SECONDARY **ARTICLE: Offshore Wind Energy**

Offshore oil rigs need electricity to run their machinery and provide a safe, comfortable environment for their workers. Platforms can't very well run cable from land-based power plants if they are miles at sea. So, how do these rigs get the electricity they need?

Offshore rigs have generators, most of which are fueled by diesel oil, to provide the electricity needed on the platforms. Some small, unmanned platforms have solar panels to provide electricity, while a few rigs use natural gas from the wells.

Most rigs use diesel fuel, a petroleum product, which is delivered by tankers. The Discoverer Enterprise, a new drillship operated by Transocean Sedco Forex, has a diesel generator which produces 40 megawatts of power—enough electricity to power 40,000 homes—and has 1600 miles of cable and wiring to distribute the electricity. It takes a lot of nonrenewable fuel to keep an oil rig working.

Researchers are developing new technologies to provide electricity offshore. The new **Spar-WARP** wind machine developed by ENECO can produce and store clean, safe electricity offshore in many areas where there is sufficient wind speed. Most offshore areas provide good sites for wind technology. A good land site usually has mean wind speeds of 13 to 17 mph, while typical offshore mean wind speeds range from 15 to 20 mph.

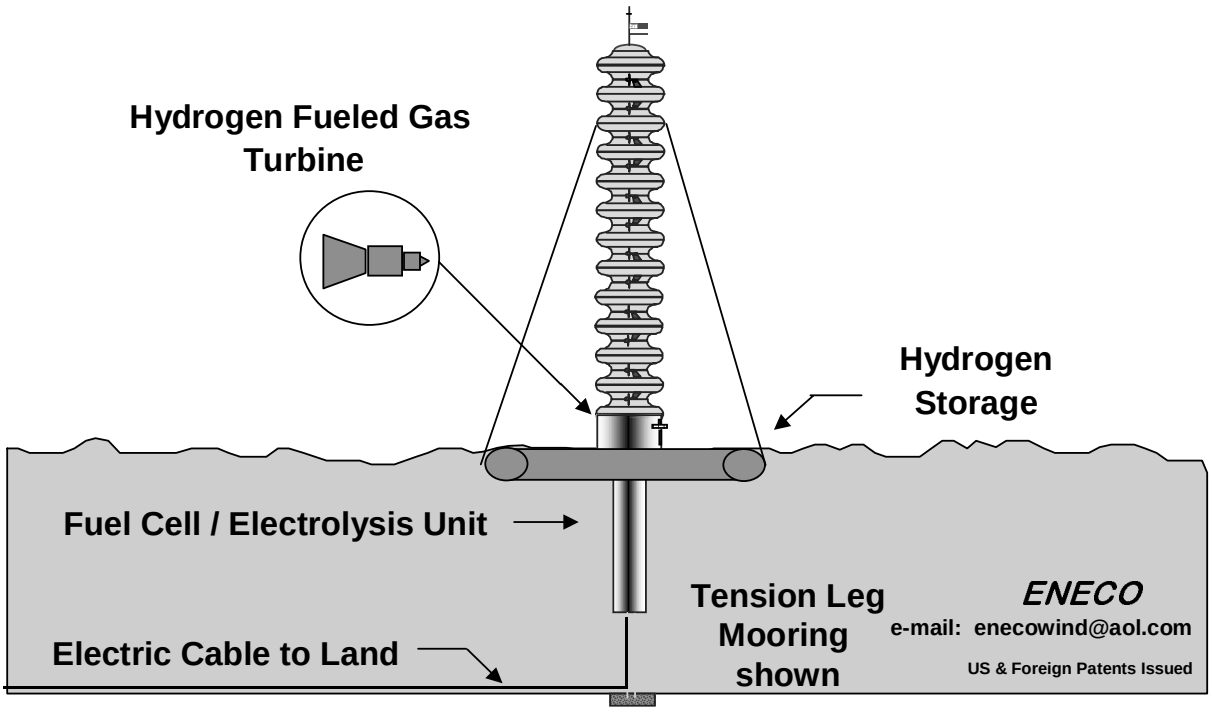
The WARP, which stands for **Wind Amplified Rotor Platform**, is designed to further amplify wind by as much as 50 to 80 percent, and has many advantages for providing electricity in offshore areas. It can be installed in any depth of water—on a foundation in shallow water or on a floating platform tethered to the bottom by cable in deep water.

