

Tbilisi microgrid benefits

Today, with the penetration of renewable energy sources and the global need to reduce CO2 emissions, microgrids are becoming increasingly popular. Why is this? We will try to unveil all the secrets of a microgrid.

Microgrid is a generic term that can correspond to a lot of systems, but here is our definition:

A microgrid is a localised and self-contained energy system that can operate independently from the main power grid (we call this off-grid mode) or as a controllable entity with respect to the main power grid (on-grid mode). It consists of distributed energy resources (DERs), such as solar PV plant, wind turbines, storage systems such as batteries and conventional generators, all integrated and controlled by advanced software tools and communication technologies. Microgrids can serve a small energy community, a building complex or even a single home, and can operate in islanded mode or in parallel with the main power grid. They are often designed to improve, increase resilience and reduce carbon emissions.

A microgrid controller is defined as a device capable of monitoring and managing the energy resources and loads connected to the microgrid, related to the assets into a controllable entity. It will maintain local grid stability while reducing operating costs through least-cost dispatch of assets. It should have a real-time power management system to adapt to all circumstances and can receive a predictive approach from an energy management system. In addition, a microgrid system should be able to analyse and make quick decisions in the event of an emergency, helping to balance energy production with load consumption and providing power even in the event of a blackout.

The microgrid can also refer to a permanent or intermittent local grid connected to the main grid. When the microgrid is connected, control consists mainly of respecting the constraints and characteristics of the connection point and transformer while maximise financial incoming, but also to support the main grid in case of frequency or voltage deviation with ancillary services.

Whoever says grid says electricity. Being connected to the main grid ensures a stable connection in most countries. However, there are some places where interconnection is not possible, either due to a lack of infrastructure or in the case of remote areas such as islands, far from the main grid. In this case, an isolated microgrid is a solution. It can operate while connected to the grid, but it can also disconnect and use its own local energy sources, especially in case of emergencies (storms, maintenance, breakdown of an asset...). Energy communities, for example, tend to be independent and use the energy produced locally, as it is increasingly common to install solar panels on the rooftop and a battery energy storage system to increase self-consumption and self-production ratio.

Power reliability: A microgrid can provide a reliable source of electricity in areas with frequent power outages



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or unreliable grid infrastructure. With its own generation capacity and energy storage, a microgrid can ensure that critical loads are always powered.

Energy cost savings: A microgrid can help you to optimise energy costs by using a combination of renewable energy sources, such as solar or wind power, fuel cells and energy storage systems. By reducing reliance on traditional fossil fuel sources, a microgrid can help lower energy costs and improve your bottom line.

Environmental sustainability: A microgrid can reduce your carbon footprint by generating and storing renewable energy on-site. This can help you meet your sustainability goals and reduce your impact on the environment.

Energy independence: A microgrid can provide energy independence by allowing you to generate and store your own power. This can be particularly useful in remote or off-grid locations where access to grid power may be limited or non-existent.

Resilience: A microgrid can provide resilience in the face of natural disasters, extreme weather events or other grid disruptions. By having its own generation and storage capabilities, a microgrid can continue to provide power to critical loads even when the larger grid is down.

Electrification of isolated areas: currently 10% of the worldwide population do not have access to electricity, hence, an isolated microgrid system could bring a solution.

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