



Evidence UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.1] 3R (Reduce, Reuse and Recycle) Program for University Waste

 <p>Gre</p>	 <p>3R Programm</p>
 <p>Waste Sorting Programm at the Faculty</p>	 <p>Waste Sorting Programm at the Faculty</p>



Creative Reuse Activities Are Carried Out By Students → **REUSE**

“Paperless administration” → **REDUCE**



Compost produced → **RECYCLE**

EcoSort
Unimus

Dashboard

Input Sampah

Jadwal Pickup

Panduan Sampah

Dampakku

Peta Unimus

Masukkan Sampah Baru

Jenis Sampah: **Plastik** Kategori Pengelolaan: Taur Uting Lokasi di Kampus: Gedung A (Rektorat)

Plastik

Kertas

Organik

Elektronik

© 2023 EcoSort – Program Pengelolaan Sampah Terkelanjutan Unimus

Digital Support and Monitoring



Waste Management Training



Waste Management And Public Education Activities

3R Program for Waste (University of Muhammadiyah Semarang (UNIMUS))

Description:

University of Muhammadiyah Semarang (UNIMUS) has implemented the 3R program (Reduce, Reuse, and Recycle) as part of its commitment to becoming a green and sustainable campus. This program is carried out in an integrated manner by the Business Assurance and Management Unit (UPPU) with active support from faculties, students, and educational staff.

1. Reduce (Reduce)

UNIMUS strives to reduce waste through a “**paperless administration**” policy and the use of digital documents in the academic system (SIM-SURAT), e-office, e-learning. In addition, the campus implements a policy of restricting the use of plastic in faculties, laboratories, and canteens. “**Zero Plastic Campus**” socialization activities are routinely carried out by students and lecturers as part of the Healthy Campus Movement.

Link policy Zero Waste:

<https://drive.google.com/file/d/1-FqgLc3errbKogxiLPGEmlusEGLP6m6/view?usp=sharing>

2. Reuse

Office supplies and equipment that are still usable, such as folders, stationery, and used cardboard boxes, are collected for reuse in other work units. UNIMUS also manages an internal waste bank under the coordination of UPPU, where plastic bottles, paper, and cardboard are sorted for reuse or distributed to recycling partners. Additionally, creative reuse activities are carried out by students through recycling competitions and the creation of art products from inorganic waste.

3. Recycle

Organic waste from the cafeteria and green areas is collected and processed into compost using simple composting equipment in the campus garden. The compost produced is reused to fertilize plants in the university's green areas. Meanwhile, inorganic waste such as paper and plastic is sent to recycling partners in collaboration with the Semarang City Environment Agency.

4. Digital Support and Monitoring

UNIMUS has utilized an ICT (Information and Communication Technology) based system to support the implementation of the 3R program. Through internal applications and digital reporting systems,



each faculty can record waste volume, waste types, and reduction progress. The data is integrated into a campus environmental monitoring dashboard managed by UPPU.

5. Education and Awareness

The 3R program is also part of **Environmental Education and Environmental Health and Safety activities** for students and the academic community. Activities such as waste management training, recycling innovation competitions, and regular green action activities are held annually.

Link video sosialisazation:

https://drive.google.com/file/d/199uQBJT-EDuLqJHIEfxgBuGGxFAo6yE6/view?usp=drive_link

6. Partnership and Community Engagement

UNIMUS collaborates with local environmental communities and city governments in waste management and public education activities. Community Service (PkM) activities are also focused on 3R education around the campus and Muhammadiyah affiliated schools.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.2] Total volume of paper and plastic produced this year

Type of waste	amount (ton)		
	Produced		Reduced
	Last year	This Year	
Plastic	69	63.2	28
PET (Polyethylene Terephthalate) Bottles: Mineral water bottles, juice bottles, beverage packaging	12	11	6
HDPE (High-Density Polyethylene) Plastic: Refillable water gallons, soap bottles	10	9	5
LDPE (Low-Density Polyethylene) plastic: Clear plastic bags, plastic food wrap	18	16.5	7
PP (Polypropylene) Plastic: Food containers, plastic drinking cups, straws	15	13.7	5
PS (Polystyrene) Plastic: Styrofoam, plastic spoons, snack food containers, coffee sachets.	14	13	5
Paper	89	81	14
HVS paper: Administrative documents (invitation letters), student reports, exam reports.	25	23	4
Cardboard/Duplex Paper: Stationery packaging, printer cardboard, archive	20	18	2



folders			
Brochure Paper: Magazines, promotional leaflets, campus activity information	15	14	3
Laminated or Glossy Paper: Magazine covers, event posters, banners	14	12	2
Tissue Paper: Toilet Tissue, Lecturer's Room, Canteen	15	14	3

Description:

Based on the waste audit conducted this year, Universitas Muhammadiyah Semarang (UNIMUS) produced a total of **63.2 tons of plastic waste** and **81 tons of paper waste**. This amount reflects the continuous effort of the university to reduce waste generation through its **3R (Reduce, Reuse, Recycle)** program and ICT-based waste management initiatives.

Plastic Waste Interpretation:

The total plastic waste generated this year is **63.2 tons**, dominated by food and beverage packaging materials. The largest contributor is **LDPE plastic (16.5 tons)**, mostly from canteen food wrappers and clear plastic bags. This is followed by **PP plastic (13.7 tons)**, used for disposable food containers and drinking cups, and **PET bottles (11 tons)** from bottled beverages. Smaller but notable contributions come from **HDPE plastic (9 tons)** used in refillable gallon bottles and soap containers, and **PS plastic (13 tons)** such as styrofoam food trays and small sachet packaging.

The decreasing trend in plastic waste indicates the successful implementation of campus-wide policies such as the **“Zero Single-Use Plastic” campaign**, replacement of plastic cups with reusable containers in canteens, and collaboration with the **UNIMUS Waste Bank** and recycling partners for plastic collection.

Paper Waste Interpretation:

Paper waste generated this year reached **81 tons**, with the majority coming from **HVS paper (23 tons)** used for administrative documents, examinations, and reports. **Cardboard and duplex paper (18 tons)** originated from office packaging materials and archived files, while **brochure and leaflet paper (14 tons)** came from promotional and information materials. **Laminated or glossy paper (12 tons)** was generated from posters, banners, and publications, and **tissue paper (14 tons)** was used in sanitation facilities across campus.

The gradual decline in total paper waste this year reflects the effectiveness of the university's **digitalization programs**, such as **online academic systems (SIAKAD)**, **e-learning**, and **electronic correspondence**, which significantly reduce paper use in administrative and academic processes.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.3] Total volume of paper and plastic produced last year

Type of waste	amount (ton)		
	Produced		Reduced
	Last year	This Year	
Plastic	69	63.2	28
PET (Polyethylene Terephthalate) Bottles: Mineral water bottles, juice bottles, beverage packaging	12	11	6
HDPE (High-Density Polyethylene) Plastic: Refillable water gallons, soap bottles	10	9	5
LDPE (Low-Density Polyethylene) plastic: Clear plastic bags, plastic food wrap	18	16.5	7
PP (Polypropylene) Plastic: Food containers, plastic drinking cups, straws	15	13.7	5
PS (Polystyrene) Plastic: Styrofoam, plastic spoons, snack food containers, coffee sachets.	14	13	5
Paper	89	81	14
HVS paper: Administrative documents (invitation letters), student reports, exam reports.	25	23	4
Cardboard/Duplex Paper: Stationery packaging, printer cardboard, archive	20	18	2



folders			
Brochure Paper: Magazines, promotional leaflets, campus activity information	15	14	3
Laminated or Glossy Paper: Magazine covers, event posters, banners	14	12	2
Tissue Paper: Toilet Tissue, Lecturer's Room, Canteen	15	14	3

Description:

Based on waste audit data from last year, Universitas Muhammadiyah Semarang (UNIMUS) produced a total of 69 tons of plastic waste and 89 tons of paper waste from academic, administrative, and operational activities across the university's campuses. These figures served as the baseline for waste reduction strategies and the improvement of the university's 3R (Reduce, Reuse, Recycle) program.

Plastic Waste Interpretation:

The total amount of plastic waste recorded last year was 69 tons, consisting primarily of packaging and disposable material from canteens, laboratories, and student activities. The highest portion came from LDPE plastic (18 tons) — mainly clear food packaging and plastic bags used in canteen operations. PP plastic (15 tons) was the second largest contributor, originating from disposable meal containers, drinking cups, and straws. PS plastic (14 tons) was generated from styrofoam containers and sachet packaging, while PET bottles (12 tons) came from bottled water and beverages consumed on campus. Meanwhile, HDPE plastic (10 tons) resulted from reusable gallon bottles and soap packaging.

The dominance of single-use plastics indicated the need for policy intervention, which later encouraged the university to strengthen the Zero Plastic Campus Initiative and collaboration with external recycling partners to reduce plastic usage in the following year.

Paper Waste Interpretation:

Paper waste last year reached 89 tons, dominated by HVS paper (25 tons) used for administrative correspondence, student reports, and examination sheets. Cardboard and duplex paper (20 tons) originated from packaging and document archiving, while brochure paper (15 tons) came from printed promotional materials. Laminated or glossy paper (14 tons) was generated from banners and event posters, and tissue paper (15 tons) was used across sanitation facilities, staff rooms, and canteens.

