



AQUAGEN-ISI



ALGAE BASED INFRASTRUCTURE SOLUTIONS

www.aquagen-isi.ws

Dedicated to helping save our environment.

AquaGen Solutions

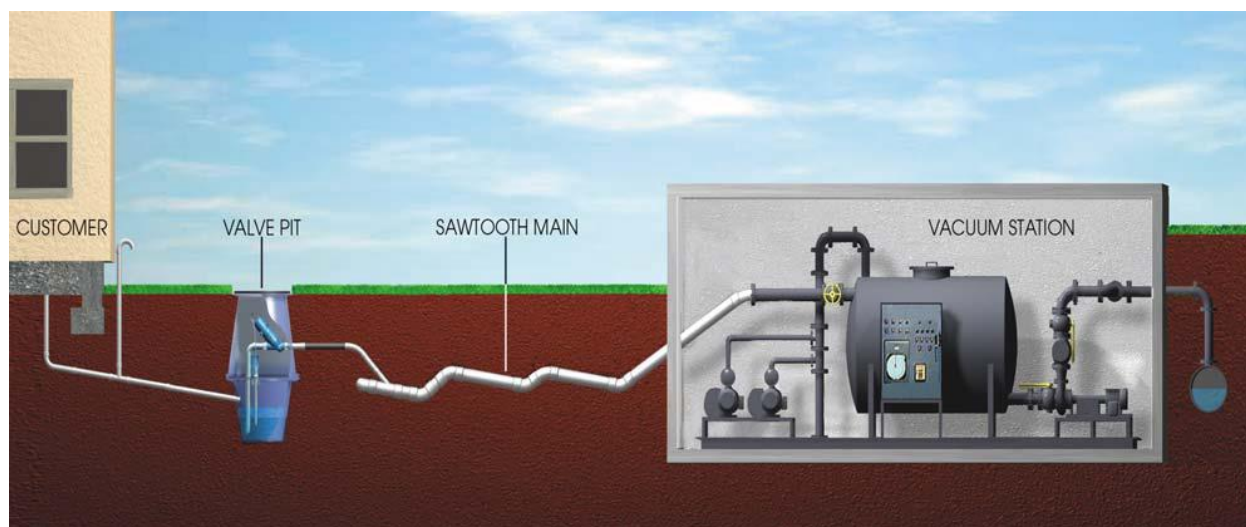
AquaGen is working to provide answers to today's most pressing environmental problems!

Our integrated package provides a complete, cost effective solution for the collection and treatment of wastewater.

How the AquaGen System Works:

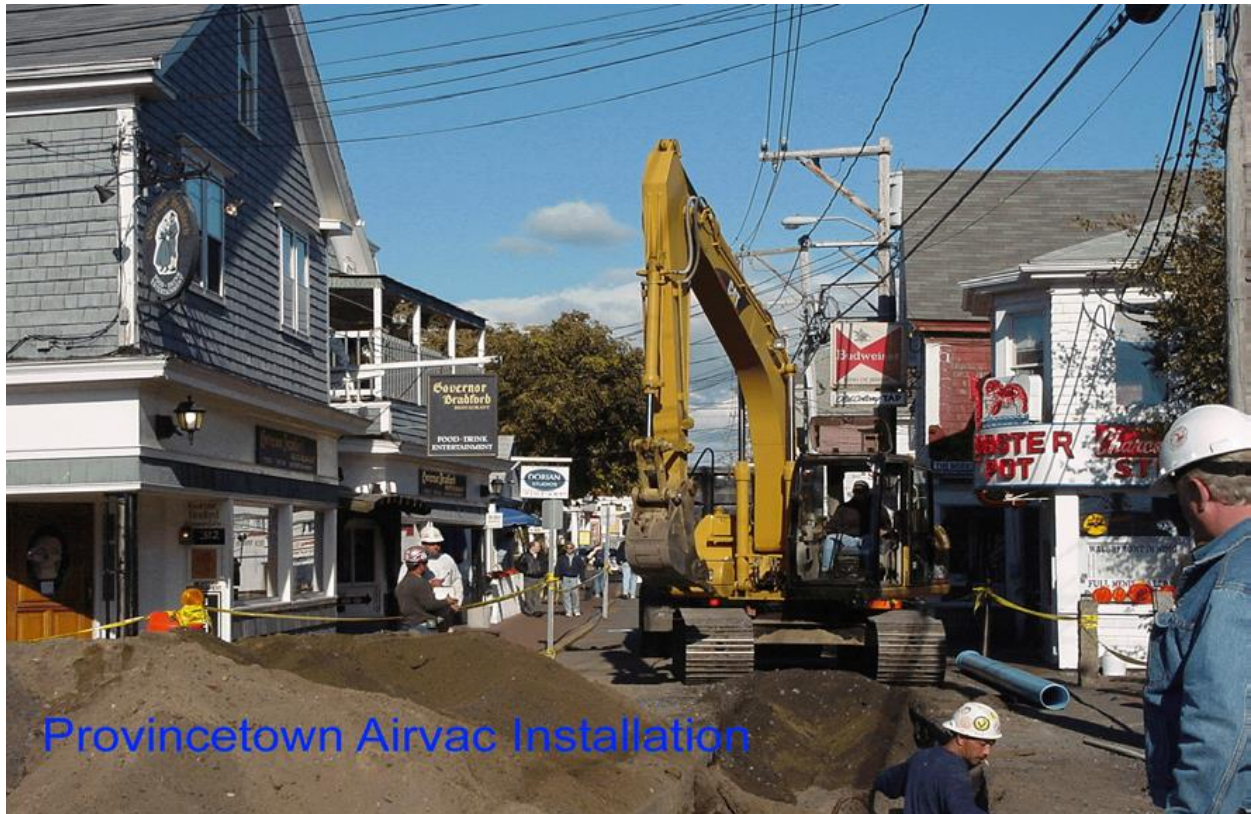
AquaGen is unique in that it combines sub components of the conventional wastewater solution process into a one step technology selection process based upon best available technology.

