



COMMENT



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Energy challenges ever-more vexing and complex issues

The energy security issue is one that promises to be ever-more vexing and complex as geopolitics and technologies evolve. The vulnerability of Europe on gas supply, the US on oil supply, and the entire developed world on grid infrastructure, presents a host of energy challenges, as well as some unique opportunities for decentralized energy systems.

The energy security benefits of moving away from a centralized power system are well documented. Just like portfolio theory for equity investing teaches us that certain risks can be significantly reduced through diversification, a portfolio of generating assets can also reduce risk of failure.

In an interesting nexus between climate change, energy security and centralized grid systems, a California utility is threatening to shut down grid power during periods of high temperatures and wind because of the fire risk from fallen power lines. This is causing a different kind of firestorm among the thousands of residents who face long periods of power shutoffs under this proposal.

The strategic significance of decentralized power should not be overlooked – alarm bells are going off in the US intelligence community about cyber-attacks on the grid. According to recent reports, these cyber intrusions are pervasive across the country. Even though no significant damage has been done, the fear is that, if undetected, these penetrations leave behind software that can be used to take control of a system during a critical time of war or conflict. If a nuclear facility suddenly becomes controlled by a hostile actor this can certainly lead to disastrous consequences. But even if the only impact is a short-term loss of power, the potential for disaster is still real, assuming that this leads to cascading turmoil in financial markets, telecommunications, internet access, water and sewage service, transportation, and other essential activities. By integrating on-site power projects with grid and smart grid systems these risks can be mitigated, even if they are not eliminated.

Another interesting development concerns the race to commercialize electric and plug-in hybrid vehicles. Reducing reliance on imported oil can certainly reduce the energy

insecurity quotient. However, having a multitude of energy storage units at the ready may offer an additional enhancement to energy security. With the collapse in the global economy and collapse in oil prices from the dizzying heights of \$147 (€113) per barrel, the market force for efficient vehicles is waning, if but temporarily.

However, the major manufacturers are all looking at rolling out some form of electric vehicle, with the Chevy Volt still supposedly on-track for 2010. Tesla Motors is delivering an electric vehicle that can go 244 miles (393 kilometres) on a single charge and does 0-60 mph in 3.9 seconds.

A plug-in vehicle uses no gasoline in battery mode and can be discharged as a power source during peak hours (and charged off-peak) if not used for transport. The lurking danger is that these vehicles are likely to be powered by lithium-ion batteries – marvels of energy storage, but as the name implies, reliant on substantial quantities of lithium for their production.

Lithium prices have already increased substantially, and as battery production ramps up so will global demand for lithium. Interestingly, the Saudi Arabia of lithium is Bolivia, which is said to hold 50% of the world's lithium reserves. Merely trading an oil cartel for a lithium cartel will not necessarily be the answer to energy security woes. But if we can move to the point where energy supplies are decentralized all the way down to millions of garages without creating new monopolies and choke points in the process, then we will be moving well down the road toward a more secure energy future.

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