

# Cleantech on the rise:

## Generational opportunities for 21st-century businesses

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2011



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# Introduction

The world is grappling with environmental realities in a new way. Reports differ wildly as to how long our global reliance on fossil fuels will be sustainable. Consensus is emerging that the next 10 to 30 years offer a window of opportunity that comes along not quarterly or annually, but periodically, generationally – perhaps only a few times in a century.

In terms of the cleantech industry, we see generational opportunities – comparable to those we saw just a few years ago in the high-tech and life sciences sectors – comparable to the development of telecommunications, air transportation, railways, even electricity. Many corporate thinkers would argue that the time is right for the right cleantech solutions, despite challenges and bumps along the way, as is evident from the highly publicized business failures of US solar panel manufacturers. Recent successful IPOs have demonstrated that the global investment community believes the time is right for investments that will pave the way toward greater sustainability of both international commerce and the environment. If you are leading a cleantech business today, you may well be in the right place at the right time.

The opportunities ahead for cleantech are global. They belong to leaders of companies who can bring the right vision, talent and intellectual capital together with the right understanding of global cleantech markets, regulatory environments and international operating efficiencies.

This is no small order. “Cleantech” is still a young industry. The term “cleantech” is still imprecisely defined. In our experience, it is not unusual for cleantech market entrants to invest significant upfront time defining who they are — and who they are not — as they seek investors, talent and business alliances.

This white paper concentrates years of our firm’s professional experience on four areas we believe cleantech companies must excel at if they are to succeed in the sector:

- the ramifications of global governmental policies;
- global operational and funding opportunities;
- corporate management and talent; and
- the need to stay focused.

You will find global insight based on the experience of Grant Thornton cleantech specialists. We have drawn perspectives from partners at Grant Thornton International Ltd (Grant Thornton International) member firms in India, Israel, the UK, China, Canada and the United States.

Our goal is to help you accelerate your success by integrating local and global market experience with Grant Thornton’s perspective on operating in the international arena, including all its promise, uncertainty and complexity.

For the benefit of the ambitious cleantech executive, this white paper explores three general themes:

- Governments worldwide express commitment to cleantech as a critical — though only partial — solution for meeting long-term needs for sustainable energy.
- The gap between governmental policy statements and practical, commercial applications of those policies is vast and fraught with unknowns.
- Success in cleantech is in the hands of corporate leaders who can develop and commercialize solutions with keen awareness of government policy but without undue reliance on public sources of funding or other forms of governmental support.

The information and insights discussed in this paper will help arm cleantech leaders, visionaries, intellectual property (IP) holders, boards and other stakeholders for the challenges they face. One point we make repeatedly is that, at this stage in the development of the cleantech industry, knowing the right questions to ask can be as important as having the right answers — if, in fact, those answers exist.

Equally important is understanding that no one person or small group of leaders can bring an organization to success without sharp, knowledgeable, and proficient external counsel well-versed in laws, regulations, finance, marketing, recruitment and other business-related matters.

As you read, please keep an eye out for MUST-DOs, MUST-KNOWs and TAKE-AWAYS that will help you in your decision-making.

We invite you to contact any of the contributors to this publication. Our goal is for you to benefit from our insight from experiences similar to yours. The professionals at Grant Thornton are poised to help you solve your problems, achieve your goals and reduce your business risk in this dynamic, global, generational market.



# What are governments doing?

Generational opportunities are within the reach of cleantech companies today, but only to the extent that these companies are adroitly managed, technologically proficient and attuned to a broad array of market considerations domestically and globally.

When we think about the market for cleantech, we have a lot to consider:

- Who are the current and future purchasers of cleantech outputs? Governments? Corporations? Individuals? Utilities? Aggregators of transactions on a smart grid yet to be developed?
- What are the outputs of the cleantech sector? Products? Services? Efficiency? Licensing agreements concerning IP?
- What kind of company would your stakeholders — investors, customers or business partners — call you?
- Where are governmental policies most favorable for your business?
- What kind of corporate structure and talent will maximize your success?

