

## Smart Grid – Race for Investment

*by Steve Pullins, Team Leader, DOE/NETL Modern Grid Strategy*

It seems to be clear from the investment data that private investment and consumer investment is rapidly taking place in the energy technology space, even if utilities don't invest in this space.

### Tom Friedman's Energy Technology

At GridWeek 2008, Tom Friedman shared from his new book, "Hot, Flat, and Crowded" about the emerging ET revolution, meaning Energy Technology. He related how ET is transformational like IT (information technology) has been over the last 25 years. As I thought about this during his presentation, it seemed to me that there is a connection with the Edge Movement that we are seeing today in the electricity sector.

The Edge Movement is the high speed innovation and investment evident at the edge of the electricity network geared to the consumer-side of the meter. For example, over the last three years there has been an explosion of new innovation companies well backed by venture capital firms. While there has been an upturn in utility R&D, capital investment in infrastructure, and piloting of new technologies, it pales in comparison to the consumer-side of the meter.

Traditional Investors in ET	Edge Investors in ET
Utilities R&D Agencies (DOE – tax money; states – tax and special funds) Consumers (through rate cases) Vendors to utilities	Consumer electronics firms Commercial Consumers (WalMart, etc) New Startups with Venture Capital (supplant consumer relationship) Clean Tech Investments
~ 50 B in 2007 (construction dollars)* ~ 34% avg. annual growth in last three years*	~ 42 B in 2007 (tech invest / build)* ~ 65% avg. annual growth in last three years*

\* estimated from several public sources (EnergyBiz, CleanTech, Renewables 2007 Global Status Report, New Energy Finance, DR Monitor Report, etc.)

While it is encouraging to see the increase in U.S. utility infrastructure expenditures for mainly traditional builds, the numbers show that by the end of 2008, the annual U.S. Energy Technology spend should overtake U.S. utility infrastructure spend.

### What Does This Mean?

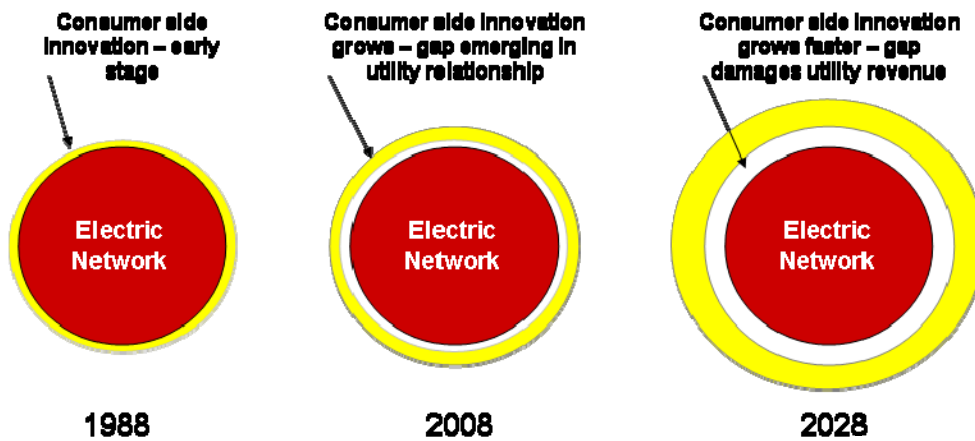
Many of you have heard me harp on the changes in the "edge" of the network and how innovation and investment is rapidly increasing here, and how utilities will have to become innovative and aggressive with Smart Grid to remain relevant to their customers in the near future. See Figure 1.

Only a small portion of the Edge investment is consistent with today's utility business model; most Edge investments are turning new companies into competitors for utility customer attention and dollars.

Utilities may choose to fight this trend when it starts to show harm to the bottom line, but the fight may be with the consumer. It is not a good plan to make an enemy of your customer base while trying to retain them.

Utilities may choose to ignore this Edge investment movement. However, this can only be a short term strategy until revenue loss forces reconsideration of this strategy.

Utilities may choose to get involved in the Edge Movement. While risky and not a typical space for utilities, it may be the only way to stay relevant to customers. This means new business models and new unregulated (probably) lines of business. Today, internal and regulatory policies do not recognize this need. Utilities could leverage this consumer interest in ET with regulators.



**Figure 1: Transformation at the Edge**

Innovation growth of the Edge yields electricity supply to consumers without utilities. The instance of commercial and residential consumers going off-grid (Grid Divorce) has increased 33% per year each of the last 10 years. Hard to believe? What if combined heat and power (CHP) is opened to having private wires between adjacent businesses (Study under Section 1308 of EISA 2007), then even more power flow will be from private generators to consumers. The gap in 2008 and 2028 represents a loss of utility relevance to the consumer which results in loss of revenue, loss of control, loss of consumer data, etc. The gap is not a total loss of utility relevance. There are still many connections and much power flow to consumers, but the percentage of consumer load actually supplied by utilities is measurably smaller and downwardly spiraling.

### **So, Why Bother?**

Without utility relevance to the customer, major network synergies and reliability channels could be lost in the new electric economy pushed by the Edge Movement.

Please do not misinterpret the goal. This is not a call to fight against the Edge Movement, but a call for utilities to become aggressively involved in it.

The grid divorce trend leads to 55 million U.S. meters (half of the nation) off-grid by 2028. How many utilities will survive if half the revenue is not coming to utilities.....half?

Next month, we will focus on environmental benefits of modernizing the grid.

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