



## Key Trends in the Clean Energy Industry

### Introduction

The clean energy industry is expected to be an important growth market and one that is at a momentous point in terms of scale-up of technologies that will transform production, delivery and consumption of energy. The success of the clean tech and renewables sector requires thoughtful collaboration among entrepreneurs, investors, strategic partners, government, and non-governmental organizations – collectively, the “ecosystem”. To that end, on October 11 and 12, 2012 Goldman Sachs hosted the inaugural Clean Energy Ecosystem Summit in Menlo Park, which brought together more than 150 leaders to reflect, collaborate and discuss ways to drive the growth of the clean energy industry.

In total, there were more than 20 panel discussions in which participants shared their views on how they are engaging the various actors in the ecosystem across a broad array of clean energy verticals ranging from solar (Clean Power Finance, DuPont Innovalight), biofuels (Ceres, Cool Planet, Solazyme), natural gas / hydrogen economy (Bloom Energy, Intelligent Energy, Siluria), electric vehicles (ChargePoint, Tesla, VIA Motors), waste to energy (Enerkem, Harvest Power, Waste Management), and smart infrastructure (Enlighted, GridPoint, Sora). We also heard from leading investors and strategic partners, including representatives of DBL Investors, Kleiner Perkins, Silver Lake Kraftwerk, TPG, T. Rowe Price, and GE Energy, who shared their views on the opportunities and challenges of investing in the clean energy industry. Founders of Nest and Opower provided a glimpse into the innovations that are underway in how we control, deliver and consume energy. Dan Tishman of Tishman Construction discussed the importance of addressing the built environment and Brigadier General Steve Anderson emphasized the strategic importance of renewable energy and energy conservation for the US military.

The following pages summarize the cross-cutting themes from this year's Clean Energy Ecosystem Summit (pg 2) as well as key discussion topics from each of the panels and presentations (pg 3-6).

#### Clean Energy Ecosystem Summit Panel Participants<sup>1</sup>

AECOM / Tishman Construction  
Bloom Energy Corporation  
Ceres, Inc.  
ChargePoint, Inc.  
Clean Power Finance, Inc.  
Cool Planet Energy Systems, Inc.  
DBL Investors  
DuPont Innovalight  
Enerkem, Inc.  
Enlighted, Inc.  
GE Energy  
GridPoint, Inc.  
Harvest Power, Inc.  
Intelligent Energy Limited.  
Kleiner, Perkins, Caufield & Byers  
Nest Labs, Inc.  
Opower, Inc.  
Relyant LLC (Brigadier General)  
Siluria Technologies, Inc.  
Silver Lake Kraftwerk  
Solazyme, Inc.  
Sora Inc.  
Tesla Motors, Inc.  
TPG Capital, LP.  
T. Rowe Price Group, Inc.  
VIA Motors, Inc.  
Waste Management, Inc.

*Disclosures: This document has been prepared by the Goldman Sachs Environmental Markets Group and is not a product of Global Investment Research. The opinions summarized are not those of Goldman Sachs, are not endorsed by Goldman Sachs, and are shared in good faith based on public statements made by conference participants. This document should not be used as a basis for trading in the securities or loans of the companies named herein or for any other investment decision. This document does not constitute an offer to sell the securities or loans of the companies named herein or a solicitation of proxies or votes and should not be construed as consisting of investment advice. We are not soliciting any action based on this material. It does not constitute a recommendation or take into account the particular investment objectives, financial conditions, or needs of individual clients.*

<sup>1</sup> Note: Not representative of all participant companies.



## Cross-cutting themes from Clean Energy Ecosystem Summit



**Convergence of digital technology and energy technology** – A recurring theme from clean energy companies underscored how they are bringing digital technology and software solutions to what has traditionally been a hardware oriented commodity business. Innovative companies are drawing on expertise from other technology verticals (IT, mobile, social media) to provide timely energy data, optimize customer interface, enable intelligent more reliable distribution systems, and drive product efficiencies and new business models.