The Grant Thornton view is that opportunities for cleantech ventures are here and now — and are strongest for leaders and investors with long-term goals. We are at a time when status quo supply and consumption patterns are clearly unsustainable. The only question is how quickly the global market adjusts to environmental pressures and adopts cleantech solutions.

This question is complicated on the one hand by global economic conditions and on the other by the ramifications of events such as the Gulf of Mexico oil spill and the nuclear disasters at Fukushima. Uncertainty is the hallmark of all emerging business sectors, but as history tells us, uncertainty breeds innovation — and innovation breeds opportunity.

Therefore, the three MUST-KNOWs regarding governmental policies and commercial success are as follows:

- Governmental policies can shape cleantech markets.
- Governmental policies can deform or curtail cleantech markets.
- Corporate and capital interests favor cleantech.

## **Governmental policies can shape cleantech markets**

As a presidential candidate and early in his administration, President Barack Obama sounded the clarion call for America to assert global, commercial leadership in cleantech. Politics, along with continual shifts in global governmental policy, have resulted in an America that may be an incubator for cleantech ideas but may not have strong governmental support for cleantech market development.

The United States “enjoys” a leaner, more capitalistic environment for cleantech innovation than some EU, BRIC and other countries. During 2009–2010, U.S. IPOs in the cleantech industry generated \$1.1 billion. This strong but not world-leading investment opportunity reflects a policy toward cleantech that is not as supportive as cleantech policies elsewhere around the globe.

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The conventional-energy-rich province of Alberta, Canada, has implemented the first operational cap-and-trade system in North America. This system is supported by the Climate Change and Emissions Management Corp., a nonprofit funding organization whose mandate is to expand climate change knowledge, develop new clean technologies and explore practical ways of implementing them.<sup>1</sup>

In India, we have seen considerable, ambitious governmental commitments to cleantech. As the Indian government faces unprecedented demand for energy, it seeks to place the country on a path to global cleantech leadership, particularly in solar power. In 2001, the Energy Conservation Act created the Bureau of Energy Efficiency to coordinate, oversee and secure funding for an array of power-related issues. Within the authority of the Act, eight energy-related missions have emerged, including the National Mission for Enhanced Energy Efficiency, which is developing plans and financial structures for a range of energy projects.<sup>2</sup> In the solar context, the Jawaharlal Nehru National Solar Mission, launched in 2008, seeks to establish grid parity between solar and fossil-fuel power by 2022 and cost parity between the two by 2032. In the mission's vision, "the sun occupies centre-stage" in terms of Indian energy advancement.<sup>3</sup>

Facing comparable demands for new energy sources, China has integrated its growing commitment to conservation and both traditional and alternative energy development into its Five Year Plans since 2001. With its ability to enact (and have its citizens adhere to) long-term social, economic and governmental policy, there is little doubt that China is setting a brisk pace for cleantech business development.

Even in places like Israel — a country that is not often mentioned in the same breath as India or China — cleantech innovation plays an increasingly important role in governmental, industrial, commercial, investment and even security decision-making. Key focus areas are oil-reduction technologies, water management and solar power. Israel boasts more than 300 companies specializing in cleantech. Since 2009, cleantech investment in Israel has topped \$300 million, and no fewer than 15 Israeli cleantech investment bodies have emerged. In parallel, the Israeli government has introduced initiatives to reduce the global use of oil in transportation. The government's goal — to become a global knowledge center for alternatives to oil — is backed by an allocation of NIS 400 million and an annual prize from the prime minister of NIS 1.5 million for world innovation in fuels other than oil. Through this program, more than 100 startup companies and research projects are slated to launch by 2012 with the involvement of 20 Israel-based companies that operate globally.<sup>4</sup>



#### THE TAKE-AWAY

Globally, governments perceive cleantech as an opportunity for leadership and as a critical factor for solving the world's energy, environmental and climate challenges. These governments are introducing programs and policies to support cleantech in its various forms, from renewable fuel R&D to "smart" infrastructure development — from carbon-reduction technologies to manufacturing and generation efficiencies. Cleantech leaders must continually evaluate governmental policies around the globe and identify the opportunities that are most valuable to their business.

