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The Promise Of The Smart Grid Invites Investors To The Fold

Smart grid companies received 11% of total North American cleantech-sector investment in 2009, up from 3% in 2008.

By Adam Bergman

The U.S. Energy Independence and Security Act of 2007 defines the smart grid as using digital information and control technology to facilitate the deployment and integration of distributed and renewable supply resources, smart consumer devices, automated systems, and electricity storage and peak-shaving technologies. Put simply, the smart grid is the 21st century grid - flexible, efficient, digitized, durable, dependable and resilient.

The smart grid has four main components:

- advanced metering infrastructure (AMI) - the backbone of the smart grid, enabling networked communication between utilities and their customers;
- backhaul/meter data management systems (MDMS) - advanced back-office software and systems that make sense of and put to use the vast amounts of newly available data;
- wide area network (WAN) - the physical backbone of the grid itself, which is being upgraded with 21st century communication technology to promote smart and efficient transmission and distribution (T&D) of electricity across the grid; and
- home area network (HAN) - every piece of the smart grid "beyond the meter," which provides measurement and control of energy consumption in residences and commercial, industrial and governmental facilities.

There has been much publicity surrounding smart meters and other advances in grid technology, but it will likely take years for the promise of the smart grid to be fulfilled. New products and technologies are just coming to market that have the ability to transform today's grid (which is a little different from the one envisioned by Thomas Edison over 130 years ago).

Adam Bergman

Although the potential for change is massive, significant capital investment is required, and utilities and public utility commissions seem reluctant to move too quickly with mission-critical infrastructure. For instance, Austin Energy's electric grid - arguably the most technologically advanced in the U.S., with a full AMI deployment and advanced MDMS capabilities - has taken over six years to implement, and the utility is only now venturing beyond the meter to implement HAN systems and WAN components that stretch back to generation sources.

Nevertheless, there is tremendous momentum behind the smart grid in the U.S., with over $32 billion in direct funding and tax incentives having already been allocated to transform our energy transmission, distribution and production systems. President Obama has made implementing the smart grid a cornerstone of his plan to lower energy costs for consumers, reduce greenhouse gas emissions and generate high-paying, sustainable green jobs.

As a result of federal government support, investment across the smart grid sector grew substantially in 2009, with almost $1 billion having been invested in North American companies throughout the smart grid value chain. Moreover, utilities, having received federal funding, are spending huge sums of money to overhaul key infrastructure in their service territories.

Upgrading the grid has also been a major imperative elsewhere around the globe. In China, over $19 billion of the country's $586 billion stimulus package is aimed at developing a super-high-voltage smart grid that will serve as the backbone for its economic development. Several countries in Europe, including the U.K., Germany and Italy, have also allocated significant portions of their stimulus funding to improving their national grids.

Many countries in Europe are working on plans for a "super grid," which would move electricity seamlessly throughout the continent and also enable the region to tap into the huge potential offered by solar energy from North Africa. Additionally,

in many countries where electricity theft is a major problem - such as in Brazil, Australia and Russia - smart grid solutions are being implemented as a way of preventing such theft.

Aside from capitalizing on fiscal incentives, utilities are motivated to implement smart grid technologies as a means of solving a number of growing challenges on the grid. In several regions of the U.S., demand continues to outpace supply. Places such as California, the Northeast and the Mid-Atlantic all have heavily stressed grids with a number of choke points throughout their T&D networks. In fact, the Electric Power Research Institute has estimated that power outages, disruptions and congestion cost Americans more than $100 billion each year. Smart grid products, therefore, are being developed to help optimize existing infrastructure and identify problems in advance. Utilities can then be proactive, rather than merely reactive.

Making matters more complex for the already strained grid is the intermittent nature of renewable energy resources, such as wind and solar, which has proven difficult to manage, despite representing less than 2% of the U.S. total electricity-generating capacity. This issue has become even more pressing following most states' adoption of renewable portfolio standards, which require renewable generation to constitute higher amounts of utilities' generating capacity.

The current grid stands in the way of the integration of renewable energy sources, prompting U.S. Energy Secretary Steven Chu to point out recently that we "need a system that can dispatch power here, there and everywhere on a very quick basis." The smart grid will provide utilities with the flexibility to react rapidly to changes in renewable energy generation levels and thereby protect against blackouts or rolling brownouts.

