

**EKSAMENSSAMARBEIDENDE FORKURSINSTITUSJONER**

**Forkurs for 3-årig ingeniørutdanning og integrert masterstudium i teknologiske fag og tilhørende halvårig realfagskurs.**

Universitetet i Sørøst-Norge, OsloMet, Høgskulen på Vestlandet, Høgskolen i Østfold, NTNU, Universitetet i Agder, Universitetet i Stavanger, UiT-Norges arktiske universitet, NKL, Metis.

**Eksamensoppgave**

**ENGELSK**

**Bokmål**

**23. mai 2024**

**Kl. 9.00-13.00**

**Hjelpemidler:**

PC med institusjonens eksamensplattform med retteprogram og elektronisk ordbok - og samtidig sperret internett. Fysiske ordbøker som er godkjent av institusjonen, alle språk.

**Andre opplysninger:**

Oppgavesettet består av to sider medregnet forside, i tillegg: to vedlegg.

Oppgavesettet inneholder to oppgaver. Begge må besvares for å bestå.

Vekting: oppgave 1 teller 30% og oppgave 2 teller 70%.

Poor waste management is one of the world's most complex environmental challenges, and engineers will play an important role in finding solutions to this challenge.

The article “Why is the Global Waste Crisis a Social Justice Issue?” in Attachment 1 describes how global waste contributes to social injustice. Attachment 2 is an edited excerpt from the report “Beyond an Age of Waste” published by the United Nations Environment Programme (UNEP).

**Answer both tasks.**

**Task 1. Summary (approx. 250 words)**

Write a summary of Attachment 1 “Why is the Global Waste Crisis a Social Justice Issue?”

**Task 2. Five-paragraph essay (approx. 600-800 words)**

Based on the two attachments, discuss what are the most important issues to focus on when working on solutions to global waste. How can engineers contribute to these solutions? Remember to cite your sources.

## **Attachment 1**

### **Why is the Global Waste Crisis a Social Justice Issue?**

Published FEBRUARY 18, 2022

Written by ALEXIA DREAU, volunteer for Zero Waste Europe.

<https://zerowasteurope.eu/2022/02/why-is-the-global-waste-crisis-a-social-justice-issue/>

World Day of Social Justice has been celebrated by the United Nations on February 20th every year. There is a good reason for that, as social justice strives for the impartial share of social, environmental, and economic advantages and disadvantages. The world's most vulnerable communities continue to experience differential access to rights and opportunities, and disproportionately suffer more from environmental burdens, such as inadequate waste management and its subsequent repercussions.

#### **What is environmental justice, and how is it connected to social justice?**

Justice for all humans and the planet are not separate conversations but remain deeply linked. Human activity profoundly impacts the environment, as the environment continually influences our lives. As an integral part of social justice, environmental justice addresses discrimination: waste disposal, resource extraction, and other activities that result in environmental degradation and impact the most vulnerable communities. The overwhelming majority of incinerators, dumps, landfills, and burn facilities are located near low-income communities, communities of colour, and marginalised communities. On a daily basis, residents deal with inadequate levels of noise, litter, increased vehicle traffic, smells, and air pollution. Emissions from incinerators lead to health-related issues due to overexposure to particles and dangerous pollutants, which also increase the risk of cardiac and respiratory disease, having the most impact on children and the elderly.

In some countries, wastepickers are the only form of solid waste collection, providing countless benefits such as high recycling rates, public health and safety, and environmental sustainability. Yet, wastepickers continue to be highly unprotected, working in unsafe and unhealthy conditions. For decades, the environmental and social justice movement has strived to highlight the challenges borne by unprivileged communities, aiming to restore the unequal distribution of environmental benefits (such as access to nature, green spaces, clean air and water, landscape improvements) and disadvantages (risks of hazards from industrial, transport-generated and municipal pollution, etc.). In this way, social and environmental justice both draw attention to power issues: who causes the pollution/waste and who suffers from it? And so, environmental rights lie at the intersection between human rights and environmental protection.

#### **The global waste crisis rooted in toxic colonialism**

In Europe today, a high percentage of waste is still incinerated or thrown in landfills; and in 2019, the EU exported a monthly average of 150,000 tonnes of plastic waste beyond its borders. However, there is a high discrepancy between the sheer scale of plastic waste trade and the ability of

importing countries to deal with the waste responsibly. As an example, Malaysia has an installed recycling capacity of 515,009 tonnes but now imports on average 835,000 tonnes of plastic waste each year. In Indonesia, less than half of the country's waste is adequately processed, while the rest is thrown in open-dumping landfills. The global waste trade sharpens environmental inequality, hierarchy, exploitation along the lines of class and race on a global scale because the ones who suffer the negative impacts are the vulnerable communities who didn't produce the waste. The issue of waste trade is, undoubtedly, an issue of colonialism.