<sup>1</sup> Climate Change and Emissions Management Corp.; <http://www.ccemc.ca>

<sup>2</sup> Government of India, <http://www.india.gov.in/allimpfrms/alldocs/15659.pdf>

<sup>3</sup> Jawaharlal Nehru National Solar Mission, <http://india.gov.in/allimpfrms/alldocs/15657.pdf>

<sup>4</sup> Grant Thornton internal research



# Viewpoint from Israel

## **Shlomi Bartov**

Partner, Advisory Services  
Grant Thornton Israel  
shlomi.bartov@il.gt.com

Israel already leads the world in “wet” cleantech – advanced technologies that enable water reuse, recycling, monitoring, reclamation and security, with everything from nanotech to nuclear. The country boasts more than 250 companies in the field, many with game-changing innovations. Israel reuses a staggering 75 percent of its waste water, far ahead of the next-best water-saver at 12 percent.

Given its limited domestic energy resources and warm and sunny climate, Israel has also become a world leader in the development of solar energy technology. Solar power meets approximately 3 percent of Israel’s primary energy needs and 20 percent of residential energy needs; however, this is almost exclusively through the use of solar panels for water heating rather than for electricity generation. Construction of solar facilities is accelerating, and experts forecast significant growth and investment in solar power and other forms of alternative energy.

As evidence of the country’s governmental and commercial commitment, Israel is establishing a Renewable Energy Technology Center, with a second center for development of water technologies to be created within a few years. To launch the Renewable Energy Technology Center, the state has committed to injecting NIS 57 million over five years, with matching funds coming from its franchisee from the project, the Eilat-Eilat Renewable Energy Initiative. Eilat-Eilat is a consortium that includes some of Israel’s most important companies in R&D (Ormat, Elbit Systems, and Rafael Advanced Defense Systems), leading research bodies in renewable energy (Ben-Gurion University of the Negev and the Arava Institute for Environmental Studies) and the venture capital firm ProSeed.

Israel has also announced collaborative efforts with Canada to expand the R&D relations between the two countries. Water technologies and alternative energy are key focuses of the initiative. The Israeli government has begun to solicit applications from private companies, university researchers and other public-sector institutions regarding their interest in participating in the collaborative.

As with all ambitious governmental policy, the devil is in the details; politics will intervene and opportunities will be subject to on-the-ground realities as policy proposals take on real-world constraints. Local counsel — expert in the regulatory, political and business climate in Israel — is a critically important component for all serious cleantech players in Israel.

### **Governmental policies can deform or curtail cleantech markets**

Recent course reversals in numerous countries demonstrate that governmental commitments and policy may not always be reliable. This includes “wobbling” of all sorts. Countries like Spain, France, the Czech Republic, Canada, the United States and many — perhaps most — others have changed their positions regarding cleantech.

Through country-specific viewpoints within this white paper, we look at the ramifications of governmental policy for cleantech in the United Kingdom, Israel, India and China. The conduct of the German and Japanese governments also opens an illuminating window onto the dampening effects of uncertainties in governmental policy.

Consider Germany. The country has played the role of global catalyst for the development of alternative energy and other innovations that address global environmental, economic and climate challenges. For example, German subsidies aimed at creating parity pricing between alternative and conventional fuels (petroleum, nuclear and coal) have enabled a range of multimillion-dollar commercial cleantech ventures in that country. Support from the government has helped create some of the world’s leading cleantech corporations, technologies and clusters of innovation. But recent shifts in German financial support for cleantech have caused ripples of concern.

