Power politics

I recently had the great honor of moderating the Smart Grid Rap Session at this year's Applied Power Electronics Conference (APEC). It brought home to me that in addition to the technical challenges facing the power industry, there are also political issues that must be addressed as we move forward. The old political arguments around power revolved around NIMBY issues about the location of power plants, but the new issues on electronics, especially smart-grid issues, will reach directly into the home itself.

Power is not only ubiquitous to electronics--power is electronics. Without moving electrons (or holes, or plasmons) around the circuit, nothing happens and the most sophisticated electronic device is just that much shiny costume jewelry. Power is so taken for granted that we mostly notice it only when it isn't functioning properly. A comparison could be made to the speaker system in a good theater: you shouldn't know that the voices are amplified in the first place. (I was recently at a Broadway play, and the primary reason I knew the place was amplified was that I could hear a blown midrange announcing its presence off to my left somewhere.) Just as you can't have amplified sound without a transducer, you can't have amplification electronics without power. In both cases, seamless integration is a testament to the designer. Just as one can have poorly-designed speakers, one can also have a poorly-designed power system. That technical challenge to create the best system for the application is what drives a designer in the power industry.

Convergence is more than just a buzz word, as functionality and technology are driving everything towards a ubiquitous-computing mesh-oriented electronics singularity, with macro integration of device functionality and the devices manifesting it becoming social issues. As George Friedman points out in his latest book, technology is often a study in unintended consequences. One example is that the developers of ARPANET did not have the iPod in mind, yet the creation of the Net demanded that devices would come about taking advantage of it. (The iPod can be described as a hard drive in a cool package with a majority of the functionality created by its web-based support infrastructure.)

The rules and regulations that accompany the development of the smart grid are as important as the technology behind it. Engineering never happened in a vacuum, and design decisions that an engineer makes today will almost certainly impact them on a personal level. That smart-meter design will be installed in the engineer's as well as the layman's home, and the functionalities that empower power providers will be used in every household. How smart-grid technology is used and the regulatory policies implemented are considerations as important to the situation as how to design the systems involved.

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