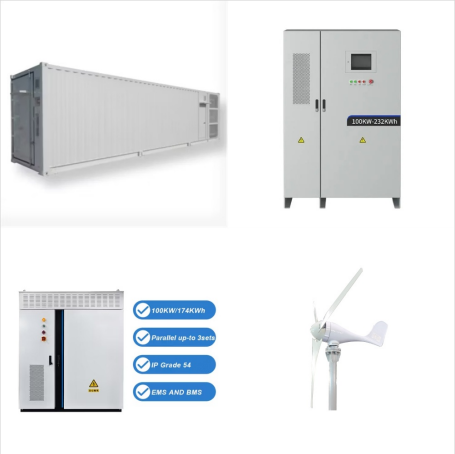
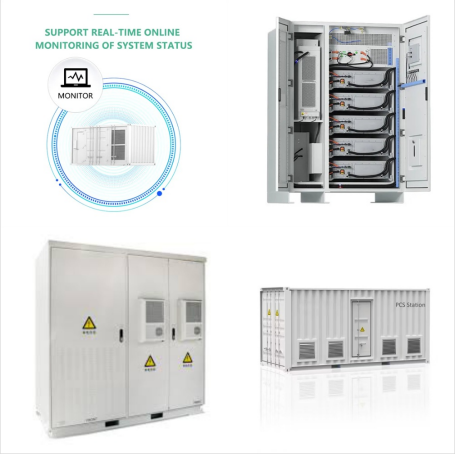
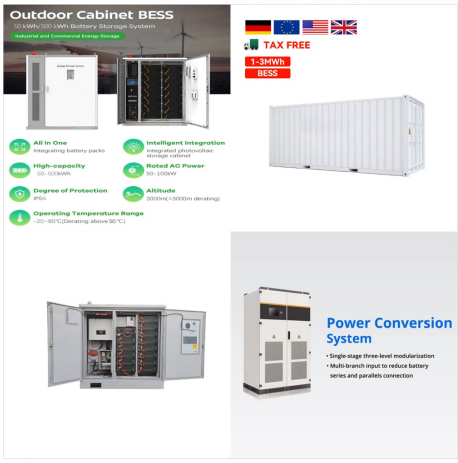


On the long-term pathway towards climate mitigation, power system resilience ??? the ability of a power system to withstand and recover from high-impact low-probability hazards 7 ??? is undergoing

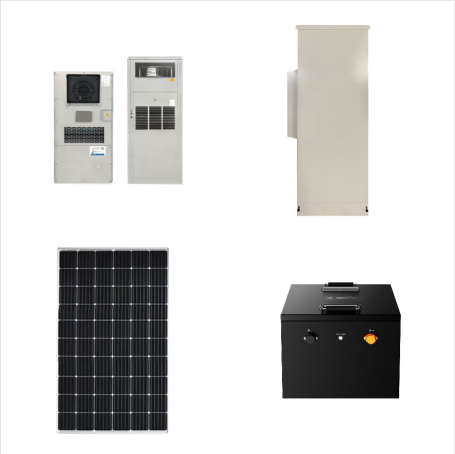


Building on this, the key resilience features that a power system should boast are then defined, along with a discussion on different possible hardening and smart, operational resilience enhancement strategies. Further, the so-called ????E? resilience assessment framework is presented, which includes a set of resilience metrics capable of

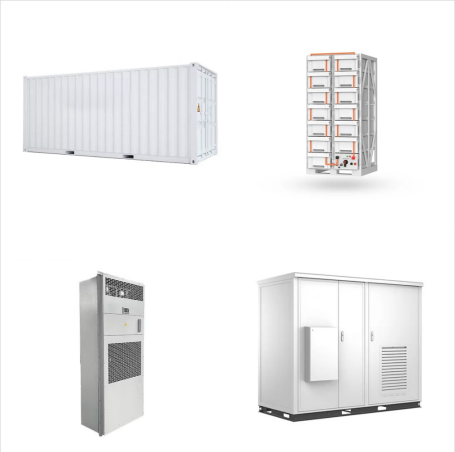


In this context, power system resilience is proposed to cap-ture the performance of power system under the influences of extreme events [3]. In general, power system resilience can be defined as the capability of a power system to maintain its per-formance (e.g., generation, load, and voltage) and speedily re-

