

FREE ENERGY: HOMES, FACILITIES AND PEOPLE THAT SURVIVE

By Paul Welch

Free Energy is what most facility professionals would like to deliver to their management. The ability to produce free energy on site has many significant benefits in addition to increasing a company's profitability and eliminating a budget line item that often increases annually.

Independence. Organizations that do not depend on utilities for electricity have inherent competitive advantages. Visualize a facility located in a place like Houston, Key West, or even Puerto Rico during 2017. The cost to get electricity on site, after the catastrophic event has subsided, (presuming the physical structures have survived intact) are typically not fully calculated or budgeted in advance. Offsite supplied electric costs are not predictable because disasters, calamity, or terrorism are the *unknowns* that relate to infrastructure damage. Even with fully functioning generators with enough underground, untainted, fuel storage to generate electricity for one month, when the second month begins, and all land routes between your location and fuel sources needed to supply the generators are no longer available, does your management want to pay for the fuel to be flown in by large cargo plane? How about helicopters? If your facility does not have electricity will the staff stay, or will they try to get home to take care of their loved ones and property? Once staff leaves, the ability to maintain the facility becomes increasingly more difficult—subsequently future startup will probably cost more and take longer. What about the cost to replace and train staff that will not return? Does your facility need heat, hot water, steam generated by using delivered fuel in addition to electricity? Remember, all the land routes are impassable, and pipelines above and below ground are severely damaged. Does any organization want to keep a facility running long term with mounting costs? In a location where continuous operation cannot be assured, now, and in the future?

Community. Imagine you are responsible for operating and maintaining that same facility which is completely energy self-sufficient. Included in the contingency plan for continuous operation and survival, is the capability of providing long term shelter, food, water and other essentials for all the employees and their immediate family and loved ones. The answer to all the questions posed above are resolved. Your responsibilities as a facility professional have become easier. The financial viability and profitability of your organization can now be maintained. Employee morale and loyalty should be exceptional because everyone will know that their management truly cares for them and those who depend upon them. Hiring, and keeping, superb employees becomes much easier.

TIMES UP! Responsible individuals do not deny the obvious and follow the utilities, oil, gas, and coal interests off the cliff. Pragmatic responsible individuals charged with keeping things running should educate their upper management about all the positive benefits of being OFF-THE-GRID and achieving ULTIMATE GREEN STATUS.

When any new structure is being planned it is essential that the most experienced and knowledgeable facility engineer/manager be the key decision maker of any design and

construction team. This premise defies tradition but will insure management the best results. The best facility people will choose function before form along with what is needed for a safe and healthy building. The best facility people know that after the designers leave they are responsible for the efficient continuous operation of the facility along with keeping preventive maintenance to a minimum. When it comes to OFF-THE-GRID buildings that are easily maintainable form typically follows function not the other way around.

Organization executives must be made aware by their facility managers that many substantial benefits will result by hiring an outside public service team who is devoted to improving the bottom line and insuring continuous operations during the worst conditions. The facility manager designated by the organization to operate and maintain what results from any and all prospective design and construction changes shall be the team leader.

NOW. This is a call to ACTION! Those who design, construct, and operate structures of all types can now build commercial, industrial, residential, and special use shelters that will protect people and equipment for very long periods of time during the worst of climatic conditions when outside supplies of everything are not possible.

Over the most recent decades many technologies needed to allow individual structures to operate continuously on a standalone basis have matured and continue to be improved.

One such rapidly maturing technology that can provide on-site power is Solar + Storage + Backup. The advances in solar cell and panel efficiencies, combined with battery improvements, coupled with unique solutions by inverter manufacturers like SolarEdge Enphase, and SMA have made standalone power, without utilities and fossil fuels, a reality. Generators that are fueled by B100 biodiesel that is stored and even produced on site can serve as a secondary backup. Another technology that has been around for decades which is becoming economically viable is hydrogen. Car manufacturers like Toyota have spent many billions of dollars over these past twenty plus years developed a vehicle now on the streets of Los Angeles that can be refueled by hydrogen in ~5 minutes, then travel about 303 miles before it must be refueled. The hydrogen powers a fuel cell which produces electricity that powers the car motor - the fuel cell byproducts are oxygen and water vapor. This hydrogen development is adaptable and scalable for use in powering all types of structures. Hydrogen can now be produced on site and safely stored underground. It is expected that hydrogen within the next ten years will become the fuel source used to create whatever amounts of electricity are called for by commercial facilities that must continuously run 24/7 for competitive reasons or to ensure their financial survival. It is anticipated that within the next 20 years countries like Japan will start the transition using hydrogen to generate electricity via fuel cells.

The Renewably Energy Home [TREH] aka www.43southbayavenue.com was designed in 2006 after which construction began and was completed in early 2007. It was net-zero during 2007 and has been near net zero up to the present, a period of ten years. The home was built using some of the best traditional construction materials and techniques and was designed to survive sustained winds up to 130 miles per hour. In 2006 affordable off-the-grid systems were not readily available

- they are now. In 2006 Cementitious Structural Insulated Panels (CSIPs) with the current attributes were not readily available - they are now.

Why CSIPs? There is no "outgassing" typically found in traditional building materials and no CFVs. CSIPs is a complete pre-engineered building system that is hurricane, earthquake, fire, moisture, termite and rodent resistant along with having a high sound retardancy and a high "R" factor.

A structure built using the CSIPs system can be pre-built in a factory then shipped to a prepared site where it can be quickly assembled in a matter of weeks when compared to many months using more traditional construction. Looking back, TREH could have been constructed using CSIPs if they were available, and considerable time and money could have been saved. Looking forward, those individuals and organizations dedicated to building affordable housing and structures for startups and small businesses should consider using the system. The CSIP system is ideal in situations where volunteers who are not construction professionals are available to install the panels and the completed assembly.

The CSIP system results in "tight" buildings. This is good for reducing energy consumption - net-zero, net-zero plus, and near net-zero buildings are considered the best categories for reduced energy consumption. But, for reasons of health and safety, all "tight" buildings must have properly designed and installed mechanical ventilation systems. That includes sufficiently filtered make up air from the outside, filtered inside air, rigorous controls of temperature and relative humidity during all seasons including transitions, and the expulsion of spent air and fumes that were internally generated by occupants, equipment, devices, and stored materials.

Since The Renewable Energy Home [TREH] was completed substantial energy reduction improvements in lighting, HVAC equipment, devices, appliances, hot water generation, along with related software monitoring and controls have entered the competitive market place. Also, there have been dramatic energy generation improvements during the last ten years in a growing number of fields, like geothermal co-generation, wind generation, biomass boilers, hydro-generation... this trend is expected to continue along with new emerging technologies.

The future of free energy powering buildings that are capable of surviving is now. This approach, along with in-depth, long term, emergency preparedness plans, will help mitigate or eliminate the disruptions caused by natural disasters, catastrophic events, and uncontrollable equipment failures.