For example, with some €14.5 million in subsidies from the German government, one cleantech company was able to build a €21.8 million manufacturing facility in Germany. Now, however, the plant sits idle as a result of downscaled financial support from the German government. One wonders if governmental support wanes, how will cleantech corporations stay on track for success?

Concurrent shifts in German nuclear policy have accelerated in response to the 2011 Fukushima disaster, which heightened worldwide safety concerns. Around the world, nuclear projects have stalled or been mothballed while governments reassess the nuclear option. Within months of the Fukushima incident, Germany announced the permanent closure of its nuclear facilities by 2020. Likewise, Japan has reduced the number of nuclear reactors online from 54 to 19 (including those directly affected by the Fukushima earthquake and tsunami). The UK, on the other hand, has reaffirmed its commitment to nuclear power in the energy mix it envisions by 2032. In the face of factors such as these, no one can reliably predict how robust nuclear power will be in the future, but it’s inarguable that alternative energy sits at a sweet spot in terms of addressing next-generation needs for power and sustainability.



#### **THE TAKE-AWAY**

Successful businesses will have to navigate cleantech markets without undue, long-term reliance on government support, particularly financial support. Facing a range of economic challenges and their own domestic affairs, governments are not necessarily in a position to deliver on their promises. Cleantech corporations must be both mindful and wary, and they must enlist informed advice from professionals who understand the implications of governmental policy globally, nationally and/or regionally.



Given their own commercial, strategic, operating and humanitarian reasons, corporations are investing in cleantech, even at today's still relatively high purchase costs for cleantech products.

### Corporate and capital interests favor cleantech

Despite uncertain governmental leadership and a raft of energy unknowns, corporate and capital interests are aligning behind cleantech.

Thousands of corporations outside the cleantech sector are actively pursuing green strategies, either introducing or integrating commercially viable cleantech products to advance these strategies. Many are adopting these innovations in order to improve their efficiency, minimize their operating expenses, strengthen their bottom lines and signal their intent to be on the right side of the environmental issue. Here are some examples:

- Vestas, a Danish wind turbine manufacturer, is an early mover that has seized the opportunity in cleantech. Over a 25-year period, the company has grown into a major cleantech player with sharp increases in revenue, sales and turbine development beginning in 2000.<sup>5</sup> Vestas anticipates sales of 7,000 to 8,000MW in 2011 and announced a 31 percent increase in revenues for the first half of 2011.<sup>6</sup>
- In its 2010-2011 *Strategy & Sustainable Development Report*, Schneider Electric includes eight key indicators of progress in its commitment to global sustainability, including two-thirds of product revenue deriving from Green Premium products; 60 percent of purchases coming from suppliers who support the UN Global Compact; 110,156 tons of reduction in CO<sub>2</sub> emissions; and the enabling of 1 million people to achieve access to electricity.<sup>7</sup>
- Inspired in part by the Israeli government's goal of oil independence by 2020, Better Place is an Israeli company that is driving global governmental, corporate and consumer adoption of electric cars. In Israel and Denmark, Better Place has worked with the private and public sectors to deploy commercial EV battery switching and charging stations; near-term expansion targets include Australia, Canada and the United States.<sup>8</sup> Better Place has secured agreements from 92 companies, including Computer Associates and Motorola, to convert part of their motor vehicle fleets to EVs beginning in 2011.<sup>9</sup>
- As a direct result of its work with Greenpeace, Coca-Cola has announced its intention to remove hydrofluorocarbons (HFCs) from all its new vending machines by 2015, reducing carbon emissions by 52.5 million metric tons. In partnership with Unilever and McDonald's, Coca-Cola launched the global nonprofit Refrigerants, Naturally! in 2004 to combat climate change and ozone depletion by replacing HFCs with natural refrigerants. The nonprofit has been recognized by the United Nations as a "Partner in Sustainable Development."<sup>10</sup>

