

Enhancing power system resilience means an improvement in the capabilities required at various operating stages of a power system. In other words, it can involve enhancing the system's anticipative capabilities before an event, as well as its capabilities to resist, with stand, absorb, adapt, and recover after an event.

What makes a power system resilient?

A power system should possess the following five features to be considered resilient: the ability to anticipate, survive, sustain, recover from, and adapt to a given threat event. These five features form the basis for a newly proposed power systems resilience taxonomy, as shown in Fig. 4.

Why is resilience important?

In order to make the power grid more flexible and intelligent and to better withstand natural disasters, the concept of resilience has recently been applied [2,3]. Extreme events have the potential to cause significant power outages, making it crucial and urgent to enhance the resilience of the power system.

Does power system resiliency compare with reliability?

The technical background of the power system resiliency comparing with reliability is presented. The proposed quantitative metrics from both operational and infrastructure aspects are discussed to understand the requirements better. The potential threats are categorized, such as natural disasters and cyber-threats.

Are power system resilience metrics standardized?

Although several power system resilience definitions, metrics, and evaluation methods have been proposed in the literature, they have not been universally accepted or standardized.

What is a resilient system?

Resilient systems, when dealing with disruptions, are designed to "bend" instead of "break", meaning they must possess flexibility and survivability. For instance, utilizing emergency power sources to provide temporary support or reconfiguring system configurations will enhance a system's flexibility.





Abstract: This paper analyzes the notion of resilience in power systems from a fundamental viewpoint and thoroughly examines its practical implications. This paper aims to describe and classify different high-impact rare (HR) events, provide a more technical definition of power system resilience, and discuss linkages between resilience and other well-established ???



Resilience of the power system definition and metrics. The recent jump of the number and frequency of natural disasters and their increasing impacts on power systems has heightened the need to improve resilience of the power system. Power system reliability is a well-known and well-established concept that has been widely studied by power



The definition of resilience in Ref. [8] is as follows: "the power system with resilience can resist, adapt and quickly recover from major weather/climate events and has the characteristics of





??? Power system resilience has been an emerging hot topic in recent years to investigate the increasing threats of extreme events, such as natural disasters, severe weather, and cyberattacks . A. Definition of Resilience . There are many existing definitions, originating from differ-ent fields, that describe concept s concerning resilience



Over the past decade, system resilience (a.k.a., system resiliency) has been widely discussed as a critical concern, especially in terms of data centers and cloud computing. It is also vitally important to cyber-physical systems, although the term is less commonly used in that domain. Everyone wants their systems to be resilient, but what does that actually mean?



The CIGRE definition of power system resilience is achieved through a set of key actionable measures, which can only be achieved by well planned, executed human interventions to preserve and enhance power system resilience at all phases of extreme events such as the COVID-19 pandemic. To that end, the CIGRE WG C4.47 proposes to further break





Severe natural events leading to wide and intense impacts on power systems are becoming more and more frequent due to climate changes. Operators are urged to set up plans to assess the possible consequences of ???



Private companies own most of the electricity grid, but the federal government plays a significant role in promoting grid resilience???the ability to adapt to changing conditions; withstand potentially disruptive events; and, if disrupted, to rapidly recover.



Reference categorizes the high-impact events and clarifies the technical definitions of power system resilience and linkages between resilience and other concepts such as security and reliability. The resilience ???





Despite various resilience-related studies recently conducted in this area, there is no standard definition of power system resilience []. Great strides have been made by the number of leading organisations towards defining resilience in this context and distinguishing from reliability []. To be clear and comprehensible, several definitions of



A comprehensive review of the literature on power system resilience (PSR) from various perspectives is presented herein. In this work, the first ever comprehensive definition for PSR is



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.





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



Several natural hazards have caused unexpected problems to power systems due to climate change, emphasising the position that power systems are not prepared for extremely large-scale events. As a result, the need to study resilience in the context of power systems has been increased. A comprehensive review of the literature on power system resilience (PSR) ???



Resilience refers to the ability of a power system, especially microgrids, to withstand disturbances and quickly recover to its normal operating conditions. This concept is crucial in ensuring that energy systems can adapt and maintain functionality in the face of challenges such as outages, extreme weather, or component failures, thus enhancing reliability and stability.





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.



This paper addresses the resilience definition problem, and illuminates the relationship of resilience to reliability for electric power grids. As a byproduct, the nature and limitations of some existing grid reliability metrics are clarified. 2.0 What is Grid Resilience? The EPRI definition of resilience specifies it in terms of three factors



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 ???





Power system resilience characterizes the ability to resist, adapt to, and timely recover from disruptions. The resilient power system is intended to cope with low probability, high risk extreme

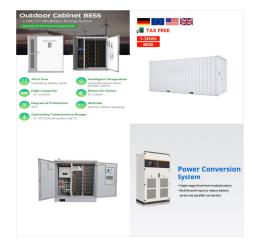


Power system resilience is the ability to limit the extent, severity, and duration of system degradation following an extreme event. An integral part of the definition is the following key actionable measures; Power system resilience is achieved through a set of key actionable measures to be taken before, during, and after extreme events, such as:



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 ???





Recently, there has been a focus on natural and man-made disasters with a high-impact low-frequency (HILF) property in electric power systems. A power system must be built with "resilience" or the ability to withstand, adapt and recover from disasters. The resilience metrics (RMs) are tools to measure the resilience level of a power system, normally employed ???



This article can provide power system operators with the means to determine and develop appropriate metrics to assess power system resilience, facilitate the rapid recovery of power systems with corrective measures, and ???



The most widely accepted and used definition of energy system resilience is given by the International Energy Agency Mathaios et al. address this by distinguishing power systems operational resilience (indicated by share of power load served) from infrastructure resilience (indicated by share of powerlines online) [20]. However, alternative





Summary. The term resilience has been used in very different fields of knowledge for many decades. In the electricity sector, the adverse impact of natural and man-made hazards on critical infrastructures has resulted in governments, regulators, utilities, and other interested stakeholders seeking to formalise a framework to oversee and enhance resilience.



The important features in power system resilience definition are categorized in Figure 3. FIGURE 3. Open in figure viewer PowerPoint. Key features of resilience definitions. Robustness refers to absorbing a shock and ???



This section reviews existing power system resilience eval-uation practices and proposes a new evaluation framework that resilience indicator, which can be a resilience metric or a system ???