GPBULLHOUND

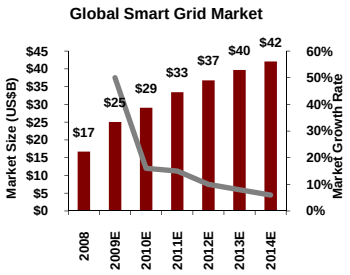
INDEPENDENT TECHNOLOGY RESEARCH

Sector Update

June 2009

Cleantech / Energy

HOW REAL IS THE VISION OF A "SMART GRID"?



Long-Term Fundamentals Intact Though Headwinds Persist

The "Smart Grid" is often described as the "Internet for Electricity" in which will modernize our aging electricity distribution grids with the goals of reducing excess energy and incorporating renewable energy sources. Numerous factors are forcing the outdated energy distribution grids around the world to become 'smarter', from rising energy costs to environmental concerns. That said, three challenges remain: 1) absence of bold incentives as utilities struggle with their return on investment case, 2) unclear regulatory guidelines, and 3) a lack of standards and international harmonization.

Leaders and Laggers

This report studies the competitive positioning of key players within two early smart grid areas: Advanced Metering Infrastructure (AMI) and Demand Response. While current market leaders are likely to hold their places (Itron, Landis+Gyr, EnerNOC), we find a number visionaries (Silver Spring Networks, Trilliant Networks) that stand to benefit from a strong adherence to open standards and current pipeline momentum. In contrast, several emerging upstarts (Grid Net, Tendril Networks) that focus on specialized applications could face significant hurdles given the uncertainty in their ability to scale and their unproven standards approach.

Investment Trends and Themes

Venture capital investments in smart grid companies are off to a slow start in 2009, and remain dwarfed by investments into the solar, biofuel, and wind segments. While we are optimistic on a meaningful pickup in smart grid investment activities within the next 6-12 months, we believe that investors will likely gravitate towards ideas that hinge on three key themes: 1) ability to scale, 2) focus on open standards, and 3) the first / early movers in any given segments.

A Sweet-Spot Along the Value Chain

We find 'the security play' as an emerging sweet-spot along the smart grid value chain. Indeed, security vulnerability is increasingly the primary concern for this nascent industry, which apt to spawn a host of smart grid security startups. Such dynamics could be analogous to the $30 billion network security industry created with the emergence of the Internet over the past 15 years. We favor companies that are at the forefront of security innovation and standards (Trilliant Networks), driving strategic interests from traditional network security leaders (Cisco, IBM) as well as vertically integrated AMI providers.

Ken So
kenneth.so@gpbullhound.com
San Francisco: +1 415 986 7480

Christian Lagerling
christian@gpbullhound.com
London: +44 (0) 207 101 7576

INTRODUCTION

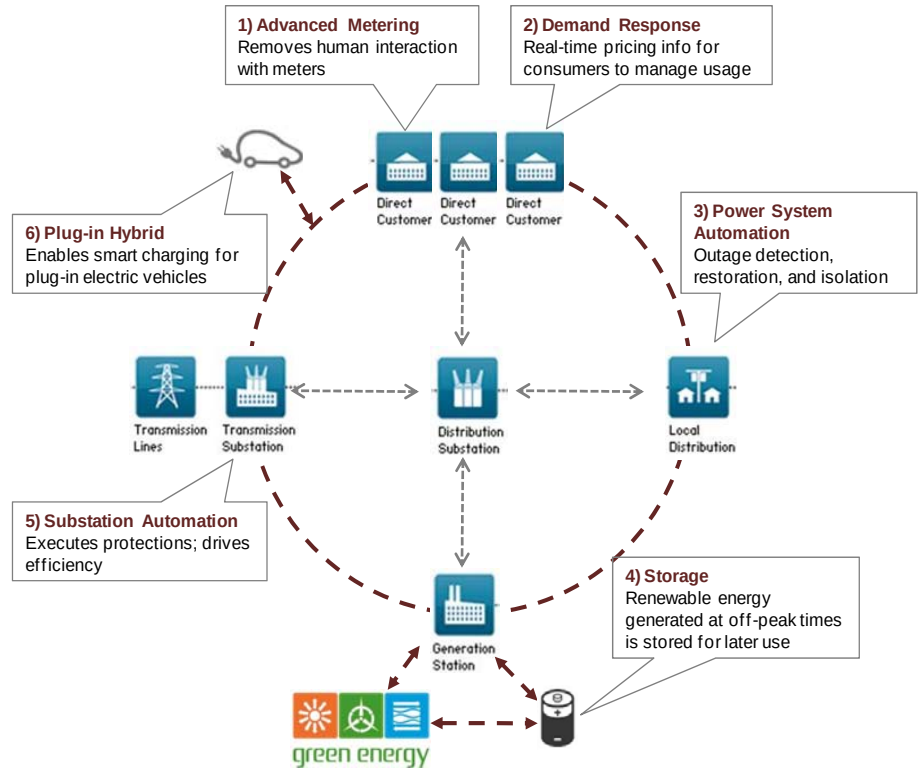
Investments momentum and strategic interests in the Smart Grid sector surged in 2008, setting a record year in venture capitalist funding and drawing a number of tech heavyweights to the scene (Google, IBM, Cisco). As the cleantech space emerged as the fastest growing asset class among venture and strategic investors fueled by federal incentives and a rise in climate change awareness, we launch a series of cleantech reports to help investors identify unique cleantech themes and refine their investment strategies. This report is the first of the series, which takes a deep-dive into the Smart Grid sector and discusses the competitive dynamics and outlook based on our interviews with industry experts, market leaders, and upstarts.

What is the Smart Grid?

The existing power grids around the world date back to the early 20th century and have not been fundamentally changed ever since. Subsequently, our current power grids are outdated and inefficient, and the term “Smart Grid” has emerged as the catchall term used to describe the confluence of technologies and solutions that will constitute the *next generation* modern and efficient grids.

The smart grid is not a single disruptive technology but rather a disruptive concept that brings network communications, analytics, feedback and control to our existing power grid systems with the goal of improving efficiency and making environmental impacts. Within the smart grid ecosystem, sophisticated meters (advanced metering infrastructure (AMI), Demand Response) would empower consumers with a clearer picture of energy usage and price in order to make better consumption decisions. Sensors and smart appliances could adjust a household's power consumption to lessen demand on the grid at peak times. Utilities would also enjoy new efficiencies through substation automation and advanced components (superconductivity, storage) that could store and distribute renewable energy such as solar and wind.

Exhibit 01 – Smart Grid Ecosystem



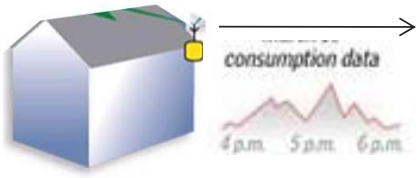
Source: GP Bullhound

Why is the Smart Grid Important?