The process utilizes a vacuum collection system which connects the wastewater facility to the user through a system of shallow depth, small diameter PVC pipe connected to pneumatically operated vacuum valves which collect wastewater from up to 4 - 3 bedroom homes. The valve allows atmospheric air into the vacuum sump which flushes contents into the vacuum line as air enters the system pulling the wastewater toward the treatment facility. This vacuum line system flows into the vacuum collection tank. The vacuum is created in the collection tank utilizing duplexed vacuum pumps. (all electrical equipment is located at the treatment plant which is equipped with onsite energy generation)



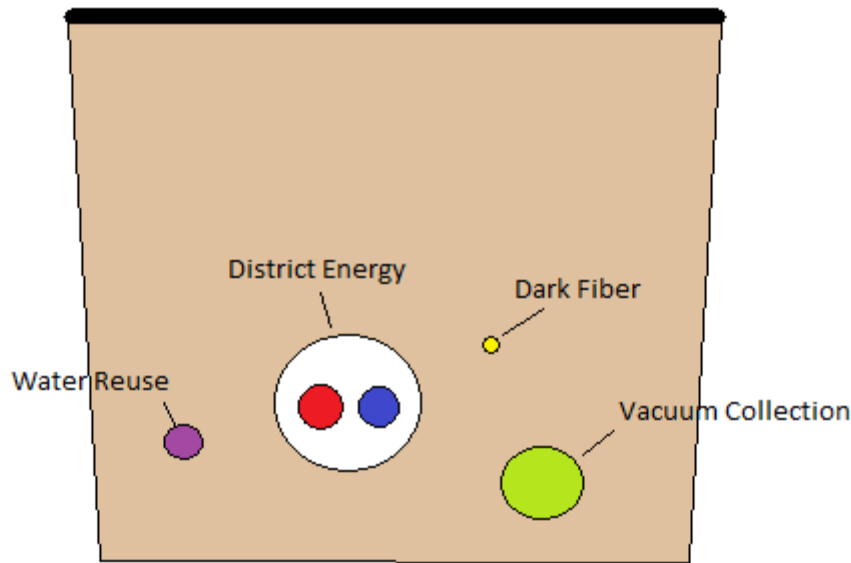
The wastewater is pumped through a mechanical screen and into an equalization tank from which it is pumped into pre-treatment before flowing into the photobioreactor process. Screened solids are disposed of at this step in the process. The treatment flow enters the PBR treatment process comprised of blending, nutrient recovery, harvesting and discharge. The system utilizes the natural capacity of algae to effectuate highly efficient nutrient reclamation. All water is then passed through UV disinfection before leaving the plant for re-use or discharge.

When most people talk about sewers they typically are thinking about the collection system, the series of pipes that collect the wastewater from the user and bring it to a location to be treated.