The smart grid has the potential to revolutionize the electricity industry, allowing real-time communication between utilities and their customers and providing a level of grid efficiency not previously possible. Improved grid efficiency will reduce the need for the construction of additional power plants, which are both expensive and difficult to build due to more stringent environmental regulations and limited transmission capacity.

Utility involvement

There are a number of very large utilities - particularly ones in supply-constrained regions and in states that practice electricity decoupling - that are making meaningful smart grid deployments, starting with AMI. According to Park Associates, there were 8.3 million AMI-enabled electric meters installed across the U.S. as of May 2009, representing just over 6% meter penetration across the country. This is up from 4.7% in December 2008, which means about 1.8 million meters were installed in the first five months of 2009 alone.

With major AMI rollouts scheduled by many of the largest utilities across the country, AMI-enabled meter deployments are expected to reach 33 million meters by the end of 2011. Some of the largest announced deployments include 5.4 million electric meters by Pacific Gas and Electric Co. (PG&E), 5.3 million by Southern California Edison, 5 million by American Electric Power, 4.4 million by Florida Power & Light and 4.3 million by Southern Company (including Georgia Power). Many of the largest deployments were recipients of the $3.4 billion Smart Grid Investment Grant awards, which were distributed in October 2009.

As the pace of smart meter rollouts increases, MDMS will be needed to manage and capitalize on this newly available data to improve grid efficiency. Utilities are carefully testing new products to ensure the effective utilization of information, adding MDMS improvements in a piecemeal fashion to their backhaul systems.

Utilities that are in the process of rolling out major AMI deployments are moving more quickly to deploy MDMS, as they will need systems in place to manage the vast amounts of data coming from smart meters. Generally, the first installments of MDMS that the utilities are implementing are the upgrading of legacy backhaul systems, including fault and theft detection in real time, and more streamlined billing and remediation systems.

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In addition to AMI and MDMS, a number of utilities have begun deploying upgraded WAN equipment, extending the smart grid all the way back to the power generation sources. Utilities want to leverage their newly implemented AMI networks to enable WAN systems to be more predictive, efficient and compatible with other pieces of the smart grid.

Utilities are also upgrading legacy systems by replacing oil-filled transformers with more efficient and robust solid-state systems; adding redundancy and automatic switching capabilities to increase asset utilization; adding monitoring and diagnostics technologies where none previously existed; and installing equipment that can handle intermittent renewable loads.

Despite the numerous advantages to both utilities and consumers, the

HAN has experienced slower adoption rates than other areas of the smart grid for a few important reasons. First, with the exception of a few HAN products, most HAN solutions require the existence of smart meters and an AMI network - two pieces of the smart grid that are just now starting to be deployed on any meaningful scale. Second, it is yet to be decided whether the consumer or the utility will fund the rollout of the HAN. Third, many utilities are unwilling to go beyond the meter into customers' homes, placing the cost and hassle of installation on consumers.

However, thanks in large part to the funding provided in the American Recovery and Reinvestment Act, a number of utilities are piloting HAN deployments. One of the largest, most publicized HAN deployments so far is the Smart Grid Miami project, where over 1,000 homes are being outfitted with in-home displays, smart thermostats and appliances, and demand-response software that will manage energy consumption across the home.

More recently, Xcel Energy announced a large trial whereby 50,000 residential customers will be participating in a program that gives them energy-use information through a Web portal. The portal-only approach could be a continuing trend, as it allows the utility to manage the system without deploying any hardware in the home.

The HAN rollout should become more feasible as the implementation of smart meters and AMI networks increases, and would especially be helped by the implementation of federal decoupling policies, which would provide a financial incentive for utilities to employ energy efficiency measures.

Competitive landscape

AMI consists of two major components: the smart meter and the network surrounding it. Smart-meter rollouts have been led by traditional metering companies with a long history of selling to utilities, including Elster, GE, Itron, Landis+Gyr and Sensus, with only limited market penetration by start-ups.

In contrast to smart meters, AMI network providers are generally newer companies. Radio frequency (RF) mesh networks, developed by vendors including Silver Spring Networks and Trilliant, have received the most fanfare. In the case of Silver Spring Networks, the company drew attention after it secured major contracts on some of the largest AMI rollouts in the country, as well as for its success in penetrating international markets - something very few smart grid companies have been able to replicate thus far. Other notable AMI networking companies include Echelon, Eka Systems, Grid Net and Smart Synch.