**De-commoditization of the business model** – Technology advancements in this industry are driving a commoditized energy market to one that is enabling business models focused on de-commoditization. Utilities are learning how to differentiate their electrons by providing more meaningful energy consumption data and customer engagement tools, lighting is becoming less about cost and lumens and more about the high performance “environment / emotional” aspect of photons, thermostats are moving from a generic box on home owner’s walls to smart technology learning devices that have innovative design features, and advanced biofuel companies are looking to boost their return through renewable biochemicals targeted towards premium consumer segments (cosmetics, organic composts, etc).



**Growing importance of strategic partnerships** – With volatility in the capital markets and financial investors increasingly focused on lower risk, lower capital intensive business models, clean energy start-ups are seeking out strategic partnerships across the value chain. Strategic partners can offer not only the much needed growth capital but also greater credibility and the prospect of future off-take business and access to broader markets. Strategic investors in turn are looking for partnerships with clean tech companies to tap into innovative technologies, to play both defense against disruptive technologies that may cannibalize their revenue base and offense to help complement and grow their business.



**Expansive, more mature VC investment** – A number of leading VC investors mentioned that they are increasingly looking at mature business models that have been able to scale technologies to critical mass and have a more visible path to cash flow generation. This is in part driven by current public market conditions and companies taking longer to come to market. Another thesis from investors was the increasingly expansive nature of clean energy and the sustainability investment theme and how it is permeating into multiple industries. This is enabling more expansive investment opportunities in areas that are less capital intensive.



**Policy Risks and Opportunities** – Policy was not a dominant theme across panels, perhaps given the current lack of energy related policy impetus. However, there was acknowledgement of the importance of stable policy and its role in helping scale-up clean energy technologies. When it comes to subsidies, most companies felt that they should be viewed as a transitional “bonus” or “cherry on top” and that in order to succeed the focus needs to be on building profitable companies that aren’t reliant on government support in the long run. Most of the investors added that the benefit of subsidy programs is to allow nascent industries time to scale-up and become cost competitive and enable a better bridge to tap into public capital markets. However, for some companies and sub-sectors it is clear that certain regulatory bodies can serve as crucial partners, especially those that are working within ecosystems that are utility dependent.



## Key discussion topics from panels and presentations

### **Always Innovate (Nest) –**

Tony Fadell, founder and CEO of Nest, kicked off the summit with his vision for changing the functionality of residential thermostats, a space that has been overlooked and neglected, and noted that if energy was finite, gadgets that we interface with in the home would be radically different. Nest has sought out a way to change the face of the residential thermostat, a device that on average controls half of a home's energy use, by enabling the thermostat to learn schedules and self-adjust as well as enabling control from mobile devices (an example of digital and mobile technology converging with the energy sector). The design elements of the thermostat further highlights the de-commoditization, with sales being driven from both energy conscience consumers and designers.

### **The Rooftop Revolution (Clean Power Finance, DuPont Innovalight) –**

The panel discussion represented a diverse mix across sector verticals including distributed rooftop solar, financing, and efficient solar cell conversion technology. The discussion highlighted the fast growth in the distributed solar segment through the compelling value proposition of cleaner power that is cheaper and by enabling customers to realize energy savings without the upfront costs of purchasing systems outright. The large scale demand for new systems has provided a marketplace for innovative business models that can connect installers, who need capital, with investors seeking returns (Clean Power Finance). This in turn has the potential to bring new sources of capital and lower transaction costs. The industry has also recently seen a steep price reduction in solar panels, driven by innovations in areas such as cell process technology which boosts performance of solar cells (DuPont Innovalight), industry scale-up and cost down, as well as from lower cost panels from abroad.



