6 CLEAN WATER AND SANITATION

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17 ROOMS GLOBAL FLAGSHIP 2021 ROOM DOCUMENTS

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This document summarizes the ideas and actions that emerged from Room 6, a working group for Sustainable Development Goal 6 on Clean Water and Sanitation, that convened as part of the annual 17 Rooms global flagship process in 2021. The 17 Rooms initiative is co-hosted by the Center for Sustainable Development at The Brookings Institution and The Rockefeller Foundation. Each Room, one per SDG, was asked to identify actionable priorities that can be advanced by the end of 2022 to improve some component of 2030 outcomes for its respective Goal. Corresponding documents prepared by the other flagship Rooms are available here, alongside a synthesis report prepared by the 17 Rooms secretariat.

Reframing the challenge: Sanitation as a resource at scale—for fertilizer production, new water, energy generation and finance from carbon credits

Room 6: What would it take to change the scope for system change

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Water, Sanitation and Hygiene (WASH) Services
General: 3.6 billion people, almost half the global population, have no safe means for excreta disposal.
Education: Nearly one in five primary schools have no sanitation services—approximately one-third in sub-Saharan Africa and Oceania.

Background: The slow and slowing progress in achieving Sustainable Development Goal (SDG) 6—ensuring availability and sustainable management of water and sanitation for all—is motivating a search for new pathways. The stakeholders and delivery mechanisms commonly involved and mobilized for closing the massive and growing gap in water, sanitation and hygiene services—despite huge efforts, considerable knowledge accumulated and innovation through municipalities, corporates and startups—are overwhelmed by the magnitude of the challenge. It is now recognized that both untreated human excreta and wastewater, and certain treatment methods, can be a major contributor to a country's greenhouse gas (GHG) emissions. New income streams from carbon credits and new political economy settings may now offer themselves up for a re-think of the systems we deploy when we manage the collection, transportation, treatment, discharge, and reuse of human excreta (urine and feces) from both onsite systems and sewers.

The untold story of sanitation and climate change
Emissions: Direct and indirect emissions across the sanitation service chain include CH_4, N_2O and CO_2 (indirectly from the energy needed for waste conveyance and treatment, and directly from the process of waste conversion/treatment itself).
Variability by system: Depending on methods deployed along the sanitation service chain, GHG emissions can differ dramatically.
GHG contributions of up to 45% or more: In a city such as Kampala, the contribution of GHGs from the onsite sanitation systems alone can be larger than industrial energy use, the buildings and the on-road transportation combined. GHG emissions from sanitation in Santiago, Chile are projected to reach 50% of national emissions by 2027.
Adaptation a major challenge: Sanitation systems are often the first very visibly and dangerously hit by floods, droughts, and power outages, ceasing to function adequately, and creating major health challenges. At the same time, innovative technology-based 'workarounds' and community-based solutions can offer ways to adapt to new realities but require targeted investments and struggle to get to scale.
Missing in action in the global climate dialogue: Only a handful of countries mention sanitation in their Nationally Determined Contributions (NDCs).

What's wrong with fecal sludge and wastewater—for our health, our climate, our food, our biodiversity, and in terms of human rights? Most of us will know that the absence of sustainable sanitation services—i.e., when we inadequately manage both untreated and treated excreta and fecal sludge—has considerable, systemic, and negative effects across multiple other systems that shape our lives. Access to adequate sanitation is a human right. We know that poor management leads to dire health consequences in terms of, for example, diarrhea, dysentery, and death from exposure to feces. We know that women and girls particularly lose out in terms of access to education, safety, menstrual and regular health when they do not have access to a safe means of disposal of human excreta. We know that a lack of adequate treatment leads to contamination of receiving

waters, creating health-risks for those who drink affected water or eat agricultural products grown with it. And we know that poorly or untreated fecal sludge and wastewater can pollute rivers, lakes and marine waters, killing aquatic fauna and flora, unbalancing and eventually destroying biodiverse environments, threatening the livelihoods and food sources of the many people who rely on fish as a key source of protein. What many of us do not know, however, is that whenever fecal waste accumulates or is treated, greenhouse gases are emitted, mostly and considerably so in the case of methane, nitrous oxide, and carbon dioxide. The GHG "footprint" of sanitation is considerable and needs to be fine-tuned; it may well prove to become a game changer for mitigation measures in many countries.

Reframing the challenge: Sanitation as a resource for energy, fresh water, fertilizer components, and carbon credits. The climate mitigation dimension of sanitation is likely to offer new income streams and opportunities for blended financing—in turn opening up the opportunity for a "re-think" of systems and which groups they serve and how. Current systems are designed with the individual human user as the only focus—his and her needs, convenience, and desire for "out of sight and out of mind" solutions, and urban or rural service providers' ability to service these needs. The advent of additional and new income streams—and the broader imperatives from the climate mitigation mandate—allows for substantive re-think of the systems deployed, creating the opportunity for a systemic shift. What if sanitation systems were designed with the primary purpose of generating high-value outputs for the fertilizer industry, the energy sector, or the water reuse needs of communities? What if they were designed primarily to reduce GHG emissions? Significant innovation has happened in the sector in the past years—particularly in the space of off-site latrine solutions, composting, etc.—but none has re-considered the "basics" of the system itself. Some cities, including Stockholm and Helsingboer, have experimented in this direction. Some communities are incorporating research-based approaches to trialing a new water-sensitive approach to managing water and sanitation.[1] And elsewhere, the concept of bio-factories or Water Resource Recovery Facilities are being developed as a first step. This proposal suggests exploring further opportunities for a fundamental rethink and—consequently—a potential shift at scale.