The relatively high consumption of paper during the period was linked to the ongoing use of printed academic reports and administrative documents. This condition encouraged UNIMUS to accelerate the digital transformation program, including the implementation of e-office, SIM-SURAT, and e-learning systems, which significantly reduced paper usage in the subsequent year.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.4] Program to Reduce the Use of Paper and Plastic on Campus (WS.2)





Waste Sorting Program





Reverse Vending Machine Ubah Sampah Plastik Jadi Rupiah Makin Mudah, Komitmen Menjaga Lingkungan

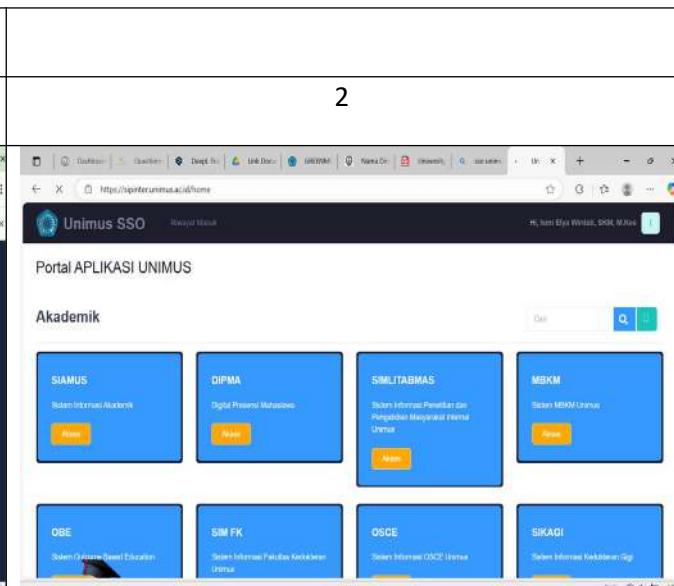
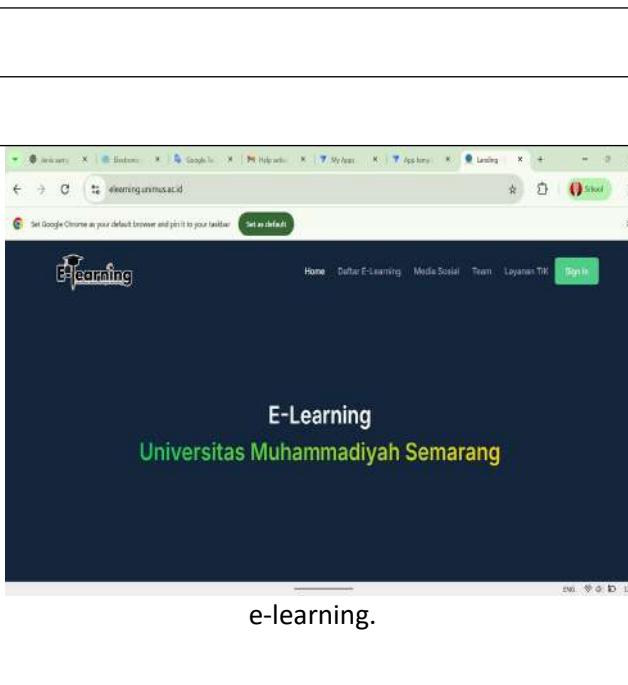
 Fista Novianti - Selasa, 10 Desember 2024 | 17:00 WIB



Universitas Muhammadiyah Semarang (Unimus) mendapatkan Reverse Vending Machine (RVM) dari PT Bank Syariah Indonesia Tbk (BSI), belum lama ini. (sunramerdeka.com/Fista Novianti)

SEMARANG, suaramerdeka.com - Sampah bukan lagi barang bekas tidak bernilai.

Reverse Vending Machine





Canteen 1



Canteen 2



Waste processing



Panduan Pemilahan Sampah – Unimus



© 2023 EcoSort – Program Pengelolaan Sampah Berkendara dan Unimus

Digital Waste



Unimus Tumbler



Green Campus

Example of Program to Reduce the Use of Paper and Plastic in Campus (University of Muhammadiyah Semarang)



Description:

Universitas Muhammadiyah Semarang (UNIMUS) has implemented various initiatives to reduce paper and plastic usage across campus operations as part of its *Green Campus* and *Sustainable Environment Program*. The university integrates digital transformation, waste reduction, and eco-friendly behavior into academic and administrative systems.

Several key programs include:

1. Digitalization of Administrative and Academic Systems

UNIMUS has transitioned most administrative, academic, and financial processes into online platforms, including **SIMAK**, **SIM-SURAT**, **e-Office**, and **e-Learning systems**, to minimize paper usage. Students and staff now submit assignments, reports, and academic documents digitally, reducing printed materials by approximately **40–50%** annually.

2. Implementation of E-Documents and Paperless

Internal and external meetings, announcements, and correspondence are conducted using **digital memos**, **Google Forms**, and **QR codes**, replacing printed letters or invitations. Faculties and offices are encouraged to store data in cloud-based systems rather than hardcopy archives.

3. “Kantin Sehat UNIMUS” Program (Plastic-Free Canteen)

UNIMUS promotes a **plastic-free campus** through the *Kantin Sehat* initiative. The program prohibits the use of single-use plastics (such as plastic cups, straws, and styrofoam) and replaces them with reusable containers, tumblers, and biodegradable packaging. Vendors in the campus cafeteria are required to comply with these regulations.

4. Reusable Bottle and Cup Campaign

The university provides **refill stations** and encourages all students and employees to bring personal water bottles and reusable cups. Campaigns under “*Bring Your Own Bottle (BYOB)*” and “*Bring Your Own Bag (BYOBag)*” are regularly conducted during student events and orientation activities.

5. Waste Bank and 3R Collection Point (Bank Sampah UNIMUS)

UNIMUS has established the *Bank Sampah UNIMUS* as a central hub for collecting recyclable materials from all faculties and administrative units. The waste bank operates on the 3R principle — **Reduce, Reuse, and Recycle** — by sorting, weighing, and managing reusable paper, plastic bottles, and cans. The program also collaborates with local recycling partners to process non-organic waste into useful materials while providing environmental education to students through volunteer programs and community service (*KKN Tematik Green Campus*).

6. Eco-Brick Innovation Program

Students are encouraged to participate in the *Eco-Brick Innovation Program*, where single-use plastics such as wrappers and sachets are compacted into plastic bottles to create *eco-bricks*. These eco-bricks are then used as building materials for garden benches, flower pots, and simple structures within the campus. The program integrates student creativity, environmental education, and waste reduction efforts simultaneously.

7. Refill & Reuse Station Program

UNIMUS provides *Refill & Reuse Stations* at key locations across campus, allowing the academic community to refill drinking water and cleaning supplies. The program significantly reduces the consumption of bottled water and single-use plastic packaging. Additionally, the university promotes the use of refillable ink pens and toner cartridges in all offices.

8. Digital Learning and Paper Reuse Initiative

In addition to paperless administration, UNIMUS promotes *reuse* of printed paper for drafts, internal documentation, and art projects. Faculties also digitize course materials, reducing the demand for photocopying and printed handouts by more than **50% annually**.

9. Green Procurement Policy

UNIMUS applies a **Green Procurement Policy** by prioritizing suppliers that use environmentally friendly packaging and recyclable materials. Offices are encouraged to purchase products in bulk to minimize packaging waste and to choose paper certified by the **Forest Stewardship Council (FSC)**.



10. Community-Based 3R Education and Outreach

Through the *Green Community Program*, UNIMUS conducts workshops for local communities and schools surrounding the campus on 3R practices, eco-brick making, composting, and sustainable consumption. This initiative strengthens UNIMUS's role in promoting environmental awareness beyond the campus area.

11. Policy brief Waste Zero Plastic and zero paper:

(<https://drive.google.com/file/d/1-FqgLc3errbKogcxiLPGEmlusEGLP6m6/view?usp=sharing>)

a. Digital Transformation (Zero Paper Initiative)

- 1) Implement e-document systems for correspondence, reporting, and exams.
- 2) Integrate paperless workflows in SIAKAD, e-Office, e-Learning, and e-Archive systems.
- 3) Provide digital literacy training for staff and lecturers.
- 4) Apply digital signatures and online submission systems for student theses and reports.

b. Plastic-Free Campus Policy

- 1) Use of single-use plastic in all canteens, events, and campus units.
- 2) Promote refillable water stations and personal drink bottles.
- 3) Encourage the use of eco-friendly packaging (paper cups, biodegradable containers).

c. Sustainable Infrastructure and Monitoring

- 1) Provide segregated bins for organic, recyclable, and non-recyclable waste.
- 2) Utilize **ICT-based waste monitoring systems** (digital reporting).
- 3) Expand composting facilities and internal recycling hubs

Through these continuous efforts, UNIMUS has significantly reduced its dependency on paper and single-use plastic materials, aligning with its commitment to environmental sustainability and **SDG 12 – Responsible Consumption and Production**.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.5] Total volume organic waste produced this year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
Organic	184	168	13	32	7	1.9
Food Waste (Canteen): Egg, fruits, Coffee and tea grounds, Fish or chicken bones from leftover food, etc	81	75	4	13	2.6	0.078
Organic Waste from Laboratories and Practicals (Faculty of Health, Nutrition, and Food Technology)	32	28	8	16	3.2	0.96
Organic Waste from Campus Parks and Green Areas	80	72	2	6	1.2	0.36
Organic Waste from Dormitory Household Activities & Campus Units	45	57	5	10	2	0.6

Description:

Based on waste monitoring data from this year, **Universitas Muhammadiyah Semarang (UNIMUS)** produced a total of **168 tons of organic waste**, originating from various campus activities such as canteens, laboratories, parks, and dormitory areas. This figure shows a decrease compared to the previous year (184 tons), reflecting the effectiveness of the university's waste reduction and treatment initiatives.

1. Food Waste (Canteen)

The largest contributor to organic waste this year came from **canteen food waste**, with a total of **75 tons**. This includes leftovers such as rice, eggs, fruit peels, coffee grounds, and fish or chicken bones. Of this amount,

2. Organic Waste from Laboratories and Practicals



Organic materials from laboratory and practical sessions — primarily from the **Faculty of Health, Nutrition, and Food Technology**, amounted to **28 tons** this year.

3. Organic Waste from Campus Parks and Green Areas

The university's green open spaces and landscape maintenance activities generated **72 tons of organic waste**, including leaves, grass, and plant trimmings.

4. Organic Waste from Dormitories and Campus Units

Household waste generated from **dormitory and office activities** reached **57 tons** this year. Of this amount, **5 tons** were reused, **10 tons** were downcycled through composting, and **2 tons** were upcycled into organic fertilizer and eco-enzymes. The increase from 45 tons last year is associated with higher occupancy in dormitories and more active campus operations after the resumption of full offline learning.