The toxic and hazardous waste imported to the Global South mainly includes electronic, chemical and plastic waste, which is managed without any protection gear whatsoever, exposing workers through direct contact, inhalation, and more. Every year, about 50 million tons of e-waste are produced. While the majority comes from the United States and Europe, most of it is shipped to the Global South to be processed. If not done properly, e-waste leaks heavy metals, toxins and chemicals, thus polluting drinkable water, soil, and food crops.

Incinerated waste contributes to the release of various hazardous gases, heavy metals, and sulphur dioxide in the air, poisoning wildlife and local communities, who increasingly suffer from cancer, diabetes, hormone disruption, skin alteration, neurotoxicity, kidney, liver and reproductive damage, bone disease, and more. When countries have no ability to process plastic trash, it often ends up in the oceans. Consumed by hundreds of aquatic species and large mammals alike, it kills millions of animals every year by entanglement or starvation. When plastic waste is not recyclable, it is often sent to illegal recycling factories that dispose of it by burying or burning it, affecting the health of those living nearby.

### **What's next?**

- To heal the systemic inequalities and institutional racism inherent to the waste crisis, it is crucial to allow those on the frontline of environmental justice's struggles to hold a central role in creating zero waste communities. Wastepickers should be protected and acknowledged.
- The Global North should take responsibility for its waste and a complete ban on waste exports outside the EU should be implemented.
- Corporations must take full responsibility for their products by making Extended Producer Responsibility a mandatory practice; prioritising redesign and waste prevention; and setting up systems that make the disposal of waste redundant.

## Attachment 2

### **Excerpt from “Beyond an Age of Waste” published by The United Nations Environment Programme (UNEP)**

Published FEBRUARY 28, 2024

[https://wedocs.unep.org/bitstream/handle/20.500.11822/44939/global\\_waste\\_management\\_outlook\\_2024.pdf?sequence=3](https://wedocs.unep.org/bitstream/handle/20.500.11822/44939/global_waste_management_outlook_2024.pdf?sequence=3)

#### **A Wasteful World**

Every year across the globe more than two billion tonnes of municipal solid waste (MSW) is generated. If packed into standard shipping containers and placed end-to-end, this waste would wrap around the Earth’s equator 25 times, or further than traveling to the moon and back. As well as municipal waste, human activity generates significant amounts of agricultural; construction and demolition; industrial and commercial; and healthcare waste. This waste is produced on farms and building sites and in factories and hospitals.

Municipal waste is generated wherever there are human settlements. It is influenced by each person in the world, with every purchasing decision, through daily practices and in the choices made about managing waste in the home. The way people buy, use and discard materials determines the amount of energy and raw materials used and how much waste is generated. Municipal waste is thus intrinsically linked to the triple planetary crisis of climate change, pollution and biodiversity loss.

The first *Global Waste Management Outlook* (GWMO), published in 2015, provided a pioneering scientific global assessment of the state of waste management. It was also a call to action to the international community to recognise waste and resource management as a significant contributor to sustainable development and climate change mitigation. Since then, despite some concerted efforts, little has changed. If anything, humanity has moved backwards - generating more waste, more pollution and more greenhouse gas (GHG) emissions. Billions of tonnes of municipal waste is still being generated every year, and billions of people still do not have their waste collected. Uncontrolled waste knows no national borders. It is carried by waterways across and between countries, while emissions from the burning and open dumping of waste are deposited in terrestrial and aquatic ecosystems and in the atmosphere. Pollution from waste is associated with a range of adverse health and environmental effects, many of which will last for generations.

The Global Waste Management Outlook 2024 echoes the first GWMO’s call to action to scale up efforts to prevent waste generation; to extend adequate safe and affordable MSW management to everyone worldwide; and to ensure that all unavoidable waste is managed safely.

## **Types of Waste**

The word “waste” means different things to different people. Different local conditions and data collection methods confuse attempts to arrive at clear definitions. Various referred to as refuse, discards, trash or garbage, waste is essentially the unintended by-product of consumption and production.