The Integrated technology provides the community with a cost effective single step wastewater solution. AquaGen also provides the capacity to “grow in flow” to satisfy increased demand from community growth. The core module is designed to treat 40,000 gallon per day system expandable to treat any size flow. Guaranteed crystal clear water quality with typical results like $BOD < 5$, $TSS < 5$, $TN < .3$, Phosphorous of .02 and Turbidity at or near non-detectable limit creates an alternative water resource rather than contaminated wastewater flow. The major difference between a small system and a large system is the size of the collection area, the scale of the pre-treatment works and the number of modules in the system.

Single Trench, Multiple Utilities

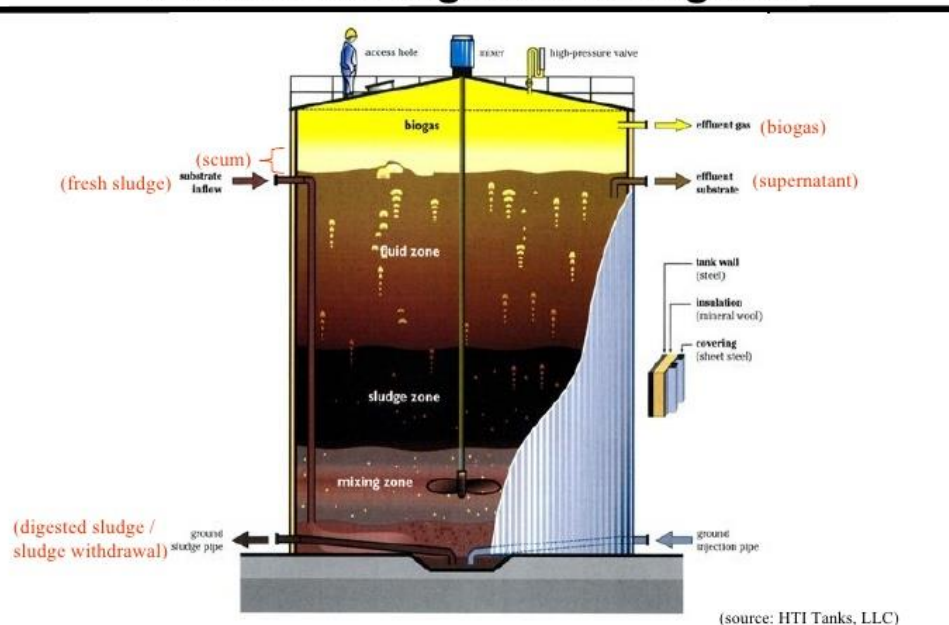


By utilizing the same trench installing multiple utility functions reduces the cost of each utility proportionately. In our comprehensive utility function we facilitate the conveyance of utility services in one trench to include wastewater collection, recycled water return, district energy and broadband last mile capability. By creating an integrated sustainable renewable energy platform from the wastewater we create the opportunity to turn the wastewater crisis into an economic development opportunity. It all begins with the wastewater and our integrated algae based process technology.

Capturing the organic flows for reduced treatment costs and energy production:

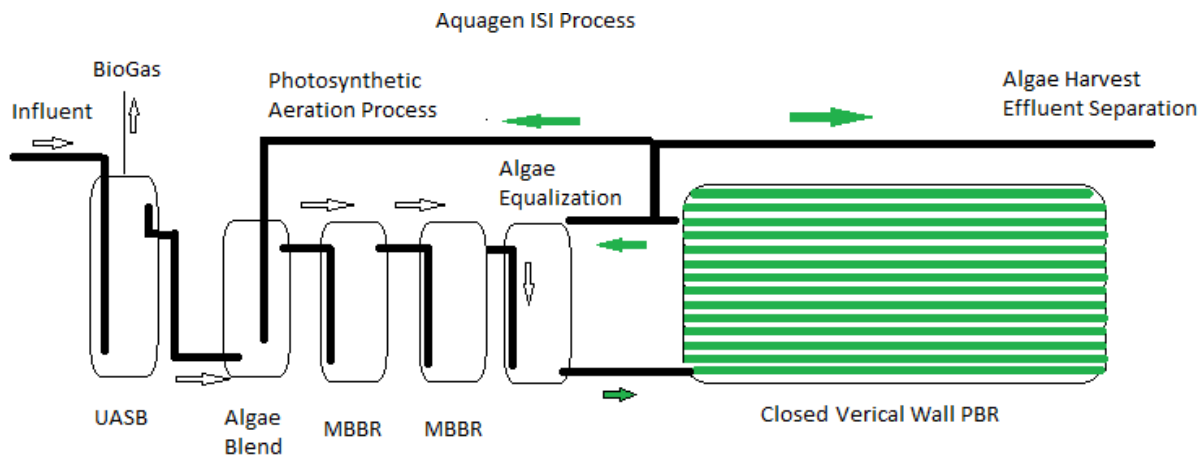
The Aquagen process utilizes an Upflow Anaerobic Sludge Blanket digester to remove organic material from the treatment process as a final step in the headworks. By capturing the biomass pre-