Its simple modular design is economical and low maintenance, and facilitates easy assembly in shipyards or on site without the need for large rigging. And capacity can be increased by installing additional units. The WARP design also allows for the integration of PV technology and the incorporation of natural gas and fuel cell plants.

There are many potential applications of offshore WARP technology in addition to powering oil platforms. If these wind machines are sited near land, cables can be run to provide electricity to nearby towns. In the diagram below, the Spar-WARP system incorporates a hydrogen fueled gas turbine with the wind technology to provide power onshore.

For more information about new wind energy technology, check out the Offshore Wind Energy Network website at www.owen.org.uk, as well as NEED's ***Secondary Energy Infobook***. For more information on the drillship Discoverer Enterprise, check out www.deepwater.com.

Spar-WARP^{tm} Operating Baseload with Fuel Cells or Hydrogen Fueled Gas Turbines



SECONDARY **ARTICLE: THE SOLAR SAILOR**

The ***Solar Sailor*** is the first sun–and–wind–powered passenger boat in commercial use. Launched in Sydney Harbor in June as a ferry boat, the vessel can carry up to 100 passengers. It uses solar panels on its deck to capture sunlight and has additional panels on solar wings, which can function as sails when they are raised. It also has a battery to store power and a gas-powered engine for emergencies. The 69-foot boat can reach speeds of 15 knots on solar and wind power alone.

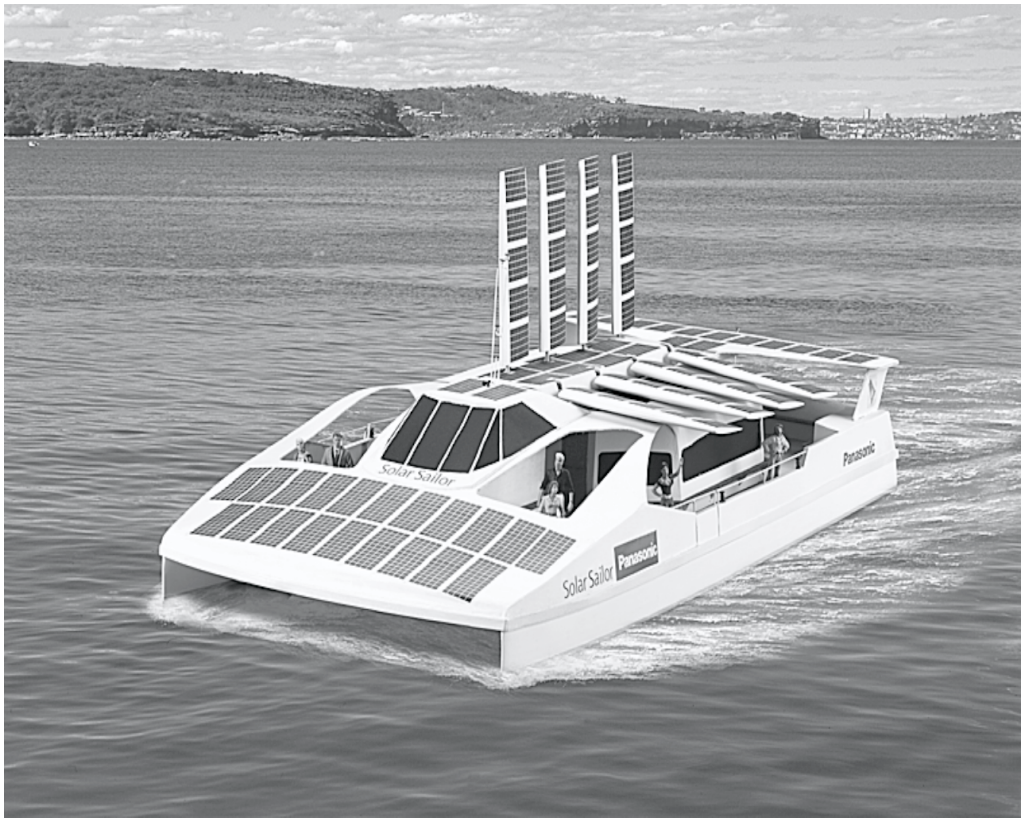
The unique feature of the ***Solar Sailor*** is its revolutionary solar wings. These solar wings are pivotally mounted at the base—like a bird's wings—to allow multi-plane movement to adapt to prevailing wind and sun conditions. The wings can also be reefed (lowered) and furled (raised) from zero to 100 percent, so that the sail area exposed to the wind can be controlled, altering the boat's center of gravity to make it seaworthy in different weather conditions. The wings can be completely reefed, for example, during a storm.

