

Recommendations concerning the scaling-up-potential of BORDA-DEWATS wastewater treatment in the urban context of Kabul, Afghanistan*

The principal objective of this document is to assess the scaling-up-potential of DEWATS technology and to identify bottle-necks which need to be addressed to improve sanitation in an urban environment that is widely deprived from proper sanitation services.

The following assessment is based on the Technology-Applicability-Framework (TAF) developed by SKAT, Switzerland and was conducted in Kabul, Afghanistan in 2015.

Description

BORDA-DEWATS constitutes the treatment element of a sanitation concept that starts with the individual user interface, the toilet, and continues with a simplified sewer system that connects a neighbourhood of less than 10 households up to a few hundred households. The collected wastewater then enters the treatment stage. Solid matter sediments under anaerobic conditions and decomposes by producing small quantities of inert sludge and methane. Ideally, the gas could be collected and used. Two different products transmit from the treatment process: (i) treated effluent with a residual Chemical Oxygen Demand (COD) of 170 to 320 mg COD/l that may be percolated into the subsoil or used for restricted irrigation or discharge into a surface water body with low sensitivity, and (ii) stabilized sludge that could be used as soil conditioner.

With over thousand facilities this technology has proven its scalability in Indonesia. The situation is somewhat different in the Philippines, Vietnam or Tanzania, where numbers are

considerably lower. It is therefore worthwhile to assess the scaling-up-potential in urban Afghanistan.

Approximately 30 different DEWATS facilities have been implemented by BORDA. The German based NGO (Bremen Overseas Research and Development Association) is active in Afghanistan since 2012. Recently a contract was awarded that serves approximately 13.000 inhabitants in Kabul, the biggest project of its size based on this technology.

Approach

The assessment was conducted as a series of interviews with various stakeholders related to urban sanitation in general and the DEWATS concept in particular. The TAF approach was modified to fit to the requirements of the assessment, namely the entire sanitation chain from the private interface to the point of discharge into the environment. The TAF guides the user through a number of questions which reflect the perspectives of three different stakeholders: the users, the producers and the facilitators/operators. Six different

sustainability dimensions (social, economic, environmental, institutional and legal, skills and knowhow, technical) are viewed from different perspectives. The scorecard finally indicates which aspects need to be regarded closely to better judge the potential for Scaling-up.

Results

Social

(1) **User:** The users in urban Kabul are generally well aware of the sanitation problematic. There is a certain interest in DEWATS technology among informed users. Due to good performance, easy operation and low O&M cost, suitability to cultural and religious habits the demand for this technology is expected to increase. The general public is not informed about DEWATS technology however, it therefore needs to be promoted and marketing efforts need to come with strong public awareness. Users who are required to provide technical solutions (e.g. because they are obliged by law to provide a technical solution) will most likely consider DEWATS technology as a viable solution if financially affordable. (+) (Please refer to the scorecard on the last page for an overview).

(2) **Producer:** On a limited scale the DEWATS concept seems to do well without further promotional effort. A higher production however, as a consequence of increased demand, would require corresponding investments and possibly a different business approach. (Refer also to indicator (5), economic sustainability). Customer follow-up is taking place on a regular basis and in response to customer demand. (+)

(3) **MUDA:** According to the *Ministry of Urban Development Affairs* (MUDA) households are currently not aware of the DEWATS concept. Households generally

face difficulties to have their wastewater collected and treated (with the price for one tanker ranging from \$ 100-150, treatment not included). Reason why MUDA assumes that the scaling-up potential is considerable. Although sludge disposal is not clarified yet, the advantages of the technology are obvious, because it doesn't generate bad smell and operating cost are low. From the perspective of MUDA the DEWATS concept does not require any social marketing or behavior change. This opinion might be due to MUDA being informed when the general public isn't. (+)

Economic

(4) **User:** Low income users (US\$ 100-200/month) will not be able to individually afford the DEWATS technology. Simplified community sewerage (connection of many household to one DEWATS Plant) could be an affordable option however if external subsidies are made available. Middle and high income users (US\$ 500-5000/month) can afford the DEWATS technology either as a privately operated individual facility on-site or as a de-centralized treatment facility. Generally, the willingness to invest money is currently low due to unsecure prospects. (0)

(5) **Producer:** BORDA has been financing its operations through a BMZ-grant and started only in 2014 to apply a moderate margin of profit (7%). This overhead appears to be insufficient to operate sustainably and cover entrepreneurial risks. Scaling-up requires a pronounced market orientation that would involve additional investments, increased training and promotion activities. (0)

(6) **MUDA:** Especially when it comes to providing access of low-income households to this technology a major

obstacle will consist in providing the necessary funds. Currently there are no state controlled mechanisms for financing sanitation for private households in place. This may need to be reconsidered in case of changes in legislation which require investors to provide standardized wastewater treatment facilities when applying for construction permits. (0)

Environmental

(7) **User:** Apart from moderate ground works there are no negative impacts on environment and users. If the service provider/producer provides the O&M manual for the DEWATS technology and the users operate and maintain the plant properly no negative environmental impact resulting from operating the facility is expected. Although desludging of DEWATS Plant is taking place every few years only, the discharge of untreated sludge has to be rated as critical which can only be mitigated by properly regulating DEWATS facilities. Register them, certify their compliance and include them into regular sludge evacuation schemes on municipal level. (0)

(8) **Producer:** The predominant materials are clay bricks, cement and limited quantities of GRP (glass fiber reinforced plastic). An increased local production is possible without additional environmental damage. Condominial pipes may be executed in PVC (polyvinylchloride), which is considered an environmentally critical material, but there are other slightly more expensive alternatives such as polyethylene. (+)