Anaerobic Digester : Diagram



treatment we eliminate the cost of paying to reduce the material by carbonaceous oxidation in secondary treatment. The UASB removed 75% of the organic load and therefore reduces the biological oxygen demand proportionately reducing the treatment cost.

AquaGen ISI: AquaGen System layout with our Algae Based Treatment and Nutrient Recovery.

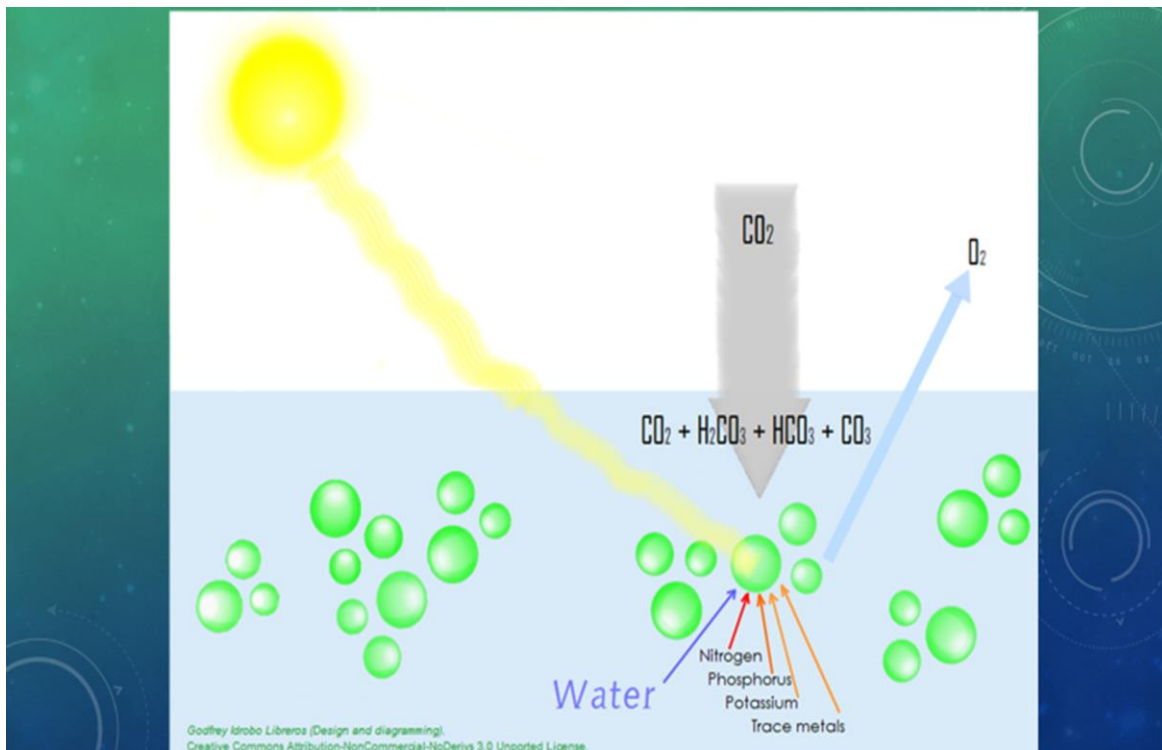


The evolution of wastewater treatment has progressed to an exciting point where natural algal based systems are now providing superior treatment to most current methodologies.

The AquaGen integrated systems model is a perfect example of a comprehensive package that will save significantly on initial capital cost as well as ongoing operation and maintenance related costs through convergence.

With algae based nutrient recovery, the algae is the technology, eliminating significant mechanical equipment and process steps while also providing removal rates beyond the capacity of most current treatment technologies.