In the US, on average, the power generating station was built in the 1960s with mid-century technology. The average age of a substation transformer is 42 years old, pushing beyond its shelf-life of 40 years. Further, the existing grid has only a one-way communication, with a starling lack of information for either the utilities or the consumers. For example, when a blackout occurs, the grid operators have no knowledge of the failure until a homeowner calls to complain. The state of the current electricity architecture in Europe is no different, comprising of highly centralized carbon-based power generators. If the existing system is updated, an estimated 20% of Europe's energy could be produced by existing renewable sources such as wind turbines or solar panels (~9% today). Notably however, the future of the smart grid is more uncertain in Europe as the region lacks the same level of financial incentives that the US has committed to in the recent stimulus bill.

While we have lived with these inefficiencies for more than half a century now, we are faced with the vast array of renewable energy resources (wind, solar, geothermal) waiting to be tapped. Smart grid plays a critical role in enabling the transformation of our energy landscape.

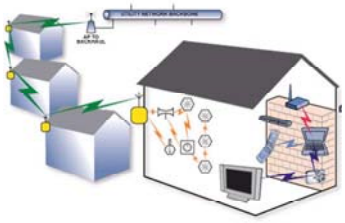
Exhibit 02 – Example of How the Smart Grid Helps to Avoid Blackouts



Step 1: The utility company remotely collects real-time usage data from smart meters.

Step 2: It identifies a potential power failure during a high-demand period.

Step 3: The utility redistributes power across its service area by sending a radio signal to customers' smart appliances (thermostats, air-conditioner) to turn power on and off.



Source: GP Bullhound

The value of smart grid technologies has been difficult to quantify in a simple cost-benefit analysis due to 1) the multi-tiered benefits that are provided to each stakeholder and 2) the fact that deployment is done incrementally over a very long period. Therefore, the best way to characterize and simplify the benefits in our view is in three successive phases.

The first leg in smart grid deployment relates to demand-driven technologies (AMI, Demand Response). The combination of greater interaction between consumers and utilities and greater security would result in lower energy consumption.

The second leg relates to the power distribution, improving adaptability and stability of the system. This is by far the biggest 'bang for the buck' as such initiatives could prevent costly blackouts and other disruptions.

The third phase is the build-out of supply-side enabling technologies (energy storage, substation automation). Such initiative is critical for the integration of renewable energy to the existing system, eliminating the need to reinvent the energy distribution infrastructure.

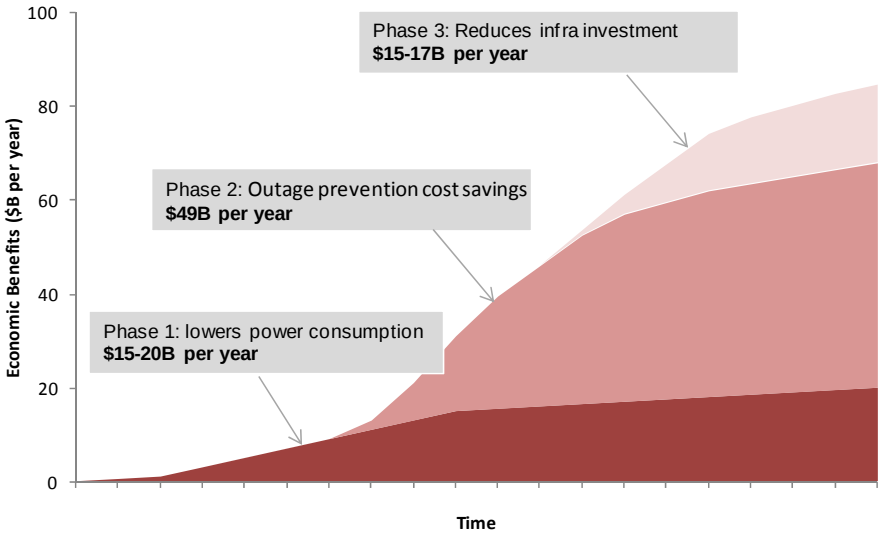
Exhibit 03 – The Smart Grid Value Creation

Phase 1: Demand-side (AMI, demand response)	**Phase 2: Distribution** (power system automation)	**Phase 3: Supply-side** (substation automation)
▪ **Interactive** – empowering consumers with dynamic pricing info	▪ **Adaptive** – self healing by responding to system problems	▪ **Optimization** – making the best use of resources while minimizing operations and costs
▪ **Secure** – detecting and response to attacks from man-made or natural disruptions	▪ **Stability** – integrating localized power sources to the grid with high power quality and reliability	▪ **Reach** – distributing across geographical and organizational boundaries

Source: GP Bullhound

According to a study by Galvin Electricity Initiatives, the cumulative economic benefits of transforming the current electric distribution system to a smart grid could reach $90bn annually by 2020 (see Exhibit 4).

Exhibit 04 – Potential Economic Benefits in the US



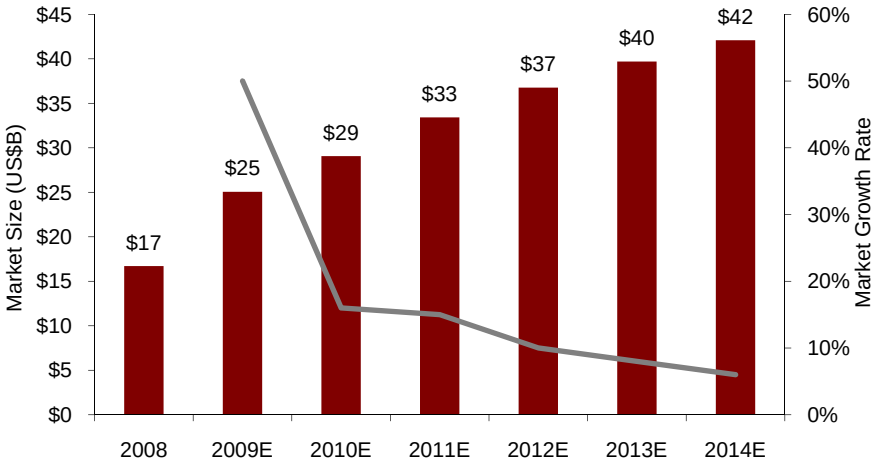
Source: Galvin Electricity Initiatives (2009), GP Bullhound Analysis

Significant Market Already – and Growing

According to Deloitte technology, the global smart grid market generated an estimated US$17bn of revenues in 2008. The market is forecast to grow rapidly in 2009, reaching $25bn (+50% y/y). Forecasts suggest that the total market will continue to grow at an average annual growth rate of 11%, reaching US$42bn by 2014. The market currently breaks down into:

- AMI (20-25%): led by Itron, Landis+Gyr, ESCO
- Demand response (12-17%): led by EnerNOC, Comverge
- Distribution and components including sensing, measurement and control, distributed generation, and distributed storage.

Exhibit 05 – Global Smart Grid Market Size and Growth Rate Forecast



Source: Deloitte, FERC, GP Bullhound Analysis

Summary – Short-term Appetite Not Living up to the Buzz

While the long-term benefits of the smart grid are clear, skepticism has been mounting on the magnitude and rapidity of the economic benefits with the smart grid adoption.

