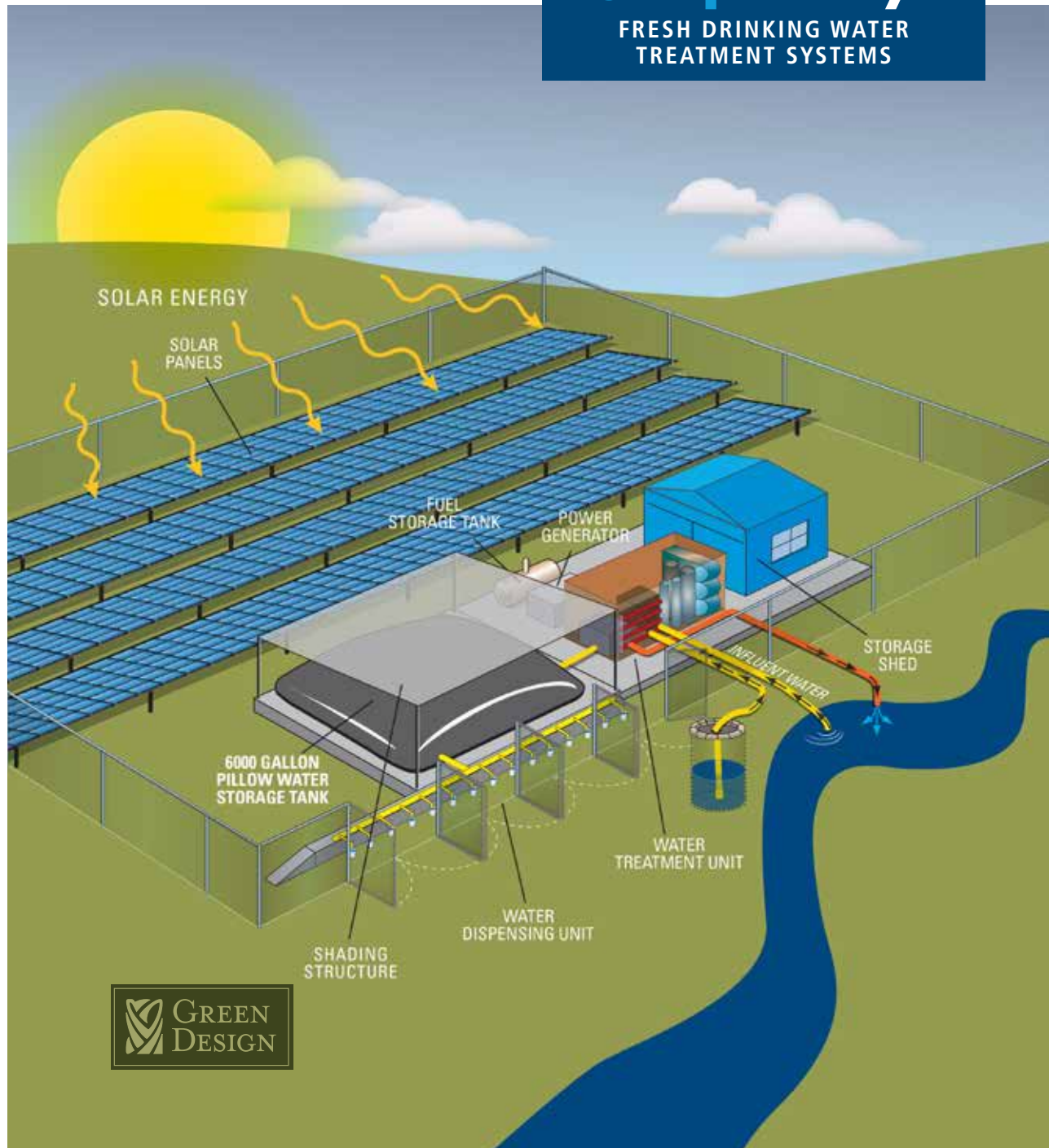




FRESH DRINKING WATER
TREATMENT SYSTEMS



Clean water from clean energy sources

APPLICATIONS FOR TREATMENT

- Water from surface sources
- Water from underground sources
- Removes turbidity
- Solar power provides clean renewable energy
- Provides drinking water for remote sites
- Supplies fresh drinking water for emergencies
- Perfect for green design applications
- Holistic approach to land resource usage





AquaOxy™ Treatment Units for Commercial / Industrial Applications; or as systems that provide an economical solution for supplying fresh drinking water to remote areas through the use of solar energy.

All dimensions given are approximate and are rounded.

