



Power Generator With Thermo-Differential Modules

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A thermoelectric power generator consists of an oven box and a solar cooker/solar reflector unit. The solar reflector concentrates sunlight into heat and transfers the heat into the oven box via a heat pipe. The oven box unit is surrounded by five thermoelectric modules and is located at the bottom end of the solar reflector. When the heat is pumped into one side of the thermoelectric module and ejected from the opposite side at ambi-

ent temperatures, an electrical current is produced.

Typical temperature accumulation in the solar reflector is approximately 200 °C (392 °F). The heat pipe then transfers heat into the oven box with a loss of about 40 percent. At the ambient temperature of about 20 °C (68 °F), the temperature differential is about 100 °C (180 °F) apart. Each thermoelectric module, generates about 6 watts of power. One oven box with five thermo-

electric modules produces about 30 watts.

The system provides power for unattended instruments in remote areas, such as space colonies and space vehicles, and in polar and other remote regions on Earth.

*This work was done by John R. Saiz of Johnson Space Center and James Nguyen of Jacobs-Sverdrup. Further information is contained in a TSP (see page 1).
MSC-24268-1*

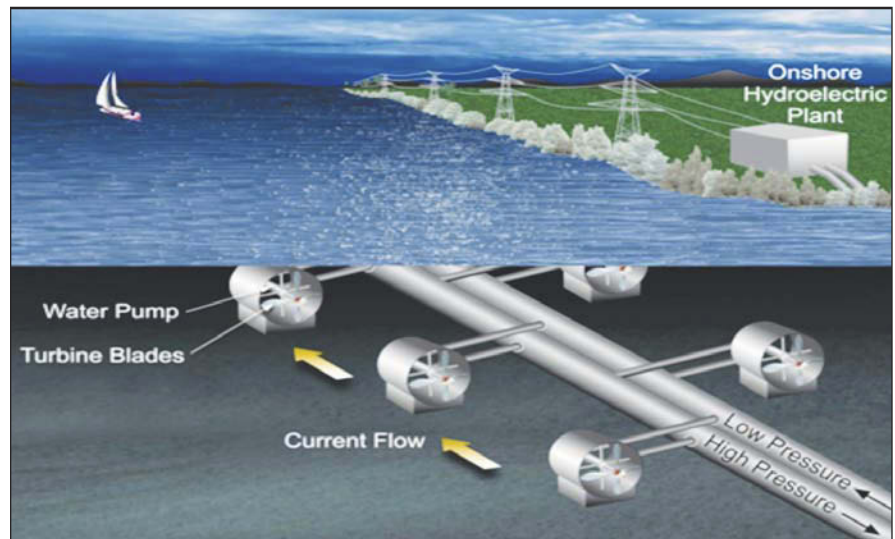
Mechanical Extraction of Power From Ocean Currents and Tides

No electrical equipment would be submerged in the ocean.

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A proposed scheme for generating electric power from rivers and from ocean currents, tides, and waves is intended to offer economic and environmental advantages over prior such schemes, some of which are at various stages of implementation, others of which have not yet advanced beyond the concept stage. This scheme would be less environmentally objectionable than are prior schemes that involve the use of dams to block rivers and tidal flows. This scheme would also not entail the high maintenance costs of other proposed schemes that call for submerged electric generators and cables, which would be subject to degradation by marine growth and corrosion.

A basic power-generation system according to the scheme now proposed would not include any submerged electrical equipment. The submerged portion of the system would include an all-mechanical turbine/pump unit that would superficially resemble a large land-based wind turbine (see figure). The turbine axis would turn slowly as it captured energy from the local river flow, ocean current, tidal flow, or flow from an ocean-wave device. The turbine axis would drive a pump through a gearbox to generate an enclosed flow of water, hydraulic



Turbine Blades Would Intercept Flow in the ocean or other natural body of water. The turbine would drive a pump to obtain a smaller, higher-pressure flow that would be piped to an above-water facility for use in generating electric power.

fluid, or other suitable fluid at a relatively high pressure [typically ≈ 500 psi (≈ 3.4 MPa)].

The pressurized fluid could be piped to an onshore or offshore facility, above the ocean surface, where it would be used to drive a turbine that, in turn, would drive an electric generator. The fluid could be recirculated between the submerged unit and the power-genera-

tion facility in a closed flow system; alternatively, if the fluid were seawater, it could be taken in from the ocean at the submerged turbine/pump unit and discharged back into the ocean from the power-generation facility. Another alternative would be to use the pressurized flow to charge an elevated reservoir or other pumped-storage facility, from whence fluid could later be released to