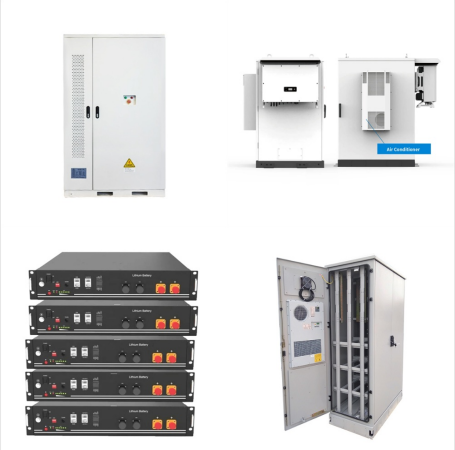
POWER SYSTEM RESILIENCE



Based on this analysis a new definition for power systems resilience has been proposed as: "the recurring ability of a power system to anticipate, survive, sustain, recover from, and adapt to high impact low frequency events", with anticipate being the default state in the resilience cycle. This definition includes all the key elements

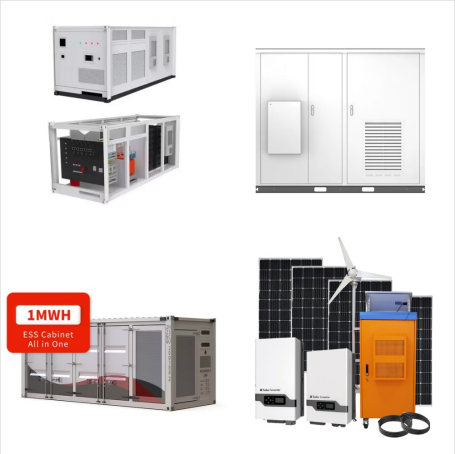


Energy resilience is the ability of the grid, buildings, and communities to withstand and rapidly recover from power outages and continue operating with electricity, heating, cooling, ventilation, and other energy-dependent services. cooling, ventilation, and other energy-dependent services. A resilient power system reduces the likelihood

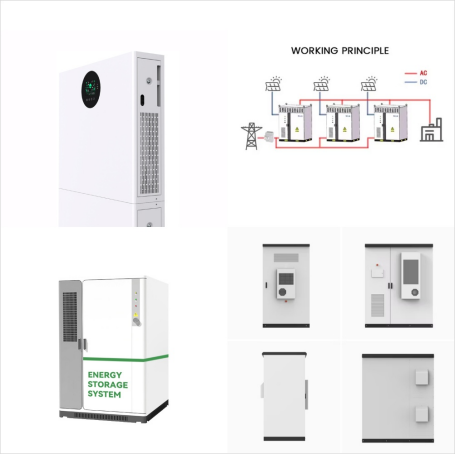


Quantification can analyze existing power systems and identify resilience improvements in future power systems. Given that a 100% resilient system is not economic (or even technically achievable), the degree of resilience should be transparent and comprehensible. Several gaps are identified to indicate further needs for research and development.

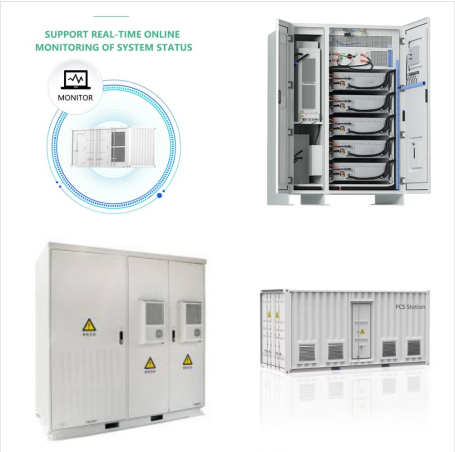
POWER SYSTEM RESILIENCE



The term ``resilience"" in power systems has several attributes ranging from the ability of a power system to ``resist`` and ``recover`` from a disrupting event to the ability to proactively respond ???

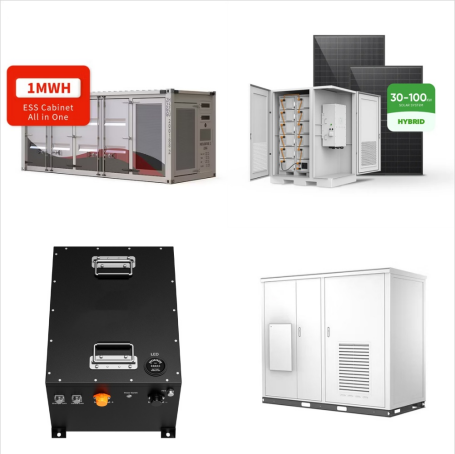


Power system resilience has been a hot topic in recent years, and it has attracted much attention from both industry and aca-demia. A lthough much research has been done in various studies to investigate and implement power system resilience, the defi-nitions of resilience and the metrics and quantification methods

