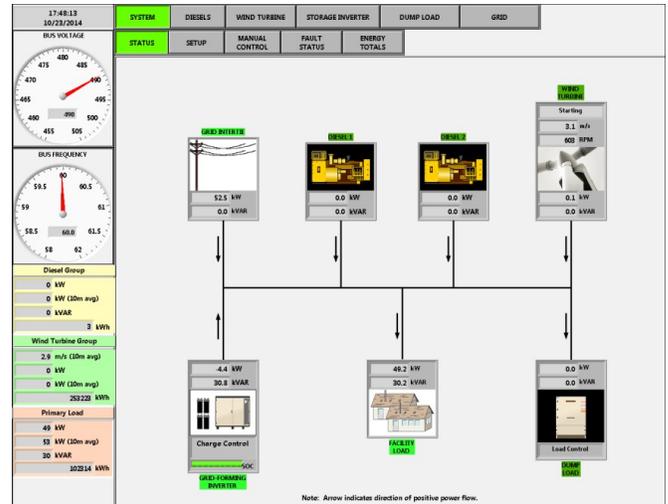
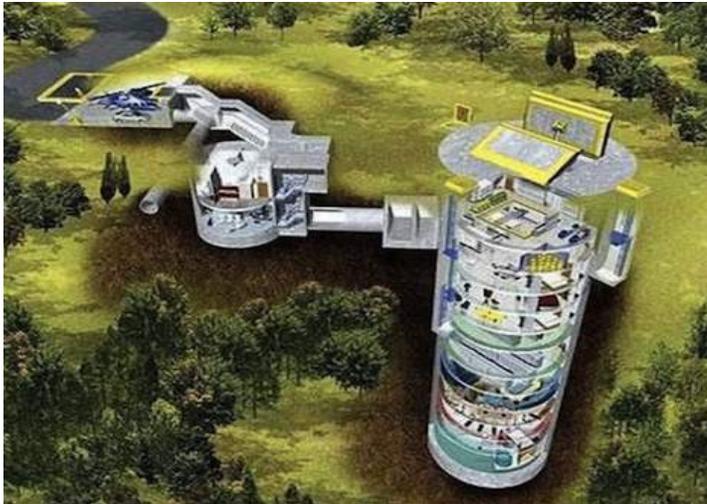




## Innovation in Microgrid Automation

# Energy Security for Survival Condos



Sustainable Power Systems' Grid-Tied Microgrid for the Luxury Survival Condos in Kansas

## Background

A project developer in Kansas converted an Atlas F missile silo (built in the 1960s) into luxury survival condominiums. The silo has 14 below-ground stories to shelter 10 families in the event of a major natural or political disaster. If the condos lose power from the electric utility's grid, they require a microgrid power system to keep them up and running.

Sustainable Power Systems (SPS) was chosen to develop a grid-tied microgrid to deliver energy security to the condos. While the condo's microgrid is connected to the electric utility's grid most of the time, SPS designed the microgrid to operate independently of the utility when grid power is lost (island mode). SPS's microgrid incorporates renewable energy from a wind turbine and automatically balances the turbine with a battery and diesel generators, delivering stable and reliable electricity.

## SPS Microgrid Design

SPS designed and deployed this grid-tied facility microgrid using a wind turbine, diesel generators, SPS's Grid-Forming Inverter and

SPS's *Universal Microgrid Controller™* – the brains behind the microgrid.

The average electrical load drawn by the condo complex (which includes a swimming pool, hydroponic and aquaculture food production, bar and lounge and general store) is 85kW, equivalent to the load of about 70 average American households.

Under normal operating conditions, the condo facility is connected the utility's grid. However, should the condo complex need to disconnect from the grid for any reason, the SPS microgrid takes over, providing stable and reliable power to the condo community.

## SPS Microgrid Performance

This commercial facility is connected to an unreliable utility distribution feeder in rural Kansas. The microgrid responds instantly to any voltage disturbances or outages on the utility, acting as a large UPS for the facility. Unlike a UPS, however, the microgrid allows the wind turbine to stay online while the facility is islanded. Since its commissioning, this SPS microgrid has successfully responded to numerous utility disturbances. At one point,

Kansas experienced severe ice storms that brought down the utility's distribution lines, cutting off the condo's access to utility power for *over five hours*. SPS's microgrid immediately took over without any disruption in power to the facility.

The condo's developer and owner Larry Hall states, "Energy security is a top priority for our community. We needed a microgrid to ensure that our power stays on and that our wind turbine continues to produce, regardless of what is happening out on the electric grid. Ours is a complex facility, and Sustainable Power Systems overcame some significant system integration challenges to provide us with *true energy security* -- we now have power no matter what."

## Conclusions

SPS's *Universal Microgrid Controller™* and *Grid-Forming Inverter* have been automatically running the survival condo's microgrid since April, 2013. SPS's microgrid has handled small power disturbances as well as major outages, keeping the power on for this community, providing true energy security.