Abstract

The Economics of Small Modular Reactors at Coal Sites: A Program Level Analysis Within the State of Texas

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Interest in Small Modular nuclear Reactors (SMR) has grown rapidly in recent years as the world searches for large scale, zero or low-carbon energy sources that can replace fossil fuels. In this analysis we will examine the economic costs and benefits of building dozens of SMRs on recently retired coal power plant (CPP) sites across Texas to determine the viability of a grid or "program-level" approach to nuclear power plant (NPP) planning in the United States. Previous studies have indicated that utilizing stranded infrastructure assets at retired CPPs, known as the "coal-to-nuclear" (C2N) transition, could greatly reduce the amount of time and capital required to build just a single commercial SMR NPP. A discounted cash flow (DCF) analysis was created using data from regional electricity markets, C2N studies, and other industry sources to measure the potential value of SMR projects. The analysis includes multiple scenarios to account for varying project sizes, changes in technology learning rates, and recently implemented energy tax credits. Results indicate that changing the rate of learning has a noticeable effect on the Levelized Cost of Electricity (LCOE) up until a certain point, after which both the learning rate and LCOE plateau. When using the same learning rate for all plant size scenarios, the LCOE remains the same, meaning there is no additional economic benefit to building 84 reactors anymore than there is 12

reactors. However, the project net present value does change drastically as the number of reactors increases, regardless of learning rates or tax credits, implying that the most financially attractive scenario will likely be the one with the highest number of reactors built.

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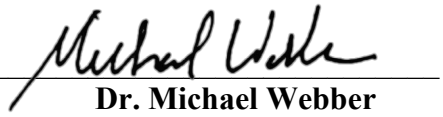
Supervisor: 
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