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The global energy consumption is estimated to be 580 million terajoules per year, with about two-thirds accounting for electricity consumption alone. Global electricity generation is expected to reach nearly 45 trillion kilowatt-hours (kWh) by 2050. The demand for energy is ever-increasing. The pandemic put a brief pause on this growing demand, with a fall of 1% in 2020, but it came back up quickly and is expected to grow by 4% this year. The usual suspects - population, economic development, and advances in technology - are the key drivers for this growth in demand.

How is this energy produced?

Today, much of the energy consumed is sourced from fossil fuels such as oil, coal, and natural gas. High energy-consuming countries such as China, India, and the US are still reliant on fossil fuels, with 71% (China), 59% (India), and 61% (USA) of energy coming from these sources. However, fossil fuels are rapidly depleting and also hampering climate goals.

Governments and organizations worldwide have recognized this and are equally and heavily invested in identifying new sources of energy - sources that are cleaner for the environment and the planet.

Energy generation from renewable sources such as wind, sun, and water is set to increase over the next few years. Renewable energy sources accounted for close to 30% of the global electricity generation in 2020. By 2050, renewable sources are expected to contribute to 80 to 90% of global energy consumption.

There are, of course, several challenges to the widespread adoption of renewable energy sources - the prohibitive cost of installation, their distributed nature, the need for new transmission infrastructure, unpredictability due to weather, political influences, and market conditions.

Given this juxtaposition of factors, governments and energy bodies globally urgently need a solution to optimize energy production, distribution, and consumption from multiple sources.

Enter Smart Grid: The way forward for smart energy management

This is where Smart Grid comes in. A Smart Grid is an electrical grid with automation, communication, and technology that help monitor the flow of power from its point of generation to the point of consumption, thereby controlling or curtailing the load to match the generation of power in real-time.

Primarily leveraging IoT technologies, a Smart Grid helps to proactively detect and respond to consumer

needs. It enables analysis, and communication of information to enhance efficiency and transparency across the supply chain, optimize energy consumption, and improve the reliability of the supply.

Smart Grids help to make transmission efficient, identify and resolve outages, predict the peaks and troughs in demand to optimize utilization and reduce wastage, improve operational costs for utility companies, and enable smoother integration with renewable energy systems.

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