<sup>5</sup> Vestas, <http://www.vestas.com/en/about-vestas/history.aspx>

<sup>6</sup> Vestas, "Shareholder Information," [http://www.vestas.com/Files/Filer/EN/Investor/Shareholder/2011\\_02\\_Shareholder\\_information\\_UK.pdf](http://www.vestas.com/Files/Filer/EN/Investor/Shareholder/2011_02_Shareholder_information_UK.pdf), February 2011

<sup>7</sup> Schneider Electric, "Strategy & Sustainable Development Report 2010-2011," <http://www2.schneider-electric.com/documents/interactive-publications/2011-strategy-and-sustainable-development-report-en/index.htm>

<sup>8</sup> Better Place, <http://www.betterplace.com/global-progress>

<sup>9</sup> Ibid.

<sup>10</sup> The Coca-Cola Co., [http://www.thecoca-colacompany.com/citizenship/refrigeration\\_equipment.html](http://www.thecoca-colacompany.com/citizenship/refrigeration_equipment.html)

- Dow Chemical announced the launch of its POWERHOUSE integrated photovoltaic (PV) solar shingles in 2009. The product is a cornerstone of the company's goal to dramatically reduce the cost of building integrated solar products. *Time* magazine named the shingles one of the 50 best inventions of 2009. In 2011, Dow Solar received a \$12.8 million grant from the U.S. Department of Energy.<sup>11</sup> Reuters reported expected revenue from the product to reach \$1 billion by 2015.<sup>12</sup>
- In 2010, Siemens generated €27.6M in revenue from its environmental portfolio, representing more than one-third of its total revenue from sales and up from €26.8M in 2009. The company's technologies reduced global CO<sub>2</sub> emissions by 267 million tons from 2002 to 2010.<sup>13</sup>

Given their own commercial, strategic, operating and humanitarian reasons, corporations are investing in cleantech, even at today's still relatively high purchase costs for cleantech products. What this says is that, despite uncertain governmental policy, corporations are active customers of cleantech companies. Capital is moving. Innovation is robust. And as price differentials tighten between cleantech and fossil fuel outputs, cleantech will become further entrenched in national and global infrastructures.



#### MUST-DOs FOR CLEANTECH SUCCESS

- Ensure that you have a distinctive, value-added offering.
- Engage market researchers and other advisers to test global proof-of-concept.
- Enlist talent (board members, senior management, external consultants, etc.) to enable the commercialization of the offering.
- Hire global talent to finance and operationalize your product or service.
- Secure global expertise — internally or externally — to stay abreast of international cleantech policy.
- Join international, regional and national associations that specialize in cleantech.
- Attend international, regional and national conferences on cleantech.

<sup>11</sup> Dow Chemical Co., <http://www.businesswire.com/news/dow/20110902005285/en>

<sup>12</sup> Reuters, <http://www.reuters.com/article/2010/11/04/us-dow-solar-analysis-idUSTRE6A35WX20101104>

<sup>13</sup> Siemens, *Annual Report 2010*, [http://www.siemens.com/annual/10/download\\_center\\_en.html?p=siemens\\_at\\_a\\_glance#siemens\\_at\\_a\\_glance](http://www.siemens.com/annual/10/download_center_en.html?p=siemens_at_a_glance#siemens_at_a_glance)

# Viewpoint from India

## Vivek Singh

Associate Director, Strategic Services Group  
Grant Thornton India  
vivek.singh@in.gt.com

India's rapid economic growth, which the government hopes to maintain at 7.5 to 8 percent, is spurring exponential demand for energy. For every 1 percent of GDP growth, India's need for base power generation increases by 1.5 percent. In practical terms, this translates into an additional 20-25 GW of capacity annually, now and into the future.

India's need to develop capacity is urgent. In 2011, India ranks fifth in the world in terms of primary energy consumption, accounting for about 3.5 percent of global commercial energy demand. The Indian government faces a dilemma it must soon address: How can it meet exponential demand for energy when, at a global level, demand and competition for energy are also growing?

