SUPER-DAM: A Multifunctional System that Effectively Extracts, Utilizes and Oxidises Greenhouse Gases via Methanotrophic Bacteria

Ribeiro, Thomas

If the installation of an underwater piping system, a uniquely designed gas engine, and a chamber containing sphagnum moss and methanotrophic bacteria is implemented within a reservoir, we can aim to protect aquatic species from greenhouse gases, generate large amounts of electricity and significantly decrease methane and carbon dioxide emissions. To represent the extraction phase in my model, I pierced four holes on the lid of a large container for the insertion of vinyl tubes (airlift pipes) and one hole on the side for the insertion of an electric pump that, once submerged in water, would create air bubbles (CO_2 and CH_4 bubbles). To represent the utilization process in my model, I constructed an engine by removing the base of a cylindrical container and heating the bottom of another and inserting a ball (ball valve), a spring for stability, elbow and thread adapters (intake and exhaust valves), a foam piston-like structure and a dynamo flashlight (electric generator) in the cylinder within a wooden crate. To represent the oxidation and absorption phase, I constructed a chamber using plastic crates, an aluminum pipe and a large container containing sphagnum moss, which in reality would contain methane-oxidising bacteria. All sections were attached using vinyl tubes. The air bubbles were produced and captured and would be compressed to exert pressure on the piston, moving it down and activating the dynamo flashlight which lit to represent a production of electricity. Using various stoichiometric calculations, I proved the absorption and oxidation of CH_4 and CO_2 by the moss and methanotrophs. The unique model that I have designed and created is based on accurate scientific information and represents, on a smaller scale, an innovative and eco-friendly system.

Awards Won: