

## Earlier Anaerobic Digesters for Biogas Production

The fact, that a combustible methane gas is produced from anaerobic digestion of biological material, was recognized by Von Helmont in 1630, Shirley in 1667, Volta in 1776, Priestly in 1790, and Dalton in 1804. Laboratory experiments to produce methane from manure were made in 1806 by Humphrey Davy.

The history of municipal sewage sludge digestion can be traced back to the 1850s with the development of tanks to treat settled waste-water solids. A treatment scheme known as the Mouras automatic scavenger was developed in Vesoul, France, about 1860. Donald Camerson, who in 1895 built the first septic tank for the English city of Exeter, used its methane gas for lighting streets near the treatment plant. A full-scale plant existed as early as 1857 in Bombay, India. The continuous digestion process, as developed by Imhoff around 1900, became generally accepted for the treatment of municipal wastewater. One of the earliest U.S. installations using separate digestion tanks was at Baltimore, Maryland, in 1911. From 1920 to 1935 the anaerobic digestion process for stabilization of municipal sludge was studied and improved extensively.

During World War II approximately 30 farm-scale biogas plants for the anaerobic treatment of manure were developed in Germany, using the Schmidt-Eggersglüss and the Darmstadt methods. Only one of these appears to be still in use. Ducellier and Ismann in Algeria also worked on the problem at this time. A large number of small, inexpensive digesters, based largely on research work by R. B. Singh (1971, 1972), have been in operation in India since around 1960. Reports on many such digesters have also come from Taiwan and other parts of the world. The gas from these small digesters is used for cooking and for driving electric generators.

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