Theory of a Lit System

The power storage and generation industry has produced meaningful advances in products that deliver increased functionality and more capability–it's smart tech that results in long-awaited user-friendly operations. Our philosophy for supporting power consumption aboard our designs begins with an accurate usage profile based on typical daily loads during normal and peak operations. From this, we boil down l targets for specifying equipment or program setting automations, but most importantly understand how to manage worst-case scenarios during top consumption periods. Matching load demands with creature comforts– the "air-conditioning-first" approach–will finally shape the principles governing our electrical systems. This approach produces a realistic view of electricity management and utilizes the most current tech onboard the vessels we have created over the past decade.

A hybrid generator and lithium battery-based marine electrical power system provides electricity to the vessel while extending the life of a diesel generator, at a reduction of overall fuel consumption. This equation enhances the lifestyle of our clients by reducing the impact of noise and fumes, reducing maintenance intervals, and opening opportunities for silent periods on the yacht while a system sits idle awaiting the next demand.

Most people are familiar with running an oversized generator 24/7 to power air conditioning loads, make hot water, and use galley appliances. This arrangement wastes power, makes noise, emits noxious fumes, and is largely inefficient. Worse, the generator's peak capacity is rarely used even though it runs nonstop.

Our design maximizes the generator's value by leveraging its full output power for the limited time it runs. It is paired with a 20.4 kWh Victron LFPSmart Lithium battery bank and 8,000 kW Victron Inverter. This 24 vDC-based system will manage a DC-based HVAC system and other hi-loads with invisible hands-free operations. The 12 kW Whisper Power Genset will be started manually, or automatically, and employed for battery charging and production of supplemental power when the electrical system is under heavy demand, like when the galley is in full swing and the air conditioning is at max cooling or heating. However, on most days, the batteries and inverter will give the vessel uninterrupted power, seamlessly to her users, when the generator is stopped.

Under regular operation with guests onboard, we estimate the vessel will use an average of 3.5- 4kW of continuous electrical power. With about 16kWh of practical electrical storage in the battery bank, we can assume more than 4 hours of quiet operation before the generator starts again to replace the balance. While running, we expect the genset to provide 11 kW of continuous power– 4 kW of which is consumed by average running loads, and 7 kW going into topping off batteries in about 2.5 hrs time. The boat will be heated and cooled with a VRV (variable refrigerant volume) system by Termodinamica, capable of maintaining the desired interior temperatures in all climatic conditions. A VRV system uses 50% less power, shows up to 70% efficiency gains in temperature maintenance and reduces overall power consumption due to responding to variable load.

The VRV chiller system circulates 50-55 degree cooling water to the fan coils through the ship. At that temperature, water vapor has only just started to condense. With the VRV system, humidity is electronically controlled by software that adjusts the coil temperature according to need and can maintain a 33-35 degree coil temp.

This provides maximum dehumidification. Most yachts with traditional chilled water HVAC equipment struggle to maintain desired relative humidity. A VRV system can accomplish rapid temperature and humidity regulation and throttle back quickly in maintenance mode. This kind of technology works flexibly and efficiently, especially as we eye all other power supply components with similar capability–adjusting running speeds to power demands. In short order, this technology works well with our theory of using smaller variable speed equipment throughout, like the DC genset, in a blended inverter/genset/battery architecture.