

## [GMLC] Power Planning for Alignment of Climate and Energy Systems (PACES)

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**Timeline:** FY2024 – present

### **Challenge:**

There is a growing need to enhance our understanding and management of climate change's impact on the energy sector. Solutions that integrate advanced analysis capabilities into planning and risk management tools are needed to address both immediate and long-term effects of climate change.

### **Technical Approach:**

The project will produce analysis capabilities to integrate acute and chronic effects of climate change across a suite of planning and risk management tools for the energy sector. Key components of the PACES project include:

*Methodology Enhancement:* PACES will build upon established methodologies, focusing on refining climate data downscaling, wind and solar power generation modeling, capacity expansion scenario analysis, system operational analysis, and hydrology and hydropower modeling.

*Comparative Analysis:* PACES will compare various methods for climate analysis, including downscaling using generative machine learning and dynamical downscaling, as well as hydrology and hydropower modeling. Power system analysis will be conducted using state-of-the-art tools available within the DOE and National Lab Complex, such as ReEDS, Sienna, and PRAS models.

*Strategic Outputs (LANL focus):* PACES aims to deliver valuable outcomes, including well-calibrated climate change datasets, an extended Sienna model incorporating energy justice concepts in capacity expansion decisions, and the application of decision-making under deep uncertainty framework to power system planning in the face of climate uncertainty.

The project will comprehensively address climate stresses on the energy system, considering changes in wind, solar, and hydro resources, the impact of extreme weather on energy demand, and the intersection of acute climate hazards with renewable energy siting and transmission. Furthermore, it will assess changes in precipitation, hydropower, and water availability for thermal cooling.

### **Impact:**

The team anticipates providing high-quality analyses with actionable insights to answer critical questions about climate change's impact on the energy sector. This effort aligns with Los Alamos National Laboratory's commitment to advancing sustainability and resilience in the face of evolving climate challenges. The project also strengthens collaborative partnerships with researchers from NREL and ORNL, as well as industry and university partners such as Tennessee Valley Authority, Southern Company, EPRI, the City University of New York, Evolved Energy Research, Colorado State University, and UCONN School of Engineering.