Supporting the Shift to Climate Positive Sanitation

Emissions calculator demonstrates reduced climate impact with container-based sanitation

Climate change represents one of the world's most pressing and urgent challenges. Sanitation is a significant contributor, producing roughly 2–6% of global man-made methane. As urban populations grow, the use of rudimentary sanitation systems such as pit latrines, septic tanks, and waste settling ponds will increase sanitation-related emissions. These impacts highlight the urgent need for climate positive approaches to the sanitation crisis. Findings[1] from a new, scientifically robust sanitation emissions impact calculator, demonstrate that container-based sanitation (CBS) can significantly reduce global Greenhouse Gas (GHG) emissions from sanitation. Moreover, the tool provides an innovative opportunity to support funders, planners, companies, implementers and policy makers to shift towards more climate-positive solutions and support the realisation of global climate change targets.

RATIONALE

Sanitation produces both methane (CH_4) and nitrous oxide (N_2O) from anaerobic waste degradation, in addition to carbon dioxide (CO_2) emissions from energy used in waste treatment. While research is underway to improve the climate impacts and sustainability of centralized wastewater treatment, similar research on essential non-sewered sanitation systems is limited.

CBS AND GHG EMISSION CALCULATIONS

In CBS systems, sanitation waste is contained in sealable containers or cartridges that can be easily and safely transported to treatment facilities. CBS is often feasible where sewer systems are not, and it reduces anaerobic degradation of waste, requires less energy than conventional wastewater treatment, and provides opportunities to recover nutrients and produce sustainable, value-added products such as compost and biofuel.

To quantify the climate change impact of sanitation services, the Container Based Sanitation Alliance (CBSA), with support from the Water Supply and Sanitation Collaborative Council (WSSCC), has developed a GHG calculator using emission factors and assumptions about waste characterization and energy from the Intergovernmental Panel on Climate Change (IPCC), the Clean Development Mechanism (CDM) and peer-reviewed literature.

The calculator assesses GHG emissions of a sanitation service against a baseline scenario that would exist in the absence of that service. The calculator was applied to four members (Loowatt, Sanergy, Sanivation, SOIL) of the CBSA as case studies to better understand the potential for GHG mitigation from CBS systems specifically.

FINDINGS

Several findings emerged:

CBS systems can significantly reduce global GHG emissions from sanitation. The four operators that we studied mitigated 4-11 kg CO2-eq kg-1 COD treated, equivalent to 80-210 kg CO2-eq cap-1 yr-1. This is equivalent to the annual emissions from 17-46 million passenger cars.

Transportation emissions have little impact on the overall GHG footprint for all sanitation systems studied, including both CBS and baseline alternatives. This is notable because transportation of CBS waste by trucks

INTEGRATING APPROACHES TO THE SUSTAINABLE DEVELOPMENT GOALS

SDG 6
Clean water and sanitation
- ensure availability and sustainable management of water and sanitation for all

SDG 13
Climate action
- take urgent action to combat climate change and its impacts

CBSA
Container Based Sanitation Alliance

WSSCC
WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL

[1] Based on a paper currenly under peer review: *Climate change mitigation from container-based sanitation systems*

is often cited as an environmental concern when comparing CBS to gravity-fed sewer systems.

When energy is produced as a reuse product, improved energy emissions over the baseline alternative of fossil fuels or unsustainably harvested firewood drive the overall positive GHG impact of that system.

When agricultural inputs are produced from resource recovery, the overall GHG impact is driven by emissions mitigated from the baseline sanitation system, particularly by eliminating methane emissions from pit latrines.

Furthermore, as a waterless system, CBS brings added advantage in water scarce communities or areas where there are water shortages due to the effects of climate change.

CONCLUSION

The emissions calculator is a tool that provides a critical opportunity to implement climate-positive solutions to the global sanitation crisis, making headway on both Sustainable Development Goal (SDG) 6 on water and sanitation and 13 on climate action, which are inextricably linked. Indeed, the Paris Agreement on Climate Change compels Member States to increase their adaptive capacities as well as the resilience of development interventions, including from the Water, Sanitation and Hygiene (WASH) sector.

There are currently 1 billion people living in urban informal settlements, where unsafely managed sanitation is common, and CBS is often a feasible and cost-effective solution. These findings demonstrate that using CBS systems instead of traditional pit latrines or sewers in urban areas can help to mitigate GHG emissions and contribute to positive climate outcomes.

KEY POLICY RECOMMENDATIONS

- **Governments, including municipalities, must commit to, and incentivize, climate positive solutions** to the urban sanitation crisis, recognising it as an essential strategy in climate change mitigation.

- **Ensure a cohesive regulatory environment and enforcement mechanisms** that can enable CBS to compete with traditional forms of sanitation such as sewage, particularly in 'off-the-grid' areas.

- **Harness the significant potential of using climate funding from sources such as the Green Climate Fund (GCF) and carbon credits to support climate positive sanitation investment.** This could provide a win-win where increased sanitation coverage from CBS services improves climate outcomes.

- **Create connections across different sectors and stakeholders to strengthen interlinkages between the SDGs, and with other global agendas including the Paris Agreement on Climate Change and the New Urban Agenda**, to enhance collaboration.

- **Develop robust, comparable and transparent data on climate impacts of sanitation**, in particular on different waste treatment processes and reuse product options, to inform smart sanitation investments as well as to foster public-private partnerships.

For more information, visit: www.cbsa.global and www.wsscc.org

FURTHER READING

Addressing Climate Change Means Addressing the Global Sanitation Crisis

Global Methane Emissions from Pit Latrines

Climate change mitigation potential in sanitation via off-site composting of human waste

Sanitation and climate

Climate, Sanitation and Health

Climate change adaptation and resilience and water, sanitation and hygiene: links between SDG 13 Sustainable Development Goal and SDG 6

Cost and Climate Impacts of Urban Sanitation (CACTUS) Project

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