OCTAVE

WHITE PAPER

5 steps to transform your utility with renewable energy



Contents

1 Go digital

2 Decentralize

3 Adopt DERs

4 Employ DERMS

5 Seek tax credits

6 Conclusion

Energy providers can no longer lean on the billowing smokestacks of fossil fuel plants as key parts of their power portfolios. Coal is out – today the prevailing word in utilities is "sustainability." In are wind, solar, biomass and hydropower. Renewable energy sources currently provide more than 23% of power in the European Union and 20% in the U.S., according to Eurostat and the U.S. Department of Energy, and the percentages are growing.

By 2050, according to the International Renewable Energy Agency, renewable sources will account for 85% of power generation worldwide, with up to 60% coming from variable sources such as solar and wind.

But here's the catch: traditional utilities have been able to rely on well-documented peaks and valleys in power generation and usage to predict and prepare for extra demand. With smaller, less predictable pieces – distributed energy resources (DERs) – plugged into the grid, managing such a variety of inputs becomes complicated. Wind generation is as unpredictable as, well, the wind. Solar power is affected by cloud cover. Electric vehicles are increasing demand, particularly when charging overnight at owners' homes. And hydroelectric power peaks and valleys can be affected by rainfall, or a lack thereof. Without an advanced solution for monitoring and maintaining a distribution grid, it's impossible to support split-second decisions necessary for powering next-gen operations. The path to sustainability for electric utilities is modernization.



1. Go digital

The inability to predict peaks and valleys in energy consumption is why digital transformation must be No. 1 in our list of steps to a sustainable utility.

With a GIS-based geospatial asset management solution, utilities can create digital twins of their entire networks, making it possible to monitor and regulate input and output to the tiniest degree. A digitalized network will also be more efficient since each component and asset can be meticulously tracked and maintained through its entire lifecycle.

Utilities looking to modernize will need to upgrade their infrastructure if they want to manage electrical load and lifecycle of their assets. To do this, they will need real-time insights into their networks and assets.

While legacy GIS systems can show operators how many transformers and substations are in service, a digital twin can keep track of the whole network, from the power plant to the customer. With the advent of AI, a digital twin can also predict the lifecycle of parts and schedule needed maintenance. It can not only monitor power usage, but also provide the digital tools to design the expansion when one is needed.

A robust digital twin network model also bridges the divide between business and IT departments. An accurate, flexible solution with a topology-centric physical network model can be used by all parts of the organization through whichever method is most convenient, whether it be web, desktop or mobile.



2. Decentralize

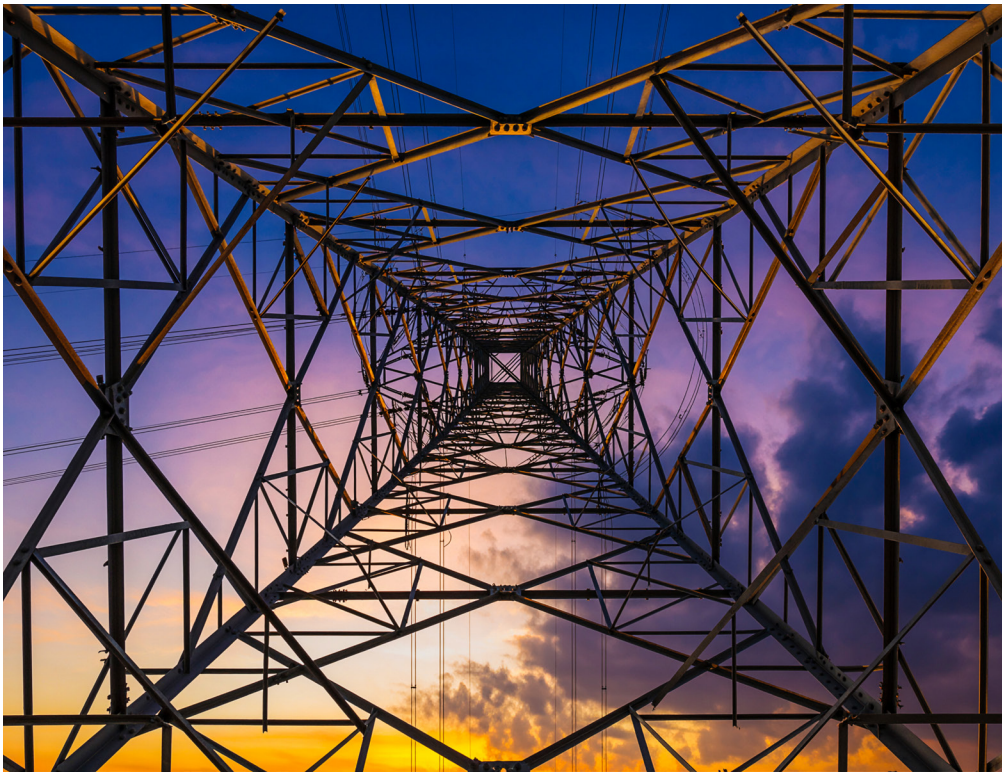
To move toward adopting renewable energy, electricity distribution companies must adjust their operations, and their physical grids, to accommodate bringing external power generation into their networks.