The sentiment is not unfounded as the smart grid vision hinges on three fundamental premises:

- **Premise #1: Consumer behavioral change** – By conveying real-time pricing, the smart grid will encourage consumers and utilities to redistribute their consumption of electricity to off-peak hours of the day. This will "level load" and solve the perennial problem of utilities in meeting demand that occurs a few hours and days of the year.
- **Premise #2: Concerted efforts on all sides** – The smart grid requires significant planning and coordination across all the stakeholders (policy makers, energy producers, operators, and consumers). First and foremost is interoperability. When a new solution is incorporated into the system, it must be able to configure and communicate with legacy systems.
- **Premise #3: A radical change in utilities' business models** – Traditional utility business models do not benefit from energy conservation as energy consumption is directly tied to their profits. Hence a workable model has to allow both utilities and consumers to share in the savings from lower energy consumption.

The biggest hurdle to the smart grid adoption thus far is not the lack of technological advances, but rather instilling impactful financial and social incentives to drive these three fundamental premises. While government incentives (US stimulus bill for example) and decoupling initiatives are important steps forward, until the conservative utilities groups get comfortable with the three pillars of the smart grid concept, the pace of adoption will remain choppy in our view.

SMART GRID TECHNOLOGIES AND SOLUTIONS

As stated earlier, the smart grid is a collection of a broad range of technologies and solutions that optimizes electricity transmission and distribution.

Two critical components at the forefront of the smart grid value chain are Advanced Metering Infrastructure (AMI) and Demand Response.

Advanced Metering Infrastructure (AMI)

The simplest form of AMI is Automatic Meter Reading (AMR), a 1980s technology, which replaces mechanical meter. The meters communicate directly with the utility and remove the need for humans to interact with the meters. However, it is still consists of a one-way communication. The next generation consists of two-way communications, allowing utilities to "talk" to the meter and control other devices. More importantly, real-time usage information enables utilities to dynamically monitor and price electricity consumption in order to 1) predict individual usage to better manage supply, 2) detect faults, and 3) supply electricity more efficiently to consumers.

Products and solutions include: hardware/software AMI, meter data management, metering/analysis software.

Market leading suppliers include:

- **Itron** (NASDAQ: ITRI) – WA, US headquartered, 8,500 staff, $1.9bn revenues (CY08), $2.1bn market cap (5/28/09)
- **Landis+Gyr** (Private) – Switzerland headquartered, 370 staff, estimated at $170m revenues (CY08)
- **ESCO** (NYSE: ESE) – MO, US headquartered, 2,200 staff, $623.8m revenues (CY08), $1.0bn market cap (5/28/09)

Demand Response

It is the method of managing energy consumption devices by directly supplying pricing information to consumers. The key premise is to allow utilities to reach out and modify consumers' consumption behavior at critical peak times either directly (remote load controls) or via pricing incentive models, thereby shedding loads during peak demand. The deployment is predicated on the roll-out of advanced meters and communication infrastructure (wired or wireless).

Products and solutions include: Demand-side management, distribution monitoring and control software, and demand/cost response software.

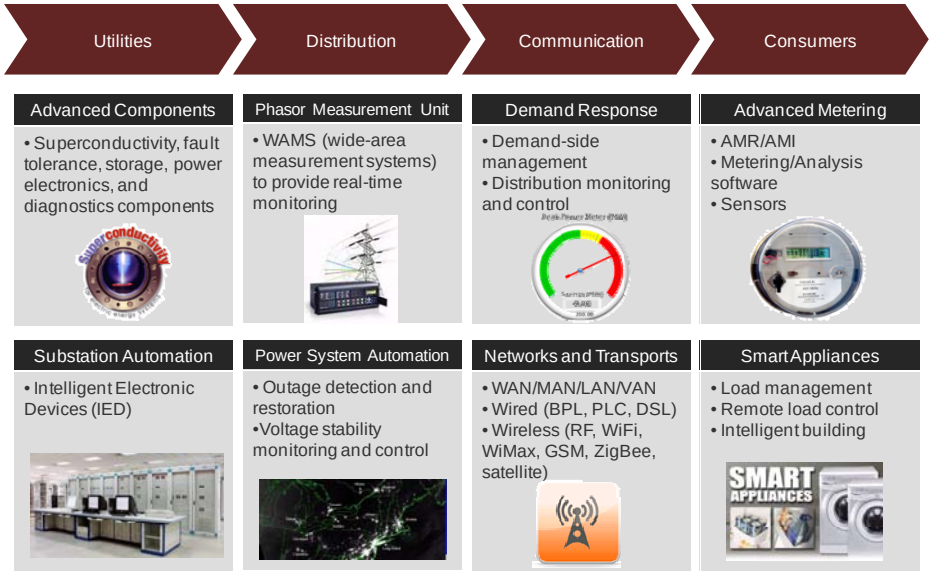
Market leading suppliers include:

- **EnerNOC** (NASDAQ: ENOC) – CA, US headquartered, 345 staff, $106.1m revenues (CY08), $480.2 market cap (5/28/09)
- **Comverge** (NASDAQ: COMV) – NJ, US headquartered, 385 staff, $77.2m revenues (CY08), $208.2m market cap (5/28/09)

The key to the smart grid concept pivots on the adoption of existing technologies used in other applications (manufacturing, tele-communications). We categorize these technologies in four key groups along the smart grid value chain.

1. **Utilities** – manage the integration of macro components, renewable energy sources, and new systems to the grid infrastructure
2. **Distribution** – drive efficiency and automation in existing distribution infrastructure
3. **Communications** – provide various techniques to manage the two-way communication between utilities and end consumers
4. **Consumers** – hardware and software that enable the connection to the endpoints in the grid

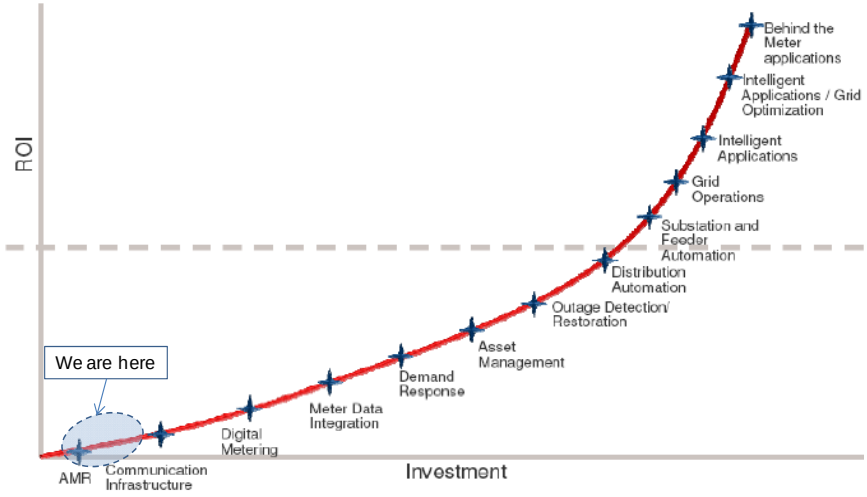
Exhibit 06 –Technology and Solutions along the Smart Grid Value Chain



Source: GP Bullhound Analysis

While the smart grid is still in the early innings of the adoption cycle, the good news is that AMR, the first piece of the puzzle, is matured and time tested as millions of end points have already been deployed. The nascent market augurs well for new applications to emerge given easing technology barriers. We expect Demand Response to take center stage as the next leg in smart grid technology adoption.

