

Lunar Thermoelectric Power System

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According to the objectives of the workshop, this paper deals with the use of nuclear technology for power generation in space, which is one of the key technologies needed for the space exploration and mainly for resources exploitation. This technology is a mean for achieving some of scenarios of space exploration and exploitation: energy supply is necessary from several Watts to several hundred of kWatts, for instruments supply, drilling, moving, production of materials, life support...

Technicatome is the designer and prime contractor for the on-board nuclear reactors used for submarine propulsion of the French Navy. French attack nuclear submarines are the smallest in the world. Then a compact technology has been developed to meet the requirements. Experience of this technology is acquired since ten years, and about ten reactors of this type are in operation.

This paper will give an overview of the design and critical technologies related to the spin-on of this kind of system for power production in the frame of space application. But the problematic is not limited to the technical feasibility. Everybody agree that if the nuclear has great advantages (1g of Uranium gives as much energy than 5 tons of oil fuel), this technology have to deal with the nuclear safety aspects. The safety, i.e. the non-dispersion of radioactive material, must be guaranteed from the assembly of the system to its end of life. This will include the launch, the space transport to the operation site, and the operation during its life span.