TEX-GRID is a consortium comprised of researchers from diverse fields, working together with builders, utilities, politicians, and citizens, to provide quantitative and qualitative solutions to the technical, political, and social challenges associated with delivering resilient, affordable, and clean power to Texas.

We will accomplish this objective with a multi-disciplinary research effort targeted at:

- Evaluation of the energy system in Texas to assess reliability and resilience critical points that can be addressed with introduction of new nuclear capacity.
- Optimizing capacity and siting of new generation
- Accurately estimating first-of-a-kind and nth-of-a-kind construction costs
- Quantifying the most effective strategies for building political and social capital
- Investigating and building a strong business case for nuclear power expansion in Texas
- Maximizing public benefit to the people of Texas

Project Scope

The project will consist of research in 5 distinct, but interrelated areas. Researchers will consistently work with public and private sector stakeholders at all stages to create actionable solutions that enable them to create a power grid that is reliable, cleaner, cheaper, and more resilient.

Grid-Scale modeling

A working model of electricity generation in Texas will be constructed, and used to optimize generation mixes for a variety of realistic scenarios. The model will be based on prior work by Co-PI Liebowicz and colleagues[1]. For this work, the model will be used to simulate the introduction of new generation into the Texas grid. Parameters will be adjusted and optimized to simultaneously:

- Inform design decisions by builders
- Provide market research for deployment

- Generate social capital for political support

Geographic and Geological Analysis

Building new nuclear power involves more than simply meeting demand while minimizing cost. Political, social, environmental, and economic factors exert influence on the allocation of land for generation, and an optimized model must account for these forces. The TEX-GRID project will incorporate geographic data science to inform decision making models to:

- Identify communities where the political climate is most receptive to nuclear generation
- Identify and evaluate conditions and business cases to facilitate additions at the Comanche Peak and South Texas Project (STP) sites.
- Identify grid and siting scenarios involving construction of new nuclear capacity on sites in addition to Comanche Peak and STP.
- Assess supply chain and utility considerations that would both facilitate and challenge new nuclear.
- Anticipate and alleviate potential environmental-justice issues that may arise.

Policy Analysis

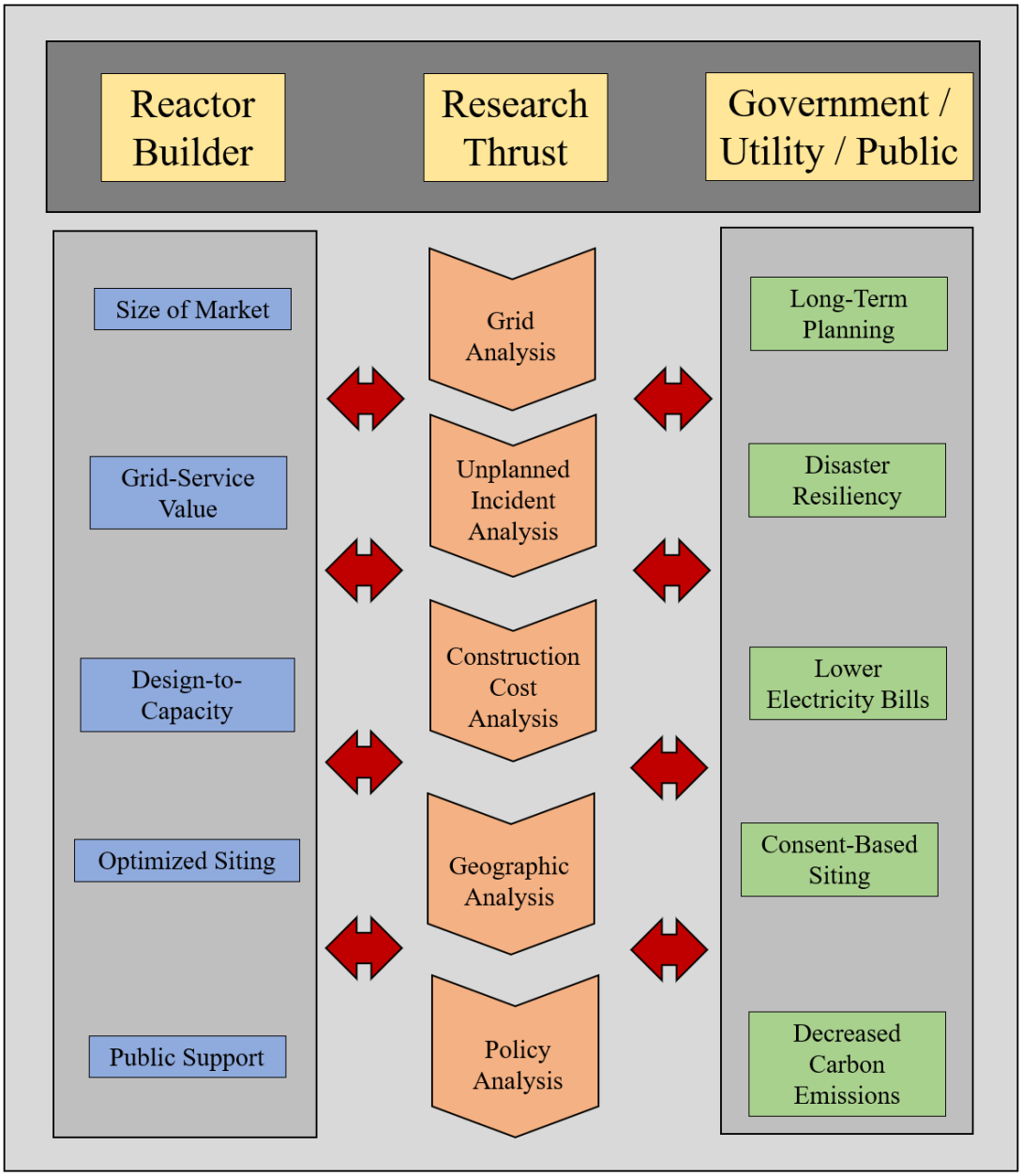
Siting new generation inherently involves political involvement at the local and state levels. For this task, the local political climate will be surveyed to determine the most effective policy levers for gaining the popular support needed to achieve sufficient enthusiasm for new nuclear generation. The problem will be approached with a combination of public opinion polling and data science. An effective combination of these techniques will be used to produce a "sensitivity analysis", showing how actors in the public sphere can most effectively earn public support for nuclear power by identifying the talking points and constituencies that have the best correlation with shifts in support for nuclear power.