Exhibit 07 – Smart Grid Technology Adoption Curve



Source: Independent Electricity system Operator (IESO), 2008, GP Bullhound

Storage and Distribution are Key Requirements for Effective Adoption

Current outdated distribution system is widely regarded as the bottleneck for renewable energy development. Without a smarter grid, we cannot effectively tap into our vast renewable energy reserves. According to Energy Policy Institute, three wind-rich US states (North Dakota, Kansas, and Texas) have enough wind resources that if harnessed, can meet the electricity demand in the entire country. The biggest challenge is not the generation of renewable energy, but rather moving and storing the electricity from where it's generated to population centers often far away (eg., wind power from North Dakota to the populous city of Chicago).

We believe the powerful momentum in clean energy investments in recent years will fuel smart grid innovation and further garner interests from the tech heavyweights (Google, Cisco, IBM), a harbinger for market adoption.

Local Initiatives

While the European markets have a higher number of installed smart meters (skewed by Italy), the North America smart grid market has seen a greater level of activity since late 2007 underpinned by growing government and private investment activities. Extrapolating current growth trajectory, the US will surpass Europe in its number of smart meters installed by 2014.

California – PG&E is on track to deploy nearly 10 million electric and gas meters by end of 2011, currently at 2.3 million installed which began in 2006. GE and Silver Spring Networks will be the primarily beneficiary of the roll-out.

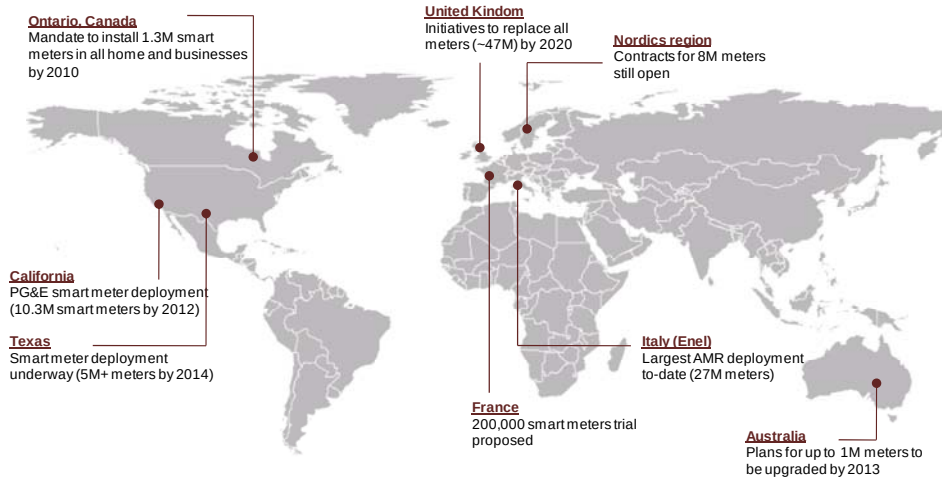
Austin, Texas – Austin Energy of Austin, TX, is expected to roll out its Phase 1 smart-grid project of 500k smart meter devices by July-09. The

utility has also installed 86,000 smart thermostats and 2,500 distribution grid sensors across its service territory. Vendors for the project include GE Energy, IBM, Oracle, and GridPoint.

Ontario, Canada – The province mandated all local distribution companies to install 1.3 million smart meters in every home and small business by 2010. Trilliant Networks, an AMI vendor, will provide the communication infrastructure and software applications.

Enel of Italy – Enel installed over 27 million customers between 2000-2005, the world's largest smart meter deployment to-date. The project cost approximately 2.1 billion Euros. Enel estimates the cost savings is 500 million Euros per year, suggesting an astonishingly short 4 year payback time.

Exhibit 08 –Advanced Metering Initiatives Around the World



Source: GP Bullhound Analysis

MARKET DRIVERS AND CHALLENGES

Key Factors Driving Market Adoption

The increasing cost of energy bills has created a demand from consumers for more control over their energy consumption decisions. The overall economic benefits to the consumers could potentially be staggering. Consider a market during an energy crisis could see its energy costs climb to a whopping $1,000 per megawatt hour (from $7-10/MWh off-peak). Deferring peak energy usage or reducing peak consumption is by far the highest leveraged win for all consumers (two 2006 Carnegie Mellon studies showed a ~10% reduction in peak demand). Continuous improvement of awareness and transparency should give customers incentives to be active participants in the energy market, fueling further growth in smart grid adoption.

Governments around the world are putting regulatory standards to help with smart grid implementations. Two government initiatives remain pivotal for smart grid adoption: 1) subsidies (tax credit, grants), needed for utilities to justify their investments and 2) interoperability mandate, a timetable to push for collaboration on standards. The recent buzz is centered on the American Recovery and Reinvestment Act of 2009 (Obama's stimulus plan) that comprises of $4.5bn in grants for smart grid technology development. However, the program caps at $20 million for a given project, which is a drop in a bucket compare to the sheer size of a smart grid deployment project (PG&E budgeted $1.7bn, FPL $700m, and Duke Energy $1bn over the next five years).

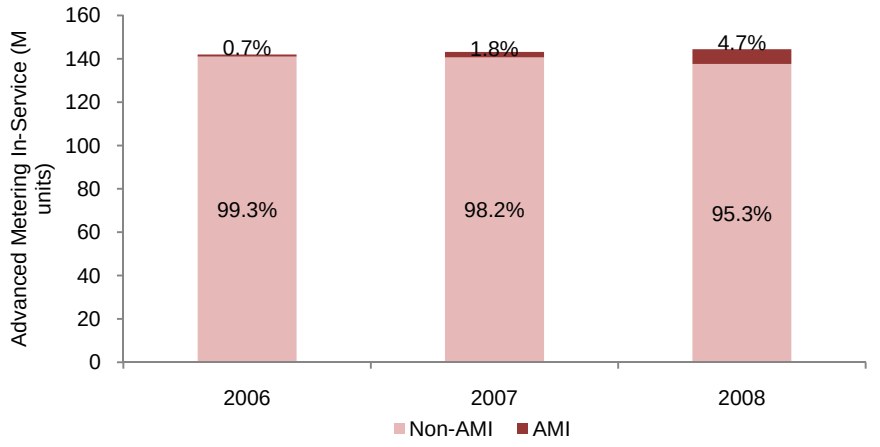
But Challenges lie Ahead

While advanced metering has been available on the market for more than a decade, overall adoption of the technology by utilities has been rather anemic thus far. There are 2.7 billion meters worldwide, but only 8% are automated (electric (10%), gas (12%), water (5%)). The United States has been the most aggressive country to adopt with 46% of installed meters converted to automated metering (AMR). That said, current US AMI penetration stands at a mere 5% of total meters, growing at mid-single digits annually. The sluggish growth has squarely been blamed on the utilities' fear of stranded costs and regulatory uncertainty. The Electric Power Research Institute estimates the cost of building a smart grid in the US to be a staggering $165 billion, about $8 billion a year for two decades. Further, the current global economic crisis coupled with the lack of clarity in the US stimulus bill casts doubt on the near-term viability of advanced metering infrastructure (AMI) and has derailed recent AMI programs:

- San Diego Gas and Electric pushed back its deployment start date to 2Q09 (from Feb 09 previously) due to technical and security issues.