The Algae process of converting carbon dioxide and nutrients to oxygen and more algae:

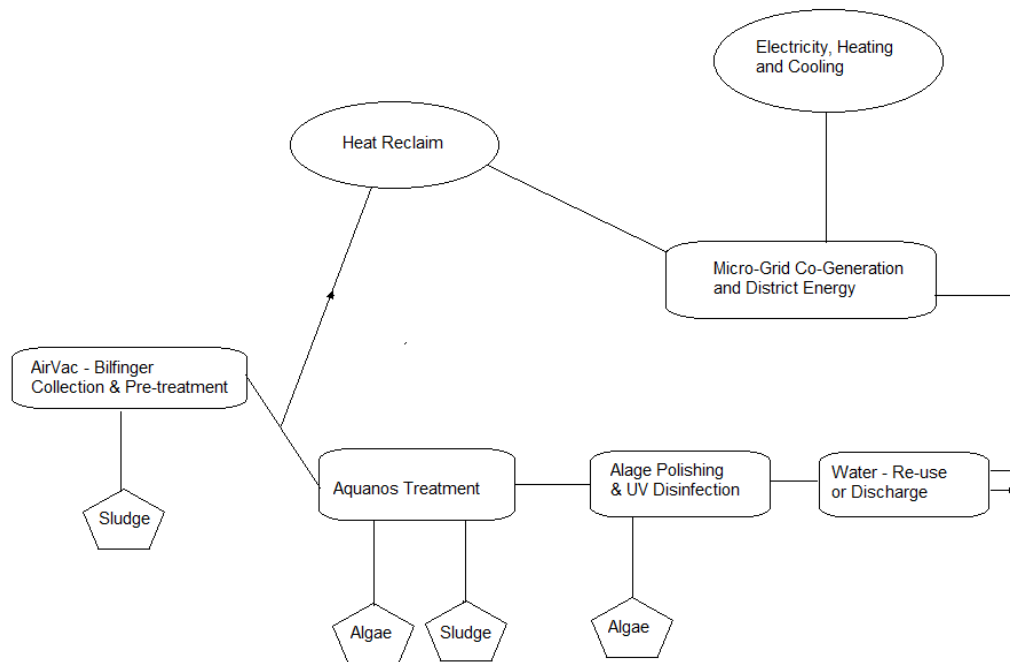


The algae in the AquaGen process use the nutrients in the wastewater to provide fuel and light for energy to create more algae and pure oxygen which creates a super-saturation of oxygen in the water. The algae is separated out of the water as an important biotech product, and the water is either discharged or used as make-up water in the biological oxidation process of secondary wastewater treatment. By utilizing this oxygen supersaturated water we are able to virtually eliminate the need for aeration typically used to provide oxygen for the biological process. This eliminates the need for expensive blowers and aeration as well as the high cost of electricity used to run the equipment.

This not only impacts the initial capital cost of the treatment plant, it reduces the operating costs by more than 50%. If we consider that this natural process also eliminates the need for chemicals to remove the nutrients and dramatically reduces the waste byproducts of the treatment process we find more value. This reduces the operating costs and disposal costs associated with the more conventional approach. Our algae byproduct also represents an important renewable resource which can become many products from animal feed or fertilizer to bioplastics or biofuel. In our process nothing is wasted, the water from the secondary treatment module is either re-used in the process or sent through a second algae nutrient reclaim cycle for final polishing resulting in a very clean discharge water and more biotech algae. The patent pending AquaGen process is the only multistage algae wastewater treatment process available.

By utilizing the vacuum collection system in conjunction with our algae based system we can cost effectively deal with most coastal community settings with a technology that is both very forgiving and able to withstand even severe storm conditions. We do this by having a central collection station with independent back-up power which is able to operate when the grid power is out and it is a very tight system which eliminates groundwater infiltration and wastewater seepage. The combined technology cluster provides the best available technology in wastewater collection and treatment available.

We provide factory guaranteed design and installation along with factory authorized operations and maintenance. We also assure our clients of a seamless transition from initial project design and development to final consumer connection, making sure that the last connection is completed according to specification and in line with AquaGen Systems best management practices.

