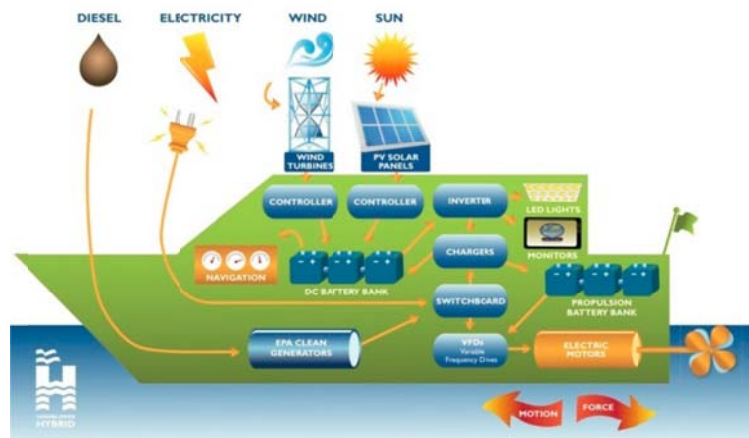


Hybrid Electric Propulsion System for Marine Vessels

Features and Benefits of the ATS Diesel-Electric Propulsion System:

- ◇ AC Propulsion System for Hybrid Diesel-Electric Marine Vessels
- ◇ Offers unprecedented fuel efficiency at any vessel speed.
- ◇ System allows one diesel engine/generator to operate two large propellers. Second engine/generator provides redundancy and extra power when needed. This eliminates light load or “wet stacking” conditions detrimental to diesel engines - ensuring extended engine life. It also cuts energy consumption at vessel speeds typical for inland water ways and long range cruising.
- ◇ System can have multiple control stations.
- ◇ Compact Modules are liquid cooled.
- ◇ Built in inverters for auxiliary equipment.
- ◇ Protected against output short circuits.
- ◇ Uses electronic motor thermal overload protection.
- ◇ Better fuel economy by decoupling the engine speed from the propeller speed which allows operation at the most efficient load point over a wide speed range.
- ◇ Minimized pollution due to highly efficient operation of the diesel engine over a wide range.
- ◇ Longer engine life because only one engine is operating under normal cruise speed conditions.
- ◇ Redundancy of engine availability enhances safety.
- ◇ Total elimination of traditional generators, their controls and cooling systems.
- ◇ Total elimination of gear box(es) between the engines and the propellers thereby avoiding hardware cost, maintenance and mechanical losses. This also eliminates the tedious task of aligning the engine, gearbox and propeller shaft.
- ◇ Elimination of mechanical shifting between forward and reverse. Instead, forward and reverse is quietly and gently performed by reversing the rotational direction of the electric propulsion motor.





Alcatraz Clipper and Flyer, Powered by the ATS Dual 700HP Hybrid System

The Alcatraz Hybrid – 20m dual 300kW AC Propulsion

Commissioned in 2008, The Hornblower Hybrid was the first hybrid passenger ferry in the United States. The vessel utilizes battery power when moored at the pier, reducing fuel consumption and eliminating the noise and fumes associated with diesel engines while passengers are boarding. The Tier II diesel generators come on-line as necessary while underway, depending upon the vessel load requirements. Solar panels and wind turbines also augment the power from the main generators.

Hybrid Ferry Operational Review

- Alcatraz Island, San Francisco CA is only serviced by the Hybrid fleet.
- During the summer holiday season, 5,200 passengers per day are transported to the island; during the nine month off-season 2,000 passengers per day make the trip.
- The two at Alcatraz ships make twelve round trips each per day, 363 days a year
- Over 1 million people per year have been utilizing the hybrid ships to visit this national park.
- Reductions of 15% (average) fuel consumption has been measured, resulting in a reduction of Nox emissions and particulate matter.
- 10% lower decibel output than conventional ships
- Zero diesel fuel consumption, exhaust fumes and reduced vibration during passenger boarding

American Traction Systems

Typical Hybrid Ship Propulsion System