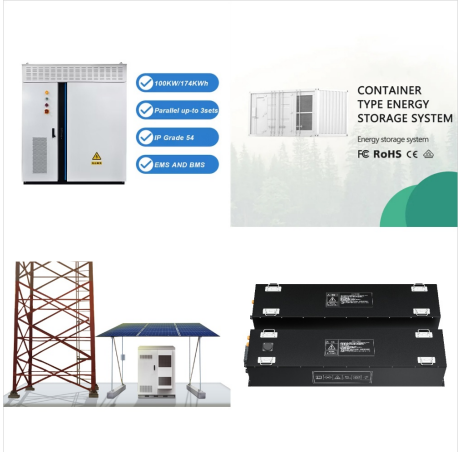


??? Well-planned power systems can withstand and recover from disruptive events. ??? Disruptions can be natural (storms, earthquakes) or man-made (cyberattacks, equipment failure). ??? Mitigations focus on minimizing outages and restoring power quickly. ??? Why is it important for everyone to understand the resilience of power systems?

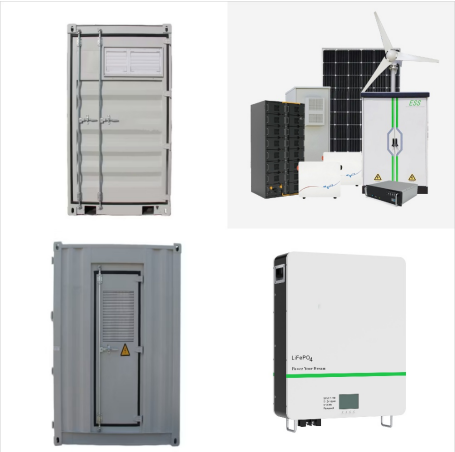
POWER SYSTEM RESILIENCE



Smart grid resilience is a relatively young field of research and hence is still not adequately defined. This paper provides an in-depth investigation into the understanding of power systems resilience to date and proposes a new definition derived from a comparative analysis of existing definitions in the publicly available literature.

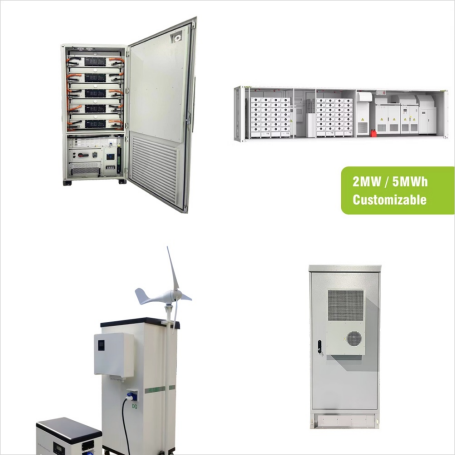


Power resilience refers to a company's ability to adapt to power outages. Operating reliability: The capability of the overall electrical power system to endure unexpected disruptions, like electrical faults or unforeseen component failures due to credible emergencies, without experiencing unmanaged, widespread power outages or harm to



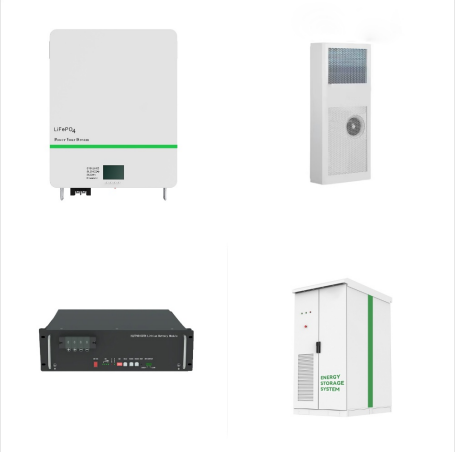
This paper provides a comprehensive and critical review of current practices of power system resilience metrics and evaluation methods and discusses future directions and recommendations to contribute to the development of universally accepted and standardized definitions, metrics, evaluation methods, and enhancement strategies. The frequency of extreme events (e.g., ???

