

Swachh Bharat Abhiyan: Role of Indigenous technologies developed by BARC

***Courtesy Department of Atomic Energy**

Swachh Bharat Abhiyaan was launched by Hon'ble Prime Minister of India on 2nd October, 2015, which caught attention of everybody not only in India, but also in the world. The Government has taken various steps to create awareness among the masses for keeping the area surrounding them neat and clean. Government is also paying special attention for cleaning of rivers, railway stations, tourist destinations and other public places.

To achieve the target of cleanliness, the technologies to treat the waste material should also be developed along with creating awareness. There are many technologies that are used to treat waste material. They are usually very costly, very complex to be understood and viable only for large size units. At the same time, indigenous technologies are low cost capital and easy to use and they can also be used by different size units. In India, they are particularly suitable for the small and medium units. In this regard, a National workshop on Indigenous water, Wastewater and Solid Waste Treatment Technologies was organised by the Department of Atomic Energy (DAE) in January, 2015 at Gujarat Technological University (GTU) in Ahmadabad. The objective of the workshop was to disseminate indigenous technologies of water, wastewater and solid waste treatment developed by the **Bhabha Atomic Research Centre (BARC) under "Swachh Bharat Abhiyan"** and to bridge gap between the research at the research centres and the practical application of the technologies.

The BARC is playing a pivotal role in the development of these technologies. Some of these technologies are as follows:

Indigenous water purification technologies:

These technologies can improve the drinking water quality of smaller villages as well as larger cities. It uses the Pressure Driven Membrane Processes. These are suitable for all capacity units e.g. they are adaptable from household level unit or community level unit to large scale unit. Water purification technologies make use of the nuclear energy and solar energy also.

Environment friendly Plasma technologies:

Solid waste dumping sites or landfill sites need more amount of land which is not available in urban areas. Incineration of solid waste pollutes the environment if the incinerators are not designed or operated properly. Thermal Plasma Technology is ideally suited for waste treatment. By plasma technology Hazardous & toxic compounds are broken down to elemental constituents at high temperatures; Inorganic materials are converted to Vitrified Mass; and Organic materials are Pyrolysed or Gasified, Converted to flue gases (H₂ & CO) & Lower hydrocarbon gases when operated at low temperature (500 – 6000C). Disposal of carcass is also being thought of using plasma pyrolysis.

Unique Multi Stage Biological Treatment Solution:

Multi Stage Biological Treatment Solution (MSBT) can be implemented on existing STP which are not able to process Sewage to optimum efficiency. MSBT can be implemented as a

modular or container on the banks of rivers on Drains/Nalas which discharge waste water to the river. It can also be implanted in small urban societies and housing complex for better water management. Benefits of MSBT are: No Surplus of Organic Sludge, No Odour problem, Drastic reduction of Electrical Power usage which minimizes operating costs, No need for return sludge pumping (minimizing electromechanical component which ultimately reduces operating cost).

Role of environmental isotope techniques in the water resources development and management:

There are two type of isotopes, stable isotopes and radioactive isotopes. Isotope techniques are used to find out the type of contamination in surface water and ground water, the sources and origin of contamination, pollutant dispersion in surface water bodies, to assess the groundwater salinity, to assess the changes due to long-term exploitation of groundwater, for hydro-chemical investigation and to carry out geochemical evolution of groundwater.

The BARC UF Membrane Technology for Domestic Water Purifiers:

Water filters manufactured by Sondhka based on membrane based water Purification Technology has been developed by BARC. Benefits of BARC Polysulfone Membrane are high tech 0.02micron or 20nm, simple form factor, rugged (life of more than 1 year) and low maintenance (about Rs. 500 per year). It is very easy to use and very low cost solution for the water contamination.

Deployment of BARC Domestic Water Purifier in Rural Area through AKRUTI Program:

Rural Human & Resource Development Facility is disseminating BARC technologies, namely Nisargruna Biogas, Soil Organic Carbon Testing Kit, Seed Bank, Domestic Water Purifier, Weather Forecasting, LLL, RIA, FSD, VTD; under the AKRUTI (Advance Knowledge of Rural Technology Implementation) Program. Activities carried out under the AKRUTI program are surveys for safe drinking water, Interaction with the villagers, Entrepreneurship development for domestic water purifier production and Awareness programs for benefits of use purified water. RHRDF has also launched a scheme for safe drinking water for village under CSR.

Radiation Hygienization of Municipal Sewage Sludge:

The Sewage is the waste water generated from domestic premises and consists mainly of human waste. It typically contains 99.9% water and about 0.1% solid. The solid waste in sewage is typically organic in nature and is broken down in the sewage treatment plants resulting in sewage sludge as a byproduct. In Radiation Hygienization process dry sludge generated at STP's is hygienized using radiation technology using standard Gamma facility at a Dose of 10 kGs. Such radiation plants are operating in India for sterilizing medical products.

Refuse Derived Fuel: An Emerging Processing Technology in MSWM:

Refuse Derived Fuel (RDF) is a processed form of Municipal Solid Waste (MSW) and it can be a substitute to coal energy. The process of conversion of garbage into fuel pellets involves primarily Drying, Separation of incombustible, Size reduction and Pelletisation.

Conclusion: The above mentioned technologies can be of great help in the treatment of water and solid waste management. This shows that solid waste which is normally treated as the cause of concern, if treated properly it can become a sustainable source of energy.

The aim should be to promote research work in these technologies. After the research is done, the gap between research and its implementation at ground level should be bridged. All stakeholders such as various departments, urban local bodies, consultants and contractors should be involved so that these technologies can be utilised by small, medium and large units, so that they can contribute to the Swachh Bharat Abhiyaan by making India clean.

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