Sustainability of decentralized wastewater treatment and reuse systems

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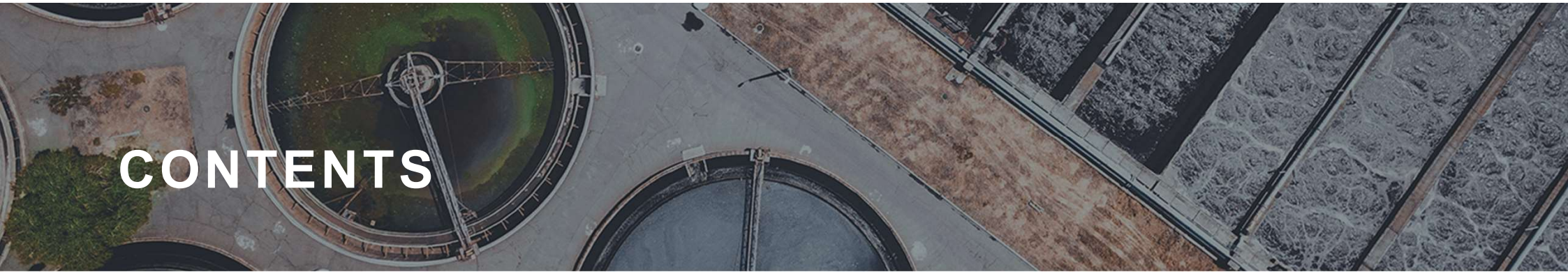

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Goal: Identify **best available as well as affordable technologies** for decentralized wastewater treatment with scope of **resource/energy recovery** and reuse in rural and urban areas.

Scope:

1. Piloting candidates for best available technologies for India
    a. Decentralized WT
    b. Black-water
    c. Sludge
    d. Post-treatment
2. Monitoring, experimental work, and performance assessment
3. Developing suitable automation and control strategies
4. **Assessing overall sustainability and identifying BATs**

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Participant No *	Participant organisation name	Short name	Country
1	University of Natural Resources and Life Sciences Vienna	BOKU	Austria
2	Delft University of Technology	TU Delft	Netherlands
3	Fundacion Centro de las Nuevas Tecnologias del Agua, Sevilla	CENTA	Spain
4	University of Tartu	UT	Estonia
5	University of Antwerp	UA	Belgium
6	Sociedade Portuguesa de Inovação, Porto	SPI	Portugal
7	Centre for Environmental Management and Decision Support, Vienna	CEMDS	Austria
8	Biokube, Tappernoje	BIOK	Denmark
9	Cambi Group AS, Asker	Cambi	Norway
10	Ben Gurion University, Beersheba	BGU	Israel

Participant No *	Participant organisation name	Short Name	State
11	Indian Institute of Technology Kharagpur	IITKGP	West Bengal
12	Indian Institute of Technology Roorkee	IITR	Uttarakhand
13	Indian Institute of Technology Madras	IITM	Tamil Nadu
14	Indian Institute of Technology Bhubaneswar	IITBBS	Odisha
15	National Institute for Industrial Engineering, Mumbai	NITIE	Maharasthra
16	Malaviya National Institute of Technology Jaipur	MNIT	Rajasthan
17	TERI School of Advanced Studies (formerly TERI University), New Delhi	TU	Delhi

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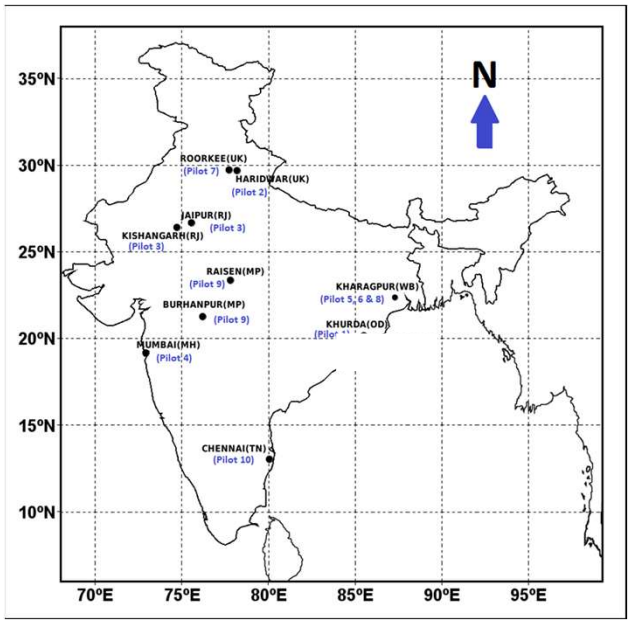
Overview of pilots



