With the growing deployment of DC power and the ongoing advances in power electronics, the question is:

What will be the role of DC power in the Utility of the Future?

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Meet the Author:

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DC or AC – Can we all get along?

All electrical engineers and many others are very familiar with the historical significance of AC versus DC, the battle royal between Edison and Tesla/George Westinghouse. We also know that AC power won mainly because of the ability to transform voltages, which was necessary to transmit power over long distances, and the need to reduce losses.

For a long time, it was certain that the battle and the war were over, and the future of the world was with AC. This is far from what is actually happening. The onset of electronics, PV, storage and others has brought a resurgence of DC-based supply and consumption. In addition, several advances in DC motors have made them almost as robust and efficient as AC motors.

This is causing a problem with the current AC grid because everything needs to be converted back into AC. Every electronic device in the house has a converter that converts the incoming AC to DC before the device consumes it. Most distributed energy sources also generate in DC, requiring converter mechanisms to convert them back into AC. This is not good. First of all, it is inefficient because all of these smaller converters are not designed to be energy efficient, and more importantly, there are just too many of them in a house.

We need to move to something that allows both to co-exist. And here is a scenario that permits just that.

The future electric grid that ties the centralized generation sources to the load centers may still be AC-based, but not everything else needs to be AC. To start with, the houses can be pure DC-based. This is okay because much of the house works off of one single voltage level. Each house can contain one single converter to convert the incoming AC power to DC, and everything inside the house can be DC – right from the kitchen appliances to the electronics. In addition, renewable sources of energy such as PV and other storage mechanisms can all continue to be DC-based and feed into the house. The main converter into the house can be two-way so that excess power can be converted back into AC and fed back into the grid. The physical separation between the two systems will also allow each homeowner to make their own energy decisions, and be better energy customers and better stewards of the environment as they feel appropriate. Lastly, reducing the number of converters in the house will also make the electronics simpler without the need for bulky and energy-inefficient conversion devices.

A future as described above allows us to create the perfect symbiotic relationship between the two systems by taking advantage of their respective strengths.