### **Global Partnerships and Strategic Transactions for Clean Energy Today –**

Gene Sykes, Head of Global Mergers & Acquisitions and Chairman of Global Technology, Media and Telecommunications Investment Banking at Goldman Sachs, talked about the importance of global partnerships and strategic transactions in growth industries, such as clean energy. Though every industry is different, markets are inevitably volatile and cyclical (“Sine Wave”), and there are many lessons to be drawn from past cycles of boom and bust. Gene highlighted the importance of fostering partnerships and raising capital with a longer term perspective as vital to growing companies. For example, having high valuations in initial funding rounds can make it more challenging in subsequent rounds. He also commented on the importance for companies with strategic partnerships to be mindful of their partners' broader goals and to understand their pressure points.

### **Adding (Bio) Fuel to the Fire (Ceres, Cool Planet, Solazyme) –**

This panel addressed the challenges and opportunities facing the advanced biofuels sector. Feedstocks were a key discussion point. As the industry develops and companies begin to scale commercially, they are looking to establish stable, long term supply contracts with feedstock suppliers. Ceres is developing energy crops that help address the need. The complex ecosystem that this sector relies on was also highlighted, as companies come to rely on partnerships with customers, suppliers, investors and government. Solazyme referenced its partnership with the US Department of Defense, which has a long track record of innovation. Economic scalability, controlling cost drivers (input costs, transportation costs, etc), and additional revenue streams (renewable chemicals) continue to be a focus. Cool Planet is commercializing drop-in biofuels, a byproduct of which is bio-char, a soil enhancer.

### **Global Market Outlook and Prospects for Growth –**

David Solomon, Co-Head of Investment Banking Division at Goldman Sachs, shared his views on the global market and growth prospects. After what has been a challenging few years, financial markets seem to be showing signs of improvement. A good way of describing the current market sentiment is “long term optimistic, with short term macro risks”. These macro risks include the US fiscal cliff, European sovereign debt issues, a slow-down in China. The bright side is that we are also seeing a pick up in investor interest for innovative and entrepreneurial businesses (a la clean energy sector) as well as the desire to look at emerging growth regions around the globe.



### **Renewable Energy: A National Security Imperative... and Military Operational Necessity –**

Brigadier General Steve Anderson, who is currently Chief Marketing Officer at Relyant LLC and previously served 31 years in the military, led a discussion about the strategic imperative of energy demand reduction and renewable energy in keeping our troops safe and in enhancing military effectiveness. Brigadier General Anderson asserted that the US military could use renewable energy sources such as solar, wind, micro-hydro generation, geothermal, and waste to energy systems

to reduce costs to taxpayers and reduce the loss of human lives by not having to secure fossil-based fuel transport and storage convoys. An initiative he led to spray insulated foam on tents in Iraq and Afghanistan resulted in \$1 billion in annual energy cost avoidance for air conditioning and 11,000 fuel trucks taken off the road. The military has been on the cutting edge of many new technologies so the need to adopt new energy sources that are applicable in off-grid locations looks promising for renewable and other clean energy solutions.

### **Impact of Shale Oil & Gas on the North American Energy Outlook –**

Arjun Murti, co-director of Americas Equity Research at Goldman Sachs, provided an update on the natural gas revolution and America's energy future. The US energy outlook has been favorably transformed due to the recent boom in oil and gas exploration in shale rich locations. As a result, US power costs are expected to be among the lowest in the world due to shale gas and the US will become less oil import dependent, with China on track to import more oil than the US by the end of the decade. Given the abundance of shale reserves in the US, we should expect there to be additional investment focus on infrastructure assets. While a large scale natural gas conversion in the transportation sector is unlikely in the near-term given the infrastructure costs associated with consumer autos, we could expect to see fleet vehicles and municipal transport vehicles to gradually transition over to natural gas as a fuel source.

