Enabling Load Following Capability in the Transatomic Power MSR

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SUMMARY FOR PUBLIC RELEASE

Molten Salt Reactor (MSR) designs promise exceptional passive safety, fuel utilization and sustainability. However, cost-competitiveness of such innovative designs in the current domestic energy market may only be feasible with load-following operation. This work will design a fuel processing system that enables liquid-fueled MSRs to load-follow. The Transatomic Power (TAP) will serve as a prototype. Nuclear engineering experts at the University of Illinois will work on both experiments and simulations to characterize fission gas removal for load-following capability and to establish a feasible system design for molten salt fuel reprocessing. This work will achieve the program objectives of the FOA since the fuel salt processing system underpins the safety, commercial viability, and cost-competitiveness of this advanced reactor concept. Three core tasks of this effort are based on modeling and simulation of the individual and coupled physics impacting the system design. A fourth task will conduct targeted experiments to alleviate knowledge gaps in available salt processing data. This work additionally has the potential to dramatically impact the ARPA-E mission areas: By enabling load following operation, this innovation will improve the stability and market responsiveness of the electric grid which contributes directly to Economic and Energy Security. Since the fuel processing scheme is central to the safeguardability of the proposed design, it minimizes proliferation risk and enhances National Security. Finally, by establishing a feasible design for the fuel processing system, this work promises to boost United States Technological Leadership in MSR innovation and deployment.