- PG&E (California US) now expects to complete its electric AMI upgrade installations by 4Q12 (vs. 1Q12 previously).
- PSEG suspended its AMI pilot and program early in the quarter.

Exhibit 09 – US Advanced Metering Penetration Rate



Source: 2008 FERC Survey, GP Bullhound Analysis

Utilities Struggle With ROI Case and Will Need Regulator Push…

The traditional utilities' business models simply work against the notion of energy conservation; that is the lower energy consumption, the lower the revenue for utilities. This potential loss of revenue coupled with significant upfront investment discourages utilities from supporting smart grid initiatives, despite the overall economic and social benefits they create. For example, PG&E in California estimates the cost of its meter program at $2.2bn for 5.4 million electric advanced meters. To date, it has installed 557,000 meters but less than 2% of those consumers have taken advantage of the advanced features to put cost savings to work. While progress has been made to reduce the disincentives (decoupling programs in at least ten states in US, Stimulus bill), there is simply a lack of sustainable financial rewards – and regulatory reforms – for utilities to be the first adopters and to take on the added operational and financial risks.

Unclear Regulatory Guidelines

The controversy centers on the difficulty in quantifying the ROI of an advanced metering project. In US, each AMI plan requires an approval from the state commission before the project is deployed. The utility must demonstrate a positive cost-benefit which could come from operating cost savings such as 1) avoided meter-reading costs, 2) faster outage detection, and 3) improved customer service. However, in many instances, operational benefits alone could not make up the ROI needed for approval. While many utilities build their cases with the inclusion of Demand Response benefits, the lack of a reliable and accurate method to

assess the net benefits of Demand Response programs has consequently slowed overall progress.

Lack of Standards and International Harmonization

In contrast to the Internet which is a great example of a global standard, the smart grid industry, over the past decade, has been scrambling to agree on a set of standards. Indeed, the slow pace of standards adoption has widely been blamed on:

1) the scope and complexity that spans across a wide range of industries and disciplines,

2) financial incentives for each stakeholder, and

3) protectionism (many neighboring countries use different voltages and socket types).

Today’s situation remains confusing and chaotic with overlapping standards from established bodies and de facto standards from new players. To further compound the problem, a true smart grid needs to interact with standards from other industries, such as heating and air conditioning, commercial buildings, home appliances and automation, and plug-in hybrid vehicles. To be fair, recent progress is evident in driving standards adoptions including the much anticipated standards guidelines that address security issues and promote uniform software communication (slated to be released by mid-2009, according to NIST). However, many solutions providers and utilities are skeptical of such initiatives to gain traction. Without such standards, each country will have to develop the entire ecosystem of proprietary device makers, application developers, and service providers. Such scenario will likely force manufacturers to customize each solution, thus driving up the cost and protracting the rate of adoption for utilities.

COMPETITIVE LANDSCAPE

We find the current environment conducive for smart grid upstarts to make headway in the nascent market given 1) stakeholders still in search of standards and 2) fragmented customer backdrop reducing buyer power (Itron has 8,000 customers without a single 10% customer). While traditional AMR vendors are highly concentrated, dominated by Itron with 46% market share in the US, the AMI segmentation is much more fragmented given the multi-layer disciplines within the smart grid ecosystem.

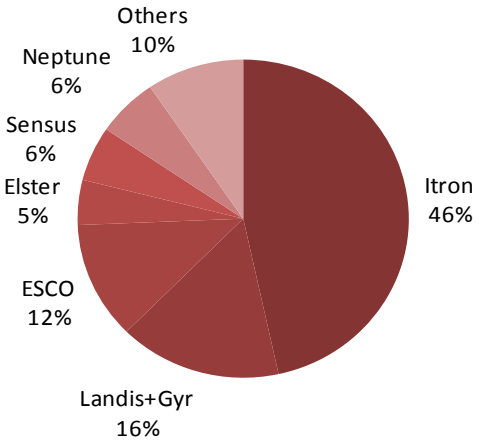
The table below categorizes select smart grid vendors in 8 key segments:

Exhibit 10 – Selected Smart Grid Vendors

Advanced Metering	Demand Response	Backend Systems (Data Mgmt)	Network Systems
Itron (public)	Advanced Telemetry	eMeter	Arkion Systems
Landis+Gyr	Ameresco	Itron (public)	Current Group
ESCO (public)	EnerNOC (public)	Oracle (public)	Datamatic
Elster	Comverge (public)	SAP (public)	DCSI
Sensus	CPower	OSIsoft	Echelon
Neptune	GridPoint	GridPoint	Eka Systems
GE Energy (publ.)	Honeywell	Ecologic Analytics	Google PowerMeter
Badger	Nighthawk Systems		Silver Spring Netw.
MasterMeter	PowerSecure Int.		SmartSynch
	Trilliant Networks		Trilliant Networks
			Tantalus Systems
			Tendril Networks

Wide Area Measure-ment Systems	Grid Automation Software	Resource Integration	Energy Storage
Doubletree Systems	GE (public)	GridPoint	A123 Systems
Macrodyne Inc.	GridPoint	IBM (public)	Altair Nanotech.
PowerWorld		Ice Energy	NGK Insulators
			Ice Energy

Exhibit 11 – North America AMR Market Share (2008)

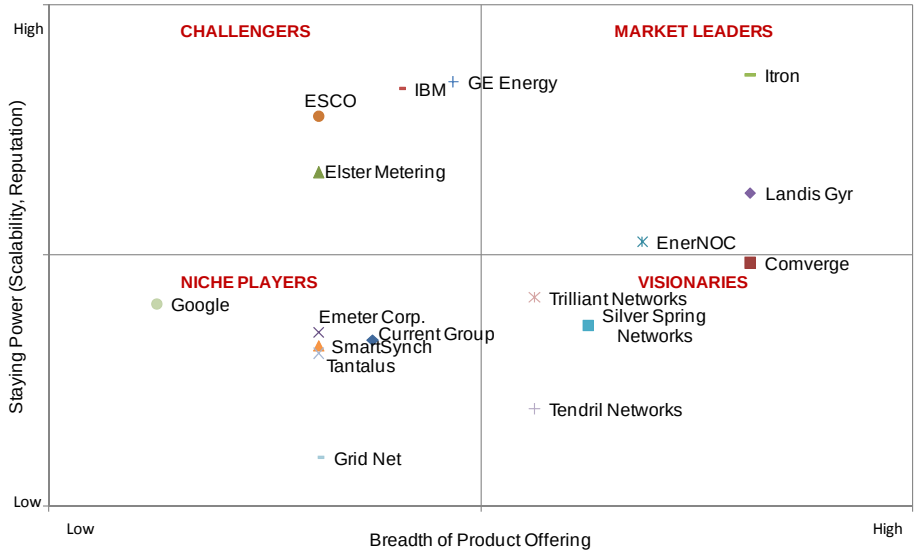


Source: The Scott Report AMR Deployment Q4 2008, GP Bullhound Analysis

Below we lay out a framework to assess the competitive positioning of the key players, a subjective analysis based on their staying power and breadth of product offerings. Given the scope of the smart grid ecosystem as well as relevance to investors' interests, we have focused only on the

