



## **Producing methane and liquid carbon dioxide simultaneously in water supported structures**

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Reducing atmospheric CO<sub>2</sub> concentrations on a global scale requires both non-fossil energy and means to extract and sequester CO<sub>2</sub> from the atmosphere. Bacterial anaerobic digestion is a very hardy natural process at work anywhere organic matter accumulates with insufficient oxygen; swamps, landfills, wastewater treatment plants, ponds, and oceans. The process decomposes organic matter into water, carbon dioxide, methane, and plant nutrients. When conducted below about 500 meters deep at typical ocean temperatures, the CO<sub>2</sub> will come out of solution as a liquid with about 80% the density of seawater. If pumped to depths in excess of 3,000 meters, the liquid CO<sub>2</sub> will be denser than seawater. Processes combining principles of anaerobic digestion and ocean engineering suggest sustainable, potentially economic, means for generating on the order of 2 Ttherms (200 quads or 50% of world 2005 fossil energy production) while sequestering on the order of 16 Gt/yr of CO<sub>2</sub> (60% of world 2005 fossil CO<sub>2</sub> production). Plankton or kelp production for this slow reduction in atmospheric CO<sub>2</sub> using anaerobic digestion would employ on the order of 4% of Earth's water surface.