guest opinion

Building Tomorrow's Super Grid

By Thomas J. Overbye

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AMERICA CURRENTLY OBTAINS 85 percent of its energy from fossil fuels: petroleum, coal and natural gas. With finite supplies, global warming concerns, and geopolitical instabilities this percentage will undoubtedly need to decrease. Hopefully that decrease will come gradually through foresight rather than abruptly through crisis.

But getting a higher percentage of our energy from non-fossil sources, while simultaneously meeting the increasing energy needs of a growing population, will require major infrastructure enhancements that can't be done overnight.

Today we use about 40 percent of our energy in electric form, compared to 28 percent in 1975. How fast this percentage will increase is unknown. But given its versatility, if electricity could be generated at low enough cost it could be used for practically all our needs. Pluggable hybrids could move a significant portion of transportation into the electric category, at a cost of perhaps 75 percent less than $3 per gallon gasoline. Geothermal heat pumps could do the same with heating.

However, switching off of carbon requires other energy sources. While lots of alternatives beckon, upon closer scrutiny most can't even come close to providing the amounts of energy needed to put a significant dent in that 85 percent.

The technologies that can provide the needed energy, nuclear and to some extent wind, both use electricity to move their energy. But given siting difficulties and wind distributions, most of this new generation will need to be built quite a distance from the urban load. And we will need a lot of it.

The existing grid could be augmented with new overhead lines to transport this additional energy. But many would oppose efforts to crisscross the nation with more overhead lines

A continental super grid can help meet our future needs. The concept was originally developed by Chauncey Starr, the former president of the Electric Power Research Institute, and Paul Grant, who was involved in the discovery of high-temperature superconductivity. In short, the super grid concept envisions the use of underground, superconducting direct current cables for long distance power transmission at levels of perhaps 5 to 10 gigawatts. In addition to carrying electricity, these supercables could also transport hydrogen for use both as a cryogen and for end-use energy consumption - if a significant hydrogen energy market ever develops. Many experts agree that the concept is technically feasible and could have major societal and environmental benefits. However, it would require substantial engineering research and development.

Currently, the bulk of the necessary R&D is not getting done. Industry leaders and experts are not providing policymakers and the public with much of a vision for electricity's paramount role in our future energy economy. Perhaps the super grid won't be the best solution, but it is an idea that deserves serious consideration. It may serve as a catalyst for additional innovation. Our predecessors faced with the challenge of electrifying the world. We're faced with the challenge of making it sustainable.

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