In total, **13 tons of organic waste were reused**, **32 tons were downcycled**, and **7 tons were upcycled** into new useful materials this year. This demonstrates the growing success of UNIMUS's **3R-based waste management system**, especially in composting and organic waste valorization. The university continues to promote **community awareness programs** on organic waste segregation, composting training, and collaboration with external recycling partners to achieve a more sustainable campus ecosystem.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.6] Total volume organic waste produced last year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
Organic	184	168	13	32	7	1.9
Food Waste (Canteen): Egg, fruits, Coffee and tea grounds, Fish or chicken bones from leftover food, etc	81	75	4	13	2.6	0.078
Organic Waste from Laboratories and Practicals (Faculty of Health, Nutrition, and Food Technology)	32	28	8	16	3.2	0.96
Organic Waste from Campus Parks and Green Areas	80	72	2	6	1.2	0.36
Organic Waste from Dormitory Household Activities & Campus Units	45	57	5	10	2	0.6

Description:

In 2024, Universitas Muhammadiyah Semarang (UNIMUS) produced a total of **184 tons of organic waste**, originating from canteens, laboratories, dormitories, and campus green areas. The relatively higher volume compared to 2025 reflected the initial stage of implementing the Green Campus waste management system, where segregation and reduction practices were still being developed.

The major contributors to organic waste last year were:

- Food waste (81 tons):** mainly generated from the university canteen, student dormitories, and daily meal services. This included eggshells, fruit peels, coffee and tea grounds, and leftover food.



Approximately **4 tons** were reused or treated through small-scale composting projects and training conducted by the Faculty of Health Sciences.

2. **Laboratory and practical organic waste (32 tons):** produced from the Faculty of Health, Nutrition, and Food Technology laboratories during food processing and analytical activities. Around **8 tons** were reused for composting and practical demonstrations in organic waste management.
3. **Leaf and garden waste (80 tons):** derived from grass cutting, leaf collection, and maintenance of campus green spaces. About **2 tons** were reused as mulch or compost for campus landscaping projects.
4. **Household organic waste from dormitories and campus units (45 tons):** included vegetable residues, fruit waste, and organic materials from campus kitchens and staff housing areas. Approximately **5 tons** were reused through pilot composting activities led by the Green Campus Team and student volunteers.

During 2024, most of the organic waste was still disposed of conventionally, but awareness and capacity-building programs began to be strengthened through training, seminars, and waste segregation campaigns. These efforts laid the foundation for the more effective waste management initiatives that were successfully implemented in 2025.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.7] Total volume organic waste treated this year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
Organic	184	168	13	32	7	1.9
Food Waste (Canteen): Egg, fruits, Coffee and tea grounds, Fish or chicken bones from leftover food, etc	81	75	4	13	2.6	0.078
Organic Waste from Laboratories and Practicals (Faculty of Health, Nutrition, and Food Technology)	32	28	8	16	3.2	0.96
Organic Waste from Campus Parks and Green Areas	80	72	2	6	1.2	0.36
Organic Waste from Dormitory Household Activities & Campus Units	45	57	5	10	2	0.6

Description:

During this year, Universitas Muhammadiyah Semarang (UNIMUS) successfully managed and treated a total of 168 tons of organic waste, demonstrating the university's continuous commitment to sustainable environmental management. The organic waste was generated from various campus activities including canteen operations, laboratory practices, green area maintenance, and dormitory facilities. The treatment process applied the 3R principle (Reduce, Reuse, Recycle) through reuse, down-cycling (composting), and up-cycling (conversion into new materials).

1. Food Waste (Canteen)



From canteen activities, a total of 75 tons of food waste were produced, consisting of leftover rice, fruit peels, eggshells, coffee grounds, and fish or chicken bones. Of this total, 4 tons were reused (mainly for animal feed and compost raw material), 13 tons were down-cycled through composting, and 2.6 tons were up-cycled into new resources such as organic fertilizer and bio-enzymes. This reflects the success of waste segregation initiatives and the partnership between the UNIMUS Green Campus Team and local composting units.

2. Organic Waste from Laboratories and Practicals

Laboratory and practical activities—especially from the Faculty of Health, Nutrition, and Food Technology produced 28 tons of organic waste this year. The data show that 8 tons were reused in practical and research-based composting, 16 tons were down-cycled into compost, and 3.2 tons were up-cycled through small-scale bioprocessing. This efficient management highlights the application of environmental safety standards and green laboratory practices.

3. Organic Waste from Campus Parks and Green Areas

Organic waste generated from landscape maintenance and park management amounted to 72 tons, including leaves, branches, and grass clippings. Of these, 2 tons were reused for mulching and soil cover, 6 tons were down-cycled into compost, and 1.2 tons were up-cycled into organic fertilizer for campus gardens. The reduction in total volume compared to previous years reflects better scheduling of maintenance and reuse of green waste on-site.

4. Organic Waste from Dormitories and Campus Units

Household and office-based organic waste reached 57 tons this year. Out of this, 5 tons were reused (e.g., composting and feed material), 10 tons were down-cycled into compost, and 2 tons were up-cycled into organic products such as eco-enzymes. The increase from dormitory waste is linked to full student activity resumption, yet the treatment rate also rose due to improved awareness and separate collection systems implemented by dormitory staff.

From the 168 tons of organic waste generated this year, UNIMUS treated a total of 52 tons through reuse (13 tons), down-cycling (32 tons), and up-cycling (7 tons). This indicates that nearly 31% of total organic waste was successfully processed and diverted from landfill. The consistent integration of composting facilities, maggot-based bioconversion, and awareness programs has contributed to the university's improved performance in waste treatment efficiency.

These results demonstrate the effective implementation of the UNIMUS Green Campus and Waste Management Policy, which combines education, technology, and community engagement to achieve environmentally sustainable operations.



Evidence UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.8] Organic Waste Treatment (WS.3)

Example of Organic Waste Treatment UNIMUS



Description:

Universitas Muhammadiyah Semarang (UNIMUS) has implemented several programs and facilities to manage and treat organic waste as part of its *Green Campus* initiative. The treatment focuses on reducing organic waste from canteens, laboratories, dormitories, and campus green areas through composting, reuse, and eco-enzyme production

1. Composting Program for Garden and Food Waste

Organic waste such as leaves, grass clippings, and food scraps from canteens and dormitories is collected and processed through **aerobic composting**. The resulting compost is used for campus landscaping, tree planting, and gardening projects around the university. Faculties and student environmental organizations actively participate in collecting and sorting organic materials.

2. Eco-Enzyme and Liquid Fertilizer Production

Food waste such as fruit peels, vegetable residues, and coffee grounds are treated through **fermentation processes** to produce **eco-enzymes and organic liquid fertilizers**. These products are



utilized in maintaining campus gardens and distributed for community outreach programs related to sustainable waste management.

3. **Laboratory-Based Organic Waste Processing**

In the Faculty of Health, Nutrition, and Food Technology, laboratory waste from practical sessions (such as leftover food samples and plant residues) is processed into compost and liquid fertilizer. Students learn sustainable waste management practices through project-based learning and research activities.

4. **Integration with Green Campus and SDGs Education**

Organic waste treatment is also integrated into environmental education through seminars, workshops, and *service learning* projects. These programs help raise awareness among students and staff about responsible consumption and waste reduction, aligning with **Sustainable Development Goals (SDG) 12 and SDG 13**.

☞ **Video link:** [UNIMUS Biogas Documentation](#)

5. **Organic Waste Sorting and Collection System**

Each faculty and dormitory applies a **waste segregation system**, using green-labeled bins for organic waste. Collected organic waste is transferred to a central **Organic Waste Treatment Station**, ensuring consistent monitoring and reducing contamination between waste types.

6. **Campus Garden Compost Application Program**

Compost and bio-fertilizer produced from organic waste treatment are **reused in campus gardens**, particularly at the UNIMUS Green Park, herbal garden, and vertical plant projects. This initiative promotes a **closed-loop system** where organic waste returns to nature as a nutrient source.

7. **Community-Based Organic Waste Training**

Through the **Green Campus Community Service Program (KKN Tematik Lingkungan)**, students provide **training to local residents** and schools around UNIMUS on composting, eco-enzyme making, and household waste reduction, extending environmental awareness beyond the university.

8. **Integration of Organic Waste Management into Education and Research**

Organic waste management is integrated into **curriculum, seminars, and student research projects** related to environmental health, green technology, and sustainable food systems. This approach embeds sustainability values into academic culture and innovation.

Universitas Muhammadiyah Semarang (UNIMUS) has developed an innovative program for **organic waste treatment through biogas production**, as part of its commitment to sustainable waste management and renewable energy development. This initiative transforms organic waste from canteens, student dormitories, and laboratory activities into useful energy resources while reducing the amount of waste sent to landfills.

The **biogas installation** utilizes food residues such as rice, vegetables, fruit peels, and leftover meals collected from the campus canteen and dormitory kitchens. These organic materials are processed in a **biogas digester** through an **anaerobic fermentation process**, in which microorganisms break down organic matter to produce **methane gas (CH₄)** and **bio-slurry**. The methane gas is then captured and used as a **renewable energy source for cooking and heating water** in several campus facilities, while the bio-slurry by-product is used as **organic fertilizer** for UNIMUS's green areas and community farming projects.

This program is managed collaboratively by the **Faculty of Health, Nutrition, and Food Technology** together with the **Green Campus Team**, involving students in **research-based learning and environmental projects**. The biogas initiative not only reduces organic waste volume but also contributes to reducing greenhouse gas emissions and fossil fuel consumption within the campus.