The ***Solar Sailor*** is the brainchild of Dr. Robert Dane, an Australian doctor. In 1996, Dr. Dane attended the annual Advanced Technology Boat Race in Canberra. What he saw that day sparked an idea that led him to sell his medical practice to build a boat that would win the next year's event. Twelve months later, a working prototype, the Marjorie K, used only the energy of the sun and the wind to complete more laps of Lake Burley Griffin than any of its 40 national and international competitors. This prototype achieved a steady boat speed of 6 knots on wind power alone while diverting the solar power into batteries. When power was transferred to the electric outboard motor, the Marjorie K reached speeds of 12–15 knots.

Dr. Dane then set about building a team to make ***Solar Sailor*** commercially viable. With the assistance of people like surfboard maker Bruce Heggie, who helped bring the solar wings to life, and Max Hayward, an ex-British Aerospace employee, Dr. Dane and his team designed and constructed the world's first ***Solar Sailor***. The vessel was awarded the gold medal at the 1999 Asian Innovation Awards and recently won a $1 million grant from the Australian Federal Government. The New South Wales Government also provided $45,000 in funding and included the ***Solar Sailor*** as part of the Australian Technology Showcase.

The ***Solar Sailor*** represents benefits for both passengers and the environment. Under any form of propulsion, the ***Solar Sailor*** creates minimal noise, fumes, vibrations, air pollution, greenhouse gas emissions and no water pollution. Dr. Dane's company believes the design can be used for making any sized vessel, including ocean liners, and plans to build more boats for use in sensitive environmental areas.

For more information on the ***Solar Sailor***, go to www.solarsailor.com.au.



SECONDARY **ARTICLE: MARINE LIFE ON OFFSHORE RIGS**

In the ocean waters off the California coast, there are 27 platforms producing oil and natural gas. These platforms provide an artificial habitat for more than 50 species of algae and invertebrates, many of which have potential uses in medicine and industry through applied biotechnology.

The Minerals Management Service (MMS), the federal agency that manages our nation's offshore resources, has provided grants to the University of California at Santa Barbara (UCSB) and Louisiana State University to investigate the potential uses of the rich marine life growing on and around these oil platforms. Deputy Secretary of the Interior David Hayes stated, "It is no secret that, like the rainforests, the oceans harbor life forms with untold potential for commercial and pharmaceutical uses. For example, compounds from some species of marine invertebrates, like the starfish, already show promise as tumor-fighting agents. From this exciting research, we hope to gain additional insight into the potential of life forms and marine organisms."

The marine life will be investigated for specific compounds with potential wound-healing, anti-inflammation, and anti-cancer activity. A compound from marine coral is currently being used as an implant in the treatment of bone fractures. Compounds from red algae have been discovered that imitate the anti-inflammatory actions of human hormones. One of the marine invertebrates may contain an important drug that can be used in the treatment of leukemia.

Researchers will also study the community and population ecology of the platforms. They will study the factors that affect the resident species, as well as the differences between natural populations and those around the platforms.

The research will analyze marine life around platforms in the Santa Barbara channel and the Gulf of Mexico without disturbing the naturally occurring reef systems. Many organisms, in fact, will be harvested as the platforms are cleaned. In some areas of southern California, mussels are already systematically harvested from oil platforms for human consumption.

Walt Rosenbusch, Director of MMS, explained some of the benefits of the research, "If the man-made offshore oil and gas structures prove to be a viable **substrate** *(an environmental foundation on which organisms live)*, then this type of marine bio-harvesting could significantly lessen the need to harvest organisms from the natural ecosystem. This could help protect the marine habitat as well as provide a sustainable source for beneficial natural products."

For more information on this research, visit the Minerals Management Service website at www.mms.gov or the UCSB website at www.instadv.ucsb.edu.

Divers examine the marine growth on a platform off the coast of southern California.