Off-grid wikipedia

Off-grid wikipedia

The United States Department of Energy Microgrid Exchange Group[9] defines a microgrid as ""a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode.""[10]

The Berkeley Lab defines: "A microgrid consists of energy generation and energy storage that can power a building, campus, or community when not connected to the electric grid, e.g. in the event of a disaster." A microgrid that can be disconnected from the utility grid (at the "point of common coupling" or PCC) is called an "islandable microgrid".[7]

Electropedia defines a microgrid as a group of interconnected loads and distributed energy resources with defined electrical boundaries, which form a local electric power system at distribution voltage levels, meaning both low and medium voltage up to 35 kV. This cluster of associated consumer and producer nodes acts as a single controllable entity and is able to operate in either grid-connected or island mode.[3]

Microgrid Knowledge[12] defines a microgrid as a "self-sufficient energy system that serves a discrete geographic footprint, such as a college campus, hospital complex, business center or neighborhood."[13]

The focus of campus microgrids is aggregating existing on-site generation to support multiple loads located in a tight geographical area where an owner can easily manage them.[15][16]

These microgrids are being actively deployed with focus on both physical and cyber security for military facilities in order to assure reliable power without relying on the macrogrid.[15][34]

Architectures are needed to manage the flow of energy from different types of sources into the electrical grid. Thus, the microgrid can be classified into three topologies:[37]

In DC microgrid topology, power sources with DC output are connected to DC bus directly or by DC/DC converters. On the other hand, power sources with AC output are connected to the DC bus through AC/DC converter.

The hybrid microgrid has topology for both power source AC and DC output. In addition, AC and DC buses are connected to each other through a bidirectional converter, allowing power to flow in both directions between the two buses.

A microgrid presents various types of generation sources that feed electricity, heating, and cooling to the user.

These sources are divided into two major groups - thermal energy sources (e.g.,. natural gas or biogas generators or micro combined heat and power) and renewable generation sources (e.g. wind turbines and solar).[citation needed]

In a microgrid, consumption simply refers to elements that consume electricity, heat, and cooling, which range from single devices to the lighting and heating systems of buildings, commercial centers, etc. In the case of controllable loads, electricity consumption can be modified according to the demands of the network.[citation needed]

This is the point in the electric circuit where a microgrid is connected to a main grid.[39] Microgrids that do not have a PCC are called isolated microgrids which are usually present in remote sites (e.g., remote communities or remote industrial sites) where an interconnection with the main grid is not feasible due to either technical or economic constraints.[citation needed]