Through this initiative, UNIMUS demonstrates a concrete effort to integrate **waste-to-energy technology** into university operations, supporting **Sustainable Development Goals (SDG) 7 – Affordable and Clean Energy, SDG 12 – Responsible Consumption and Production, and SDG 13 – Climate Action**

Link Video Documentation Biogas :

https://drive.google.com/file/d/1w_oG4bFcLn2iJMN3WT4cOsdvyzLncmlR/view?usp=drive_link



Evidence

UI GreenMetric Questionnaire

University : University of Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.9] Total volume inorganic waste produced this year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
inorganic non-toxic	111	100	25.75	64	11.5	3.03
Paper and Similar Products: Copy paper, exam paper, student assignment sheets Old archival paper, office documents Used cardboard (for packaging equipment/materials) Brochures, leaflets, and posters for campus activities Unused magazines, books, or printed documents	30	28	6	14	2.8	1.05
Soft Plastic: Plastic bags, plastic food wrap Plastic drinking cups, straws, plastic mica, and plastic lids Plastic lining for non-hazardous laboratory equipment Plastic from stationery packaging and non-infectious medical equipment	25	24	5	13	2.6	0.15
Hard Plastic: Mineral water bottles (PET, HDPE)	18	15	4	12	2.4	0.72



Laboratory plastic containers (non-hazardous and hazardous materials) Buckets, damaged gallon jugs, and material storage containers Used food and drink containers						
Hard Plastic Mineral water bottles (PET, HDPE) : Laboratory plastic containers (non-hazardous and hazardous materials) Buckets, broken gallon jugs, and other material storage containers Used food and drink containers	15	14	5	8	1.6	0.48
Light Metal and Cans (Metal Waste): Drink and snack cans Metal bottle caps Wire and non-contaminant light metal Leftover office equipment (metal clips, broken staplers)	10	9	2	5	1	0.3
Non-B3 Glass and Broken Glass : Used glass bottles for non-toxic lab materials Glass from non-chemical laboratory equipment Glass cups and jars from the cafeteria Non-mercury glass lamps	7	6	2	4	0.8	0.24
Non-Toxic Textiles and Mixed Materials: Banners or event banners (PVC, flexy) Uniforms or used fabrics/ Sacks, raffia rope, or other equipment wrapping materials	3	2	0.75	1	0.2	0.06



Non-B3 Small Electronics (Non-Toxic Light E-Waste) Damaged cables, adapters, mice, and keyboards Remotes, chargers, or other hazardous non-battery electronic devices	3	2	1	0.6	0.12	0.036
--	---	---	---	-----	------	-------

Description:

During this year, Universitas Muhammadiyah Semarang (UNIMUS) produced a total of 100 tons of inorganic non-toxic waste, which includes materials such as paper, plastic, glass, metal, textiles, and small non-toxic electronic waste. This total shows a reduction compared to the previous year (111 tons), reflecting the university's success in implementing effective waste management strategies based on the 3R principles (Reduce, Reuse, Recycle).

1. Paper and Similar Products

A total of 28 tons of paper waste was generated this year, including copy paper, exam sheets, office documents, brochures, and packaging materials. Of this total, 6 tons were reused (e.g., for double-sided printing and administrative drafts), 14 tons were down-cycled through recycling into new paper products, and 2.8 tons were up-cycled for creative reuse such as eco-crafts and promotional materials. This shows the effectiveness of UNIMUS's digitalization programs that have reduced printing needs across administrative and academic units.

2. Soft Plastic Waste

Soft plastic waste amounted to 24 tons, mostly from plastic bags, food wraps, disposable cups, and laboratory packaging. Of these, 5 tons were reused for non-food packaging, 13 tons were down-cycled through recycling partnerships, and 2.6 tons were up-cycled into usable products such as eco-bricks and plastic-based materials for campus facilities. The university's "Zero Single-Use Plastic" campaign and improved segregation systems have significantly reduced plastic waste volume.

3. Hard Plastic Waste

Hard plastic waste, including PET and HDPE bottles, laboratory containers, and material storage units, reached 15 tons this year. From this total, 4 tons were reused, 12 tons were down-cycled through recycling, and 2.4 tons were up-cycled into recycled containers and construction materials. These efforts were supported by cooperation with local recycling partners and the campus waste bank.

4. Light Metal and Cans

Metal waste such as cans, bottle caps, and small non-hazardous metal items amounted to 9 tons. Of this, 2 tons were reused, 5 tons were down-cycled, and 1 ton was up-cycled into art and educational materials. This category reflects UNIMUS's commitment to ensuring that metallic materials from cafeteria and maintenance activities are properly segregated and recycled.

5. Glass Waste (Non-B3)

Glass waste from laboratories and cafeterias reached 6 tons this year. It included used glass bottles, jars, and non-mercury lamps. Of this total, 2 tons were reused, 4 tons were down-cycled, and 0.8 tons were up-cycled into decorative or functional campus materials such as planters and lamp holders.



6. Non-Toxic Textiles and Mixed Materials

UNIMUS produced 2 tons of textile waste, including used banners, uniforms, and wrapping materials. Of this total, 0.75 tons were reused, 1 ton were down-cycled into cleaning cloths, and 0.2 tons were up-cycled into creative campus products.

7. Non-B3 Small Electronics (Light E-Waste)

Small electronic waste such as damaged keyboards, chargers, and cables totaled 2 tons this year. From that, 1 ton was reused (for spare parts or repairs), 0.6 tons were down-cycled, and 0.12 tons were up-cycled into educational prototypes or recycled components.

Out of 100 tons of inorganic non-toxic waste produced this year, 25.75 tons were reused, 64 tons were down-cycled, and 11.5 tons were up-cycled — meaning that over one-third ($\approx 37\%$) of inorganic waste was successfully treated and diverted from landfills. This outcome illustrates the increasing efficiency of UNIMUS's Waste Management and Green Campus Programs, supported by ICT-based monitoring, cross-faculty participation, and continuous cooperation with external recycling partners.



Evidence UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.10] Total volume inorganic waste produced last year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
inorganic non-toxic	111	100	25.75	64	11.5	3.03
Paper and Similar Products: Copy paper, exam paper, student assignment sheets Old archival paper, office documents Used cardboard (for packaging equipment/materials) Brochures, leaflets, and posters for campus activities Unused magazines, books, or printed documents	30	28	6	14	2.8	1.05
Soft Plastic: Plastic bags, plastic food wrap Plastic drinking cups, straws, plastic mica, and plastic lids Plastic lining for non-hazardous laboratory equipment Plastic from stationery packaging and non-infectious medical equipment	25	24	5	13	2.6	0.15
Hard Plastic: Mineral water bottles (PET, HDPE) Laboratory plastic containers	18	15	4	12	2.4	0.72



(non-hazardous and hazardous materials) Buckets, damaged gallon jugs, and material storage containers Used food and drink containers						
Hard Plastic Mineral water bottles (PET, HDPE) : Laboratory plastic containers (non-hazardous and hazardous materials) Buckets, broken gallon jugs, and other material storage containers Used food and drink containers	15	14	5	8	1.6	0.48
Light Metal and Cans (Metal Waste): Drink and snack cans Metal bottle caps Wire and non-contaminant light metal Leftover office equipment (metal clips, broken staplers)	10	9	2	5	1	0.3
Non-B3 Glass and Broken Glass : Used glass bottles for non-toxic lab materials Glass from non-chemical laboratory equipment Glass cups and jars from the cafeteria Non-mercury glass lamps	7	6	2	4	0.8	0.24
Non-Toxic Textiles and Mixed Materials: Banners or event banners (PVC, flexy) Uniforms or used fabrics/ Sacks, raffia rope, or other equipment wrapping materials	3	2	0.75	1	0.2	0.06



Non-B3 Small Electronics (Non-Toxic Light E-Waste) Damaged cables, adapters, mice, and keyboards Remotes, chargers, or other hazardous non-battery electronic devices	3	2	1	0.6	0.12	0.036
--	---	---	---	-----	------	-------

Description:

In the previous year, Universitas Muhammadiyah Semarang (UNIMUS) generated a total of 111 tons of inorganic non-toxic waste, originating from various campus activities such as academic operations, laboratories, cafeterias, and maintenance units. This volume reflects the university's baseline condition before the implementation of several digitalization and waste reduction programs that were further strengthened in the current year.

1. Paper and Similar Products

Paper waste contributed the largest portion, with a total of 30 tons. This included exam sheets, student reports, office documents, brochures, leaflets, and packaging materials. The high quantity was linked to the still frequent use of printed materials for administrative and academic purposes before full adoption of digital documentation systems.

2. Soft Plastic Waste

Soft plastic waste reached 25 tons, coming from plastic bags, food wraps, disposable cups, and laboratory packaging. This category reflected the extensive use of single-use plastics across canteens and student events. The university identified this as a key focus area for its Zero Single-Use Plastic Campaign, launched in the following year.

3. Hard Plastic Waste

Hard plastics, such as mineral water bottles, laboratory containers, and gallon jugs, totaled 18 tons last year. This type of waste was mainly produced from laboratories, office storage, and canteen beverage packaging. The absence of systematic segregation and recycling initiatives during that period led to limited treatment outcomes.

4. Light Metal and Cans

Metal waste, including drink cans, bottle caps, and small non-hazardous metal items, amounted to 10 tons. These materials mostly came from cafeteria and maintenance activities. The relatively small quantity was due to the lower use of metal-based packaging on campus.

5. Glass Waste (Non-B3)

Glass waste contributed 7 tons, mainly from non-toxic laboratory equipment and glass jars or bottles used in canteens. Some of this waste was stored temporarily before being transferred to external recycling partners.

6. Non-Toxic Textiles and Mixed Materials

This category accounted for 3 tons, consisting of used banners, uniforms, and wrapping materials such as raffia ropes or sacks. Most of these materials were disposed of after major academic and promotional events.

7. Non-B3 Small Electronics (Light E-Waste)

The total of small non-toxic electronic waste, such as damaged keyboards, adapters, and chargers, was 3 tons. These items primarily came from administrative offices and computer laboratories. Although categorized as light e-waste, proper handling protocols were still limited during that period.