	Pilot	Description / Pilot co-leaders
DWT	1	UASB-deammonification plant (UT/IITBBS)
	2	Small scale SBR (IITR)
	3	Biokube Package treatment (Biokube/MNIT)
	4	Rotating Biological Contactor (CENTA/NITIE)
BWT	5	Anaerobic Digestor-Photobioreacor (TU Delft/IITKGP)
	6	Anaerobic Digestor-Electrically Conductive Biofilter (CENTA/IITKGP)
ST	7	Thermal Hydrolysis Plant (Cambi/IITR)
	8	Ultrasonic Sludge Disintegration and Disinfection (TU Delft/IITKGP)
PT	9	Disinfection using Sand Pressure filter, UV and Ultrasound (CENTA/NITIE)
	10	Ion Exchange membrane Bioreactor for Nitrogen Removal (BGU/IITM)

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Aspects relevant for sustainability - background

- Without adequate consideration of sustainability aspects, investments in wastewater treatment systems prone to failure, in particular in developing countries (DC).
- BATNEEC vs CATNEP, whereas the latter often prevailing in DCs
- Common reasons:
  - Lack of funding, in particular for operation
  - Institutional weaknesses, lack of enforcement
  - Lack of skilled personnell


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Policy Analysis

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Why Do Water and Sanitation Systems for the Poor Still Fail? Policy Analysis in Economically Advanced Developing Countries

Markus Starkl,*† Norbert Brunner,‡ and Thor-Axel Stenström§


water

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Review

Sustainability Assessment for Wastewater Treatment Systems in Developing Countries

Markus Starkl [1,*], Norbert Brunner [2], Sukanya Das [3] and Anju Singh [4]

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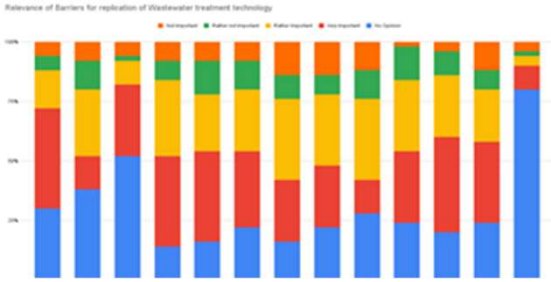
Barriers for achieving sustainable solutions

- Stakeholder workshops in Kolkata, Mumbai and Chennai
- Various aspects of pilot technologies discussed
- Examples of barriers identified during workshops:
  - The CAPEX and/or OPEX of the proposed technology will be too expensive
  - Lack of capacity to replicate the technology
  - Lack of skilled/trained personnel for operation
  - Lack of demand for technology because lack of experience in India
  - Existing procurement practices may not support technology
  - Lack of local certification in India
  - Lack of public acceptance for certain reuse scenarios
  - No incentive for reuse because of low water price…



Aspects relevant for sustainability

- International standards can help ensuring maturity of technologies (BAT)
- Environmental standards (emission thresholds) may be flexible (to some extent) to adjust to local context
- Affordablity and financing of operational phase should be examined for each project
- Capacity building and training required to strengthen institutional framework and increase skills for new technologies (part of Saraswati 2.0)

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Feature

Can International Nonsewered Sanitation Standards Help Solve the Global Sanitation Crisis?

Clément A Cid,* Francine Abiola, and Markus Starkl

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Interpreting best available technologies more flexibly: A policy perspective for municipal wastewater management in India and other developing countries

Markus Starkl[a,*], Josephine Anthony[b], Enrique Aymerich[c], Norbert Brunner[d], Caroline Chubilleau[e], Sukanya Das[f], Makarand M. Ghangrekar[g], Absar Ahmad Kazmi[h], Ligy Philip[i], Anju Singh[j]

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Article

Affordability of Decentralized Wastewater Systems: A Case Study in Integrated Planning from INDIA

Norbert Brunner [1], Markus Starkl [2,*], Absar A. Kazmi [3], Alvaro Real [4], Nitin Jain [5] and Vijay Mishra [6]

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