AquaOxy Treatment System Description

The AquaOxy water treatment system is capable of treating water from a surface body or from a groundwater source to provide a product suitable for drinking and for domestic use. AquaOxy provides a moderate cost solution which meets or exceeds EPA and other governmental quality and health standards for drinking water. Treatment based on the concept of ultra filtration, mechanical filtration and carbon adsorption is designed to supply 72 m³ (19,000 gallons) per day, per treatment module for up to 500 users. Each user will receive 50 liters of potable water per day. This is based on dispensing 25 liters in the morning and 25 liters later in the afternoon. Treated water is dispensed into two 3.5-gallon containers that will be carried by the user for daily use. The AquaOxy dispensing unit has the capability of dispensing stored and treated water to 15 users simultaneously. The objective is to allow all 500 users to fill their buckets during a one-hour period in the morning and during a one-hour period in the late afternoon. This system is fully scalable into a multi-modular system in order to substantially augment the quantity of treated water to meet the needs and specific requirements of the customer. When operated with solar power it can be expected to pay for itself through energy savings in a few years, depending on the configuration required and the amount of sunlight available.

Applications of AquaOxy Systems

- In remote areas near an available fresh water body source (lake or river)
- By organizations and relief agencies working to bring fresh drinking water to developing countries
- At remote exploration sites by companies and government agencies to meet the water needs of their employees
- By communities seeking to implement self-sustaining infrastructure both from the resource and energy standpoint
- By entities interested in implementing green design technology in their surroundings
- By anyone interested in achieving independence from local water authorities
- To remove undesirable chemical elements from water such as humic acids, colloids, algae, bacteria and color
- Clean and silent operation with no harmful emissions when powered by solar energy

- To provide alternative emergency clean water to the affected communities during catastrophic events as a longer term solution

Water parameters removed by the AquaOxy System

- Color
- Odor
- Turbidity
- Chemical Oxygen Demand (COD)
- Colloids
- Algae
- Bacteria
- Humic acids

The AquaOxy System has been proven to disinfect water by eliminating the following microorganisms

- Coliform types of bacteria
- E. Coli bacteria
- Clostridium perfringens bacteria
- Enterococci bacteria
- Pseudomonas aeruginosa bacteria

Land Area Requirements for H₂O Treatment Volume

6,000 GALLONS/DAY

12,000 GALLONS/DAY

Surface Water Source

80 ft x 160 ft (25m x 49m)

125 ft x 160 ft (38m x 49m)

Groundwater Source

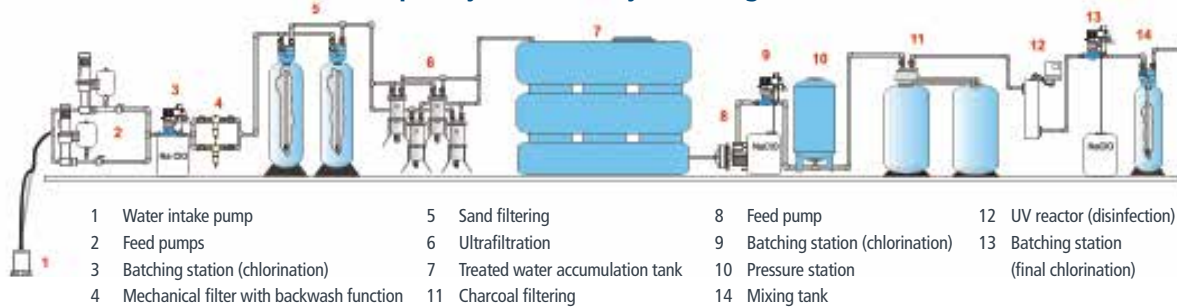
80 ft x 168 ft (25m x 52m)

125 ft x 168 ft (38m x 52m)

Power Requirements for System Operation

The AquaOxy water treatment system provides the capability of optimizing energy usage by utilizing a combination of available energy sources. AquaOxy is designed to be an autonomous system that can be operated with solar power, through the use of a fuel generator or by connection to the existing electrical power grid. The choice of method for supplying energy to the facility depends on the number of sunny days in the area to be serviced, compared to the economics of using either fuel or electrical power where available. In the case of using solar energy, AquaOxy's system design ensures that the batteries' stored energy absorbed from the solar panels is capable of supplying power for up to 6 days. At this time the electric backup power generator would automatically start and provide energy for the pumps. A fuel storage tank, installed near the power generator, will contain enough fuel to operate the generator continuously over a period of 28 days.

AquaOxy Treatment System Diagram



Monitoring and Operation of the AquaOxy System

Operation requires the presence of an attendant for one hour in the morning shift and one hour in the afternoon shift for treatment monitoring, water sampling and analysis purposes. The solar based community system requires his/her presence during the dispensing activities, two hours in the morning and two hours in the afternoon.