POWER SYSTEM RESILIENCE



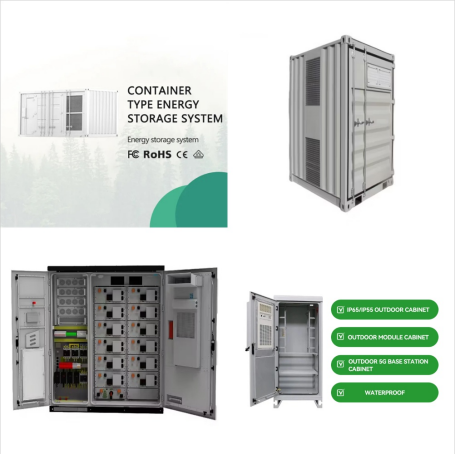
Extreme weather events such as earthquake and hurricane have disastrous consequences on power systems. Due to the inherent nature of these events, as high-impact low-probability (HILP) events, selection of an appropriate method that can provide the effects of weather conditions on the power system behavior still remains a significant challenge. ???

"The power system resilience is the ability of this system to withstand disasters (low-frequency high-impact incidents) efficiently while ensuring the least possible interruption in the supply of electricity, sustain critical social services, and enabling a quick recovery and restoration to the normal operation state."

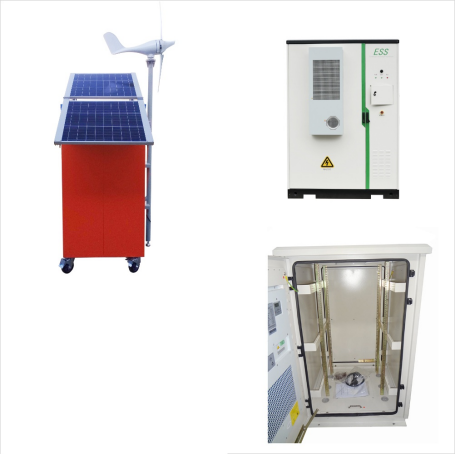


The concept of resilience was first introduced by Holling as a measure to determine the ability of an ecological system to absorb changes to its state and driving variables [9].Specifically, resilience is defined as a system's ability to withstand and minimize the impact of disruptions provoked by an external event, as well as the ability of the system to satisfy or ???

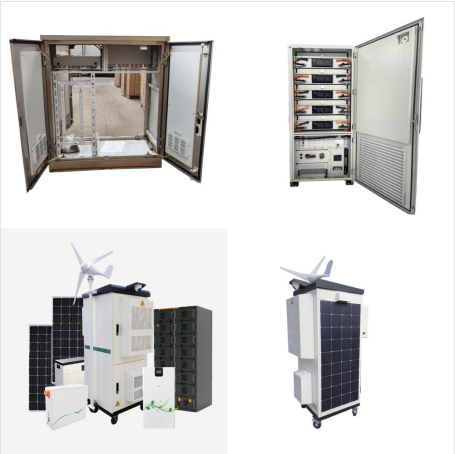
POWER SYSTEM RESILIENCE



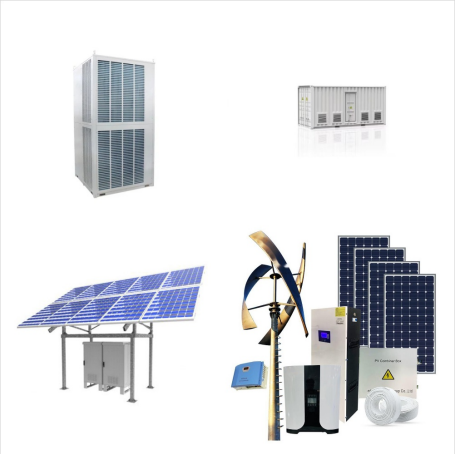
The power system is the backbone critical infrastructure of our economy and is under treat of such events. The resilient power system is intended to cope with low probability, high risk extreme events including extreme natural disasters and man-made attacks. Realizing resilience in the power system has been an unprecedented mission.



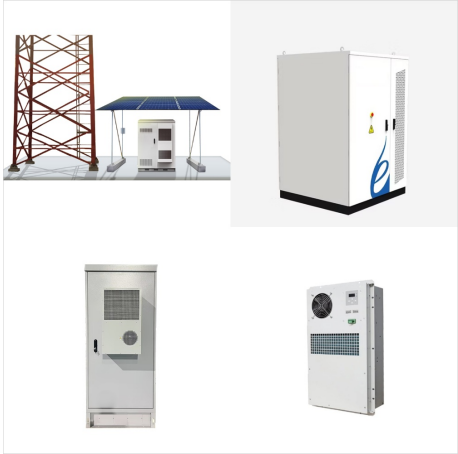
Power system resilience evaluation and enhancement meth-ods have been gaining signi??cant momentum. The term ""resilience"" in power systems has several attributes ranging from the ability of a power system to ""resist"" and ""recover"" from a disrupting event to ???



