Fleet Deployment Models for Standardized New Nuclear Deployments

Executive Summary

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Revision Table

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Executive Summary

As the world faces increasing demand for clean reliable energy, the interest in deployment of new nuclear power (NNP) projects is increasing. This is in large part due to the emergence and convergence of multiple priorities. These include the need for dispatchable, reliable and resilient electricity to power the rapid growth and electrification of a data-driven society, the need for greater energy independence and security, and commitments to decarbonize. Nuclear energy sits at the nexus of these forces, creating the need and opportunity for a large build-out of new, relatively standardized NNP projects to meet national and international goals.

A large build-out of standardized nuclear power plants creates an opportunity for the development and utilization of fleet operations models that realize greater effectiveness, efficiency, and cost savings over models utilized in the existing nuclear power plant fleet. This paper focuses on providing future owners/operators of NNP fleets with a framework as well as key considerations for the development of fleet operations models to capture those benefits. To realize these benefits, future fleet operations models will be built on standardization, centralization, and collaboration as the three primary pillars underpinning the framework. Each is critical to developing and utilizing a fleet operations model that is effective, efficient, and suitable for the owners/operators of NNP fleets.

While the specific applications and utilizations of nuclear fleets may differ, the considerations and the framework in this paper may be used to develop a fleet operations model that best works for the owners/operators and other stakeholders of a specific fleet. There exists no definitive fleet operations model that can account for every variable between different owners, operators, and technologies. Rather, the framework contained within this paper must be applied and the specific owners/operators must set priorities and make decisions regarding the operations model that best fits their fleet use case. Early discussion and alignment of business needs and objectives is crucial to ensure that stakeholders develop a fleet operations model that is based upon their strengths and capabilities, complementing their existing structures, and to meet their individual business objectives and needs. Without this alignment on use case, needs, and objectives, competing interests and differing priorities can cause these new nuclear generation units to not fully achieve their potential, and potentially be uneconomical individually.

The detailed design of a fleet operations model will require evaluation of tradeoffs related to individual site agility, overall fleet efficiency, risk, size, geography, and many other factors. Each of these considerations should be weighed against the goals and needs of the owners/operators of the NNP fleet. The results will affect the scope, decision-making, division of responsibilities, and business practices of the fleet.

As future owners/operators assess their need for energy, the potential for Multi-Corporate Fleets (MCF), typically built around a common nuclear technology, creates additional opportunities for fleet deployment. Arrangements such as joint ventures between stakeholders could allow for fleet operations models that encompass multiple organizations working together to further leverage each other and to raise efficiency. Each owner/operator has the opportunity to capture the benefits of a large, standardized fleet without requiring each owner/operator to make a large capital investment to develop their own fleet of many units.