Asset Management for Drinking Water Distribution Networks
			ISO 24516-2:2019 – Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24528:2021 – Guidelines for Water Loss Investigation in Drinking Water Distribution Networks

No	KBLI 2017	Activities	Relevant International Standards/Guidelines *(non-exhaustive list)*
			ISO 24523:2017 – Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 9001:2015 – Quality Management Systems
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems – Requirements and Guidance for Use
			IUCN Global Standard for Nature-based Solutions (2020)
			ISO 37101 – Sustainable Development in Communities – Management System for Sustainable Development
			ISO 14006:2020 – Environmental Management Systems — Guidelines for Incorporating Eco-design
			ISO 24516-3:2017 – Asset Management Guidelines for Wastewater Collection Networks
			ISO 24516-4:2019 – Asset Management Guidelines for Wastewater Treatment Plants, Sludge Treatment Facilities, Pumps, Storage and Settling Facilities
			ISO 30500:2018 – Non-Sewered Sanitation Systems — Prefabricated Integrated Treatment Units — General Safety and Performance Requirements for Design
			WHO Guidelines for Safe Use of Wastewater
			UNEP Guidelines for Wastewater Reuse
			IWA Water Reuse
18	42911	Construction of water resources infrastructure	ISO 31000 – Risk Management – Principles and Guidelines
			ISO 24513:2019 – Glossary for Drinking Water, Wastewater, and Stormwater Systems
			ISO Series 5667 – Water Quality Sampling
			ISO 24516-1:2016 – Asset Management for Drinking Water Distribution Networks
			ISO 24516-2:2019 – Asset Management for Treatment Plants, Pumps, Reservoirs, Dosing Systems, and Related Infrastructure
			ISO 24528:2021 – Guidelines for Water Loss Investigation in Drinking Water Distribution Networks
			ISO 24523:2017 – Guidelines for Performance Benchmarking of Water and Wastewater Services
			ISO 9001:2015 – Quality Management Systems
			ISO 14001:2015 – Environmental Management Systems
			ISO 45001:2018 – Occupational Health and Safety Management Systems – Requirements and Guidance for Use
			IUCN Global Standard for Nature-based Solutions (2020)
			ISO 37101 – Sustainable Development in Communities – Management System for Sustainable Development
			ISO 14006:2020 – Environmental Management Systems — Guidelines for Incorporating Eco-design
19	42915	Dredging	IUCN Global Standard for Nature-based Solutions (2020)
			ISO 31000 – Risk Management – Principles and Guidelines
			ISO 14001:2015 – Environmental Management Systems
			ISO 37101 – Sustainable Development in Communities – Management System for Sustainable Development
			ISO 14006:2020 – Environmental Management Systems — Guidelines for Incorporating Eco-design

E.3. List of Abbreviations and Terminology

Table 14. List of Abbreviations and Terminology

Abbreviations and Terminologies	Description
Non-Revenue Water (NRW)	The volume of water that has been produced and is lost before it reaches the customer or is otherwise unbilled. This includes physical losses, commercial losses and unbilled/unauthorized consumption.
Hazardous Materials	Substances, energy forms, or other components that, due to their properties, concentration, or quantity, whether directly or indirectly, have the potential to pollute or damage the environment. These materials may also pose risks to environmental health, human health, and the survival of other living organisms.
Population Equivalent (P.E.)	A standardized unit of measurement used in wastewater treatment to express the organic biodegradable load (primarily from human waste) generated by one person per day.
Electrical and Electronic Equipment (EEE)	Encompasses a wide range of devices that require electric currents or electromagnetic fields to operate. Below are some common examples: • Household appliances • IT and telecommunications equipment • Consumer electronics (e.g. televisions, cameras) • Lighting equipment • Medical devices