Coal dominates India's energy supply, with 70 percent of power generation coming from coal-fired power plants. All indications are that coal will remain India's primary energy source through 2032.

On the other hand, the report of the Planning Committee indicates substantial governmental support in many areas of cleantech, including the development of energy efficient technologies, renewable energy technologies and solutions that address India's dual population challenge: 1) increased consumer affluence that drives energy demand; and 2) a distributed rural population in the hundreds of millions with limited or no access to base power.

To strengthen the competitive opportunities for cleantech, the report proposes numerous steps. Among these:

- Reform the power sector to improve efficiency and energy intensity ratios.
- Establish tax and regulatory structures to create a level playing field for all parts of the energy sector.
- Establish transparent and targeted subsidies.
- Remove entry barriers for new players and imports.

The question is whether political will in India will rise to the challenge – and how corporations can successfully navigate shifting and uncharted waters. Local expert counsel is a must-have in instances such as this.

# Think globally about operational and funding opportunities

Perhaps like no sector before it, cleantech is emerging in a truly global manner — one that requires global scope, reach and business strategy. In terms of the high-tech and life sciences sectors, the United States has arguably been the incubator and developer of innovation, product/service commercialization and market adoption for some time. True, customer and consumer adoption has occurred globally, but the high-tech and life sciences sectors have been driven largely by U.S. entrepreneurs, idea guys, corporations and their investors.

Cleantech is not developing according to a U.S.-centric paradigm. The United States is a player but not a leader — at least not across the board. No cleantech company can afford to be isolated from developments on the world stage. If only in the area of high-tech talent recruitment, North American cleantech cannot develop successfully over the next 10 years without looking abroad.

## **The relevance of globalized cleantech operations**

Every company needs to consider its position relative to its markets — and specifically to its customers. To achieve success, cleantech companies must adopt the now-classic approach of thinking globally and acting locally. Commercial and governmental demands for cleantech are growing. But that is not to say that there is an international pattern for HOW these demands are growing. Differing aspects of cleantech are growing at different speeds around the world.

Solar, wind and alternative-fuel production are growing more quickly in some countries than in others — India, the UK and Germany, for example. Israel hopes to teach the world how to reduce individual (i.e., personal) dependence on oil. In different ways, nearly every country on Earth is engaged or interested in cleantech to some degree.

To a large extent, the question of cleantech is a question of global management. Where is the R&D opportunity richest? Where is the investment potential richest? Where is the talent? Relative to buyers, where are manufacturing facilities best located?

A Spain-based client of Grant Thornton UK LLP is tackling these kinds of questions.

The corporation is a relatively late entrant into the offshore wind sector, a position that may hold interesting benefits. Most EU offshore wind development activity takes place in the UK, which is seeking to create employment and economic development opportunities through wind farms, particularly in the North Sea. Without a turbine of its own in commercial production, this company is facing a number of key questions, such as:

- Where is the optimal location to situate R&D at this point in the company's development?
- Is the UK an ideal location for future capital investment and manufacturing operations?
- Is the UK a good location for other critical business operations?
- Does focusing on UK operations provide a long-term advantage over key competitors, particularly those that are heavily invested in operations elsewhere in the EU?

Perhaps like no sector before it, cleantech is emerging in a truly global manner — one that requires global scope, reach and business strategy.

## Cleantech is not developing according to a U.S.-centric paradigm.

Each of these questions — along with many others — holds myriad implications for business development, financing, facilities development and other critical aspects of running a business. Answers to such questions lead in turn to questions of international tax liability, tariff structures, operating expenses, regulatory compliance and workforce development. To a large extent, decisions of this magnitude fall to management, boards and their external advisers.

For cleantech companies to capitalize on emerging, generational opportunities, they must be managed by teams that are sophisticated about marketing and able to articulate the nature of their business, given the shifting sands of today's economic climate. They must be globally attuned and technologically proficient.

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### WHAT'S A CLEANTECH COMPANY TO DO?

