

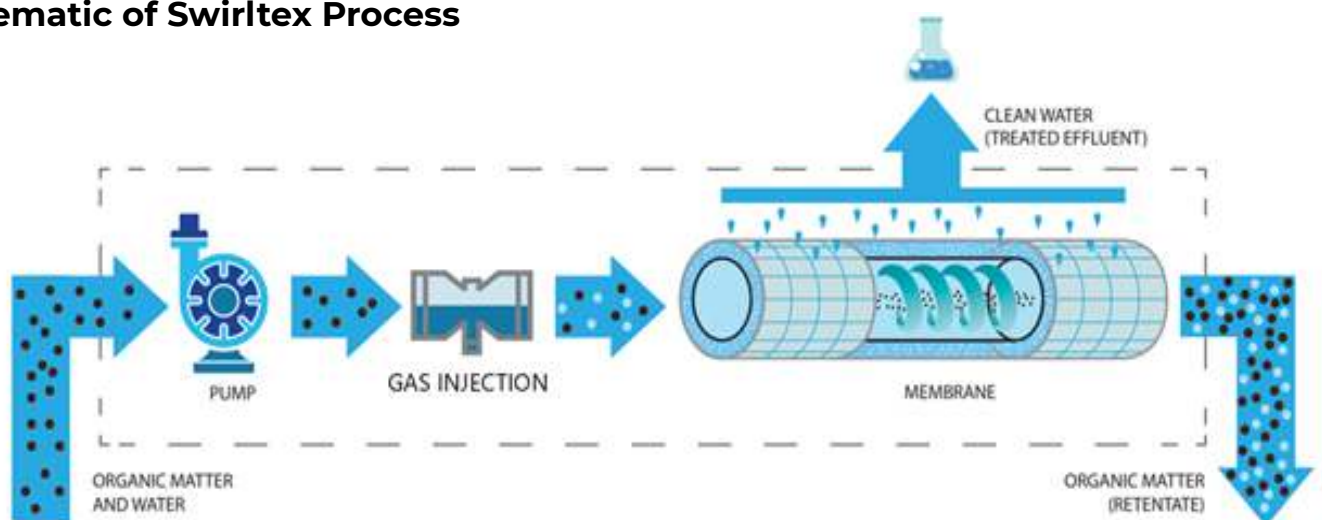
# An Innovative Membrane Solution for Upgrading Wastewater Cesspools in Hawai'i

## The Technology

Swirltex uses tubular ultrafiltration membranes in unique way – manipulating contaminant buoyancy with air bubble addition and inducing a spiral flow through the tubular membrane. The benefits of this technology are **consistency in quality, energy savings** and **lower membrane cleaning frequency**. Due to the pore size of the membranes, solids, bacteria and oil particles as small as 0.04µm are rejected from the effluent. This consistent quality allows for customers to re-use the water for irrigation.

The novel aspect of the Swirltex innovation, compared to traditional ultrafiltration membranes is up to a **60% reduction in energy** requirements per volume of water treated as well as a **50%+ reduction in fouling rates** on the membrane surface. The hyper oxygenated recirculation loop assists with biological breakdown of wastewater upstream.

## Schematic of Swirltex Process



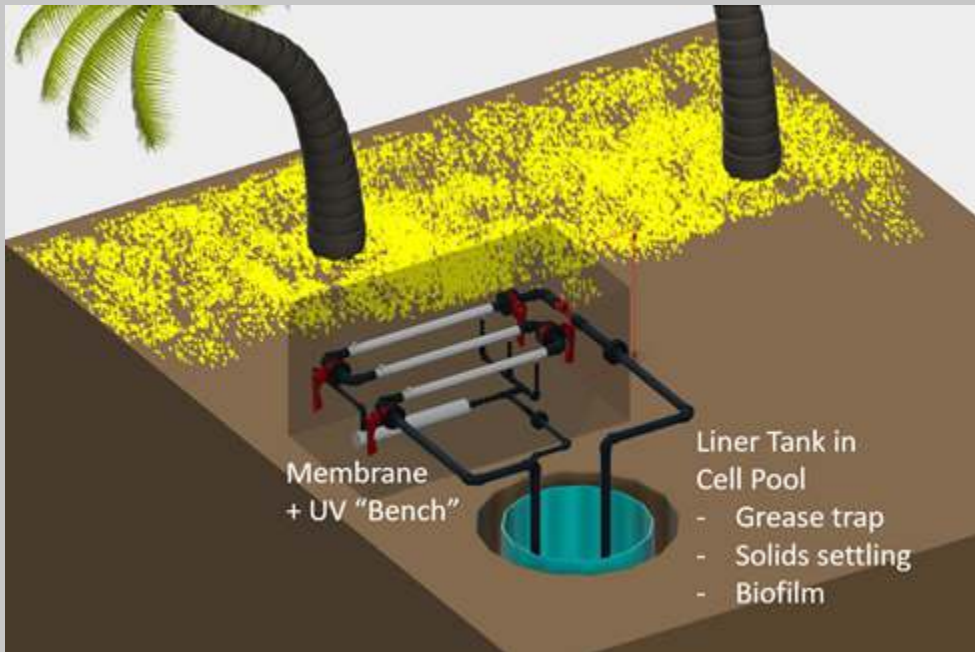
- Air/Oxygen Addition
- Ultrafiltration
- Treated Water Re-use
- Biological Breakdown

The membrane systems are designed to be contained within compact, modular units. This allows for flexibility on-site and reduces the footprint required for treatment.

Swirltex has deployed the technology in municipal and industrial wastewater applications. The units are typically sea-can sized, 10ft wide and 40ft long, easily transportable. They service communities up to 3,000 people. The systems can easily be scaled down for residential use.



## The Cesspool Solution



Utilizing the existing cesspool, Swirltex will implement the following:

- Biofilm liner tank to assist in the breakdown of nutrients.
- Sump pump feeding the membrane elements
- Membranes & air injection device contained under a bench
- Treated water will be re-used for irrigation, or safely discharged to the environment.
- Concentrated wastewater will be sent back to the cesspool for further treatment with the septic system.
- This process will reduce frequency with which the cesspool will need to be emptied by a truck.
- Helps to alleviate the fresh water shortage in Hawaii, by re-using the wastewater for irrigation.

## Competitive Landscape - Residential Treatment

|                         | Swirltex | Septic Tank | Recirculation Filtration | Aerobic Treatment Units (ATU-N and ATU-N-DN) | Absorption |
|-------------------------|----------|-------------|--------------------------|--|------------|
| Water Quality for Reuse | ★        | 🚫           | ★                        | ★  | 🚫          |
| Maintenance             | ★        | ★           | ★                        | ★  | ★          |
| Ease of Install         | ★        | 🚫           | 🚫                        | 🚫  | 🚫          |
| Pricing                 | ★        | ★           | 🚫                        | 🚫  | ★          |
| Power Consumption       | ★        | ★           | ★                        | 🚫  | ★          |
| Footprint               | ★        | ★           | ★                        | ★  | 🚫          |

★ Best  
 ★ Medium  
 🚫 Worst

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