Advanced power and energy system pnnl

As equity and energy justice concepts are starting to guide important changes in energy system planning, policy, and regulation, it"s important to define the structural role of the electricity grid in this transformation and prepare a new generation of analytical models and industry guidelines.

A sparkling technology and more to come In 2014, PNNL scientists finished developing the Solar Thermal Advanced Reactor System (STARS). This system converts natural gas and sunlight into a more energy-rich fuel, called syngas, which power plants can burn to make electricity.

The interconnected nature of energy-water systems raises the possibility of cascading failures, increasing complexity and risks. ... and modeling, focusing on integrated water-power systems. Second, to understand how resilience and planning are being applied in practice, we interviewed utilities and organized, curated, and synthesized the ...

Modeling experts at Pacific Northwest National Laboratory (PNNL) offer an assortment of grid modeling and simulation tools and capabilities to meet the demands of a rapidly changing energy industry. These offerings help large building owners and energy suppliers confront such forces as global warming, potential power system disruptions ...

Pacific Northwest National Laboratory PO Box 999 Richland, WA 99352 (509) 375-3975 ... His other research interests include plug-in electric vehicles, distributed control, production cost modeling, advanced grid analytics, and hybrid energy systems. ... In 9th IFAC Symposium on Control of Power and Energy Systems (CPES 2015), December 9-11 ...

Pacific Northwest National Laboratory (PNNL) is enabling grid resilience and supporting the clean energy transition by leveraging decades of experience in climate, energy, and Earth system modeling and research. Capabilities in advanced modeling, high-performance computing, and the power grid provide critical insights to complex multiscale interactions in a rapidly changing ...

Opportunities for Wave Energy in Bulk Power System Operations. Applied Energy 352. ... OCTOBER 18, 2024. Article. Projects Drive Grid-Enhancing Analytics for Smarter Operations . Read. OCTOBER 12, 2024. Report. Advanced Measurements for Resilient Integration of Inverter-Based Resources: PROGRESS MATRIX Final Report ... Pacific ...

Measurements have been an essential part of managing the electric power system from the beginning. Surprisingly, today"s measurements are not always particularly trustworthy. ... Limitations in Advanced Measurement Systems: An Overview for Power Systems Richland, WA: ... Pacific Northwest National Laboratory (PNNL) is managed and operated by ...

Pacific Northwest National Laboratory"s (PNNL) distributed wind research is funded by the Department of Energy"s Wind Energy Technologies Office (WETO), which supports the goal of advancing wind energy technology to contribute maximum societal, economic, and power system benefits. PNNL"s team of distributed wind researchers spans a range ...

RICHLAND, Wash.--If all the high-voltage transmission currently under construction and in advanced stages of permitting is built by 2030 in the Western United States--enabling the construction of new renewable energy projects--carbon dioxide emissions in the Western United States would drop by 73 percent compared to 2005.

With more than three decades of experience in building energy research, PNNL is central to the nation"s efforts to improve the energy efficiency of homes and buildings while making them more comfortable. Our research teams have delivered energy savings via building energy codes, by supporting dramatic acceleration of highly efficient solid-state lighting products, and by ...

About PNNL. Pacific Northwest National Laboratory draws on its distinguishing strengths in chemistry, Earth sciences, biology and data science to advance scientific knowledge and address challenges in sustainable energy and national security.Founded in 1965, PNNL is operated by Battelle for the Department of Energy"s Office of Science, which is the single ...

When the power grid heats up, buildings could help the energy system chill out. The Thermal Energy Storage System (TESS) at Pacific Northwest National Laboratory () is a testing resource that helps researchers better understand how building cooling methods can become contributors to energy efficiency and improved grid operations.Research conducted in TESS also could ...

Research. The Institute combines complementary expertise from PNNL and WSU in the fields of advanced grid modeling, wide-area measurements, demand response, energy storage, grid architecture, cybersecurity, and power system reliability research.

PNNL is hiring a Senior Energy Systems Analyst in Richland, Washington. Review all of the job details and apply today! ... analyzing, and implementing solutions to challenges and risks associated with advanced nuclear power production. Working in collaboration with senior engineers, scientists, and project managers the successful candidate will ...

Transactive systems can coordinate distributed energy resources (DERs), ... America"s efforts to create a carbon-free power sector by 2035 will require modernization of the biggest machine on Earth--the electric power grid. ... Pacific Northwest National Laboratory (PNNL) is managed and operated by Battelle for the Department of Energy

Some of the findings are: o Point-on-wave technology adds new capability to the existing suite of

measurements, and could allow for improved operation and protection o Power quality analysis has historically been concerned with assessment of how non-sinusoidal the delivered voltage shows promise in signature recognition, a departure from ...

Energy System Modeling; Transmission; Distribution; Energy Efficiency. Appliance and Equipment Standards; ... PNNL researchers have developed technologies that are advancing the safe, reliable, and efficient production of power from renewable resources, such as geothermal, hydropower, marine hydrokinetics, solar, and wind. Inventions range from ...

But the world is increasingly seeking to add renewable sources of power into the generating mix. These renewable resources have traditionally included hydropower, terrestrial wind, and solar photovoltaic, and we envision newer resources--such as marine energy, wind energy, and geothermal--enabling a sustainable energy future for our nation.

PNNL is known worldwide for effectively field-deploying international nuclear materials safeguards, nuclear and radiological security, and complex radiation detection systems. PNNL is also known for leadership in integrated building energy technologies, including advancing solid-state lighting, advanced building control, and building-grid ...

Richland, WA: Pacific Northwest National Laboratory. WECC Wide-Area Oscillation Assessment and Trending Study Report; 2021. Follum J.D., J.T. Holzer, and P.V. Etingov. 2021. "A Statistics-Based Threshold for the RMS-Energy Oscillation Detector." International Journal of Electrical Power & Energy Systems 128. PNNL-SA-155196. doi:10.1016/j.ijepes ...

PNNL is inventing systems to turn buildings from passive users of energy into active participants in the power system, making the buildings we work in work for us. We"re researching how buildings can adapt to changes in weather, adjust for time of day, and respond positively to the natural environment, evolving grid conditions, and dynamic ...

An ultra-large scale power system control/coordination architecture - a macro architecture for grid control that can solve the problems inherent in the power grid"s evolutionary path is needed ...

PNNL-30757 . Advanced Power Systems Measurements . A Literature Review . December 2020 : Jim Follum Emily Ellwein ... Department of Energy, and Dr. Guohui Yuan, of the Department of Energy"s Solar Energy ... a small team at the Pacific Northwest National Laboratory (PNNL) began a project

PNNL"s Vision Statement for Equity in the Power Grid. Drawing from a wealth of interdisciplinary research in grid modernization, PNNL is spearheading an effort to advance equity and energy justice through the role of scientific research with the goal of building an advanced national power grid, transitioning to clean reliable energy, and designing smart buildings that are more just and ...

Artificial intelligence (AI) has the power to transform nearly all aspects of daily life--from accelerating scientific research through autonomous experimentation to increasing protection from chemical threats. As noted in a recent Department of Energy (DOE) report, Advanced Research Directions on AI for Energy, the energy sector provides an enormous ...

These systems interact with the grid but also readily tap on-site renewable resources and energy storage to meet system power needs. Other advanced building controls research makes buildings more efficient and more capable of enabling virtual energy storage strategies.

A new report by Pacific Northwest National Laboratory and the National Renewable Energy Laboratory identifies a path forward for hydropower research and strategies to resolve gaps in power system modeling for hydropower. The report is based on gaps identified during a workshop held in 2019.