AMI and Demand Response segments in our competitive analysis. Overall, we find the traditional AMR vendors to remain in market leading positions (Itron, Landis+Gyr, EnerNOC) given their scale, geographical reach, and strong reputation among the conservative utilities group. Right behind them are the visionaries (Trilliant Networks, and Silver Spring Networks) that attempt to redefine the vision of the energy platform. Rounding out the long tail are the niche players. We see significant challenges ahead for some of these companies given the lack of scale and unproven standards.

Exhibit 12 –AMI Competitive Positioning



Source: GP Bullhound Analysis

Notes: Staying Power is a weighted index of revenues, mind share, years in business, and headcount. Breadth of Product Offering is a weighted index of number of products and services and targeted segments.

Promising Upstarts

Silver Spring Networks

Key Highlights:

- Founded in 2002; ~50 staff; $5m+ annual revenues; based in CA, US
- Also known as the "Cisco of the grid", uses unlicensed 900 MHz spectrum and puts wireless devices on power lines, transformers, and home meters to send information to utilities
- Received $90mm in funding led by Kleiner Perkins Caufield & Byers (Mar-09)
- Key competitors: Trilliant Networks, SmartSynch

Competitive Advantages:

1) Strong pipeline (won a massive contract with PG&E); $500 million in backlog that could quadrupled by end of 2009
2) Open architecture approach (specs and communication standards) to gain first mover advantage as the defacto standard

Competitive Disadvantages:

1) Limited market share thus far with few installed meters
2) Scalability is uncertain with mesh networks

Trilliant Networks

Key Highlights:

- Founded in 1998; ~300 staff; $40m+ annual revenues; based in CA, US
- Offers a full suite of network solutions (wireless, RF network operating system, comm chips, gateway, mgmt tools)
- $100 mm in revenues in 2008
- Received $40mm in funding from MissionPoint Capital, Zouk Ventures
- Key competitors: Silver Spring Networks, SmartSynch

Competitive Advantages:

1) Strong pipeline momentum on the heels of the largest AMI deployment ever with HydroOne in Ontario, Canada (1.3 million meters by 2010)
2) Offers a 'true' open-standard platform to integrate smart meters, in-home displays, smart controls and devices

Competitive Disadvantages:

1) Limited mindshare relative to competitor (Silver Spring Networks), lends risk to platform adoption
2) Weak International presence (only contract is in Ireland outside of North America)

No Man's Land

eMeter

Key Highlights:

- Founded in 2000; ~150 staff; $15m+ annual revenues; based in CA, US
- Delivers meter data management solutions for utility mass market, and commercial and industrial deployment
- Products: 1) EnergyIP, an enterprise meter data management software platform and 2) Business Process Management Tools
- Current contracts with CenterPoint Energy, Alliant Energy, and Southern California Edison (5.3 million meters through 2012)
- Key competitors: Oracle, Ecologic Analytics (contract with PG&E)

Competitive Advantages:

1) Implementation knowhow; deep expertise and long-time relationship with utilities
2) Partnership: Itron, SAP, Oracle, Control4 (smart appliances, thermostats)

Competitive Disadvantages:

1) Lack of product offering (focuses only in a niche area (meter data management))
2) Only a fast follower in demand-response

SmartSynch

Key Highlights:

- Founded in 1998; ~40 staff; $10m+ annual revenues; based in MS, US

Competitive Advantages:

1) Inked partnership with AT&T to provide wireless network to commercial and residential markets

- Provides network capability for smart meters to link via cellular networks for residential and commercial meters
- Received $25 mm Series D from Credit Suisse, Siemens VC, Batelle Ventures, and others (May-08)
- Key competitors: Silver Spring Networks, Trilliant Networks

Competitive Disadvantages:

1) Using cellular networks could be cost prohibitive for many customers
2) No real presence outside of North America

Significant Hurdles Ahead

Google (NASDAQ: GOOG)

Key Highlights:

- Google's PowerMeter is currently in internal beta testing (~50 Google employees are using home energy monitors to record their power usage)
- Key competitors: Greenbox Technology, Tendril Networks

Competitive Advantages:

1) Scalability and accessibility (albeit in different area)
2) Robust programmability
3) Knowhow in security
4) Standards savvy, an open-systems platform (think Android)

Competitive Disadvantages:

1) Lack of industry knowhow
2) No relationships with utilities
3) No real killer apps

Grid Net

Key Highlights:

- Founded in 2006 by Ray Bell, former CEO of Silver Spring Networks; based in CA, US
- Focuses solely on WiMAX, which is drawing supports from Intel, GE, Sprint, Clearwire.
- Signed pilot deals with four utilities (EnergyAustralia, SP AusNet, American Electric Power, Consumers Energy)
- Funded in 2006 by Intel Capital, GE, and Catamount Ventures (undisclosed amount)
- Key competitors: **S**martSynch, Silver Spring Networks

Competitive Advantages:

1) Technology advantage with WiMAX strategy: a) high reliability and security
2) Strong strategic partnership with GE and Intel

Competitive Disadvantages:

1) WiMAX is much more expensive given the licensed spectrum
2) Highly dependent on the success of WiMAX deployment, which is facing stiff competition from LTE in Europe

Tendril Networks

Key Highlights:

- Founded in 2004; ~40 staff; $3m+ annual revenues; based in CO, US
- Provides home energy management software and hardware of smart plugs and energy displays in an open architecture
- 7-yr deal with Reliant (TX, US); Pilots with 5 major utilities; tests with 15 others
- Received $12 m Series B from RRE Ventures, Vista Ventures, Access Venture, Appian Ventures (Mar-08)
- Key competitors: Greenbox Technology, Control4

Competitive Advantages:

1) Provides a robust set of open APIs in an open architecture
2) Partners with market leaders: Itron, Landis+Gyr
3) Placed big bets on Zigbee, which is the emerging standards for in-home modules

