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Nuclear Power Sources for Space Exploration: Status and Prospective in Europe

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ABSTRACT

Following the Preparatory Phase of the Aurora Space Exploration Programme, started in 2001, ESA will submit a proposal for a fully fledged European Space Exploration Programme at its next Council at Ministerial level. This will confirm the involvement of Europe in an ambitious programme of robotic and human exploration of Moon and Mars.

Among the several technological challenges posed by space exploration, power generation, be it for propulsion, mobility or for stationary purposes to support planetary bases, is one of the greatest. The United States and Russia have developed and used nuclear power sources for space for about 40 years and they actively work on further developments. Europe used nuclear power sources twice on collaborative space missions and is currently in the process of elaborating a coherent long-term approach to development and use of nuclear power sources for space science and exploration.

The paper addresses the role of nuclear power sources for space exploration applications and current state of art and on going technology development.

Subsequently it will present the current European capabilities in nuclear technology relevant for space use.

The paper will also address the implications of Europe's current dependency on its partners for the development, provision and launch of nuclear power sources for space exploration. Moreoever it will reflect on the legal and societal aspects peculiar to Europe concerning the use of nuclear power in space exploration missions.