### **The Emerging Nat Gas / Hydrogen Economy (Bloom Energy, Intelligent Energy, Siluria) –**

Company representatives on the panel discussed the increasing demand for distributed on-site power generation and the growth of fuel cells particularly from commercial customers and data center customers. Driving this demand are customers looking for not only access to renewable and lower cost electricity, but more importantly a solution to managing reliability risks in the event of power outages. The director of product management from Bloom discussed financing models of customers which entail both outright purchases and those who are entering into long-term PPAs. Siluria's CEO discussed the cost competitiveness of converting methane to drop in fuels and chemicals and how utilizing gas as a feedstock for gasoline compares favorably to a barrel of oil. The CEO of Intelligent Energy highlighted the use of hydrogen as cost effective energy storage solution for solar and wind, where hydrogen storage could be used to address renewable energy intermittency, variation in demand and distribute energy between sectors. Once produced hydrogen can be stored in existing pipeline infrastructure and converted back to electricity or used as a transportation fuel.

### **The Next Big Things (Kleiner, Perkins, Caufield & Byers) –**

John Doerr, a partner at Kleiner, Perkins, Caufield and Byers, shared his view of the clean energy industry and the next big ideas. He discussed distributed generation, renewables (solar and wind), transportation (EVs, municipal vehicles, fleet vehicles), mobile power / batteries, biomass and waste to energy systems. He also highlighted the recent shift towards looking at mature business models that have been able to scale technologies to critical mass and have a more visible path to cash flow generation, in part driven by current public market conditions and companies taking longer to come to market. This trend has largely been driven by a number of factors including: companies requiring more capital to prove out technologies and scale-up, regulatory concerns for renewable energy companies weighing on public market participation, and valuation gaps between companies and public market investors. As a result, more companies are raising capital from private sources and establishing strategic partnerships until public markets become more active in the near future.



### **Inside the GE Partner Ecosystem (GE Energy) –**

Ronnie Hawkins, Vice President of Business Development for GE Energy, gave a presentation outlining the diverse mix of energy solutions on which GE is focused. While GE Energy's interests span the broader energy sector, it has been focused on clean energy segments such as distributed energy (scalable off-grid solutions, fuel conversion and critical power systems), energy efficiency (hi-tech electronics/conversion, grid automation/control), and software solutions for energy (data analytics, predictive maintenance). He provided a perspective to help growth

stage companies demystify the process of establishing strategic partnerships with GE Energy. While part of a much larger corporate entity, GE Energy is actually much more nimble than many perceive. GE Energy looks at strategic partnerships across the sector, but with a focus on innovative companies that offer technological solutions that are either complementary to existing GE technology or disrupting the existing competitive base in their sub-sector.

### **Innovation in Vehicles and Transportation (ChargePoint, Tesla, VIA Motors) –**

Executives from ChargePoint, Tesla and VIA Motors discussed the importance of the ecosystem for electric vehicles (EV), how traditional automotive companies are acting as both investor and customer of technologies (Toyota and Daimler for Tesla; GM and PG&E for VIA Motors), and the need for infrastructure and broader build out of charging stations. Tesla is deploying its own supercharging network to support its EVs, while ChargePoint continues to deploy its turnkey open network of charging stations by providing charging station owners (often places of extended stay such as parking lots, malls, restaurants, hotels) with the value proposition of greater customer stickiness through the added amenity of being able to charge their EVs. Also discussed was consumer adoption. Consumer demand for EVs is being driven by the desire for not only a more environmentally friendly vehicle, but for a “better way to drive”. On the commercial side, fleet managers are looking at more economical alternatives to the total lifecycle costs of their fleets and EV can present interesting economic motivations for adoption.

### **How SaaS Can Save the Planet (Opower) –**

Alex Laskey, President and co-founder of Opower, provided a compelling presentation on the ability for software solutions to facilitate energy efficiency and customer engagement. Its software-as-a-service (SaaS) helps utilities meet efficiency goals by aggregating energy consumption data, which is used to create home energy reports to engage customers. These reports not only provide single unit energy consumption data in an easy to understand construct, but also provides energy reduction tips and compares energy usage to neighboring residents to encourage positive behavioral changes. Since inception, Opower has found that 85% of customers who receive these reports take some step to reduce their energy consumption. The company is an example how the clean energy ecosystem is coming together - to bring customers and communities, utilities and regulatory bodies, and investors and clean tech entrepreneurs together to address energy efficiency.

