



Smart Grid Strategy

Smart grid transmission: How "twins" could double our benefits

Apr 16, 2013

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Editor's note: Paul Michael Grant, Ph.D., is an esteemed researcher and electric power veteran. He has long promoted the idea of using electric power transmission corridors for dual purposes, namely the delivery of electric power AND liquid hydrogen. When he got in touch to say that the shale gas explosion was making this scenario even more plausible, I asked him to share his viewpoints with you. If you disagree with him, the Comment form awaits. If you agree, you should consider his suggestion to petition for a pilot. -- **Jesse Berst**

By Paul Michael Grant



"Double your pleasure, double your fun," went the old advertising jingle for Doublemint gum.

How does double your return on investment sound?

We all know families containing "doubles"... fraternal twin siblings -- the daughters of George and Laura Bush, for example. Each of the two can differ markedly from the other in looks, personalities and gender. Yet

together they can form the vital core of the family.

The energy world badly needs fraternal twins to double the benefits we get from our energy thoroughfares. I submit as candidates chemical and electric power co-delivered over a common right of way (ROW). In a [2006 article published in Scientific American](#), Chauncey Starr (founder of EPRI) and I proposed a model "SuperGrid" conveying such power over a "SuperCable" of high temperature superconductors cooled by liquid hydrogen, the latter to be oxidized as chemical power at point of delivery. The vision proposed that both "electrons and protons" would be electromagnetically and electrolytically generated via nuclear power at the "front end" of the SuperCable. But the key concept, the "twinning" if you will, is the use of a common right of way for co-transmission.

Now a great "teenage" job opportunity for the twins is emerging. We have now learned the North American continent is awash in "clean-green" fossil fuels. This "shale gas" is retrievable via hydraulic fracturing ("fracking") and horizontal drilling, and subsequently delivered over a pipeline from wellhead to your neighborhood utility.

A significant portion of this mostly methane, perhaps as much as 50%, will be combusted in high-Carnot efficiency combined cycle gas turbines to produce electricity. Why not burn this fraction at the wellhead and send the "twins" down a common ROW over a parallel gas pipe and superconducting cable, with consequent reduction in pipeline size and gas flow and pressurization losses? Such a scenario has been briefly addressed in several peer-reviewed

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papers, [one focusing on the long-planned Mackenzie Valley Pipeline](#) running from the Northwest Territories Artic Delta to Alberta. When the gas eventually runs out, we could install on the now vacated fields advanced high-tech nuclear power plants to "make" electrons and hydrogen and give the twins a ride over the pre-existing highway.

But wait, you say! What about using "tight oil" pipeline ROWs such as the soon-to-be built Keystone XL running from Kardisty, Alberta southward to Houston, Texas? Note that near Kardisty and along the way toward the lower 48, there lie numerous "playable" gas reserves. Why not place along the Keystone XL ROW, "placeholder" conduits to later to "pull" superconducting cables to accommodate wellhead CCGT generation, and take advantage of the 30-year HTSC national treasure now sitting on the shelf?


How to make all this happen? Any parent...mother or father...knows ambition and advocacy are paramount. So let's all of us, the U.S. electric and gas utility industry collectively with our spokes-groups, the Electric Power Research Institute, the American Gas Association and the Interstate Natural Gas Pipeline Companies (INGAA), petition incoming DOE Secretary Ernest Moniz to conduct a relevant due diligence, engineering economy study on a mutually appropriate and emerging opportunity for our twins as our natural gas and oil pipeline infrastructure expands.

And then, along with the help of FERC, we'll chew on what surfaces!

Paul Michael Grant is known principally for his career at the Electric Power Research Institute and for his fundamental research on superconducting materials and their subsequent applications to energy and power. Presently, he serve as a "due diligence" consultant for Silicon Valley start-ups and a writer of opinion and commentary for Nature, Physics World and Cold Facts.

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<p>Dual use of already owned right of way.</p> <p>There are a few problems not discussed, Liquid hydrogen doesn't stay cold forever, it must evaporate into the gaseous state, every few miles we would have to allow it to de-pressurize. But we could use it there to augment the power being transported. Not wasting any! Also the fuel cost to liquify hydrogen may be more than it's use for a super conductor would repay. But using the right-of way for transport would eliminate a lot of problems. But I feel that the eco-wackos would still be against it. Their real agenda is destruction of our whole industrial base. Maybe we could call their bluff... they have always advocated hydrogen as an automotive fuel. But then again they don't let facts get in their way. The engineering can be accomplished....but the lawyers probably can't.</p> <p style="text-align: right;">chuck conly - 04/16/2013 - 06:49</p>
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<p>Demand, access, opportunity cost, and need</p> <p>Demand is not along the corridor but in the urban areas. Underlying fuel prices will continue to diminish what operations and investments can deliver. The need is for Increased efficiency in the production of energy. Not scaling of new inefficiencies. Investment should go into resilient shareable generation that cost effectively address regional health and welfare.</p> <p style="text-align: right;">Gladwyn D'Souza - 04/16/2013 - 08:20</p>

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