

The  
**Essential  
Utilities<sup>®</sup>**  
Consortium

*An Integrated Solution of  
**Renewable Energy,  
Grid Stabilization,  
Base-Load Power**  
and **Fresh Water** Production  
for Island Nations and  
Emerging Markets*



# About Associated Wind Developers and the *Essential Utilities*...

***Associated Wind Developers, LLC*** is based in Plymouth, Massachusetts, USA. We are a renewable energy project developer and system integrator with on-going projects worldwide. We provide planning and design, engineering, permitting, construction, financing and operations for our projects on a turn-key basis. We build-to-own, and also build-for-hire.

In our efforts to provide renewable energy services to various locations in Africa, we came to understand the need that most island nations and remote villages share - a need for renewable energy to reduce fossil fuel energy costs *combined with* a need for greater energy production and grid capacity, and the resulting need for grid stabilization as increasing amounts of renewable are added to the system. And underlying all of these needs is the need for fresh water for humanity. The *Essential Utilities* solution is an outgrowth of that effort. It is a collection of much needed energy systems and utilities that work together in a synergistic manner to improve the human condition around the world.



## Essential Utilities<sup>®</sup>

*A Total Solution of Power and Water for  
Island Nations and Smaller Grids.*

**One Source... Multiple Solutions**

**Associated Wind Developers, LLC**

11 Resnick Road, Plymouth, MA USA 888-800-2381

[www.AssociatedWindDevelopers.com](http://www.AssociatedWindDevelopers.com)



# Wind & Solar

Many island nations, remote villages and other smaller grids rely on fossil fuels—typically diesel generation—to provide their electrical needs. As fossil fuel prices continue to escalate, these locations face an ever increasing drain on their economy, from both a percentage of overhead and a balance of trade basis. If a good wind resource is available, wind generated electricity can be very economical and help to stabilize energy prices.

The cornerstone of our renewable utility offering is the ***Aeronautica 750kW*** series of wind turbines. *Aeronautica Windpower, LLC* is the authorized North American licensee for *Norwin A/S of Denmark*, who designed this IEC certified turbine.

The '750' is currently in operation all around the world. Manufactured in the United States, the AW-750 is available in a number of tower and rotor configurations and has hot and cold climate packages to fit each application.

These 'queen-size' 750kW machines are utility-grade wind turbines, but at a physical size that allows them to be transported and erected at locations with limited infrastructure, poor roads, and smaller cranes. They are perfect for remote applications. Our consortium does utilize other wind turbines (such as 225kW or 1.65 and 2mW sizes) if they make sense for the site, but the *Aeronautica* turbine is a real workhorse for isolated locations.



# Grid Stability<sup>Cosφ</sup>

Wind and Solar sources, although an inexpensive form of electricity, are inherently variable in their output. Winds can gust or stop altogether, and clouds can pass over photovoltaic arrays. This places unusual demands on grid operations, as backup generators need time to spool up to operating speed. Brown-outs or blackouts and harmful flicker can often occur.

As increasing amounts of solar and wind generation is added to grids, instabilities in the system will increase and become a large problem for grid operators. Problems in one location will affect other generation and loads across the grid. Variations in voltage, frequency and power can trip entire legs of the grid off-line.

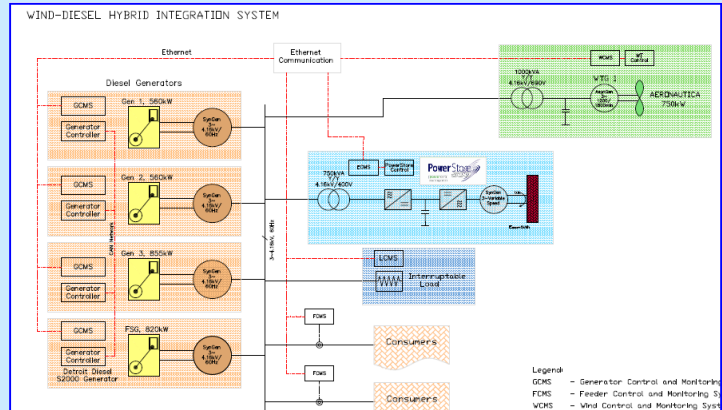
The solution to providing clean, firm power from your grid while relying on variable sources of power such as wind and solar can be found in a grid stability system. Our grid stabilization system provides a combination of intelligent controls that allow generators (and loads) to talk and work together, along with an energy storage system that removes harmful spikes and fluctuations from wind and solar generation. This short term storage system provides the electrical 'inertia' or 'spinning reserve' that allows diesel generators to be turned off completely, stabilizing grid performance and saving much more money.