Today, with disruptive new technologies such as solar power and electric vehicles adding to supply and demand levels, a decentralized approach for generation and storage is needed.

Traditional power grids were not designed to handle microgeneration of power and will require upgrades to allow for multiple new sources of power coming into the grid from various places. While consumption loads remain stable, just how much generation new green power sources will provide is uncertain. For this reason, companies must move to a real-time, digital load management system to maintain balance in their networks.

A digital representation of a network is essential to understand and forecast production and consumption levels. Not only that, but in the age of climate change and increasing natural disasters and vulnerable cybersecurity practices, decentralization increasingly means moving that digital twin to the cloud.

A cloud-based utility management system provides robust cybersecurity and creates redundancy for critical systems. It can also provide real-time collaboration for users, making it easier to make informed decisions about the network.



3. Adopt DERs

Once a utility has digitalized and decentralized its networks, it's time to bring DERs into the grid. That may be solar panels, wind turbines, natural gas generators and battery storage units. These small-scale electricity generators can provide additional power sources. Solar panels can also be installed on residential rooftops and give electric customers incentives including lower power bills and credits for uploading their extra electricity generation into the grid.

The European Commission is encouraging the construction of renewable energy infrastructure, awarding nearly €600 million to eight cross-border energy projects in January 2024. The commission also issued a call for increased private investment in energy efficiency to meet EU sustainability goals for 2030.

Utilities can develop and own these DERs themselves or integrate third-party operations into their public networks. It's also possible to involve both third parties and customers in the integration of DERs. For instance, a utility might pay a third party to install solar panels at customer residences. In this case everybody wins as the utility recovers the cost of the equipment as the solar panels begin creating electricity for the grid, the third party gets paid for its work and customers benefit by paying lower power bills.

DERs are growing in popularity and are transforming passive energy consumers to "prosumers," who both consume and produce electricity. A study by CE Delft cited by the European Parliament in a paper about DERs estimates that 83% of EU households could become prosumers by 2050.

4. Employ DERMS

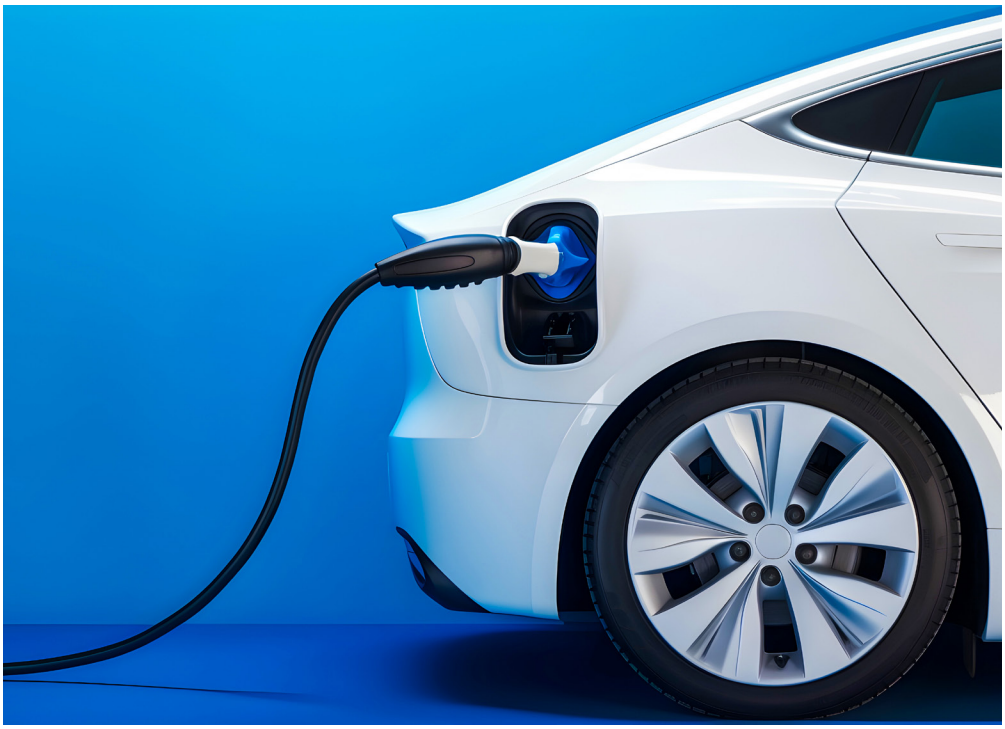
A utility that integrates renewable energy sources will need to implement a distributed energy resources management system (DERMS). This software platform allows utilities to monitor, control and optimize DERs, such as solar, wind, battery storage and even electric vehicles - components that weren't traditionally part of a legacy grid.