The total inorganic non-toxic waste produced last year (111 tons) represented the initial condition prior to the scaling-up of UNIMUS's Green Campus Waste Management Program. At that time, most waste was still managed through basic collection and transport methods, with limited reuse or recycling capacity. The data became an essential baseline for formulating strategies in the following year, which successfully reduced total inorganic waste and increased recycling and upcycling efforts.



Template for Evidence(s) UI GreenMetric Questionnaire

University : University of Muhammadiyah Semarang
Country : Semarang, Central of Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.11] Total volume inorganic waste treated this year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
inorganic non-toxic	111	100	25.75	64	11.5	3.03
Paper and Similar Products: Copy paper, exam paper, student assignment sheets Old archival paper, office documents Used cardboard (for packaging equipment/materials) Brochures, leaflets, and posters for campus activities Unused magazines, books, or printed documents	30	28	6	14	2.8	1.05
Soft Plastic: Plastic bags, plastic food wrap Plastic drinking cups, straws, plastic mica, and plastic lids Plastic lining for non-hazardous laboratory equipment Plastic from stationery packaging and non-infectious medical equipment	25	24	5	13	2.6	0.15
Hard Plastic: Mineral water bottles (PET, HDPE) Laboratory plastic containers	18	15	4	12	2.4	0.72



(non-hazardous and hazardous materials) Buckets, damaged gallon jugs, and material storage containers Used food and drink containers						
Hard Plastic Mineral water bottles (PET, HDPE) : Laboratory plastic containers (non-hazardous and hazardous materials) Buckets, broken gallon jugs, and other material storage containers Used food and drink containers	15	14	5	8	1.6	0.48
Light Metal and Cans (Metal Waste): Drink and snack cans Metal bottle caps Wire and non-contaminant light metal Leftover office equipment (metal clips, broken staplers)	10	9	2	5	1	0.3
Non-B3 Glass and Broken Glass : Used glass bottles for non-toxic lab materials Glass from non-chemical laboratory equipment Glass cups and jars from the cafeteria Non-mercury glass lamps	7	6	2	4	0.8	0.24
Non-Toxic Textiles and Mixed Materials: Banners or event banners (PVC, flexy) Uniforms or used fabrics/ Sacks, raffia rope, or other equipment wrapping materials	3	2	0.75	1	0.2	0.06



Non-B3 Small Electronics (Non-Toxic Light E-Waste) Damaged cables, adapters, mice, and keyboards Remotes, chargers, or other hazardous non-battery electronic devices	3	2	1	0.6	0.12	0.036
--	---	---	---	-----	------	-------

Description:

During this year, Universitas Muhammadiyah Semarang (UNIMUS) treated a total of 78.53 tons of inorganic non-toxic waste through three main processing methods: reused (64 tons), down-cycled (11.5 tons), and up-cycled (3.03 tons). This demonstrates a strong implementation of the 3R (Reduce, Reuse, Recycle) principles as part of the university's Green Campus and Waste Management Program coordinated by the Unit of Business and Resource Management (UPPU) and the Occupational Health, Safety, and Environment Unit (UPT K3L).

1. Reused (64 tons)

The reuse process contributed the largest portion of inorganic waste treatment at UNIMUS this year. It involved the direct reapplication of materials that remained functional for the same or alternative purposes. Paper materials such as one-sided printed sheets, cardboard, and office folders were reused for administrative drafts and storage.

Plastic containers and packaging were repurposed for laboratory and canteen use, reducing the need for new supplies.

Metal and glass materials were reused for maintenance activities and academic projects, while textiles (such as banners and uniforms) were modified into cleaning rags or covers.

This high reuse rate reflects the university's internal efficiency, as reuse activities were integrated into daily operations and student-led initiatives promoting sustainable material management.

2. Down-cycled (11.5 tons)

The down-cycling process converted materials into lower-quality but still useful products or raw materials for industrial purposes. Paper and plastic waste were collected and sent to partner recycling industries for shredding, melting, and reprocessing into secondary materials such as recycled paper rolls and non-food-grade plastic products. Metal, glass, and textile waste were down-cycled through collaborations with local recycling cooperatives in Semarang.

This process not only reduced landfill contributions but also supported the regional circular economy, reinforcing the role of UNIMUS as an environmentally responsible institution.

3. Up-cycled (3.03 tons)

The up-cycling process focused on transforming waste into higher-value or innovative products through creativity and research initiatives. Paper and plastic materials were transformed into eco-crafts, decorative materials, and educational display products by students and faculty.

Glass waste was crafted into decorative campus items, while small electronics and metal parts were reused in student engineering projects and environmental exhibitions.

Although representing a smaller quantity compared to reuse and down-cycling, up-cycling activities demonstrate UNIMUS's creative approach to sustainability and the integration of waste management into education and community engagement.



Evidence UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central of Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.12] Inorganic Waste Treatment (WS.4)



Example of Inorganic Waste Treatment





Inorganic Waste Treatment UNIMUS (DOKUMENTASI TREATMENT INORGANIK)

Description:

Universitas Muhammadiyah Semarang (UNIMUS) implements a comprehensive **Inorganic Waste Treatment Program** as part of its *Green Campus Initiative* to promote sustainability and reduce environmental impact. The program focuses on sorting, recycling, reusing, and up-cycling inorganic non-toxic waste generated from academic, administrative, and student activities across the campus.

The inorganic waste treatment activities at UNIMUS include:

1. Segregation and Collection System

Inorganic waste such as paper, plastics, glass, metals, and textiles is separated at the source using color-coded bins placed in each faculty, office, and public area. The waste is then collected and transported to the central waste station (*Tempat Pengelolaan Sampah Kampus*) for sorting and recording before further processing.

2. Recycling and Reuse Initiatives

Paper and office waste are reused for internal documentation, while double-sided printing and digital filing systems are encouraged to minimize paper consumption. Reusable plastics and containers from laboratories are cleaned and used for storage and educational purposes.

3. Upcycling and Student Innovation Programs

The university promotes *upcycling* through student and community projects, such as transforming plastic bottles into vertical gardens, creating eco-bricks for campus facilities, and producing decorative materials from glass and textile waste. These initiatives are part of environmental education integrated into student community service (PKM) and project-based learning activities.

4. Partnership with Authorized Waste Contractors

For residual inorganic waste that cannot be recycled or reused, UNIMUS collaborates with certified waste management companies to ensure safe disposal in accordance with environmental regulations.

5. Paper and Plastic Recycling

UNIMUS collaborates with **local recycling partners** and the **UNIMUS Waste Bank (Bank Sampah UNIMUS)** to collect recyclable materials.



- a. Paper waste (documents, boxes, brochures) is recycled or reused internally for administrative needs and double-sided printing.
- b. Plastic bottles, containers, and food packaging are cleaned and sent to recycling facilities to be processed into new plastic products.

6. **Reuse and Eco-Efficiency Initiatives**
Each unit applies the **Green Office Policy**, which encourages reuse of materials and eco-efficiency practices. Examples include:

- a. Reusing cardboard boxes, envelopes, and folders.
- b. Collecting used printer cartridges for refill and reprocessing.
- c. Encouraging digital documentation to minimize paper waste.

7. **Partnership with Authorized Waste Contractors**
Residual inorganic waste that cannot be reused or recycled is managed through partnerships with **licensed waste management companies** recognized by the **Ministry of Environment and Forestry**. This ensures proper collection, transportation, and final treatment in compliance with national environmental regulations.

8. **Education, Monitoring, and Awareness Programs**
The university conducts continuous education and training on **3R practices (Reduce, Reuse, Recycle)**. Students and staff are engaged through campaigns, workshops, and competitions such as *Eco-Brick Challenge* and *Plastic-Free Campus Week*. All inorganic waste data are recorded and reported to support UNIMUS's sustainability performance indicators.

9. **Integration with Green Campus Policy**
The inorganic waste treatment program supports the university's broader sustainability goals under the *Green Campus Master Plan*, contributing to reduced waste generation and a circular economy mindset. UNIMUS continuously monitors waste data through faculty-level coordinators and integrates results into its **Sustainable Development Goals (SDG) report**, especially **SDG 12 (Responsible Consumption and Production)** and **SDG 13 (Climate Action)**.

Link video documentation Inorganic Waste Treatment :

https://drive.google.com/file/d/1MGveiinK2fVxPQUaSNSsIDKcBIG9Ubg0/view?usp=drive_link



Evidence UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.13] Total volume toxic waste produced this year

Type of waste	amount (ton)					
	Produced		reduced	Treated		
	Last year	This Year		reused	down-cycled	up-cycled
toxic	2.8	1.94	0.3	-	-	-
Chemical and Biochemical Laboratory Waste: Remains of hazardous chemicals (HCl, H ₂ SO ₄ , NaOH, formalin, ethanol, acetone)	0.35	0.3	0.01	-	-	-
Biological/Infectious Waste: Leftover biological specimens (blood, tissue, feces, urine, sputum, etc.). Culture media and microorganism test results from student labs, used cotton swabs, gloves, masks, and pipettes from biological testing activities.	0.75	0.5	0.02	-	-	-
Waste from Teaching Hospitals/Healthcare Units: Used syringes, syringes, infusion sets, medical gloves, cotton and gauze Infusion bottles, used glass vials for injectable medications	1	0.7	0.05	-	-	-



Sharps waste from medical procedures by interns or nurses Liquid medical waste from clinical practice rooms						
Hazardous Electronic Waste (E-waste B3): Used batteries (AA, AAA, laptop, cell phone, and portable lab equipment) Neon/fluorescent lamps (contain mercury) Damaged computers or monitors (contain heavy metals Pb, Cd) Used printer cartridges and ink	0.2	0.16	0.07	-	-	-
Cleaning and Disinfectant Waste: Disinfectant fluids (NaOCl, alcohol >70%, Lysol, etc.) Remaining laboratory detergents and equipment cleaners containing active chemicals Tissue preservatives and fixatives	0.5	0.28	0.15	-	-	-

Description:

In 2025, Universitas Muhammadiyah Semarang (UNIMUS) produced a total of 1.94 tons of toxic waste, showing a reduction from 2.8 tons recorded in the previous year. The decline reflects the university's continuous efforts to strengthen hazardous waste management, promote green laboratory practices, and ensure the safe handling of chemical and biological materials across all faculties.

