

Complementarity between Solar and Nuclear Energy

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Abstract

India faces a major challenge in providing a long-term energy security needed for meeting the aspirations of her growing population and, at the same time, in fulfilling her commitments for preventing generation of greenhouse gases. Use of non-fossil energy sources is the solution. There is a need for making a right balance of generation of energy from sources such as solar and wind which are, by nature, distributed and intermittent and from nuclear which is concentrated and continuous. It will be highlighted in this presentation how the solar and nuclear energy – the two primary energy sources can complement each other in supplying energy in a sustainable manner. The combination of a high solar insolation in a large part of our country and the huge thorium reserve has the potential for making the country self-sufficient in energy supply. Though the country has made an impressive growth in the installed capacity of solar photo voltaic power generation, the techno-commercial viability of solar thermal has not been proved as yet. The latter has the potential for producing heat at high temperatures, as in the case of a high temperature nuclear reactor. There are some commonalities in the heat extraction and energy conversion technologies which can be deployed in both nuclear and solar. The coupling of the sulphur-iodine process and high temperature steam electrolysis for breaking water molecules into hydrogen and

oxygen, both technologies being suitable for achieving a very high energy conversion efficiency, with high temperature nuclear or solar energy sources can lead to a large-scale production of hydrogen, the environmentally benign fuel for the transport sector in the future. Some futuristic aspects of nuclear energy such as accelerator driven systems and the possibility of energy evolution from artificially created unstable nuclei will be briefly deliberated.