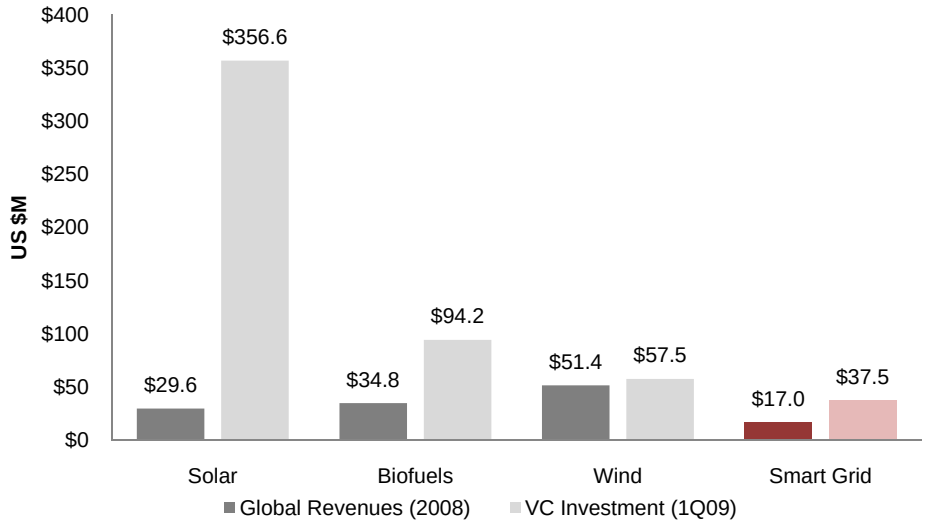
Competitive Disadvantages:

1) Unproven business model selling directly to consumers instead of utilities
2) Limited systems integration experience beyond pilot phase
3) Unproven ability to scale and limited mind share, barriers to standards adoption

INVESTMENT IMPLICATIONS AND OPPORTUNITIES

VC investments in clean technologies have slowed in 2009 amidst the difficult macro environment. After a record year in 2008 ($461 million total smart grid investments), investments are off to a slow start. Smart grid investments are dwarfed by investments into other cleantech areas such as solar, biofuel, and wind. In Q1 of 2009, investment in smart grid only nudged $37.5 million in five deals, only 8% of total smart grid investment in 2008 and roughly 5% of overall cleantech investment (vs. solar at 67% of total).

Exhibit 15 – Global Cleantech Revenues (2008) vs. VC Investment (1Q09)



Source: GP Bullhound Analysis

Notes on global revenues: **Biofuels** (global production and wholesale pricing of ethanol and biodiesel), **Wind** (new installation capital costs), **Solar** (including modules, system components, and installation)

We expect resurgence in smart grid investment activities once the private equity market returns to a more normal state. While we believe the smart grid is approaching the peak of the hype cycle, investor sentiment is unlikely to retrench given smart grid's three powerful hallmarks: 1) strong capital efficiency, a better alternative to other capital-intensive clean-tech verticals (solar, wind), 2) no technological breakthrough required (the technologies of the smart grid are familiar vernaculars), and 3) benefits increase with time as the aging electricity grid only gets older.

As many tech heavyweights have entered the game (Cisco, Google, Intel, Oracle, AT&T) in recent years, we expect M&A activities to be robust, with a particularly sharp focus on the software-centric companies given the favorable capital efficiency and ease of integration.

1. **Consumer Play** – Cisco's interest in smart grid is well known (teamed up with GE in the $200M smart grid project in Miami). To content with its heavyweight counterparts that have recently entered in the field (Google), Cisco is likely to make a strong push into smart

grid consumer gear and software. Private companies that focus on in-home energy monitoring devices include GridPoint, Greenbox Technology, and Tendril Networks.

2. **Security Play** – Just as the Internet has created a whole new industry to prevent cyberattacks, currently a $30 billion+ market, we believe the smart grid is apt to spawn a host of smart grid security startups addressing the growing concerns of security vulnerability. The fear of a single hacker disrupting service to homes and businesses or worst causing a blackout has slowed adoption for utilities. Companies that are at the forefront of security innovation and driving security standards are likely to garner a close look. We expect traditional network security leaders (Cisco, IBM) and vertically integrated AMI providers to be potential acquirers.

Mining the smart grid landscape, we find many of the smart grid private companies share similar profile: consists of $1-3 million in annual revenue and scores a small-scale utility pilot deal. Amidst a sea of smart grid upstarts, we identify three key criteria to help investors to better gauge the next smart grid opportunity:

1. **Scalability** – The lack of scale remains the Achilles heel for many niche players in scoring major utility contracts. Many major utilities, a notoriously conservative group, make their procurement decisions based on balance sheet strength, vast resources, and end-to-end solutions, leaving smaller niche companies in a rural coop. However, niche players that have strategic partnership with market leaders (eg., Silver Spring Networks with GE Energy) are likely to fare better.
2. **Open standards** – The use of open standards is critical to ensure the reliability and security of the electric system. Companies that will likely parish are those that are levered to a single proprietary standard which raises significant adoption risks or lack management expertise working with regulators and utilities to drive standards adoption.
3. **First mover advantage** – Each smart grid project deployment process is long and complex, going through a series of trials and testing before the multi-phase launch. A first mover advantage is critical not only to get a leg up on establishing the standards, but also to drive network externalities for future contract wins.

