

Solar Organic Rankine Cycle

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In the present scenario of huge demand for energy and economy necessitates development of various energy resources either, conventional or nonconventional. Despite the rapid depletion of fossil fuel across the world, billions of people are yet devoid of the comfort offered by electricity. If the consumption of fossil fuel continues at the current rate, the future generation is bound to suffer from the acute shortage. The associated global warming and ozone layer depletion caused due to intensive application of fossil fuels forces us to look for solar based systems. One such system is an Organic Rankine Cycle (ORC) plant which is modular and scalable. It can be easily transported, assembled and commissioned rapidly at site, may it be in small industrial units or “micro-grids” for remote and isolated areas. The heat-energy converter of the ORC plant is a hermetically sealed unit with a few moving parts. This technology now turns out to be proven and available to all. The plant requires no operator; the maintenance cost is negligible over long periods, and the unit can be operated and monitored remotely. The design, technologies and materials proposed to be used are largely indigenous and it acquires a significant improvement over the traditional units used earlier for large plants, thus it provides acceptable performance at low capital cost. The solar energy available for almost 295 days a year in India is utilized by an array of sun-tracking parabolic-trough collectors. The functionality and performance of such newly developed low-temperature ORC unit comprising of helical coil solar cavity receiver based parabolic trough concentrator (PTC) was investigated at CERD, Mechanical Engineering, IIT(BHU), Varanasi. The PTC comprised of blackened helical coil made up of two concentric borosilicate glass cylinder with vacuum in annulus was kept at focal line that maximized the conversion of energy received from sun into useful heat and eventually electricity.

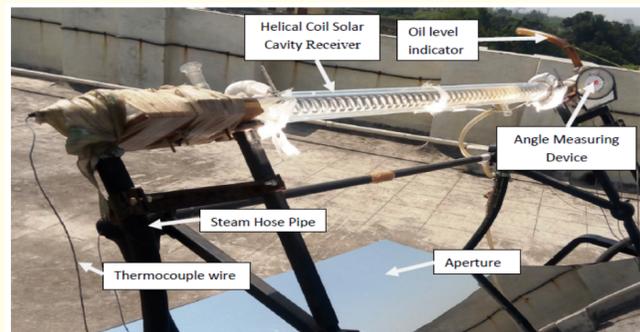


Figure 1: Line concentrating helical coil solar cavity receiver at CERD, Mechanical Engg. IIT (BHU), Varanasi.

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