Smart grid for renewable energy

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Smart grid technology is enabling the effective management and distribution of renewable energy sources such as solar, wind, and hydrogen. The smart grid connects a variety of distributed energy resource assets to the power grid. By leveraging the Internet of Things (IoT) to collect data on the smart grid, utilities are able to quickly detect and resolve service issues through continuous self-assessments. Because utilities no longer have to depend on customers to report outages, this self-healing capability is vital component of the smart grid.

The relationship between the smart grid and renewable energy revolves around gathering data. For example, wind farms use mechanical gears that require each link to support multiple sensors. Each sensor is able to note current climate and environmental conditions. This information is then quickly sent though the grid to alert the utility of any issues, which improves both the quality of service and safety.

"You"ve got this story of this invisible, dangerous commodity that travels at the speed of light that we call electricity and for the last hundred-plus years most people could interact with it in only the most rudimentary ways," says Mark Feasel, vice president of smart grid for Schneider Electric. Companies are now deploying much more advanced sensing devices. According to Feasel, some devices can continually capture information on electricity up to 60,000 times per second.

Semiconductor materials, such as silicon, are supporting the creation of green energy with smart grid technology. Due to their ability to hold millions of minuscule transistors, these materials have enabled IoT advancement. In turn, this advancement has allowed the smart grid to link up devices throughout the system, which ensures that the supply of energy is equal to the demand. It also keeps the current evenly distributed.

Smart grids equipped with parts made from semiconductor material reduce the usage of electricity. For example, electric vehicles can charge at night-- a time when offices and homes are not typically using much electricity. Lights switches and furnaces can also automatically power on and off. In this way, energy usage becomes “smart” by not using more than what is needed.

By 2037, Thailand wants a third of its energy to be generated by renewable energy sources. This means that Thailand’s grid will need to be modernized to handle the varying levels of energy provided by renewable sources. Any modernization plans will also need to take the country’s growing demand for electric vehicles (EVs), which is predicted to grow in coming years.

"When we have more renewable energy, the grid will become more difficult to manage, and then we will need to give them more flexibility with the digital to make it smarter," says Dr. Surat Tanterdtid, Chief of Enterprise Architecture of the Electricity Generating Authority of Thailand. Smart grid technology can help monitor and predict the supply of renewable energy into Thailand’s grid. This may allow the country to anticipate power outages and prepare accordingly.

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The New York State Energy Research and Development Authority is currently holding a competition in order to improve the state’s energy distribution. The Future Grid Challenge, which began in July, is part of a push to transition the state’s electric grid to renewable energy. A new statewide act includes requirements for a clean or carbon-free electricity sector by 2040 as well as an 85% greenhouse gas emissions drop by 2050.

The first round of funding will provide up to $6 million USD to projects that partner with Con Edison and Orange & Rockland Utilities. The goal of the competition is to improve data analytics, grid stability, and forecasting while reducing system losses.

One of the biggest frontiers in electrical engineering today is the development and implementation of smart grid technology. Fueled by the global demand for greener technologies and alternative fuels, environmentally-friendly smart grid technology has the ability to stimulate stagnant economies as well as change the way power is delivered to electricity consumers around the world.

Modernizing the Smart Grid is a four-course program designed to get you and your team up to speed quickly on the latest smart grid technologies. Learn more about how your organization can benefit from this IEEE course program today!

 Internet of Things (IoT) is allowing organizations to cost-effectively implement smart grids, also known as microgrids. Through IoT-based energy technologies, companies could revolutionize the

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