

Feasibility Study of a Pilot Scale Molten Salt Reactor Demonstration

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Energy Process Developments Ltd was awarded a grant by Innovate UK in July 2014 to undertake a year-long project to determine the feasibility of developing a pilot scale molten salt reactor in the UK. The study looked at six current available proposed MSR configurations and proposed the immediate next steps for design and build of a chosen demonstrator reactor project. Tremendous knowledge growth in the 60 years of the first nuclear era has not seen substantial advances in nuclear fission technology much beyond the Pressurised Water Reactor, initially a hastily adopted device for military and civil applications, and essentially comprising water cooling of solid fuel elements. The imminent second nuclear era requires introduction of inherently more efficient, safer, cheaper, nuclear power obtainable with liquid-fuelled - namely Molten Salt Reactor (MSR) technology - the best out of the six Gen IV options. This Gen IV option, when considered in 2002, was believed to be decades away from readiness. This study reviews more recent work. The evidence is that the MSR is ready now. In the immediate urgency of the present, this liquid-fuelled reactor technology can be seen as highly innovative, necessary and rewarding. It is ready to form a key part of any affordable policy proposals for the UK energy supply. This feasibility study is seen as the first step towards full scale implementation of the technology. MSRs are passively safe, operate at atmospheric pressure, at higher efficiencies than PWRs and can be load following. Thorium is the ultimate fuel of choice which can provide the world with a near limitless supply of energy. A demonstration reactor will show the media, public and investors that this technology exists as a clean source of cheap sustainable power. The project reviewed the status of all MSR activity internationally, the regulatory regime in the UK and potential sites. Nuclear insurers were consulted on their insurability and the outlook of an energy economist is discussed. The six designs shortlisted for further review were by Terrestrial Energy, ThorCON, Moltex Energy, Transatomic Power, Flibe Energy and Seaborg Technologies ranging from fast to thermal, breeder to non-breeder and single to two fluid designs. The Stable Salt Reactor from Moltex Energy was selected as most suitable for UK prototype development. See www.EnergyProcessDevelopments.com for the full report on the study.

Mr. Rory O'Sullivan

Mr. Rory obtained a 1st class honours in Mechanical and Manufacturing Engineering from Trinity College Dublin. As this was a double degree programme, part of his studies were carried out in France at l'INSA de Lyon. Dismayed by the stagnant nuclear industry, he started his career with the Bouygues group, an international construction company working in several sectors. His first years there, were as mechanical design engineer, with his most recent role as project manager on the first phase of a £700m redevelopment scheme in East London. Obtaining chartership with the Institute of Mechanical Engineers, he has since been a finalist for the Duke of Gloucester's Young Achiever Award and the Energy Institute's Young Energy Professional Award. His interest in the innovative nuclear sector has kept him up to speed with new technologies since 2008. The discovery of MSRs led him to be a co-founder of EPD in 2013 where he was Project Manager for this feasibility study.