Although AMI network rollouts have mostly benefited start-ups so far, technology giants such as Cisco and IBM, along with telecom majors like AT&T and Verizon, are beginning to become active in AMI deployments across the country. Moreover, established meter providers, including Elster, Itron and Landis+Gyr, are developing their own AMI networking products. In fact, many meter providers submit two AMI options in their responses to requests for proposals from utilities: one with a network vendor and one with their own AMI networking product.

As with other areas of the smart grid, MDMS have attracted both new pure-play entrants and leading tech companies that have historically developed and managed utility backhaul systems, such as ESCO, IBM, Oracle, SAP and Ventyx, which now face competitors with new technology for managing the smart grid.

One such company, Ecologic Analytics, was chosen to manage PG&E's smart meter installation - the largest AMI deployment in the U.S. to date - and also won the mandate to support Indianapolis Power & Light's Advanced Demand Side Management Initiative. Another company, eMeter, reports having contracts to manage data for 20 million meters, including CenterPoint Energy's rollout of 2 million meters. This is encouraging news for smart grid start-ups.

The majority of WAN equipment providers are leading industrial companies that have been selling to utilities for years. ABB, Alstom, GE, Schneider Electric, Siemens and others are providing advanced heavy-duty substation equipment to replace systems that have been in the field for decades.

Cleantech companies American Superconductor and Composite Technology provide high-efficiency transmission wires to address inefficiencies in incumbent cable technology, with which they have won meaningful contracts in China, but both are finding it difficult to gain similar traction in the U.S. Moreover, large industrial and materials companies such as Sumitomo and 3M have also developed efficient transmission technologies and have the distribution channels in place to take market share.

One area of the WAN not historically dominated by large companies and that is still relatively open to competition is monitoring and control. Companies such as CURRENT Group and H2Scan are providing sensor equipment and supporting software to monitor critical T&D assets and have won significant contracts with utilities that are rolling out smart grid deployments.

Large industrial names like Schneider Electric and Siemens, which already have monitoring and control products, are working to beef up their capabilities to take advantage of this increasingly high-growth segment.

The nascent HAN sector has attracted dozens of venture-backed, pure-play HAN providers developing dedicated products, as well as leading equipment vendors that are

expanding their product capabilities to accommodate the HAN. Also, many leading consumer technology companies are developing energy management portals and application software.

Notable pure-play vendors include AlertMe, Computerized Electricity Systems, Control 4, GainSpan, Greenbox (recently acquired by Silver Spring Networks), iControl and Tendril. Some of the larger companies that have recently released HAN hardware include Eaton, Emerson, GE, Honeywell, Schneider Electric and Siemens. Cisco, Google and Microsoft have released HAN products on the portal/software side.

Smart grid financing

Investors - in particular, venture capitalists who are more comfortable with the technology/IT aspect of smart grid businesses - are pouring money into these companies. In fact, they provided funding totaling almost $1 billion in 2009 - an increase of over 100% compared to 2008.

Indeed, smart grid companies received 11% of total North American cleantech-sector investment in 2009, up from 3% the previous year. Although most areas of the smart grid sector are not as capital-intensive as solar, wind or other renewable energy sources, these companies will need to raise significant amounts of capital to ensure they have the resources to fund the rapid rollout of smart grid infrastructure, which Pike Research estimates will cost $200 billion through 2015.

Because there are still only a handful of public smart grid companies, a majority of the financing activity in the smart grid sector has been invested in private companies, which raised over $600 million last year - a 50% increase over 2008. New business opportunities enabled a total of 25 private companies to raise capital in 2009, representing an increase of 14% compared to the previous year. Although there will probably be a number of high-profile initial public offerings (IPOs) in the sector this year, private companies will likely continue to make up the majority of smart grid companies receiving funding in 2010.

In contrast to 2009, when the average private-deal size remained flat from 2008 at roughly $20 million, private companies will most likely raise larger sums of capital in 2010. With over 70 private companies having raised capital since 2005, many firms have commercialized their technology and now need to raise funds for working capital as the sector moves from initial pilot programs to full-scale rollouts. This was the case with Silver Spring Networks, which raised $100 million in December after winning several new contracts during the year, in addition to $165 million raised over the past three years.

Another factor is that utilities are more inclined to partner with companies with a strong balance sheet, thus ensuring their long-term survival.

Public market activity is also likely to accelerate this year as the sector experiences a wave of IPOs, which will be the first ones since EnerNOC went public in May 2007. Growing government support for building a truly smart grid, as well as the limited investment opportunities for institutional investors, should encourage several private companies to go public.