This report focuses on MSW, which is the waste generated by householders; retailers and other small businesses; public service providers; and other similar sources. Managing MSW is generally a local service and is commonly the responsibility of local government. MSW is only a (comparatively small) part of the story, since enormous amounts of non-municipal waste are generated each year, for example:

- Construction and demolition waste
- Industrial waste
- Agricultural waste
- Healthcare waste

Some products or materials found in the MSW stream are of particular concern. This is owing to rapid increases in their amounts or difficulties in collection, treatment, and other aspects of waste management aimed at meeting standards for protecting health and the environment. Examples of these materials are:

- Hazardous chemical waste
- Electrical and electronic waste (e-waste)
- Textiles
- Plastics
- Food waste
- End-of-life vehicles and waste from mechanics’ garages

The management of MSW poses unique challenges due to its sheer volume, continual growth, diverse composition, ubiquity in human settlements, variability and influence by cultural change, and the intricate web of social, economic and environmental impacts that arise from its management.

## **Why waste matters: People and planet**

Questions of global social and environmental justice also arise in discussions of municipal waste growth and its management, as illustrated by the many links with the Sustainable Development Goals (SDGs) (Table 1) (United Nations Environment Programme [UNEP] 2023).

**Table 1: Waste management and its links to the Sustainable Development Goals**



**Goal 1. No poverty:** Waste workers in informal economies who have no health or social protections are vulnerable to exploitation and are paid only the material value of the materials they collect. Inclusive municipal waste management policies are most effective for addressing both poverty and pollution.



**Goal 2. Zero hunger:** While global hunger is increasing, one-third of all the food grown in the world is wasted. Hunger can be reduced by preventing food waste and redistributing excess food. Converting unavoidable food waste into compost can replenish depleted agricultural soils.



**Goal 3. Good health and well-being:** Communities without adequate municipal waste management services resort to dumping and open burning, both of which have significant negative health consequences, particularly for women and children.



**Goal 4. Quality education:** Waste management courses in tertiary and higher education are uncommon, resulting in a lack of professional technical capacity and a shortage of workers with appropriate skills and knowledge.



**Goal 5. Gender equality:** People's experience with waste and its management is gender-differentiated: e.g. household purchasing and domestic waste-generating activities, and levels of influence over community decision-making regarding waste collection services.



**Goal 6. Clean water and sanitation:** Pollutants leaching from dumpsites can contaminate freshwater sources and associated food chains. Meanwhile, combining municipal solid waste and container-based sanitation services can achieve economies of scale that make both services more attractive to investors.



**Goal 7. Affordable and clean energy:** Unavoidable food waste can be used to make biogas, a clean-burning renewable fuel that could be used to tackle energy poverty, including in off-grid communities.



**Goal 8. Decent work and economic growth:** The waste management and recycling sector is uniquely positioned to improve global resource efficiency, decouple economic growth from environmental degradation, and provide safe and decent work opportunities for all.



**Goal 9. Industry, innovation and infrastructure:** Decentralised waste management systems can attract private sector investment, encouraging innovation, entrepreneurship, domestic technology development, greater resource efficiency and increased employment opportunities, and reduce financial risks for governments and municipalities.



**Goal 10. Reduced inequalities:** Intragenerational and intergenerational inequalities must be addressed through developing waste and resource management systems; attention is required from all stakeholders because the transition to a more circular economy will not occur by default.



**Goal 11. Sustainable cities and communities:** Solid waste management is a basic utility service without which air quality and living conditions become degraded, leading to poor health and social discontent. To make cities and communities inclusive, safe, resilient and sustainable, universal access to municipal waste management services is essential.



**Goal 12. Responsible consumption and production:** Production and consumption patterns directly impact municipal waste generation. To reduce waste and prevent pollution, efforts are needed by companies, governments and citizens.



**Goal 13. Climate action:** Poorly managed waste generates a wide range of emissions that contribute to climate change, most significantly methane from landfills and dumpsites, and black carbon and a range of other emissions from the widespread practice of the open burning of waste.



**Goal 14. Life below water:** Understanding why and how land-based waste reaches the sea, and introducing mitigation measures, is essential. Urgent action is particularly required in the case of Small Island Developing States, which face a complex set of waste management challenges.



**Goal 15. Life on land:** The terrestrial environment continues to be the primary sink for waste, while rural communities face complex waste management challenges that if left unmanaged can significantly impact ecosystems and dependent livelihoods.



**Goal 16. Peace, justice and strong institutions:** The increasingly global nature of waste management calls for heightened international cooperation to build national capacity for the safe management of hazardous waste and to prevent its illegal trafficking.