For over 23 years our team has managed renewable energy generation in isolated grids, ensuring utility grade power quality and grid stability. This enables very high levels of wind and solar power penetration into isolated diesel powered grids, thus reducing emissions and dependency on fossil fuel.

Using this technology along with our own backup generation, our wind and solar projects are unique in their ability to produce clean, constant FIRM power to the grid. Many grid operators now use this system across the entire grid, helping to manage variable output from many different forms of generation.

Our grid stabilization systems are sized to match our 'modular' approach for 1.5mW systems and up. They come pre-packaged as part of the wind or solar project 'balance of plant' offering.

And, when used with our other longer term electrical storage systems, energy output can be maintained over periods of several hours in order to maximize the amount of renewable energy injected into the grid.



# Backup Power

While renewable energy sources such as wind and solar can provide significantly lower operating costs than fossil fuels and long-term sustainable power, many projects need to be able to supply firm, uninterrupted electricity 24 hours per day, 365 days per year. Backup 'thermal' generators provide just this system resource for you.

As part of our Essential Utilities solution we offer just such systems. Our team specializes in Power Station and Critical Infrastructure Engineering, Construction, Procurement, Operations and Maintenance, and Emergency Service for Mission Critical Applications Worldwide.

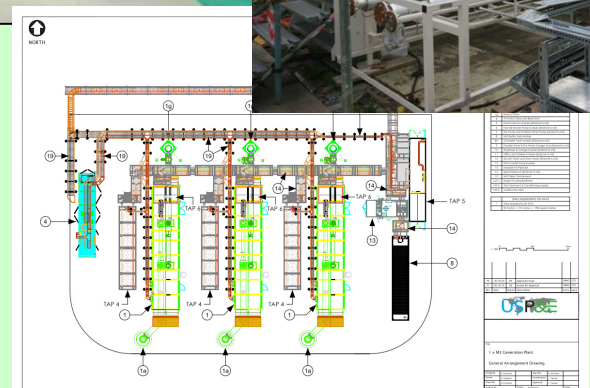
Fuels sources can range between Diesel, Heavy Fuel Oil (HFO), Natural Gas and even Bio-Fuel sources, depending on the availability at your location. Dual-fuel configurations are available if required.

We have pre-sized our thermal backup generators to fit within the 'modular' concept of our utility packages and commonly requested power plant sizes for islands and remote microgrids. Generator systems are available in preconfigured in increments of 1.5mW up to 50mW. Generators and controls are available in 'shipping container' housings if desired, allowing for fast and easy installation on simple foundations.

All power stations are designed to integrate fully with our renewable energy systems, and to be used with our 'grid stabilization' equipment. This system eliminates variability in grid fluctuations and allows smooth transitions between wind or solar/diesel applications.

Our professional team of EPC project managers offers our clients tremendous domestic and international experience. Our team provides turnkey engineering, design, procurement, construction management and start-up, commissioning and testing for aero derivative and frame units. All projects are managed by our trained personnel directly. If available, subcontractors are most often obtained from resources local to the project area. When subcontractors are used for local engineering or start-up, Our clients are assured that our partners meet stringent requirements for quality, service and safety.

So whether you have a small 1.5mW installation or need 50mW or more, we can handle your needs.



Sierra Leone Project: 8 x 1.6MW Hyundai Medium Speed Generator, HFO Fuel Purifier Unit, HFO Fuel Farm, 11,000 Volt Switch Room, Turn Key Installation

# Fresh Water



Fresh water is the essence of all life. It is the building block of a strong, vibrant economy. Using a highly efficient Reverse Osmosis (RO) process we can deliver large volumes of fresh water from seawater or brackish sources to your town or village.

We provide water treatment solutions for industrial, commercial and municipal clients. Staffed with experienced applications and membrane process design professionals, our team designs and manufactures Reverse Osmosis Systems using state-of-the-art technology, ranging from 5,000 gallons per day to over 16,000,000 gallons per day. Our water specialists have over 23 years of experience in the design, installation and operation of water treatment systems around the world.



Like all of our utility services, our RO fresh water plants come pre-engineered in a modular fashion. The plants can be packaged and operated in 'shipping container' modules, allowing for fast and easy installation on simple foundations. Service contracts are available or local workers can be trained to provide operations and maintenance and service.

Making fresh water using our renewable energy systems rather than expensive fossil fuels produces affordable fresh water for your community. By designing both the water and wind/solar systems to operate together, we are able to take advantage of periods of excess electrical generation in order to inexpensively make and store extra fresh water. In effect, the water system becomes a 'storage battery' for the excess renewable energy.