To position themselves for success, cleantech businesses should consider how to:

- clearly articulate their position in the value chain and structure their operations accordingly;
- locate manufacturing facilities in countries with lower production costs and within close proximity to end users;
- prioritize markets with high levels of governmental support (such as business development incentives or end-user subsidies);
- establish firm, international protections for IP;
- secure external counsel for critical global business development; and
- develop and manage R&D activities from a global perspective.

### JIM BURTON

Denver Office Managing Partner  
jim.burton@us.gt.com

One of the cleantech success stories we've been involved with centers on a solar inverter company in the western U.S. The company was incorporated in the mid 1990s as an energy management company serving the semiconductor industry with reliable, high-quality electricity for manufacturing. In the mid 2000s, the CEO challenged the company to translate its AC-to-DC conversion technologies into DC-to-AC capabilities to meet the needs of the solar industry. Within four years, the company had commercialized DC-to-AC technology, realized sustainable revenues and completed the acquisition of a \$22 million company with related technology.

# Viewpoint from the UK

## Nathan Goode

Partner, Head of Energy, Environment and Sustainability  
Grant Thornton UK  
nathan.goode@uk.gt.com

In mid-2011, Secretary of State for Energy and Climate Change Chris Huhne, MP, significantly clarified governmental policy on the UK's future electricity market. The Minister's release of the white paper, *Electricity market reform*, promises great things for cleantech in the UK, such as being "at the forefront of low-carbon technological development, [r]eady to lead the world in the next energy revolution."

Key to the proposed electricity market reform is collaboration with and attention to commercial partners in energy development – with clear incentives for cleantech. For example, the road map by which market reform will occur identifies eight technologies that hold the greatest potential for the UK, all of them alternative sources of energy, with specific focus on wind, biomass and heat pumps.

Nevertheless, the government's white paper tries to perform a juggling act between low-carbon energy, security of supply and low-cost energy that may turn out to be fundamentally irreconcilable.

The government is committing to replacing a tried and tested renewable energy support mechanism with something entirely new that is highly interventionist in its approach. This is a gamble during a critical time in the transition to a low-carbon economy, but one that may ultimately pay off.

Overall, while the direction of travel may be the right one, the obscurity that characterizes this document does no one any favors. Corporations looking to develop or invest in the UK must do so with a careful, critical understanding of the government's direction and the many knowns and unknowns buried within the paper. Expertise in British public policy and the emerging regulatory frameworks is a must-have.



### Capital for cleantech is global, global, global

Capital is available internationally for cleantech investment. In fact, one of the positives of the current global economic crisis is that capital has been pent up on the sidelines. International investors are hungry for opportunities and have been funding cleantech companies. In the years 2009–2010 alone, an estimated \$13.4 billion was invested globally in cleantech IPOs.

Investors who come to the table with significant funding typically understand the uncertainties that surround cleantech. In our view, cleantech excites them because they see the correlation between generational opportunity, generational risk and — perhaps in the end — generational returns on investment. But uncertainty in cleantech also makes them cautious.

With long lead times in terms of product development and capital returns, cleantech reminds us of the life sciences sector. Generally speaking, both are capital-intensive. Both have a raft of governmental policy issues to negotiate (although these are more time-consuming in life sciences than in cleantech). Leaders of both sectors have entered the commercial arena without guarantees that their products or services have firm, sustainable markets.