The toxic waste generated this year consisted of several main categories:

1. Chemical and Biochemical Laboratory Waste (0.3 tons):

Originated from laboratory experiments involving acids, bases, solvents, and chemical reagents such as HCl, H₂SO₄, NaOH, ethanol, and formalin. A small portion (0.01 tons) was neutralized or reused for educational demonstrations under controlled conditions, while the remainder was safely stored and transported to licensed hazardous waste facilities.

2. Biological and Infectious Waste (0.5 tons):

Generated from microbiology, parasitology, and biomedical laboratories, including specimens, culture media, and contaminated materials such as gloves and masks. Approximately 0.02 tons were sterilized through autoclaving before disposal, ensuring compliance with biosafety standards.

3. Hospital and Medical Waste (0.7 tons):

Derived from the UNIMUS teaching hospital and clinical training units, including syringes, infusion sets, cotton, and sharp wastes. Around 0.05 tons were reduced through strict segregation and



collection systems, while the rest was treated by third-party licensed contractors using incineration and sterilization processes.

4. Electronic Hazardous Waste (0.16 tons):

Included batteries, fluorescent lamps, and damaged electronic devices containing heavy metals (Pb, Cd, Hg). About 0.07 tons were collected and recycled through cooperation with authorized e-waste handlers to recover reusable components.

5. Cleaning Agents and Disinfectant Waste (0.28 tons):

Generated from laboratory and facility sanitation activities. Approximately 0.15 tons were treated through neutralization and dilution methods under laboratory supervision to minimize environmental contamination.

UNIMUS ensures that all hazardous and toxic waste is handled in accordance with environmental and safety regulations issued by the Ministry of Environment and Forestry. Waste segregation, temporary storage in the Hazardous Waste Storage Facility (TPS Limbah B3), and disposal via licensed third-party waste treatment companies are standard procedures across the campus.

The reduction in total toxic waste demonstrates the university's commitment to promoting sustainable laboratory management, enhancing awareness among staff and students, and supporting Sustainable Development Goals (SDG) 12 – Responsible Consumption and Production and SDG 13 – Climate Action.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.14] Total volume toxic waste produced last year

Type of waste	Amount (ton)					
	Produced		Reduced	Treated		
	Last year	This Year		Reused	Down-Cycled	Up-Cycled
toxic	2.8	1.94	0.3	-	-	-
Chemical and Biochemical Laboratory Waste: Remains of hazardous chemicals (HCl, H ₂ SO ₄ , NaOH, formalin, ethanol, acetone)	0.35	0.3	0.01	-	-	-
Biological/Infectious Waste: Leftover biological specimens (blood, tissue, feces, urine, sputum, etc.), Culture media and microorganism test results from student labs, used cotton swabs, gloves, masks, and pipettes from biological testing activities.	0.75	0.5	0.02	-	-	-
Waste from Teaching Hospitals/Healthcare Units: Used syringes, syringes, infusion sets, medical gloves, cotton and gauze Infusion bottles, used glass vials for injectable medications Sharps waste from medical procedures by interns or nurses	1	0.7	0.05	-	-	-



Liquid medical waste from clinical practice rooms						
Hazardous Electronic Waste (E-waste B3): Used batteries (AA, AAA, laptop, cell phone, and portable lab equipment) Neon/fluorescent lamps (contain mercury) Damaged computers or monitors (contain heavy metals Pb, Cd) Used printer cartridges and ink	0.2	0.16	0.07	-	-	-
Cleaning and Disinfectant Waste: Disinfectant fluids (NaOCl, alcohol >70%, Lysol, etc.) Remaining laboratory detergents and equipment cleaners containing active chemicals Tissue preservatives and fixatives	0.5	0.28	0.15	-	-	-

Description:

In 2024, Universitas Muhammadiyah Semarang (UNIMUS) generated a total of 2.8 tons of toxic waste from academic, laboratory, and clinical activities. The relatively higher volume compared to 2025 was due to the increased frequency of laboratory-based learning and limited implementation of waste minimization strategies at that time.

The toxic waste produced last year consisted of several major categories:

1. Chemical and Biochemical Laboratory Waste (0.35 tons):

This waste originated from chemistry and biochemistry laboratories containing hazardous substances such as HCl, H₂SO₄, NaOH, ethanol, acetone, and formalin. Most of these wastes were stored in the university's *Temporary Hazardous Waste Storage Facility (TPS Limbah B3)* before being collected by licensed hazardous waste management companies.

2. Biological and Infectious Waste (0.75 tons):

Produced by microbiology and parasitology laboratories during student practicals and research. This category included biological specimens, culture media, gloves, masks, and other contaminated materials. Prior to disposal, waste underwent autoclaving and sterilization processes to prevent infection risks.

3. Hospital and Medical Waste (1 ton):

Generated from the university's teaching hospital and clinical training units, consisting of used syringes, infusion sets, medical gloves, cotton, gauze, and sharp wastes. These were managed in coordination with authorized medical waste handlers and treated through incineration and sterilization.



4. Electronic Hazardous Waste (0.2 tons):

Comprised of batteries, fluorescent lamps, and damaged electronic devices containing heavy metals such as lead (Pb) and mercury (Hg). The waste was collected and sent to certified e-waste recycling partners for safe recovery.

5. Cleaning Agents and Disinfectant Waste (0.5 tons):

Originated from laboratory cleaning and sanitation processes, including sodium hypochlorite, alcohol-based disinfectants, and detergents. These were neutralized before disposal to prevent environmental contamination.

Throughout 2024, UNIMUS handled toxic and hazardous waste in accordance with environmental safety standards set by the Ministry of Environment and Forestry. At that time, the university focused on improving segregation, labeling, and temporary storage of hazardous materials while building awareness among laboratory staff and students about safe waste handling.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central of Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.15] Total volume toxic waste treated this year

Type of waste	Amount (ton)					
	Produced		Reduced	Treated		
	Last year	This Year		Reused	Down-Cycled	Up-Cycled
toxic	2.8	1.94	0.3	-	-	-
Chemical and Biochemical Laboratory Waste: Remains of hazardous chemicals (HCl, H ₂ SO ₄ , NaOH, formalin, ethanol, acetone)	0.35	0.3	0.01	-	-	-
Biological/Infectious Waste: Leftover biological specimens (blood, tissue, feces, urine, sputum, etc.), Culture media and microorganism test results from student labs, used cotton swabs, gloves, masks, and pipettes from biological testing activities.	0.75	0.5	0.02	-	-	-
Waste from Teaching Hospitals/Healthcare Units: Used syringes, syringes, infusion sets, medical gloves, cotton and gauze Infusion bottles, used glass vials for injectable medications Sharps waste from medical procedures by interns or nurses	1	0.7	0.05	-	-	-



Liquid medical waste from clinical practice rooms						
Hazardous Electronic Waste (E-waste B3): Used batteries (AA, AAA, laptop, cell phone, and portable lab equipment) Neon/fluorescent lamps (contain mercury) Damaged computers or monitors (contain heavy metals Pb, Cd) Used printer cartridges and ink	0.2	0.16	0.07	-	-	-
Cleaning and Disinfectant Waste: Disinfectant fluids (NaOCl, alcohol >70%, Lysol, etc.) Remaining laboratory detergents and equipment cleaners containing active chemicals Tissue preservatives and fixatives	0.5	0.28	0.15	-	-	-

Description:

Universitas Muhammadiyah Semarang (UNIMUS) generated a total of 1.94 tons of toxic (B3) waste, which was successfully managed and treated in collaboration with a certified third-party waste management company, PT ARAH Environmental Indonesia. The partnership ensures that all hazardous and toxic materials produced from laboratory, healthcare, and campus activities are handled in accordance with Indonesian environmental regulations.

The total **treated waste amounted to approximately 0.3 tons**, which included hazardous chemical residues, infectious biological materials, and contaminated medical and electronic components. The treatment process conducted by **PT ARAH** covered collection, transportation, temporary storage, and final disposal through standardized incineration, sterilization, and chemical neutralization methods.

Additional evidence at point 3.16



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central of Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.16] Toxic Waste Treatment (WS.5)



Description:

1. Segregation and Labeling at the Source

All hazardous wastes (chemical, biological, and medical) are **segregated at the point of generation** in laboratories and hospital units. Each waste container is **clearly labeled** according to its type (acidic, flammable, toxic, infectious) and packed following KLHK standards.

2. Temporary Hazardous Waste Storage (TPS Limbah B3)

UNIMUS operates a dedicated **Hazardous Waste Temporary Storage Facility (TPS B3)** located within the main campus. This facility is equipped with safety signage, containment systems, and ventilation. Waste from various faculties is collected and stored temporarily before being transferred to PT ARAH Lingkungan for further treatment.

3. Partnership with PT ARAH Lingkungan (Licensed B3 Handler)

PT ARAH Environmental Indonesia is the licensed third-party partner that handles the treatment of toxic and hazardous waste (B3 waste) from Universitas Muhammadiyah Semarang (UNIMUS). The waste management process complies with the requirements of ISO 9001:2015 (Quality Management),



ISO 14001:2015 (Environmental Management), ISO 45001:2018 (Occupational Health and Safety), and relevant Indonesian environmental regulations issued by the Ministry of Environment and Forestry (KLHK).