Construction Cost Analysis

To predict construction costs for new generation, economic models will be built that incorporate materials, labor, and all "soft costs" associated with plant siting, licensing, construction, operation, and decommissioning. The team will survey available tools for this analysis to determine the most appropriate. Plant builders may share as many specifics of their design as they choose, balancing confidentiality of their intellectual property with accuracy of the model. The construction data will be used both for developers' and utilities' projections, to aid in the forecasting of a power grid that is profitable for producers and cost-effective for consumers. The energy grid specifics in Texas will be accounted for to identify locations with the most favorable conditions.

Disaster Resiliency

A key benefit of the integrating nuclear power into the grid is resiliency against unplanned weather events, societal unrest, or other disasters. A comprehensive effort aimed at discovering vulnerabilities in the grid will be used to create solutions that add to grid dependability with minimal social and economic impact. Severe weather events will be modeled using industry-standard techniques, and models with and without nuclear power will be compared to show the benefit of nuclear generation. These studies will be focused on the current energy mix in Texas and energy grid conditions and expanding to potential emerging scenarios involving fossil fuels, renewables and nuclear.



Others have made grid models with externalities before. How is this different?

The TEX-GRID project is more than a research project – it is a consortium connecting researchers with developers and constituents. By directly engaging real-world stakeholders, and by connecting industrial and political partners, the TEX-GRID project will provide targeted tools and actionable knowledge specific to our partners' needs.

Team

Stephen Raiman (Lead PI)	TAMU	Project management
Pavel Tsvetkov	TAMU	Technoeconomic analysis
Lee Peddicord	TAMU	Utility Integration
Ben Liebowicz	UT	Grid-Scale Modeling
George Allen	TAMU	Hydrology
Zhe Zhang	TAMU	Disaster Management
TBD		Public Opinion Polling and Analysis

Outcomes

For Developers

- Key design inputs for developers of new generation, optimized for the technical, social, political, and environmental forces in Texas. These inputs can be used to for setting targets during design stages, and for optimizing capacity.
- Quantitative data showing benefits of new generation on electricity cost, carbon emissions, and grid resiliency. These data can be used to build political support and social capital with diverse constituencies within Texas, in an effort to create a political climate friendly toward new nuclear generation.

For Utilities

- Pathways to improved resiliency against extreme weather events and natural disasters
- Lowest-cost pathways for possible future scenarios, such as clean energy portfolios, or carbon fees

For the Public

- Comprehensive data showing how adding low-carbon generation to meet Texas' climate obligations without high costs and without sacrificing grid dependability

- Potential economic boosts including job creation and increased tax revenues for communities that want them, and are friendly toward siting of new nuclear generation