What would it take to design the systemic and societal changes needed to transform the human waste management sector into a resource at scale? Reframing the sanitation challenge would need to involve multiple sectors, including the energy sector, the agriculture sector, the water sector and the environmental sector and those involved in managing carbon credits, just to name a few. Room 6 recommends a range of steps necessary to substantiate the opportunity for a rethink and for reframing:[2]

- The economic case: Looking at excreta as a resource across the whole sanitation value chain could involve putting together a convincing analysis of the economics—for sourcing energy, fertilizer inputs, clean water, carbon credits from the sanitation sector, perhaps including suggestions/requirements for making it attractive for relevant sectors.
- The business case (and model) for the private sector to invest: Establishing the rationale for private investment opportunities towards transforming excreta into a resource (fertilizer, new water, energy, and carbon credits), including the role of blended finance, and consider building a (private sector driven) coalition that is interested in piloting and building relevant use cases at scale. For example, the fertilizer industry is beginning to embark on new

[1] The RISE program (Revitalising Informal Settlements and their Environments (RISE) is co-designing location-specific solutions that integrate green infrastructure to strengthen the whole-of-life water and sanitation cycle (www.rise-program.org).

[2] Reframing the challenge should not be taken to distract from the importance of environmental compliance - regulatory compliance has not been achieved in many countries and must remain an important goal.

transformation processes, following a food systems and circular economy approach, and while it is still early days, there is increasing interest in new paradigms.

- The technology and R&D dimension: While technology solutions themselves will not be the drivers for a systemic shift at scale, Room 6 group members felt it was important to note—if only as assurance—that technology solutions already exist and could be leveraged when moving towards turning human excreta into a *major* resource. To this end, efforts to reframe sanitation as an opportunity might need to involve new partnerships, identifying the hurdles/limitations for these technologies to be applied at scale.[3]
- A fresh look at urban planning and circular economy thinking in the urban context: For reframing sanitation as an opportunity, innovative approaches to urban planning would be key and should play a major role in any initiative going forward. Of course, new urban plans would also offer the opportunity to bridge from an urban to a rural context, offering space for small and medium private operators to pick up on new opportunities.
- Societal and socio-political dimensions associated with addressing sanitation from new perspectives: Introducing a re-framing effort would need to pay attention to the "disgust factor" involved in anything that works with human excreta (regarding which good research already exists). It would also need to consider designing for involvement of key societal and socio-political change efforts to make sure the population feels and is secure in being serviced while other and new players and interests enter the field. Furthermore, just as with individual, family and community human excreta management, it is crucial that the contributions that women can make to the systemic changes, be integrated into the way forward—a fresh look at how women can contribute to this system approach, as leaders, and entrepreneurs would be a promising start.
- Pro-active leadership from government and government agencies. Any reframing of the challenge—and pursuit of solutions that bring new players into the fold—will need strong and constructive government leadership and support. Underlying issues—related to political interest, rules and frameworks for investment and businesses, the formalization of informal settlements, and so on—will require both government as a whole, and specific government agencies, to come to the table, and ideally to lead the way.

[3] Several technologies and systems for co-composting of human waste for commercial use have been developed. The International Fertilizer Industry (IFA) is launching a new Task Force on Nutrient Recovery & Recycling, composed of members from different companies, including some that already work on specific technologies or already have pilot activities in place. Others are more in the start-up space but growing fast (e.g. 374water.org). Technologies already exist such as biomethane recovery with Methanis technology (biomethane use both for gas grid injection and for feeding bus fleets) or struvite recovery with Phosphogreen technology.

Annex 1: Participants and Moderators of "Room 6"

Participants in "Room 6": Achim Dobermann (IFA); Ana Giros/Christophe Warmier (Suez) Barbara Evans (Leeds University); Clifford A. Braimah; Faycal Benameur (OCP Group); Gisela Kaiser (formerly Cape Town City); Halidou Koanda (Water Aid); Maria Lennartsson (City of Stockholm); Mohammed Adjei Sowah (City of Accra); Najib Lukooya (CWIS Senegal); Pep Bardouille (IFC); Rebecca Nelson (Cornell University); Tareq Emtairah (UNIDO); Zouera Youssoufou (Dangote Foundation); MonikaWeber-Fahr (World Bank). **Moderators:** Letitia Obeng (WIN), Jennifer Sara (World Bank).

Annex 2: Relevant Resources and Further Reading

Research on Green House Gas Emissions and Climate Relevance of Sanitation:
https://www.nature.com/articles/s41545-020-0072-8

Seminal Overview on Methods for Waste Water Treatment:
https://www.suezwaterhandbook.com/case-studies/wastewater-treatment/As-Samra-wastewater-treatment-plant-Jordan

On Building markets and attracting businesses as the next big challenges. -
https://www.gatesfoundation.org/ideas/articles/sanitation-reinvent-toilet