(9) **MUDA:** Compared with other technologies for on-site and decentralized sanitation the environmental impact of DEWATS facilities is considered to be low. Emissions are low, but care has to be taken when placing the facilities to avoid

communication with nearby shallow wells. Sludge/septage treatment sites have to be provided on the municipality scale to cope with all generated quantities. Knowing that no binding treatment standards are currently in place for decentralized treatment facilities constitutes a certain risk for scaling-up. (+)

Institutional and legal

(10) **User:** Currently there is no legal framework for the operation of public or private sanitation services. Individual households, housing complexes and public or private institutions have to provide for their individual sanitation solutions. They operate and manage their system by themselves and without regulation. Users are generally not aware of who is responsible for O&M and who provides such a services. DEWATS technology discharges treated wastewater with a certain level of concentration that might be too high for discharge in sensitive environment. (-)

(11) **Producer:** There is no national regulation governing wastewater treatment standards or structural quality criteria. What appears to be in favor of up-scaling may hit back once national standards are introduced, that exceed DEWATS treatment capacity and leave its customers incompliant. However, with a modular concept the technology may be complimented with additional treatment steps to cope with higher effluent standards. In this case space and additional funds needs to be reserved. (0)

(12) **MUDA:** There are considerations to require new constructions to provide for a wastewater treatment solution. Also, there are no effluent quality standards in place which are relevant for DEWATS facilities. Summarizing, new legislation may increase the demand for DEWATS

facilities, at the same time scaling-up is at risk if DEWATS facilities (in a standard arrangement) fail to meet new high effluent standards which may be introduced in future. Capacities are insufficient to monitor treatment efficiency in the event of introducing binding standards. (-)

Skills and Know-How

(13) **User:** Due to low O&M requirement, there is no need for specific skills and knowledge to manage operation and maintenance of DEWATS technology in day to day operation. Training on operation and maintenance during and after installation of DEWATS technology is generally provided by the provider/producer along with the necessary manuals. (+)

(14) **Producer:** More than a decade of technical expertise on international scale has led to optimizing the design and operation. This knowhow is available in Afghanistan but constitutes a bottleneck towards up-scaling. The transformation to large scale operations (which refers to number of units rather than size) required additional business skills that ensure successful competition in addition to moderate margins of profit. (+)

(15) **MUDA:** The sector capacity is considered to be small when it comes to the introduction of new technologies and to the provision of adequate technical advice. MUDA owns three construction companies which could be mobilized to engage in the construction of sanitation facilities. (0)

Technical

(16) **User:** Due to low maintenance, easy operating, long interval of desludging and good performance, this technology is likely to fulfill all the expectation of the users. However for major repair work skilled staff is needed. A service “market” for regulated sludge removal as well as for general maintenance tasks and rehabilitation is likely to emerge once the technology has struck roots. From the perspective of the users shared DEWATS facilities, i.e. those which collect wastewater within a condominal arrangement require a higher level of organization to establish shared cost for O&M and rehabilitation. The regulator needs to be involved from the very beginning, especially if the facilities are constructed in public space. (0)

(17) **Producer:** The DEWATS concept is low in operation requirements. In absence of any electromechanical components the DEWATS technology is moderate in maintenance. A critical supply chain is no issue. However, regular inspections have to be conducted following the respective O&M manual. This task has to be addressed to both, the users and the operators and a cost recovery mechanism (sanitation tariff) has to be developed. (+)

(18) **MUDA:** There are currently no support mechanisms in place for scaling-up any given technology. Specifically funding innovation and development is neither practiced nor foreseen by MUDA. This however, is not unusual for an economy that has a number of important challenges to cope with. (0)

Recommendations

The assessment reveals that BORDA-DEWATS has a significant potential for scaling-up. Among the six different “sustainability dimensions” the Social, the Environmental, the Skills & Know-how as well as the Technology are very much in favour of that technology. For different reasons the Economic and especially the Institutional & Legal aspects seem to fall behind.

In the present display the Economic aspect requires some attention because given that major segments of Kabul residents struggle with low income. With no funding mechanisms in place these segments of society risk being deprived from this wastewater treatment option. Furthermore, in order to make the technology more affordable, de-centralized solutions need to be considered which in turn require well established procedures and regulations along which decisions are taken (by the relevant authority) with regard to location, sizing, effluent standards and sludge disposal.
































As concerns the Institutional & Legal aspect the scorecard refers to the absence of the legal framework that deprives private and institutional users/buyers from safely investing into wastewater treatment and environmental protection. This must be regarded as another main obstacle for scaling-up. The producer has the possibility to complement to the treatment process which will require additional space and funds and which stands against scaling-up. From the perspective of the regulator/investor/facilitator only MUDA was interviewed for their opinion. Here the absence of capacities to efficiently monitor treatment processes has to be mentioned as critical. Staff recruitment, capacity development and revenue generation are indispensable ingredients for a sustainable improvement that effectively supports the scaling-up process.

Scorecard for BORDA-DEWATS →

Scaling-up DEWATS in Kabul,
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		key perspectives		
		User/ Buyer	Producers/ Providers	Regulator/ Investor/ Facilitator
				
		(1)	(2)	(3)
Sustainability Dimensions	Social	 (1) 	(2) 	(3) 
	Economic	 (4) 	(5) 	(6) 
	Environmental	 (7) 	(8) 	(9) 
	Institutional & Legal	 (10) 	(11) 	(12) 
	Skills & Know-how	 (13) 	(14) 	(15) 
	Technology	 (16) 	(17) 	(18) 
			High value, positive, supportive characteristics	
			Potential impact, could become critical, needs follow up	
			Low value, negative, critical, hindering characteristics	
			Unclear impact, should be clarified	