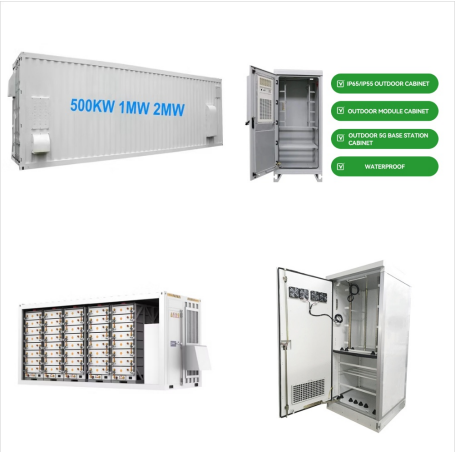
"The power system resilience is the ability of this system to withstand disasters (low-frequency high-impact incidents) efficiently while ensuring the least possible interruption in the supply of electricity, sustain ???



2.2 Parameters affecting resilience of power system. The resilience of a power system network depends on multiple factors related to the system's operating and physical condition. The parameters that affect system resilience are mentioned in previous works [33, 34].These parameters are divided into static and dynamic groups on the basis of their time ???

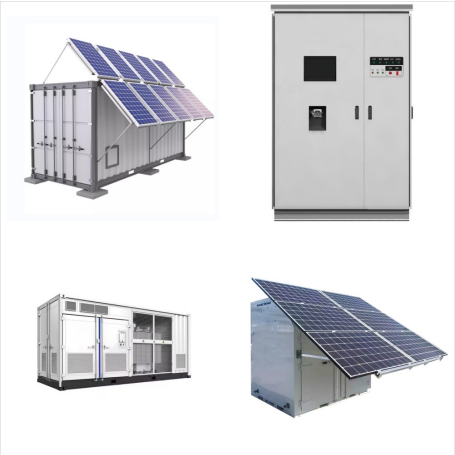


To provide important insights into power system resilience evaluation, the resilience of a test system was assessed using two different resilience metrics (analytical- and curve-based) in this work. The computational tasks are performed on a personal computer, with Quad-Core Processor (2.66 GHz) and 4-GB RAM, using MATLAB and MATPOWER [[69]].

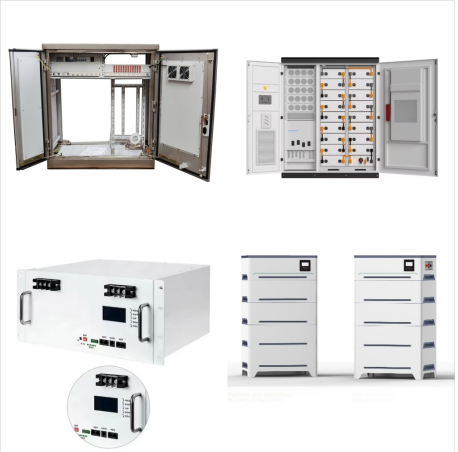


Recently, power system resilience is taken into consideration due to the rise of the frequency of extreme events . The resilience of the power system according to the occurrence time of the extreme event can be divided into three levels: (i) Proactive, (ii) active, and (iii) reactive. At each level, state of the system should be checked out and

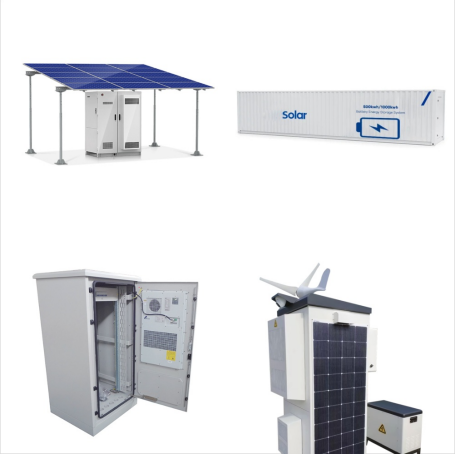
POWER SYSTEM RESILIENCE



Quantification can evaluate existing power systems and identify resilience improvements in future power systems. Given that a 100% resilient system is not economic (or even technically achievable), the degree of resilience should be transparent and comprehensible. Several gaps are identified to indicate further needs for research and development.