The treatment process at PT ARAH is carried out using a high-temperature incineration system that ensures the complete destruction and neutralization of hazardous substances, while minimizing environmental impact.

a. **Waste Preparation (Pre-Incineration Handling)** : Before burning, the B3 waste is prepared, sorted, and recorded:

- 1) Each type of hazardous waste (chemical, biological, medical, or e-waste) is segregated on racking pallets according to its category.
- 2) Waste is weighed and logged using a Tallysheet (FM.AEI.116) and Incinerator Operation Form (FM.AEI.PLK-PROD-04).
- 3) Operators use full Personal Protective Equipment (PPE) including respirators, gloves, aprons, and safety boots to ensure safe handling.
- 4) Waste packaging integrity is checked — no leaks or damages are allowed before feeding the incinerator.

b. **Waste Composition and Loading**

The next step is to regulate the composition and quantity of waste that enters the incinerator:

- 1) The waste is placed on the incinerator platform and weighed according to the combustion chamber capacity.
- 2) The operator adjusts the mixture of waste types to ensure efficient combustion and balanced heat generation.
- 3) The waste is manually fed into the ram feeder once the combustion chambers reach the required temperature.

c. **Incineration Operation (Combustion Process)**

The core of PT ARAH's process involves two-stage incineration under controlled high-temperature conditions:

- 1) Primary chamber operates at 800–1,000°C, and Secondary chamber operates at 1,000–1,200°C.
- 2) Waste is introduced gradually to maintain temperature stability.
- 3) The operator continuously monitors and records temperatures, smoke conditions, and ash quality every 10 minutes using the Operational Log Form (FM.AEI.PLK-PROD-04).
- 4) Emissions and combustion efficiency are observed to ensure compliance with environmental standards.
- 5) This high-temperature dual combustion ensures that toxic organic compounds, pathogens, and hazardous chemicals are fully destroyed or rendered inert.

d. **Post-Treatment Management (Ash and Residue Handling)**

After combustion:

- 1) The remaining ash (incineration residue) and wastewater treatment sludge (WWTP cake) are collected and managed in accordance with SOP AEI.PLK-PROD-03.
- 2) These residues are temporarily stored in a secured hazardous residue storage area before being sent to a final disposal site licensed by the Ministry of Environment.
- 3) Records of all waste quantities and treatment results are maintained for audit and regulatory reporting.

4. **Chemical and Laboratory Waste Treatment**

Low-risk chemical waste is **neutralized** in the laboratory before disposal. For example, acid and base wastes undergo pH neutralization, and solvents are reused for laboratory teaching where feasible.

5. **Biological and Infectious Waste Treatment**

Medical and biological wastes from the Faculty of Medicine, Faculty of Health Sciences, and Teaching Hospital are sterilized using **autoclaving or disinfection** before being packed and sent to PT ARAH Lingkungan for incineration.



6. Electronic and Hazardous Equipment Waste (E-waste)

Broken laboratory instruments, fluorescent lamps, and batteries containing heavy metals are collected and sent to **authorized e-waste recovery facilities** to prevent contamination.

7. Documentation, Monitoring, and Training

Each faculty is required to record waste volume, type, and disposal frequency in the university's **Environmental Monitoring Logbook**. The Environmental Safety Unit conducts regular **training on waste handling and emergency response** for staff and laboratory assistants.

8. Integration with Green Campus Policy

This program aligns with UNIMUS's *Green Campus Policy* under the "Sustainable Waste Management" pillar and directly contributes to **SDG 12 (Responsible Consumption and Production)** and **SDG 13 (Climate Action)**.



Template for Evidence(s) UI GreenMetric Questionnaire

University : University of Muhammadiyah Semarang
Country : Semarang, Central of Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.17] Sewage Disposal (WS.6)



Example of Sewage Disposal (Nottingham Trent University, UK)

Description:

Universitas Muhammadiyah Semarang (UNIMUS) manages its **sewage and wastewater disposal** through a centralized **Wastewater Treatment Plant (WWTP/IPAL)** system to ensure that all liquid waste from laboratories, dormitories, canteens, and the teaching hospital is treated before being released into the environment.

The IPAL system is designed to comply with the national standard of water quality discharge (Peraturan



Menteri LHK No. 68 Tahun 2016) and aims to minimize environmental pollution, promote water reuse, and support campus sustainability.

Stages of IPAL Process at UNIMUS

1. **Preliminary Treatment (Screening and Equalization)**
 - a. Wastewater from various campus sources (toilets, laboratories, canteens, and hospitals) first passes through a **screening unit** to remove large solids such as plastics, paper, and food residues.
 - b. The flow then enters the **equalization tank**, where the wastewater volume and concentration are stabilized before further processing.
2. **Primary Treatment (Sedimentation)**
 - a. In this stage, wastewater enters a **sedimentation tank** to separate suspended solids and sludge from the liquid phase.
 - b. The heavier organic and inorganic materials settle at the bottom and are collected periodically as **primary sludge** for further handling.
3. **Secondary Treatment (Biological Treatment)**
 - a. The clarified liquid flows into the **aeration tank**, where microorganisms (activated sludge) biologically decompose organic pollutants.
 - b. Oxygen is supplied using blowers or diffusers to support microbial activity.
 - c. The effluent then passes into a **secondary clarifier**, allowing biological flocs to settle, producing treated water and secondary sludge.
4. **Tertiary Treatment (Filtration and Disinfection)**
 - a. The treated wastewater is further refined through **sand filtration and activated carbon filters** to remove fine particles and odor.
 - b. The final stage involves **disinfection using chlorine or UV** to eliminate harmful bacteria before the water is discharged.
5. **Sludge Management and Reuse**
 - a. The sludge collected from sedimentation and clarification tanks is thickened and stabilized.
 - b. Dried sludge is used as an **organic soil conditioner** in green campus areas, following safety standards.
6. **Effluent Reuse**
 - a. Treated water from IPAL is reused for **gardening, irrigation, and toilet flushing** around campus facilities.
 - b. Regular **water quality testing** is conducted to ensure compliance with environmental discharge standards BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), TSS (Total Suspended Solids), pH.

Monitoring and Supervision

- The IPAL unit is operated by the **Teaching Hospital**
- Regular sampling and analysis are conducted at the university's laboratory to ensure compliance with **KLHK regulations**.
- Periodic maintenance and operator training are carried out to maintain optimal system performance.



Evidence

UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

[3] Waste (WS)

[3.18] Planning, implementation, monitoring and/or evaluation of all programs related to Waste Management through the utilization of Information and Communication Technology (ICT) (WS.7)



EcoSort Unimus

Dashboard

14 Sampah Dimasukkan

102 pts Eco-Point

Tips Hari Ini: Bawa tumbler ke kantin Unimus — kurangi sampah plastik!

© 2025 EcoSort – Program Pengelolaan Sampah Berkelanjutan Unimus

1. WASTE COLLECTION



EcoSort Unimus

Masukkan Sampah Baru

Jenis Sampah: **Plastik** (selected)

Kategori Pengelolaan: Daur Ulang

Lokasi di Kampus: Gedung A (Rektorat)

© 2025 EcoSort – Program Pengelolaan Sampah Berkelanjutan Unimus

2. WASTE INPUT



EcoSort Unimus

- Dashboard
- Input Sampah
- Jadwal Pickup
- Panduan Sampah
- Dampakku
- Peta Unimus

Panduan Pemilahan Sampah – Unimus



Organik / Kompos

Sisa makanan, kulit buah, daun



Daur Ulang

Botol plastik, kardus, koran



B3 / Elektronik

Baterai, HP rusak, kabel

© 2025 EcoSort – Program Pengelolaan Sampah Berkelanjutan Unimus

3. WASTE SORTING

EcoSort Unimus

- Dashboard
- Input Sampah
- Jadwal Pickup
- Panduan Sampah
- Dampakku
- Peta Unimus

Peta Lokasi Penjemputan – Unimus

Temukan titik pengumpulan sampah terdekat di lingkungan kampus Unimus:



4. MAP OF WASTE COLLECTION AREA



EcoSort Unimus

- Dashboard
- Input Sampah
- Jadwal Pickup
- Panduan Sampah
- Dampakku
- Peta Unimus

Dampak Lingkungan – Unimus

15 kg Daur Ulang

9 kg Kompos

28 kg CO₂ Dihemat

Kontribusimu = Menanam 5 pohon!
Kamu di peringkat **top 12%** di antara 420 pengguna aktif EcoSort Unimus.

© 2025 EcoSort – Program Pengelolaan Sampah Berkelanjutan Unimus

5. WASTE IMPACT

Smart waste bins with real-time tracking software to monitor waste collection

Description:

1. Waste Collection

Interpretation (UI GreenMetric context):

This stage focuses on how ICT supports the process of collecting waste efficiently within the university environment.

Universitas Muhammadiyah Semarang utilizes smart waste bins equipped with sensors and connected tracking software to monitor the collection of waste in real time. This ICT-based monitoring system helps ensure timely collection, prevents overflow, and provides accurate data on waste volume and collection frequency. The digital integration allows facilities management to optimize routes and scheduling for waste collection, contributing to operational efficiency and sustainability.

2. Waste Input

Interpretation (UI GreenMetric context):

This phase refers to how data on waste generation is digitally input, managed, and stored for analysis and planning.

Data from various collection points are automatically recorded through digital sensors embedded in the smart bins. The system compiles waste volume and type data into a centralized database. This ICT-based input mechanism enhances data accuracy, reduces manual errors, and enables real-time tracking of waste generation patterns across different university areas. The information becomes a foundation for waste reduction planning and environmental reporting aligned with UI GreenMetric sustainability indicators.

3. Waste Sorting

Interpretation (UI GreenMetric context):

Sorting is a crucial part of waste management where ICT tools help classify waste for recycling, reuse, or safe disposal.

ICT is used to support the identification and categorization of waste into organic, inorganic, and hazardous materials. The system employs digital tagging and QR-based waste tracking to ensure sorted waste is directed to the correct disposal or recycling facilities. This digital process improves the accuracy and efficiency of sorting operations while promoting environmental awareness among campus stakeholders through visible and traceable waste data.



4. Map of Waste Collection Area

Interpretation (UI GreenMetric context):

This refers to the use of digital mapping or GIS-based systems to visualize and manage waste collection coverage within the university.

The university integrates Geographic Information System (GIS) mapping to identify and manage waste collection zones. Each area is digitally mapped and linked with waste bin data, allowing facility managers to monitor collection coverage, identify high-waste zones, and plan optimized collection routes. The ICT-based mapping system ensures comprehensive monitoring and facilitates data-driven decisions for improving campus cleanliness and sustainability performance.