Recent Private Placement Activity

Date	Target	Investors	Total Value ($M)	Business Description [Target/Issuer]
04/23/2009	Energy and Power Solutions, Inc.	Altira Group LLC; Robeco Group N.V.; NGEN Partners, LLC	30.0	Offers xChange Point energy and carbon management system for industrial and manufacturing executives
04/06/2009	Ember Corporation	Chevron Technology Ventures L.L.C.; ePlanet Ventures; GrandBanks Capital Inc.; New Atlantic Ventures; et al.	8.0	Develops wireless sensor and control network technologies for building automation, integrated home automation, and metering markets
03/09/2009	SynapSense Corporation	American River Ventures, DFJ Frontier, Nth Power LLC, Emerald Technology Ventures AG, Sequoia Capital, Robert Bosch; et al.	7.0	Provides wireless instrumentation solutions that offer energy efficiency and carbon footprint reduction for data centers and enterprises
01/06/2009	Sentilla Corporation	Claremont Creek Ventures, Onset Ventures	7.5	Provides demand-side energy management solutions for commercial and industrial facilities
12/29/2008	Positive Energy, Inc.	New Enterprise Associates	14.0	Provides energy efficiency and conservation solutions
11/24/2008	Ambient Corporation (OTCBB: ABTG)	Vicis Capital, LLC	8.0	A smart grid communications platforms integrator, develops high-speed IP-based data communications networks over existing medium and low-voltage distribution grids in North America
10/30/2008	Eco Power Solutions Corporation	Altira Group LLC	7.0	Develops energy recapture and emissions reduction solutions
10/28/2008	Ice Energy, Inc.	Second Avenue Partners, Energy Capital Partners	33.0	Manufactures and markets energy storage solutions, and cooling and refrigeration products for residential and commercial markets
10/07/2008	Silver Spring Networks, Inc.	Foundation Capital; Kleiner, Perkins, Caufield & Byers; Northgate Capital Group, L.L.C.	90.0	Offers IP-based network enabled meters that allow utilities to implement metering solutions
09/23/2008	GridPoint, Inc.	Goldman Sachs Group; New Enterprise Associates; Robeco Group; Perella Weinberg Partners; Susquehanna PE Investments	100.0	Provides an intelligent network that integrates load measurement and control devices, energy storage technologies, and renewable energy sources into the electric grid
09/11/2008	Telvent Git S.A. (NasdaqGS:TLVT)	Abengoa SA; Waddell & Reed Investment Mgmt; Ivy Investment Mgmt Co.; Waddell & Reed Advisors Science and Technology Fund	103.0	Provides products, services, and integrated solutions to customers in energy, traffic, transportation, and environment industries
08/20/2008	Trilliant Networks, Inc.	MissionPoint Capital Partners, Zouk Ventures Ltd	40.0	Provides wireless network solutions and software for advanced metering, demand response, and grid management applications
08/19/2008	EnOcean GmbH	Wellington Partners Venture Capital GmbH, Siemens Technology Accelerator GmbH, BayTech Venture Capital, et al.	6.6	Manufactures and markets wireless sensor solutions for use in buildings and industrial installations
08/05/2008	BPL Global, Ltd.	El Dorado Ventures; Novitas Capital; Cross Atlantic Capital Partners; Morgan Stanley PE; International Financial Advisors, K.S.C.	23.0	Provides software to electric utilities including user security management, data repository and reporting, messaging, and common user interface framework services
06/01/2008	EKA Systems, Inc.	RockPort Capital Partners, Flybridge Capital Partners, The Westly Group	18.5	Manufactures and supplies wireless smart network, smart grid networking, and AMI for electric, gas, and water utilities to monitor and control customers' water, electric, and gas data
05/22/2008	SmartSynch, Inc.	Kinetic Ventures; Endeavor Capital Mgmt; GulfSouth Capital; Siemens VC; Southern Farm; OPG Ventures; Battelle Ventures; CSFB	20.0	Provides Smart Grid Intelligence solutions monitor, capture, and transmit power consumption data in time-based intervals over IP-based networks
04/24/2008	Verdiem Corporation	The Phoenix Partners, Catamount Ventures Management LLC, Kleiner, Perkins, Caufield & Byers, The Westly Group, et al.	12.0	Provides PC energy management solution that allows organizations to manage and measure energy consumption on PC networks
04/13/2008	Silver Spring Networks, Inc.	Foundation Capital; Edison Electric Institute Inc.	17.4	Offers IP-based network enabled meters that allow utilities to implement metering solutions
04/06/2008	eMeter Corporation	Foundation Capital; Siemens AG (DB:SIE); DBL Investors	12.5	Delivers energy information management solutions for utility mass market, and commercial and industrial deployment
03/28/2008	Tendril Networks, Inc.	RRE Ventures LLC; Access Venture Partners; Vista Ventures; Appian Ventures Inc.	12.0	Provides residential energy management systems (REMS) for utilities industry and its consumers
03/27/2008	GridPoint, Inc.	The Quercus Trust	15.0	Provides an intelligent network that integrates load measurement and control devices, energy storage technologies, and renewable energy sources into the electric grid

Recent M&A Activity

Date	Target	Buyers	Deal Size ($M)	EV / Sales	EV / EBITDA	Business Description [Target/Issuer]
05/28/2009	SkyPilot Networks	Trilliant Networks, Inc.	na	na	na	A maker of long-range wireless mesh broadband equipment
11/06/2008	Applied Mesh Technologies	SmartSynch	na	na	na	Provides leading-edge communications solutions to utilities and their commercial and industrial customers seeking to remotely monitor and control their energy usage
09/23/2008	V2Green	GridPoint	na	na	na	A software provider aims at helping utilities manage the future power demands of charging plug-in vehicles from the electric grid
06/11/2008	MapFrame	GE Energy	na	na	na	Develops mobile mapping and field automation technology for electric, gas and water utilities, telecommunications and CATV/broadband organizations
04/30/2008	CURRENT Group, LLC, Smart Grid Network	Oncor Electric Delivery	90.0	na	na	Collects, stores and analyzes data, and provide automated notification and report generation directly to the user
04/03/2008	Plan B Solutions LLC	BPL Global, Ltd.	na	na	na	Offers substation automation services for the electric utility markets
02/22/2008	Connected Energy Corp.	BPL Global, Ltd.	na	na	na	Provides Web-based energy management and control solutions and brings local control systems online to create a control center
01/31/2008	Xtend Energy	Cpower	na	na	na	A provider of rapid response services to industrial, commercial, and retail customers
01/11/2008	RTP Controls, Inc.	Gatekeeper Systems, Inc.	2.5	na	na	Offers automated demand response, real-time price control, and aggregated power monitoring solutions for commercial, industrial, and institutional facilities
01/08/2008	Serveron Corp.	BPL Global, Ltd.	na	na	na	Offers transformer online monitoring including dissolved gas analysis of the insulating oil of power transformers and other oil-filled equipment
10/01/2007	OZZ Corporation	Trilliant Networks, Inc.	na	na	na	Provides wireless network solutions and software for metering, demand response, and grid management applications
09/29/2007	Public Energy Solutions, LLC	Comverge, Inc. (NasdaqGM:COMV)	24.4	3.4	na	Provides services include lighting energy audit and analysis; system design; engineering, financing and utility rebates, installation and maintenance, and load reduction technologies
09/12/2007	MDEnergy, LLC	EnerNOC, Inc. (NasdaqGM:ENOC)	11.6	4.6	11.3	Provides energy consumption analysis, account placement, and process management services, and risk management programs
06/27/2007	Enerwise Global Technologies, Inc.	Comverge, Inc. (NasdaqGM:COMV)	87.5	6.1	-	Offers demand response services, energy consumption analysis, management of peak loads, and energy consulting
01/15/2007	Tyron Technology	BPL Global, Ltd.	na	na	na	Provides power line communication products and services in Brazil
11/30/2006	Cellnet+Hunt	Landis+Gyr Holdings	705.0	na	na	Offers RF mesh network communications and PLC networks, distribution automation, and software that provide operational control for AMI and PEM networks
02/01/2006	Aclara RF Systems Inc.	ESCO Technologies Inc. (NYSE:ESE)	71.3	na	na	Offers advanced metering infrastructure systems that is connected to water meters, or integrated into electric and gas meters and network devices

Analyst Profiles

GP Bullhound is a research centric investment bank headquartered in London with offices in San Francisco.

Christian Lagerling – Christian is a co-founder of GP Bullhound. He previously worked in the Corporate Finance department of BZW/Barclays Capital. Prior to Barclays, Christian worked as a research analyst for Connecta, a Scandinavian management consultancy. Christian completed his degree in Economics and Finance at the London School of Economics followed by an MSc Finance at the Stockholm School of Business

Ken So – Prior to joining GP Bullhound, Ken So worked at Citigroup as an Equity Research Associate covering Semiconductors. Ken also spent 8 years in the Semiconductor industry where he held program management and design engineering positions at SanDisk Corp and others. Currently an MBA candidate at UC Berkeley Haas, Ken also received a M.Sc and B.Sc in Electrical Engineering from University of Illinois Urbana-Champaign and University of Waterloo respectively. He currently holds six patents with two pending.

GP Bullhound Ltd, 52 Jermyn Street, London, SW1X 6LX
http://www.gpbullhound.com, info@gpbullhound.com, +44 20 7101 7560