### **Waste Not, Want Not (Enerkem, Harvest Power, Waste Management) –**

CEOs from Enerkem and Harvest Power as well as the vice president of organic growth for Waste Management, discussed emerging technologies and business models that convert waste to energy, the value of strategic partnerships and the regulatory environment. All three companies mentioned that they see success in this industry being led by companies that have technologies that can get to scale economically without ongoing reliance on government subsidies. Innovative business models are capitalizing on diverse revenue streams including front end tip fees, economic energy conversion process, and sales of higher margin products (renewable chemicals, compost, mulch, etc). The discussion on partnerships was particularly interesting as Waste Management is a strategic partner and investor of both Harvest Power and Enerkem. From the partnership, Waste Management will be at the cutting edge of energy innovation while both Enerkem and Harvest Power will benefit from access to new markets from Waste Management's extended geographic reach.



### **Building Better Buildings (AECOM / Tishman Construction Corp) –**

Dan Tishman presented a history of green buildings and how Tishman Construction developed innovative ways to build more efficient buildings to replace the older existing building stock in New York. With the emergence of green building certifications, such as US Green Building Council's LEED program, more and more new construction has been built greener and more efficiently, but he emphasized the need to continuously innovate and not be confined to the "checkbox" for certification. Tishman highlighted that the largest challenge will be in retrofitting existing buildings, where on average 25% of the energy is wasted. New financing structures will hopefully help alleviate some of the upfront costs associated with energy efficiency retrofits (similar to how innovative financing packages have helped residential solar scale-up). He also emphasized the need to educate on the benefits of energy efficiency to help drive adoption.

### **Smarter Infrastructure (Enlighted, GridPoint, Soraa) –**

The panel featured CEOs of Enlighted, GridPoint and Soraa, who have created technological solutions that both reduce energy consumption and provide better products / services. Soraa and Enlighted discussed how new technology breakthroughs such as next generation LED and thinking sensors are creating better lighting solutions with decreased energy use for customers. For Soraa, its LED technology has meant taking what was traditionally a commoditized lighting product to one that has superior light in addition to energy efficiency and cost savings. Enlighted utilizes sensor technology in buildings to better understand customer lighting needs and then optimizes the lighting solution, thereby providing significant cost savings for its Fortune 100 customers. Similarly, the CEO of GridPoint talked about how it is combining hardware and software to provide smart data monitoring at energy endpoints, which can drive more optimal and consistent energy consumption decisions across the portfolio. Gridpoint has been successful in showing customers true bottom line savings by harmonizing their energy use policies centrally.

### **Global Investing Perspectives on Clean Energy (DBL Investors, Kleiner Perkins Caufield & Byers, Silver Lake Kraftwerk, TPG, T.Rowe Price) –**

The final panel discussion of the summit focused on investors' perspectives on the current clean energy market. An overarching theme of the discussion was the increasingly expansive nature of the clean energy and sustainability investment theme and how it is permeating into multiple industries, including the cross-over between technology (software, mobile, IT), energy, infrastructure and industrials. This in turn is leading to a more expansive and diverse set of business models and investment opportunities. One of the investors underscored the importance of identifying great companies versus chasing particular technologies, while another discussed how institutional investors prefer to not take policy or commercialization risk. Part of the discussion also pointed to the fact that investors have become increasingly patient while business models mature when investing in the clean energy sector versus traditional information technology. Clean energy companies are taking longer to come to market and prove out their business models and investors are looking at companies that have a clear path to profitability pre or shortly post IPO. Particular interest was around low capital intensive businesses that are able to scale quickly and models that are less commoditized and more differentiated to consumers that enable premium pricing. At the same time, some investors are continuing to selectively look at "story stocks" that have disruptive technologies (intermediation of renewable financing, on-site distributed generation and smart infrastructure) that could be game changers for the energy industry.