

A 21ST CENTURY REVOLUTION: ON BILL GATES' MOVE TO SCALE UP SANITATION

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When Microsoft founder Bill Gates displayed a glass beaker with human faeces on stage at a sanitation conference in Beijing recently, he was praised by World Bank president Jim Yong Kim for “making poop cool”. Mr. Gates was in China to pursue the serious business of reinventing the toilet. Innovation, he reasoned, would expand sanitation quickly and save children in developing countries from the crippling consequences of stunting. In many places, children play amidst faeces in the open and contract disease, resulting in malnutrition and stunting.

Over the last seven years, the Bill and Melinda Gates Foundation (BMGF) has devoted \$200 million to incubate new technologies that will dramatically scale up sanitation. It has announced a further investment of \$200 million to achieve this, and trials of new toilets and processing technologies are going on in India, among other countries. According to UNICEF, 22.2% of children, or 151 million, under five years were stunted globally in 2017. The World Bank says annual healthcare costs from lack of sanitation in developing countries is a staggering \$260 billion.

The challenge to decentralise sanitation, in Mr. Gates’s view, has parallels with the historic shift from mainframe computing, which only governments and large corporations could afford, to personal computers. Fast-expanding cities cannot have massive sewage treatment plants. What they need is stand-alone processors, which will help communities and individuals.

At the Beijing conference, which also hosted the Reinvented Toilet Expo, Mr. Gates observed that “in many places in India today, 30% or 40% of the kids end up malnourished. That is because faeces containing pathogens lie exposed. Open defecation has a high health cost. It spreads disease, stunts children and prevents them from achieving normal physical and mental development. The answer lies in new technologies, some of which are at a high stage of maturity now. If India adopts them, it can rapidly expand sanitation at low cost.

To many observers, including Mr. Gates, India is further behind on sanitation than on other issues, which is reflected in the high levels of stunting. This situation persists despite high levels of economic development over the years. The BMGF wants to change that not just for Indians, who form a significant proportion of the 4.5 billion people worldwide looking for solutions, but those in Africa and other parts of Asia. The solution it offers is the reinvented toilet and omni processor waste treatment plants.

Technologists and researchers have been working on these from the time the BMGF issued a “challenge” to them in 2011 seeking innovative solutions. The technology teams now have working prototypes. It is now up to politicians and policymakers to make decisions to adopt them, especially because the Sustainable Development Goal of sanitation and clean water for all by 2030 is not far away.

Innovation involves a shift away from the gold standard of flush toilets connected to sewers. In the new order, there will be stand-alone facilities that are aesthetically designed, finely engineered and equipped with reliable chemical processes that produce nothing more than ash from solids, while reusing the liquid as non-potable water after treatment. The future, the BMGF hopes, will belong to these Multi-User Reinvented Toilets. The prototypes are undergoing trials in far-flung centres such as Coimbatore in Tamil Nadu and Durban in South Africa. The

technologies that run inside them have been developed by research institutions such as California Institute of Technology (Caltech), University of South Florida, and Duke University. Some products are ready for prime time. Caltech's partnership with toilet-maker Eram Scientific will help induct the technology and deploy it at scale. There may also be a mix-and-match approach, leveraging the best technologies from the individual prototypes.

What makes these reinvented toilets special is that they expel nothing. They turn liquid waste into clear water for flushing, and solids into pellets or ash that is fertilizer. Success will depend on making large community deployments, and developing cost-effective models for individuals. One reinvented toilet by Helbling of Switzerland has a classic European design and cost \$500 to develop. While the reinvented toilet gets optimised, India should, in parallel, look at omni processors for faecal sludge treatment plants (FSTP). These "zero emission" processors will end dumping of faecal sludge taken from septic tanks into rivers, lakes, farms and open spaces. They can also prevent the death of workers in septic tanks. Some models also attach a gasifier that can use municipal solid waste, providing a solution to handle that urban waste stream as well.

India's record in treating urban sewage is poor at 30%, and a third of about 847 large sewage treatment plants are not functional, according to BMGF estimates. The priority should be to put all these plants to full use, and equip them to handle faecal sludge by adding omni processors to them. In Beijing, Mr. Gates observed that "political leaders like Prime Minister Modi have been willing to speak about sanitation." The Swachh Bharat Mission has brought faecal sludge treatment within its ambit, and many Chief Ministers want FSTPs. Put together, their orders total 415 such plants this year. Disappointingly, only a minority of these will have omni processors. Indians have contributed a lot by way of taxes for sanitation, and the money should be spent on the new technology.

Even in an advanced State such as Tamil Nadu, which is working to upgrade its infrastructure, only 30% of urban sewage is treated, says Alkesh Wadhvani, Country Director, Poverty Alleviation, BMGF. On the other hand, in 3,500 small cities, very little gets treated. There are some promising signs. Odisha wants 115 faecal sludge treatment plants. Andhra Pradesh has taken the lead and funded 33 plants, and, importantly, tendered for omni processors for these. Tamil Nadu has announced that it will build 48 plants out of its own funds, estimating that 80% of the faecal sludge problem can be managed across the State at a cost of less than about 200 crore. Large and often idle sewage treatment plants can be put to dual use, by adding an FSTP, preferably with an omni processor. In the case of small towns, a cluster approach will help, and two or three of them can come together to share treatment plant capacity.

Philanthropy of the kind advanced by Mr. Gates aims to take up issues that may not otherwise get attention, and to lower the barriers for governments to act. Now that technology is ready with a "zero effluent" toilet, national policy should make it accessible to everyone.

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