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RETHINKING OUR ENERGY INFRASTRUCTURE

Moving U.S. energy policy to a decentralized grid

by Guy Warner 3 Jun 2010 2:32 PM

The future of America's domestic energy supply has become as murky as the waters of the Gulf as the oil spill fallout has legislators scrambling to rewrite offshore oil drilling provisions in the latest versions of the climate bill.

Critical to reducing American dependence on fossil fuels is the development of alternative clean energy sources, such as solar, wind, and biomass. The president has called for a doubling of the use of renewable energy technologies over the next three years and Congress has responded by proposing a federal renewable energy standard that would require the country to get at least 25 percent of its electricity from new, renewable power sources by 2025.

And, while the development of renewable energy technology has sped up rapidly in recent years, the technology to deliver this energy to the places where it is most needed is decades behind. America's current electricity transmission and distribution grid was built more than a century ago. Relying on the grid to relay power from wind farms in the Midwest to cities on the east and west coast is simply not feasible. Our dated infrastructure cannot handle the existing load – power outages and disruptions currently cost the nation an estimated \$164 billion each year.

Wind and solar power produce intermittent power, which, in small doses, has little impact on grid operations. As we introduce increasingly larger amounts of intermittent power, our transmission system will require significant upgrades and perhaps even a total grid infrastructure redesign, which could take decades and cost billions. With 9,200 power plants that link homes and business via 164,000 miles of lines, a national retrofit is both cost-prohibitive and improbable.

One solution to this challenge is the development of microgrids. Also known as distributed generation, microgrids produce energy closer to the user rather than transmitting it from remote power plants. Power is generated and stored locally and works in parallel with the main grid, providing power as needed and utilizing the main grid at other times.

Microgrids offer a decentralized power source that can be introduced incrementally in modules now without having to deal with the years of delay realistically associated with building central generation facilities (e.g. nuclear) and their associated transmission and distribution system add-ons. There is also a significant difference in the up-front capital costs that are ultimately assigned the consumer. Introducing generation capacity into a microgrid as needed is far less capital intensive, and some might argue more economical, than building a new nuclear plant at a cost of \$5-12 billion dollars.

Technological advancements in connectivity mean that microgrids can now be developed for high energy use building clusters, such as trading floors and hospitals, relieving stress on the macrogrid, and providing more reliable power.

In fact, microgrids can be viewed as the ultimate smart grid, providing local power that meets local needs and utilizing energy sources, including renewables, that best fit the location and use profile. For example, on the East Coast, feasibility studies are underway to retrofit obsolete paper mills into biomass fuel generators utilizing left over pulp wood. Pulp wood, the waste left over from logging, can be easily pelletized, is inexpensive to produce, easy to transport, and has a minimal net carbon output. Wood pellets are also easily adaptable to automated combustion systems, making them a valuable domestic resource that can supplement and replace our use of fossil fuels, particularly in microgrids which can be

designed to provide heating and cooling from these biomass products.

How big could the market for microgrids grow? According to a report just released by Pike Research, between now and 2015, more than 3.1 gigawatt of new microgrid capacity will come online worldwide, representing a total market value of \$7.8 billion. North America is expected to capture at least \$5.8 billion or 74 percent of this market.

To date, most of the investment in microgrids has come from the private sector. The American Recovery and Reinvestment Act of 2009 included a strong focus on renewable energy and modernizing America's energy infrastructure, however, only \$11 billion in stimulus funding was allocated to modernize the nation's electricity grid and that focused primarily on smart grid technology designed to integrate energy demand, load and usage.

It's time for Congress to break the stranglehold that the utilities and oil industry have on our energy system and include language in the climate bill that will move our nation to a more consumer-based system of energy development, management, and disbursement. This paradigm shift is clearly on the horizon with the development of microgrids and the growing appetite for local development and local control of energy sources.



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