Microgrid Ecological Benefit Evaluation Method

What is the environmental performance of a microgrid system?
The environmental performance that is assessed in case study 1 produces 3.2kg of ,3.26kg of and 1.75kg of over a lifecycle of a microgrid system which is estimated to be 25years.

How does the interest rate affect the economic performance of microgrids?
Effect of the interest rate on the economic performance of a microgrid system The renewable energy sustainability requires a substantial investment in the procurement of green energy technologies to generate electricity based on their economic, environmental and technical benefits.

How reliable is the proposed microgrid system?
Moreover, the reliability assessment of the proposed microgrid system is also carried out with the following results: EENS = 46.9485 kWh/yr, LOLE = 34.1081 h/yr and LOLP = 0.003904. The reliability of the microgrid system under consideration can be improved with the integration of the WTG, PV and ESS as presented in Table 7.

Does green technology improve the performance of a microgrid system?
This shows that the utilization of green technologies has a substantial effecton the economic,environmental and reliability benefits performance of a microgrid system.

What are the reliability indices of the proposed microgrid system?
This has further enhanced the reliability indices of the proposed microgrid system such as EENS,LOLE and LOLP with the following values: 1.3455×10 -2 kWh/yr,4.982×10 -3 h/yr and 5.70×10 -7.

What are the reliability benefits of RERs in a microgrid system?
Reliability indicesThe reliability benefits of utilizing RERs in a microgrid system can be evaluated with the application of the reliability indices. The reliability indices also provide useful information about the system capability and performance.

The MG has also attracted much attention in global academic communities. Fig. 1 shows the number of MG-related web of science (WoS) articles from 2000 to 2021. These statistics motivate the authors to conduct an in-dept study in this field to clarify the state of knowledge and identify needed research.

The generation and construction costs, which constitute the largest component of the cost-benefit analysis, reflect the total annualized costs of constructing the central-station and microgrid infrastructure, and the associated costs of energy generation under both alternatives. 7 Environmental benefits are calculated as the difference between the ...

The simulation study verifies that the optimal solution model of the microgrid environment and economic impact based on the optimization method has a good effect, and ...

Reliability evaluation and economic analysis of capacity planning of microgrid have been extensively studied. In order to achieve the optimal configuration of photovoltaics (PV) and wind turbine generators (WTG) with reliability and economy concerns, literature [12] makes use of the self-optimizing characteristics of adaptive particle swarm optimization (PSO) ...

The novelty of this case study lies in its unique approach to rank research-based microgrids, offering significant benefits to authorities by initiating a method to test microgrids ...

A comprehensive benefit assessment model for microgrid from the perspective of the entire society, taking the regular large coal power generation as reference object, was proposed and the cost ...

The grey evaluation method, on the strength of analytic hierarchy process-entropy weight method, shows that the integrated microgrid of "source-network-load-storage" promotes energy sustainability, supply ...

The method employs Mixed Integer Linear Programming (MILP) and Pareto optimization to assess the balance between economic and environmental goals, constructed ...

The grid-connected microgrid can benefit the urban energy supply. ... The majority of research works regard costs as the objective function when sizing the system components of a standalone microgrid. The technical, ecological, and economic analyses are used to build a hybrid energy system with the prime objective of lowering energy cost and ...

on the sustainability evaluation of regional microgrid interconnection systems is still quite limited, and most literature studies only focus on part of the sustainability benefits. Aghdam et al. [8] proposed a stochastic energy management method for a ...

In [21], a model for optimizing the performance of the Poly Generation micro-grid of the University of Geneva is presented, showing that MEMGs can have economic and environmental benefits if they ...

Microgrid has the advantages of low carbon, energy saving and economy. The development direction of distribution network is distribution network with microgrid. In order to evaluate the rationality of microgrid planning comprehensively and scientifically, this paper establishes a comprehensive evaluation index system of microgrid from four aspects: economy, reliability, ...

The developed evaluation model is applied in the proposed microgrid system by using the technical specifications, reliability indices and cost parameters to evaluate the LCC, ...

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The combined cooling, heating and power micro-grid (CCHP-MG) system has significant economy-environment-energy (3E) characteristics, making it valuable to evaluating its 3E performance in promoting the 3E coordinated development.Based on the energy supply structure of CCHP-MG system, this paper constructs a 3E performance evaluation index ...

The comprehensive evaluation of AC/DC hybrid microgrid planning can provide reference for the planning of AC/DC hybrid microgrids. This is conducive to the realization of reasonable and effective ...

which bring huge challenges to the benefits of the multi-en-ergy micro-grid system.2,3 As an important realization of an integrated energy system in terms of the distribution network/ ... Zhang et al22 studied the comprehensive energy evaluation method for the park micro-grid, and built a multi-attribute . 404 | LIU ET AL. decision-making model ...

When compared to different evaluation methods for microgrid planning schemes, our method yields the highest score of 0.9127, indicating superior results. ... scholars have recently conducted some research on the benefit evaluation of the highway microgrid project. Poe et al. [5] analyzed the economic, ecological, and political influencing ...

Finally, the feasibility of the above method is verified by comparing the comprehensive benefit evaluation results of the multi-energy micro-grid under different planning scenarios.

As the power market reform continues to deepen, microgrid plays an increasingly important role in promoting the local consumption of new energy and environmental protection.

In order to analyze the influence of uncertainty and an operation strategy on the reliability of a standalone microgrid, a reliability evaluation method based on a sequential Monte Carlo (SMC) simulation was developed. Here, ...

At present, scholars worldwide have carried some microgrid researches from different angles and aspects. For example, Wang et al. [7] explored the roles of three different economic indicators in helping investors make a decision. Tabar et al. [8] studied the sustainable planning of microgrid from environmental pollution, operation cost, and frequency fluctuations.

This paper lacks the implementation of microgrids at a nano scale [47] This paper is a review of microgrid cluster and operation It lacks the information of grid level energy exchange [48] This ...

In general, microgrids have a high renewable energy abandonment rate and high grid construction and operation costs. To improve the microgrid renewable energy utilization rate, the economic advantages, and environmental safety of power grid operation, we propose a hybrid energy storage capacity optimization method for a wind-solar-diesel grid-connected ...

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In view of the current problem that there is no comprehensive, scientific, and reasonable evaluation method for the comprehensive operation benefit of a multi-microgrid under dual-carbon background, the carbon ecological evaluation index system and evaluation method model of the multi-microgrid under dual-carbon background are put forward.

It can be seen from the existing researches that the current researches on the evaluation of electrical energy substitution mainly focus on (1) the comprehensive benefits of electrical energy substitution, mainly including environmental benefits, social benefits, and economic benefits; (2) the competitiveness of electric energy in terminal energy use; (3) ...