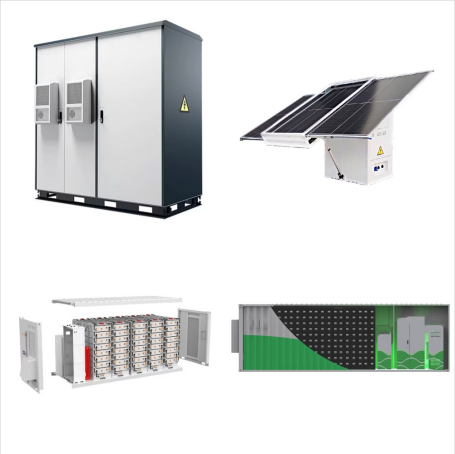


In this paper, we study the key factors that impact on power systems resilience under severe weather-induced disruptions from three dimensions: the extrinsic disruptions, the intrinsic capacities of a system and the effectiveness of recovery. Using 12 years of historical blackout data from 2007 to 2018 in the U.S., we apply various group

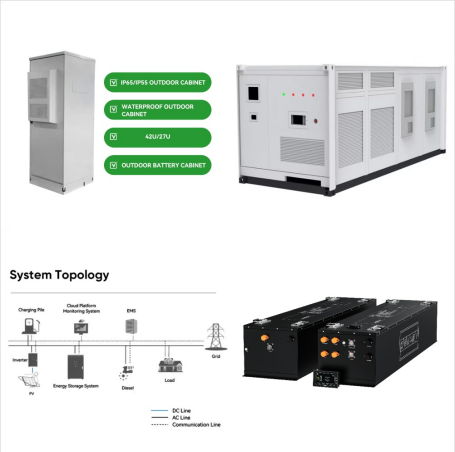


1. Introduction. The term resilience has been used in very different fields of knowledge for many decades, and it has been more recently applied in the power system sector due to the increasing number of extreme events which negatively affect power systems [1] nsidering this trend in natural events but also in cyber and/or physical attacks, the ???

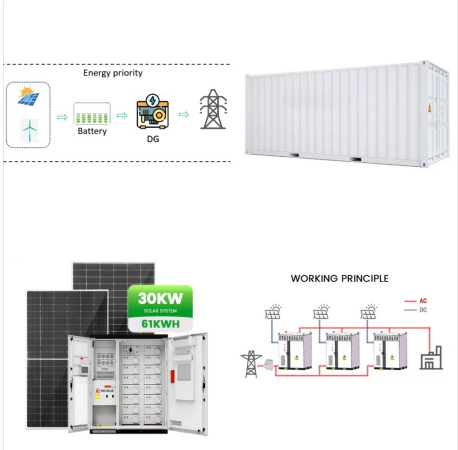
POWER SYSTEM RESILIENCE



What Is Electric Power Resilience? A resilient power system, as defined by the U.S. Department of Energy (DOE)'s Grid Modernization Initiative and the National Academy of Sciences, must be capable of lessening the likelihood of long-duration electrical outages occurring over large service areas, limiting the scope and impact of outages when they do occur, and rapidly restoring ???

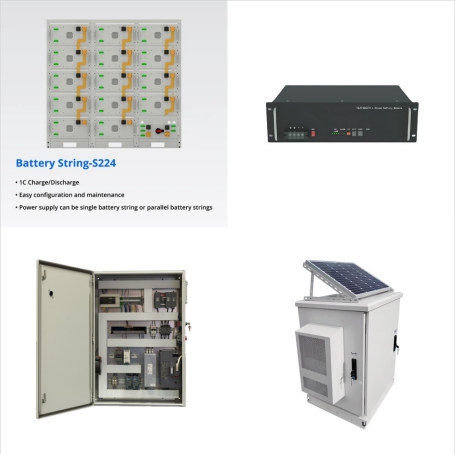


It is important to recognize that power system resilience depends on two interdependent factors: network design and system operation. Following that, we present a review of articles published since 2016 that have developed innovative methodologies to improve power system resilience and categorize them into infrastructural resilience enhancement



The concept of power system resilience has been introduced for focusing on high-impact and low-probability (HILP) events such as a hurricane, heavy snow, and floods. Power system resilience is the ability of a system to reduce the likelihood of blackout or wide power outages due to HILP events. Indeed, in a resilient power system, as the

POWER SYSTEM RESILIENCE



Simultaneous planning of two-stage generation and transmission expansion for an integrated wind farm energy system has been presented in, which considers dynamic thermal ranking systems, energy storage systems (ESSs), and line switching maneuvers as sources of heightening power system resilience, and structural analysis is performed with the k