In particular, an IPO should be very attractive to a number of sponsor-backed meter manufacturers, including Elster, Landis+Gyr and Sensus, which have long operating track records, substantial revenue and are cashflow-positive.

It will be interesting to see whether the newer entrants to AMI, HAN, MDMS and WAN, which are positioned to become high-growth leaders despite having limited revenue and being cashflow negative, will also pursue IPOs or opt for growth-stage private financings. If this latter group is able to go public, this sector could be one of the most active on Wall Street this year.

After weathering the downturn in the financial markets in 2008, many public smart grid companies recovered notably in 2009. With government money flowing into the sector, companies won new business and demonstrated improving financial results, which were instrumental in driving stock prices higher. This, coupled with their scarcity value, allowed public smart grid companies as a whole to significantly outperform the broader financial markets, as well as the cleantech indices.

For example, in 2009, EnerNOC's stock price was up over 300%, American Superconductor 151%, Comverge 129% and Echelon 42%. However, the main laggard in this sector was Itron, which rose less than 10%, reflecting the fact that its financial performance did not meet analysts' expectations and that it struggled to deleverage from significant amounts of debt on its balance sheet.

Unsurprisingly, with only a few public smart grid companies and plenty of public investors looking to capitalize on potential growth in this sector, valuation multiples have continued to climb. The average latest 12-month (LTM) earnings before interest, taxes and depreciation (EBITDA) reached 15.8x on Dec. 31, 2009. In comparison, the solar sector averaged 6.5x LTM EBITDA.

It is possible that the huge amount of government money, coupled with strong investor interest, could generate a bubble in the smart grid sector similar to the bubbles that occurred in biofuels in 2006 and solar in 2007. It should be noted that, while steadily on the rise, smart grid company valuations are still quite far below the valuations that solar companies had at their peak in December 2007.

Financing has varied widely among the different subsectors of smart grid. AMI proved to be the most attractive to investors, with notable financings by Itron, Landis+Gyr and Silver

Spring Networks, with each raising at least $100 million in 2009.

As utilities accelerate the rollout of smart meters, AMI providers will increasingly need to raise significant amounts to fund capital expenditures and working capital. Additionally, AMI companies are likely to be very active in the public markets this year, because most of the industry leaders are currently private. Strong sector momentum and profitable business models are attracting the interest of public market investors, which should also encourage a number of companies to undertake IPOs.

The HAN subsector does not yet have any public companies, implying that it is in a much earlier stage of development than AMI. That being said, companies such as AlertMe, Control4, iControl and Tendril have all raised capital recently, indicating that there is growing investor interest in this sector. As utilities carry out more HAN trials, pilots and full-scale rollouts in 2010, many of these companies will choose to raise additional capital to ensure they can fully realize these opportunities.

Although many investors find the HAN sector particularly compelling due to its positioning inside the home, with direct access to the consumer, most of the leading companies are probably at least a year away from being viable IPO candidates.

However, the acquisition of Greenbox by Silver Spring Networks in September 2009 may be a sign that consolidation in this area could begin this year. The key trend to watch is whether consolidation will occur from other parts of the smart grid value chain, or from technology and industrial companies looking to gain a leadership position in the sector.

As a pure-play MDMS industry leader, eMeter was able to take advantage of its competitive position to raise over $30 million in 2009, but it was the only significant capital raise in this area. Although other MDMS companies are aiming to raise capital this year, it is unlikely that this area will attract the same level of investor interest as AMI or HAN, because large, established technology firms, such as IBM, Oracle and SAP, are already selling their technologies to utility customers.

The WAN sector is dominated by large, established companies even more so than the MDMS space, which explains why there was no meaningful financing in 2009. This is unlikely to change significantly in 2010, but some of the companies developing high-efficiency transmission wires, monitoring and sensor solutions, and technology to optimize electricity consumption will likely generate adequate investor interest to raise new capital.

Like the Internet, the smart grid represents an infrastructure revolution with the potential to transform long-entrenched business and operating models and create new business opportunities. The smart grid has gone from a relatively unknown entity to a leading buzzword in a just a few years, which should help entice investors to fund both private and public smart grid companies in 2010.

Adam Bergman is a senior vice president at Jefferies & Co. Inc. who leads the firm's West Coast and Israel cleantech investment banking efforts. He can be contacted at (415) 229-1429 or abergman@jefferies.com.