

C-04: Possibilities in the Trincomalee canyon for the ocean thermal energy conversion plant

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The history of Ocean Thermal Energy Conversion (OTEC) system goes only upto a couple of decades. As in many alternative energy resource experiments, due to various reasons, several attempts failed at first. Anchoring cold water pipe, diameter of the cold water pipe, economic

viability are main reasons for failure of many OTEC proposals. The OTEC power plant at Hawaii (50 kW) and Japan's Saga bay (1000 kW) successfully overcame these problems. India is proposing a 600 MW plant at Lakdiv Island. In Sri Lanka, Trincomalee has the natural conditions for the OTEC plant .

Ocean Thermal Energy Conversion (OTEC) is the most promising energy converting system from the ocean after Tides (Tidal plants). The temperature difference between the upper and lower layers of the water column are utilized, for production of electricity. There should be a temperature fall about 18-20°C Results from the pilot plants situated in various parts of the world are encouraging. The USA, France, UK, China (Taiwan), Japan and India are in this field. Plants with 100MW and 1000MW capacity are planned. Trincomalee with deep as well as steep canyon close to the coastal line gives attractive conditions for the OTEC plant. The Oceanography Division of NARA with German scientists on board Research vessel "Sonne" carried out some experiments in the canyon in January '94.

There are various methods of measuring physical parameters of ocean water. The Research vessel (RV) "Sonne" used "Rosette" (Equipment complex which could measure physical properties of the ocean water). The Rosette is connected by heavy duty winch to the ship. The Rosette consists of 18 or 36 vertical 10 l pylon bottles. These bottles were connected to the heavy iron frame. Besides that there are several equipment connected to the iron frame such as Acoustic Doppler current meter (ADCP - velocity measuring equipment), CTDS (Conductivity, Temperature, Density and Salinity measuring equipment). These equipment will transmit data to the main laboratory and will be displayed on the computer When the vessel arrives at the particular position, the rosette will be released to the sea. On the way to the sea bottom the CTDS will transmit conductivity, temperature, salinity values of the water column to the main laboratory. At the sea bed rosette will stop and start to come up. On the way, at selected depths it will stop and collect water samples. On the deck it will collect water samples from the pylons for various purposes. Some water samples will be analysed in the laboratories on board. The results displayed in the computer will be calibrated. From this method real temperature profiles in the particular water column could be obtained. Temperature profiles will be prepared in every station. Using the profiles temperature variation graphs along the vessel track will be made.

The main applicability for the OTEC plant is temperature difference in the water column. The last station of the RV Sonne cruise was one of the deepest places in the Trincomalee canyon (Longitude 81 17.43 E. Latitude 8 36.1 N). The results of the salinity, temperature and O₂ variations are shown below. the temperature difference at the canyon is around 22°C.

One of the best places for the OTEC power plant in the world is Trincomalee canyon. This was declared by the International scientists in Ocean energy field. The results show that the primary conditions for the OTEC site is available here. Continuation of research in Trincomalee canyon is very essential not only temperature but current patterns, sea bottom morphology, biological parameters and many other Oceanographic factors as well as economic analysis. This will help to have valuable database by the time commercial OTEC plants are available in the market.

