Case 18

Clean Water without Sewers

This article introduces innovations to manage the flow of air and water in buildings as one of the 100 innovations that shape "The Blue Economy". This article is part of a broad effort to stimulate entrepreneurship, competitiveness and employment.

The Market

Although our planet seems to be surrounded with a volume of about 1.4 billion cubic kilometers of water, 97 percent is salt water, 2 percent is frozen in the form of glaciers and only 1 percent is available as drinking water. It is therefore imperative that we recycle our waste water. It is estimated that worldwide only 14 percent of all waste water is treated. In Latin America and Africa, less than 2 percent of waste water is purified. Based on the number that world demand for water treatment products is projected to reach $59 billion by 2013, the potential could be an impressive $420 billion. In India, urbanization is fueling demand for new water treatment systems and services with an annual 10-12 percent and in China growth reaches 17 percent.

The world population will grow from today's 7 billion today to approximately 10 billion by 2050. Three quarters of the world's citizens will live in cities. Concretely, we may have to build daily one new city for every +200,000 inhabitants for the next 40 years. This will put tremendous stress on the supply of drinking water, and also require massive investments in water treatment plants. Governments normally prefer to invest in the supply of potable water, with five times more funds than treating waste water. This imbalance practically explains why two million people die annually of preventable diseases spread through untreated water.

Studies of the World Bank demonstrates – to surprise of many – that fecal pollution gets worse as countries grow richer (and the sewage systems grow older). The sewer system of most urban areas deteriorates and requires rehabilitation or renewal. Some 30 percent of all sewage water in Sweden simply does not reach the treatment plants and contaminates ground water with viruses and chemicals. About 17 percent of the German public sewer system must be rebuilt, good for 76,000 kilometers.

Canada calculated its water sewage and treatment infrastructure requires +$80 billion in additional investments over the next 15 years simply to keep up with its growing needs, connecting an estimated 12 million citizens to the sewers, and replacing defunct installations. Canada needs an additional 27,000 kilometers of piping at a cost of $300 per meter to connect the unconnected. The cost for bringing sewers and water treatment plants to urban and peri-urban areas costs as low as $ 1,000 per citizen in the Third World, and as much as $8,000 in industrialized nations. At a time of excessive government deficits, it is hard to imagine that politicians will have the funds to invest in public health to such a degree.

The Innovation

Tight health regulations and tight government budgets steer innovations towards investments that guarantee lower operational expenses. Non-chemical solutions are therefore increasingly favored. These already represent 60 percent of the cost of investing and operating water treatment systems. This includes ultraviolet disinfection, membrane filtration and ozonation. However the advent of increased recycling of water creates renewed opportunities for the chemicals industries, since recycled water is more prone to bacterial contamination than fresh water. The cheapest chemical option is chlorine but facilities' operators are seeking less toxic alternatives.

Bertil Eriksson from Örnsköldsvik, Sweden studied the flows of water and air through buildings and designed a simple network of pipes, controlled by valves, which permits the treatment of all water in each building without the need for septic tanks. His comprehensive system treats all water born waste from kitchen, shower and toilet through a combination of ventilation, heat recovery, water purification and drainage systems. The purpose is to eliminate the risk of contamination, while reducing capital expenditure for municipalities and preserving the environment, especially ground water. This integrated system is covered by a series of patents which form the backbone for the "SplitBox" technology.

Whereas the simplified system costs an estimated $25,000 for a single family home, it offers multiple benefits, just like natural systems provide. First of all, there is a minimum need for pipes, pipe fitters and plumbers, thus saving on construction. Second, the SplitBox recovers energy from drying, domestic warm waste water and house ventilation. Third, the water drains in the floor also serve as ventilation ducts to channel an excess of humidity (bathroom) to rooms with too low humidity (bedroom). Fourth, feces and paper is processed in a special drying system, where it ends up mixed with organic waste from the kitchen. Finally, the nutrients, especially potassium extracted from urine through a combined precipitation/absorption process followed by an oxidation of wastewater leaves pure water behind. The dry, bacteria- and virus free substance can be sold on the market as fertilizer. This is managed through a 2x1x2 meter control unit for a family home.

The First Cash Flow

Mr. Eriksson and his team went on to prove the economic viability of this integrated water, humidity, energy and health unit in family homes in the North of Sweden. He created the company SplitVision AB to commercialize his invention. Soon he received orders for apartment blocks where he adapted the original designs to modular cabinets, with a processing capacity tailored to the occupants' needs. The largest one deals with all water born waste for 42 households.

The Opportunity

Whereas the savings in infrastructural cost are balanced by the investment in the treatment box steered by valves through a simple network of sensors, the real savings are in the elimination of the septic tank, the network of sewage pipelines and the water treatment plants. This saves capital expenditures both at home and at the municipality, while it eliminates the need for continuous maintenance and excess use of chemicals. This potentially relieves municipal governments of the need to borrow, raise taxes and manage something which is the least pleasant job of all: treat other people's waste. A preliminary analysis indicated that Timphu, the Capital of Bhutan, could save as much as $140 million in investments if the homes, apartments and offices were to adopt this technology.

Human settlements are not the only ones struggling with excesses of raw and untreated waste. Cattle and pig farms face the same and often more acute problem. The team at SplitVision AB has channelled their know-how to the treatment of animal manure through a simple SplitBox-Agri that fits into a 40ft. container, replacing the outdoor large storage tanks which are major source of air pollution. The system cuts transportation costs by 90 percent, eliminates the risk of contaminating ground water and provides both quality water for irrigation and a dry fertilizer with a proven commercial value. The SplitBox provides an innovative business model, eliminating massive investments and unpleasant jobs, thereby liberating funds which could be redirected to more urgent needs, and more pleasant professions.

GUNTER PAULI

Further information on this case:
www.splitvision.se/en
www.wipo.int/pctdb/en/wo.jsp?wo=1999045213
www.sumobrain.com/patents/wipo/Flow-regulator-in-surface-water/WO1998028499.html
www.cwwa.ca/pdf_files/Investment%20Needs%201997-2012.pdf

Further information on the 100 innovations at www.theblueeconomy.org and www.zeri.org.