- Maintenance free on a daily basis
- Normal weekly maintenance is suggested (based on the quality of the input water, it may be required more frequently)
- Attendant required a minimum of 2 hours per week for the filtration system operation and maintenance
- Reliable performance

Operator Responsibilities

- Carry out regeneration process of ultra filtration membranes on a weekly basis
- Monitor the AquaOxy treatment system to ensure that all the unit operations are functioning properly
- Supervise the water dispensing process of the solar based system used in community applications the quality of the water produced to ensure it meets the health quality requirements for public consumption
- Supervise the water dispensing process of the solar based system used in community applications

Location and Space Requirements

The AquaOxy unit and associated treatment system is installed on a solid concrete foundation. The treatment unit dimensions and weight are 6.06m x 2.44m x 2.44m (21'65" x 8' x 8') (L x W x H), 6 Metric Tons (empty), 8 Metric Tons (during operation). The solar panels will also be anchored in concrete. The storage shed will contain the power storage batteries, electrical utilities, chemicals, buckets and other needed equipment. Approximate land space dimensions required for basic operation of the system when using surface water are 160' x 90' (49m x 28m) for a system containing solar panels.

NOTE A different size of submersible pump and installation configuration would have to be installed in the event water is to be pumped from the ground for treatment. The number and size of solar panels for this system would be determined based on the pumping requirements and on the safe yield of the proposed water well at any particular geographic location.

Treatment Capacity

The depicted treatment system has the capability to produce up to 72 cubic meters (19,000 gallons) of water daily when operated continuously.

Treatment Technology

The water in the AquaOxy Water Treatment Unit is subjected to the following treatment processes prior to production of the effluent for storage and use as potable water:

- Primary oxidation–chlorination
- Sand filtration
- Mechanical filtration
- Ultra filtration
- Activated carbon treatment
- Final chlorination
- UV disinfection
- final mixing
- Secondary oxidation chlorination

NOTE The number of solar panels depicted on the front cover illustration is designed to produce a maximum of 12,000 gallons of water when the AquaOxy treatment system is operated continuously over a 24-hour period with water pumped from a surface source. The pillow tank shown in the illustration has a storage capacity of 6,000 gallons of water produced by the AquaOxy treatment system operating over a continuous 12 hour period. A second pillow tank of equal capacity would be required to store the additional 6,000 gallons of treated water that would result from 24 hours of continuous system operation.

Considerations for Use of Groundwater vs. Surface Water for Treatment

- Use of water from a groundwater source near a surface body of water is desirable especially in hot, arid and tropical climate zones since underground water is cool and will allow the AquaOxy treatment system to function under optimal conditions. (Not sensitive to water temperature as are some other technologies.)
- Use of groundwater allows for the location of the treatment facility at a greater distance from a flowing body of water and outside the 100-year flood flow elevations, especially if the facility is to be constructed for a long-term period.
- Use of groundwater is desirable since floating debris could damage the pumping system.
- Natural ground filtration process usually eliminates planktons and algae, thus less energy and chemicals are required for the groundwater treatment option

Uses

- Treatment of water from surface sources
- Treatment of water from underground sources
- Removal of undesirable chemical elements
- Perfect for green design applications
- Provides storage capacity for 6,000 gallons of ready-to-use drinking water
- Supplies up to 6,000 gallons (23 m3) of drinking water per day in places devoid of any central supply (construction sites, remote locations)

Advantages

- Independent operation
- Low energy consumption
- Solar power provides clean energy
- Automatic generator or grid backup
- Space-saving design
- Moderate price
- Fully scalable for varying requirements

Process Description

- Pumping station output @ 790 gallons/hr. (3.0 m3/hour)
- Primary oxidation - chlorination
- Mechanical filtration
- Sand filtration
- Ultra filtration
- Rechlorination
- Activated carbon treatment
- UV disinfection
- Final chlorination
- Neutralization/discharge of filter backwash
- Water storage in a 6,000 gallon (23 m3) pillow tank
- Drinking water dispensing system (15 taps)

General Parameters

Fresh drinking water treatment unit designed to disinfect and supply water for up to 500 people per day.* Approximate land space dimensions required: 160' x 90' (49m x 28m). Contact us for specific information concerning other capacities required.

*Based on supplying approximately 13 gallons (50 liters) of water per person per day.

System Performance

The AquaOxy water treatment system provides clean, fresh drinking water from surface or ground water supplies for use in remote areas where fresh drinking water is not readily available. AquaOxy's operating system is based on scientifically proven ultra filtration technology. It uses space saving energy-efficient components to deliver a maximum capacity output of fresh water from a compact system design in a cost effective manner. The use of solar power provides clean and silent operation with no harmful emissions for a holistic approach to green design.



A combination of treatment technologies including oxidation, filtration, ultra filtration and sorption are used together to achieve superior results. Water to be processed is pumped to the system via a submerged pump from an existing source such as a lake, river or nearby ground water well. The incoming water is treated by the patented AquaOxy treatment system and then disinfected prior to storage and consumption. AquaOxy moderate cost solution water treatment plants are not intended for use in treating water that contains low molecular weight organic pollutants, nitrates or dissolved inorganic salts.

ON THE COVER The depicted treatment system has the capability of producing up to 12,000 gallons of water daily when operated continuously. It can provide drinking water for up to 1,000 people. This scenario would require an increase in the number of solar panels, additional land area and a second pillow type water storage tank with a volume of 6,000 gallons.



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