DERMS can improve grid reliability and efficiency by managing how power from renewable sources within the grid – voltage, frequency and flow of electricity – is supplied by DERs. DERMS can be used to aggregate thousands of DERs and control them at the same time, creating a virtual power plant. That requires analyzing and determining the DERs' capacity, which will likely fluctuate throughout the day.

In that case, DERMs can use machine learning to train them for optimum output.

Looking back to our No. 1 action, digital transformation, a utility that employs DERMS would also benefit from digital solutions such as a geospatial asset management solution, an outage management system or an enterprise asset management system. These solutions can support the use of DERMS by utilizing a digital twin of the network to optimize operations and efficiency of the entire grid.

The growth in renewable energy sources is creating an expanded European market for DERMS, fostered by favorable policies and regulations among EU countries..



5. Seek tax credits

Utilities that adopt renewal energy are eligible for multiple tax credits in Europe and globally. The European Commission has proposed aligning the taxation of energy products with EU energy and climate policies to promote renewable energy and remove tax exemptions and reduce tax rates that encouraged fossil fuels.

In France, utilities can be granted a reduced tax rate – 15% instead of 28% – for profits derived from production and sale of electricity from renewable sources.

German utilities can claim a tax credit of 30% of investment costs for new renewable energy plants, up to €500,000 per plant, while Italy allows utilities to deduct 65% of the cost of installing renewable energy systems, up to €100,000 per year.

In the U.S., the Renewable Electricity Production Tax Credit, or PTC, provides a 2.5 cents per kilowatt-hour credit for electricity generated by qualified renewable sources, including wind, solar, geothermal, biomass and hydropower.

Using the Investment Tax Credit (ITC) utilities can claim a credit of 30% of the cost of installing new qualified clean energy equipment, including solar, wind, geothermal and battery storage technology.

In South America, Brazil offers a guaranteed purchase contract for renewable energy for 20 years at a fixed price, adjusted annually for inflation.



Conclusion

The trend toward modernization among utilities is clear and the path is through investment in technology. It's time to transition from legacy GIS to an asset management system that can create a 3D digital twin of a utility network. A digital twin can provide a real-time representation of the entire network, allowing for pinpoint accuracy in detecting needed maintenance, as well as the ability to use artificial intelligence to track the lifecycle of all network assets, predict the need for expansions and help design them.

Once digitalized, a utility network will be fully equipped to adopt DERs, from wind and solar farms to biomass, hydroelectric and battery storage. Despite the unpredictability of power generation from these renewable resources, a digital network gives the utility the ability to manage multiple sources of energy input. The addition of third-party "prosumers" who can both consumer and contribute power to the grid will allow for more robust power generation without a massive investment in new infrastructure.

One investment required will be DERMS, a software platform that allows for optimization of multiple renewable energy sources introduced to the grid. The good news is, thanks to the global push toward sustainability, there is no shortage of help in funding the transition to a fully digital network with a strong mix of renewable energy sources. Governments across the EU and the world are racing to provide lucrative tax credits to utilities that add renewable energy resources.

For more information on transforming your utility to achieve long-term sustainability, **visit hxgnutilities.com.**



About Octave

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