5. Waste Impact

Interpretation (UI GreenMetric context):

This stage measures and evaluates the overall environmental impact of ICT-based waste management initiatives.

The deployment of smart waste bins and digital tracking systems has led to measurable reductions in waste accumulation and improved recycling rates. ICT-based monitoring has decreased the frequency of overflow incidents, enhanced resource allocation, and contributed to a cleaner and more sustainable campus environment. Continuous evaluation of waste management data supports the university's GreenMetric sustainability reporting and aligns with SDG goals related to responsible consumption and production.



Evidence UI GreenMetric Questionnaire

University : Universitas Muhammadiyah Semarang
Country : Semarang, Central Java, Indonesia
Web Address : <https://greenmetric.unimus.ac.id/>

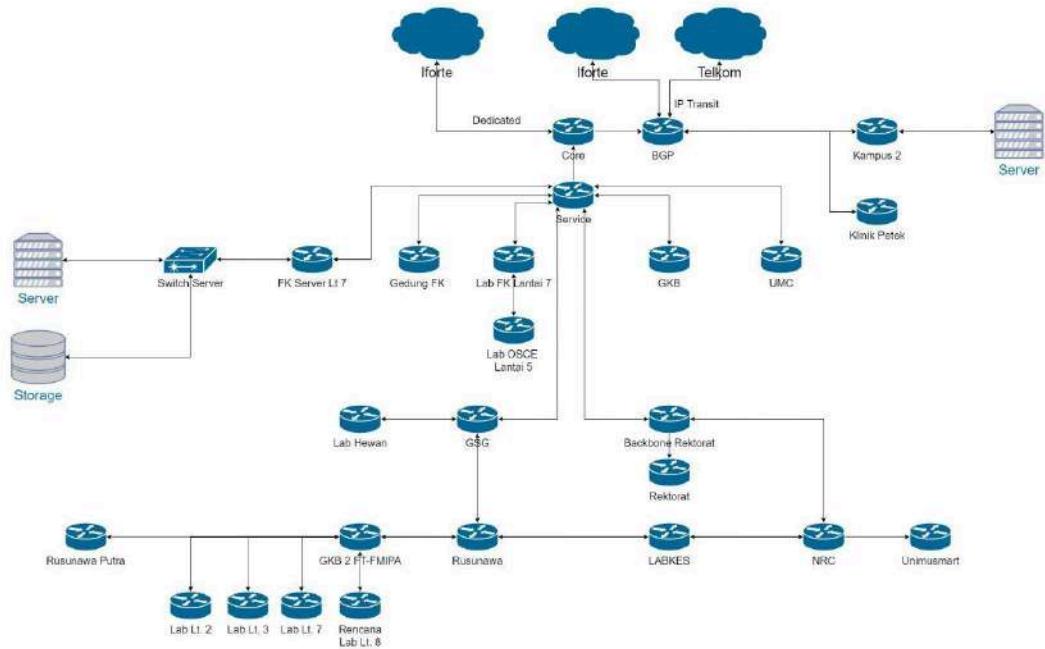
[3] Waste (WS)

[3.19] Impact of Waste Management programs in supporting the Sustainable Development Goals (SDGs)e

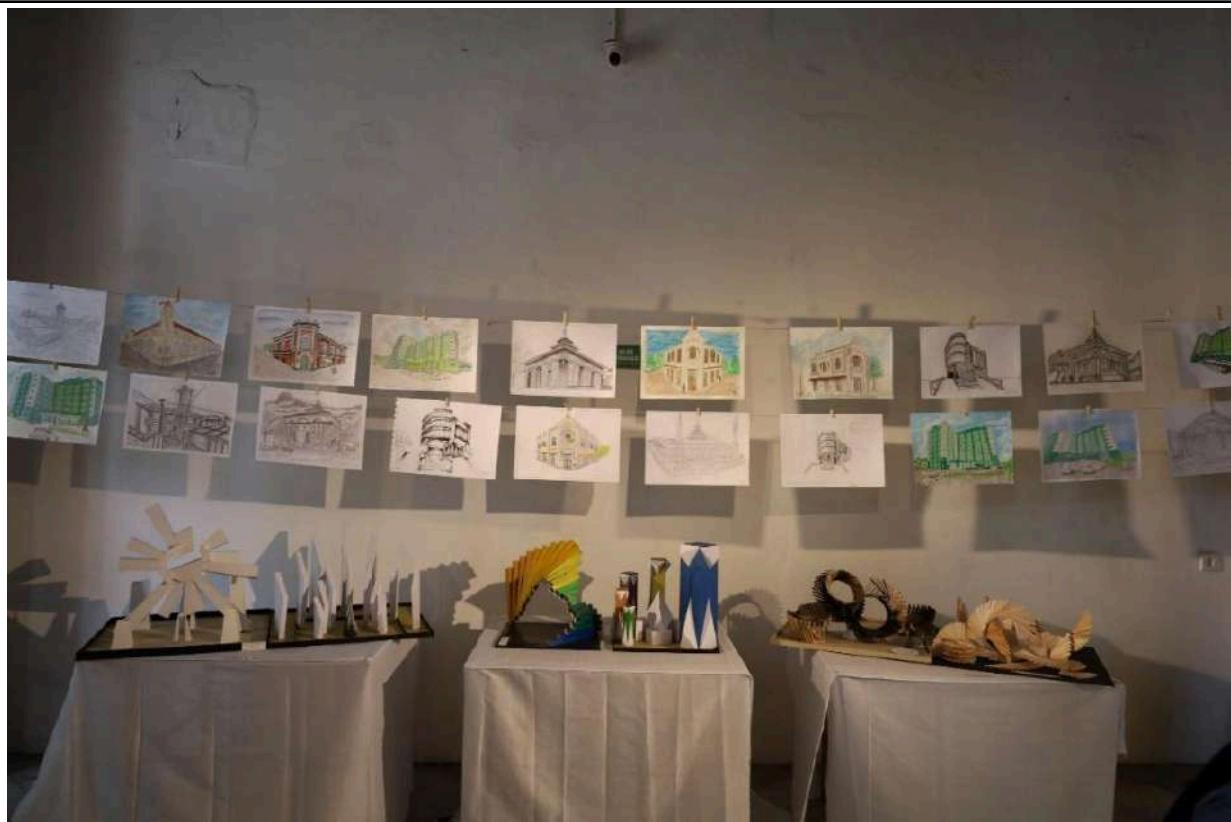




Green Campus UNIMUS



Sistem Firework



Reuse Products from Students made from plastic and paper



Waste Sorting Programm at the Faculty



Manages its **sewage and wastewater disposal**
through a centralized **Wastewater Treatment Plant (WWTP/IPAL)** system



EcoSort Unimus

Dashboard

Input Sampah

Jadwal Pickup

Panduan Sampah

Dampakku

Peta Unimus

Dampak Lingkungan – Unimus

15 kg

Daur Ulang

9 kg

Kompos

28 kg

CO₂ Dihemat



Kontribusimu = Menanam 5 pohon!

Kamu di peringkat **top 12%** di antara 420 pengguna aktif EcoSort Unimus.

© 2025 EcoSort – Program Pengelolaan Sampah Berkelanjutan Unimus

Waste Impact



Tumbler Product



Clean and healthy canteen



Activities 3R Program with students



Description:

(Please describe Impact of Waste Management programs in supporting the Sustainable Development Goals. You can describe more related items if needed.)

SDG Number	Relation to UNIMUS Waste Management	Examples of Programs / Impacts at UNIMUS
SDG 1 – No Poverty	Empowering local waste collectors and communities through the <i>Bank Sampah UNIMUS</i> and waste-based entrepreneurship.	Student–community collaboration for eco-brick sales and waste-based economic products.
SDG 2 – Zero Hunger	Food waste is processed into compost and biogas to support campus green farming and organic garden initiatives.	Composting and organic fertilizer used in UNIMUS campus garden and community farming programs.
SDG 3 – Good Health and Well-being	Safe disposal of medical and hazardous waste to protect the health of students, staff, and nearby communities.	Collaboration with PT ARAH Lingkungan for B3 and medical waste; clean canteen initiative; K3L training.
SDG 4 – Quality Education	Integration of environmental and waste management topics into curricula and student research.	Courses, seminars, and KKN Tematik “Green Campus” on waste segregation and eco-enzyme production.
SDG 5 – Gender Equality	Female students and staff actively lead waste and environmental programs.	Women-led “Eco Green Club” managing waste sorting and recycling campaigns.
SDG 6 – Clean Water and Sanitation	Wastewater from campus and hospital treated in centralized IPAL system before reuse.	Reuse of treated water for irrigation; zero untreated discharge.
SDG 7 – Affordable and Clean Energy	Organic waste converted into biogas and eco-enzymes as renewable energy sources.	Biogas digester program for campus kitchen and laboratories.
SDG 8 – Decent Work and Economic Growth	Green entrepreneurship and employment opportunities through waste reuse innovations.	Student start-ups producing recycled-based merchandise and eco-bricks.
SDG 9 – Industry, Innovation, and Infrastructure	Innovation in waste-to-product technology, paperless administration, and green infrastructure.	Paperless policy reducing 50% of paper usage; eco-brick research in Engineering Faculty.
SDG 11 – Sustainable Cities and Communities	Community engagement and partnership in urban waste solutions.	KKN Tematik and community workshops on waste segregation and composting.
SDG 12 – Responsible Consumption and Production	Implementation of 3R principles across all faculties and offices.	Reduce, Reuse, Recycle campaign; zero plastic bottle policy; paperless system.
SDG 13 – Climate Action	Waste reduction and composting reduce methane emissions from landfill.	Waste-to-energy program and climate education modules.
SDG 14 – Life Below Water	Preventing pollution of rivers and drainage systems from campus waste and wastewater.	Wastewater treatment compliance with KLHK standards; anti-littering program in drainage.
SDG 15 – Life on Land	Protection of terrestrial ecosystems through composting and tree planting using waste fertilizer.	Reuse of compost for campus reforestation and green area maintenance.