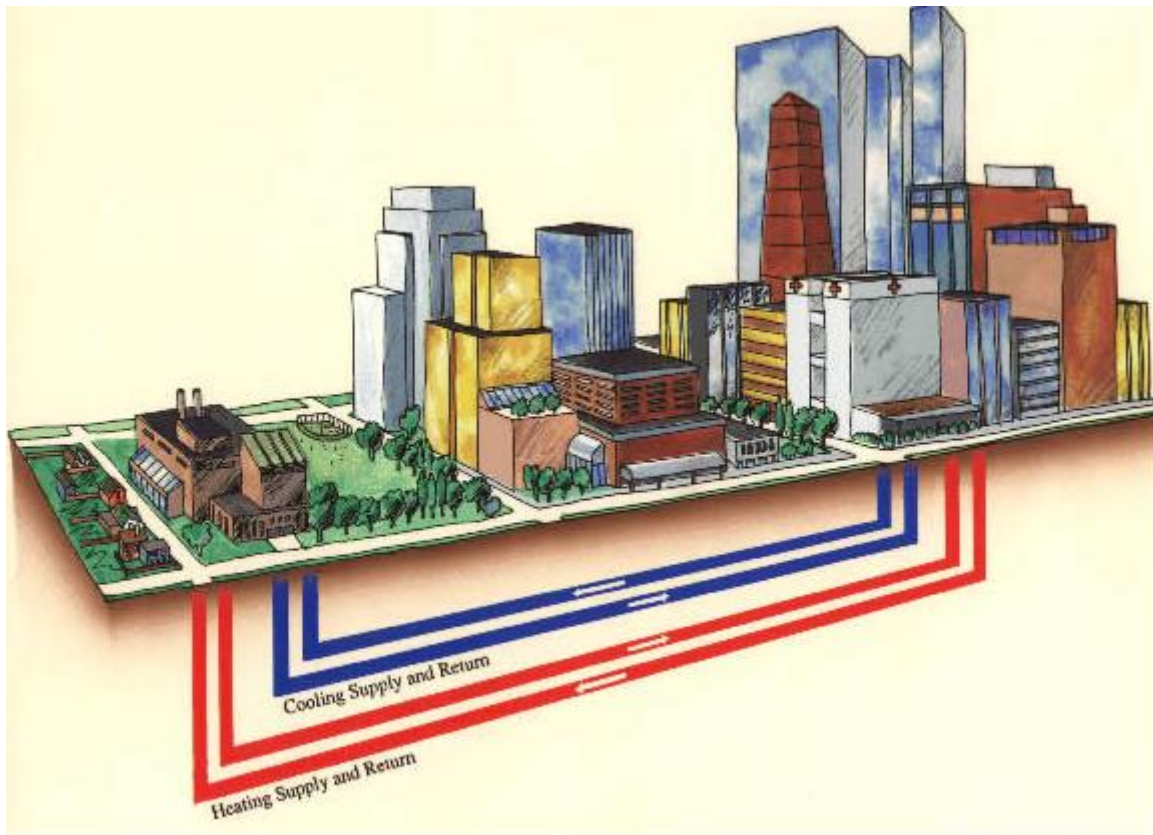


by utilizing an upflow anaerobic sludge blanket digester as the first step in our treatment process. This reduces the strength of the wastewater by 75% which translates into a less expensive treatment cost. The biogas produced is utilized in a district energy co-generation system providing both renewable energy based heating and cooling along with electricity. We further reduce costs in our system by utilizing the algae as an oxygen source. This eliminates the need for expensive mechanical aeration systems and their energy demand. Because we are utilizing microscopic plants they also consume the nutrients, eliminating the need for expensive mechanical or chemical nutrient removal systems. Energy use to treat wastewater represents 5 to 6% of our national energy budget. Aquagen Infrastructure Systems reduce energy use and become renewable energy production platforms.

We utilize the natural process of algae based photosynthesis in an ideal environment created by our photobioreactor to treat waste water better than any existing technology and create beneficial renewable clean water for unlimited re-use while producing renewable energy and important biotech product.



The AquaGen project will be equipped with an integrated sustainable utility service package utilizing a common installation methodology reducing costs. By creating a village infrastructure package for the host community we can provide a standardized integrated solution to provide sustainable growth opportunities and to adapt to the realities of our 21st Century world. This will provide the opportunity to create highly affordable village scale infrastructure which will bring about substantial cost advantages and environmental benefits along with a highly independent distributed utility facility. The algae based wastewater system will consume carbon dioxide and produce oxygen (1 pound of algae consumes 1.8 pounds of CO₂ and produces 1.5 Pounds of oxygen) while recycling nutrients from the wastewater (effluent levels as low as .03ppm TKN and .01ppm of P). The organic solids and algae from the treatment process can be converted to valuable biotech products such as bioplastics, biofuels or biogas. The facility can be powered by the biogas blended with a natural gas supply which will also provide micro grid based connection as a distributed renewable power supply. CO₂ from the cogeneration facility will be captured for the algae process. A district heating system can reduce consumer heating costs by as much as 50%, dramatically reducing the cost of living for residents while also reducing greenhouse gas emissions.



Wastewater Treatment, water re-use, and district energy



www.aquagen-isi.com