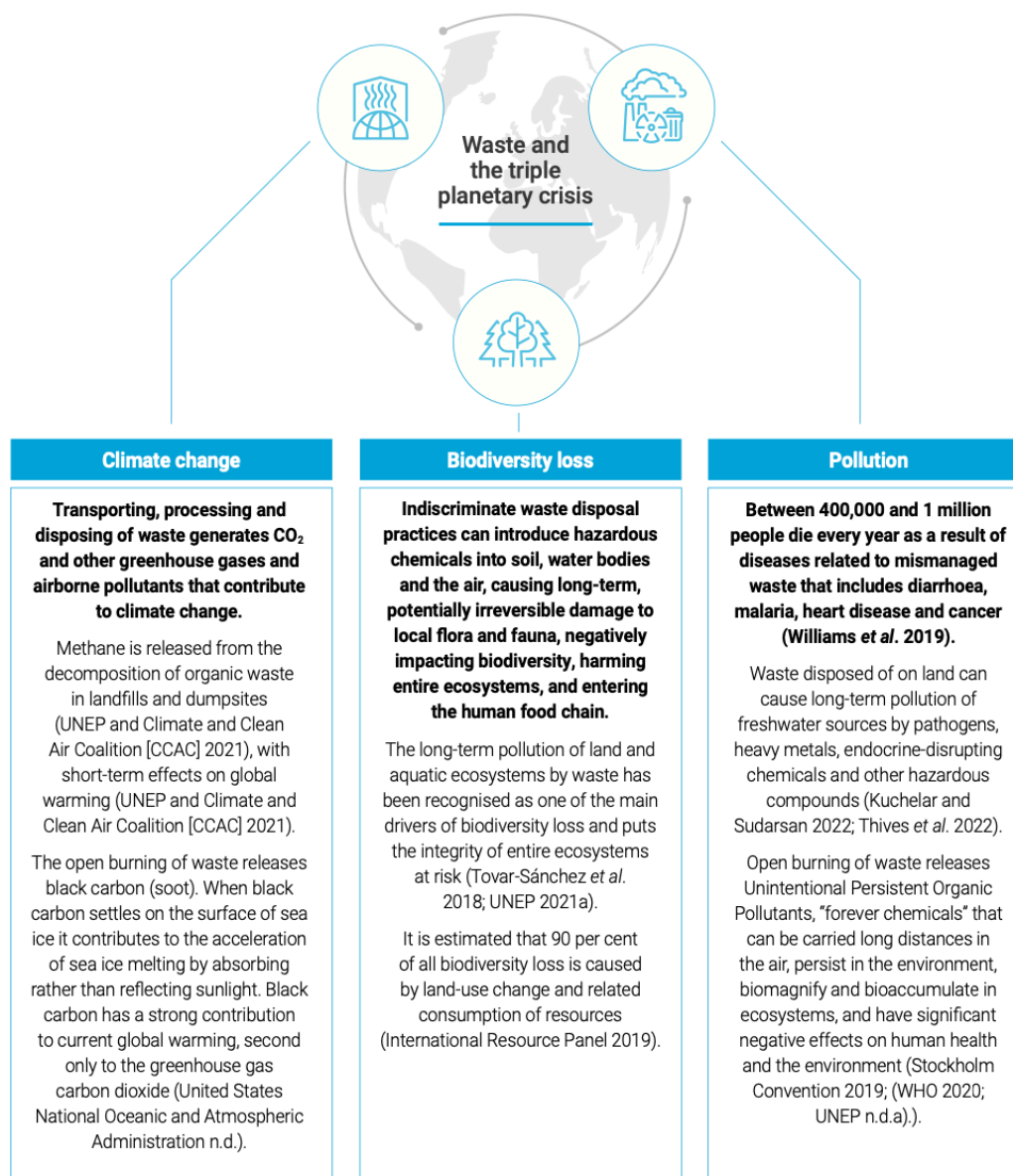


**Goal 17. Partnerships for the Sustainable Development Goals:** Current investments in waste management are insufficient. Far higher investments will be needed in the future to cope with increasing waste generation and the accumulation of legacy waste. The return on investment for waste management needs to be realised to catalyse increased finance.

Source: United Nations Environment Programme 2023

Focusing specifically on the environmental impacts of municipal waste growth and management, its influence on the triple planetary crisis of climate change, biodiversity loss and pollution is clear (Table 2).

**Table 2: Waste and the triple planetary crisis**



Working in waste management can carry severe health risks, especially under certain conditions such as in informal settings and at dumpsites, and when handling healthcare waste and dismantling e-waste. Health impacts are understood to be differentiated by gender and age, and more data is needed in this regard to better manage the risks and outcome. Between communities and countries, varying quantities and compositions of municipal waste are generated, and different approaches to its management have been adopted. One universal truth stands, however: the best approach is to not generate the waste in the first place.