Nuclear Energy University Program

U.S. Department of Energy

Paths Forward for Nuclear Energy: Using a Nationwide Post-Stratified Hierarchical Model to Facilitate Matching of New Nuclear Technologies to Receptive Host Communities

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ABSTRACT:

Scope, Objectives, Description, and Methods: Development and deployment of new nuclear energy sources is a vital component of efforts to achieve a sustainable, clean and secure energy system in the US. A critical factor enabling success in efforts to demonstrate and deploy the needed facilities – ranging from new reactors to waste storage and disposal facilities – is the level of public support and acceptance from residents of potential host communities. Variations in acceptance can substantially affect the costs and regulatory challenges faced by developers, and good data on those costs can be vital for success. With that in mind, we will leverage the largest existing database on American nuclear attitudes to develop a model that permits assessment of baseline acceptance for new facility or reactor siting at local spatial scales across the US. The model will employ multilevel regression and post-stratification (MRP), which combines the best features of both data disaggregation and simulation techniques. Using the result of the MRP model, we will identify potential technology matches that meet specific needs for communities to consider, and estimate variations (at the county-level) in public acceptance of efforts to site new nuclear facilities. The resulting validated model will provide a systematic basis for developers to evaluate public acceptance across alternative siting options. This will be a critical component for weighing benefit-cost tradeoffs for alternative paths to deploy new nuclear facilities, and will provide a novel, strong supplement to more traditional economic or infrastructure analysis approaches.

Outcomes and Potential Impact of the Project: The *outcomes* of the project will be: 1) a first-of-its-kind model, using extensive data and advanced MRP modeling techniques, that provides local-area estimates of public support for hosting advanced nuclear reactors and other nuclear facilities; 2) a web-based tool and consulting assistance through the University of Michigan's new nuclear innovation center. The *impacts* will be reduced costs and uncertainty for entrepreneurs and developers of new nuclear reactors (and other facilities) as they seek potential host sites for those facilities.

Project Plan, Tasks, and Deliverables: The tasks and associated deliverables are as follows:

Stage	Task Description	Deliverable
Stage 1	Conceptual model design and data aggregation	
Stage 2	Model development; initial local-scale estimations	
Stage 3	New data integration, model testing, validation/calibration	Model estimation/validation report
Stage 4	Integrate model results with US county map, and test that the map returns correct estimates of local public support	Submit article for peer review
Stage 5	Design of web portal, and initial website development	Web tool development report
Stage 6	Website testing, feedback and final updates	