In comparison, the cleantech industry — much like the life sciences industry in its earliest days — has demonstrated the ability to generate traction, as the following data points demonstrate:

- The ChiNext Stock Exchange has emerged as a dominant market specializing in cleantech. Since its inception in 2008, ChiNext has accounted for 37 percent of the capital raised in cleantech IPOs around the globe.<sup>14</sup>
- In May 2011, the UK government restated its commitment to reducing its carbon output to 80 percent of 1990 levels by the year 2050.<sup>15</sup> This goal is much more ambitious than goals governing overall EU carbon output. UK Member of Parliament and Secretary of State for Energy and Climate Change Chris Huhne notes that the UK intends to achieve its goals while signaling that it is open for business.<sup>16</sup> Huhne's hope is that by minimizing the impact of government policy on the cost of electricity, UK businesses will continue to play a role in delivering the green industrial transformation.<sup>17</sup>
- In 2007, applications for research projects in cleantech were received in Israel's Chief Scientist's Office worth a total of NIS 150 million. By 2010, the amount had jumped to NIS 380 million, representing a rise of more than 250 percent in three years. The amount of grants and the number of applications approved have grown by similar rates.<sup>18</sup>

International investors are hungry for opportunities and have been funding cleantech companies.

<sup>14</sup> Marcus, Stephen. "Heard of ChiNext? Most active stock exchange in cleantech," <http://blog.cleantech.com/cleantech-investments/ipo-watch/heard-of-chinext-it-is-the-most-active-stock-exchange-in-cleantech>

<sup>15</sup> Huhne, Chris. "Fourth Carbon Budget: Oral Ministerial Statement," [http://www.decc.gov.uk/en/content/cms/news/cb\\_oms/cb\\_oms.aspx](http://www.decc.gov.uk/en/content/cms/news/cb_oms/cb_oms.aspx), May 17, 2011

<sup>16</sup> *Ibid.*

<sup>17</sup> *Ibid.*

<sup>18</sup> Grant Thornton LLP internal research

- To help meet India's national emissions reduction targets, the Indian government has introduced: (1) a "clean energy tax" on coal that will create a national fund to support renewable energy projects and (2) a "tax break" for imports on renewable energy equipment. The clean energy tax is expected to raise government revenues by \$650 million annually — revenues that will be earmarked for cleantech promotion.
- U.S. IPO activity for 2009–2010 totaled \$1.1 billion with the main areas of investment being wind (\$350 million), biofuel (\$262 million) and automotive (\$260 million).
- According to *The 2010 SDTC Cleantech Growth & Go-To-Market Report* by Sustainable Development Technology Canada, the Canadian cleantech industry will shift from being for the most part a domestic market in 2007 to largely an export market by 2012.<sup>19</sup>

All of this information suggests that cleantech has traction. Few people argue with the need for a "cleantech revolution." Most agree that markets are formalizing. Most agree that customer adoption and reliable sources of revenue are necessary. And most agree that governmental support is a double-edged sword.

Many committed cleantech stakeholders believe that significant positive outcomes are attainable in the medium to long term, although timelines will vary among technologies. At the same time, the consensus is that consolidation must and will take place in cleantech — among existing players and those that emerge over the next half-decade or more. Therefore, even well-run organizations that enter the market successfully should do so with an eye toward an exit strategy.

#### A CLEANTECH TO-DO LIST

To succeed in current and near-term global capital markets, cleantech leaders must:

- ensure that their companies are capitalized by investors who know the cleantech industry and have long-term investment staying power;
- focus relentlessly on commercialization;
- understand and investigate the competitive landscape, securing global, external advisers as needed;
- understand the potential for disruptive technologies and regulatory changes to alter the landscape fundamentally and unpredictably;
- be willing to partner;
- secure international counsel to facilitate partnerships and other ventures;
- address the key question of how their technology meets tomorrow's energy challenges regarding the supply, security and reliability of energy; and
- seek professional advice to develop a global exit strategy.



#### TONY PARKE

Pacific Northwest Technology Practice Leader  
tony.parke@us.gt.com

In our view, cleantech investors are visionaries who see unique opportunities and who understand that ROI is at least a 10-year prospect. Given that understanding, they are excited by companies that promise significant yields within that term. They understand the uncertainty of cleantech. At the same time, with capital available, they are willing to bet that global environmental and business interests favor cleantech as an investment strategy. Corporate leadership must make the case that they offer solutions for moving the industry forward.

<sup>19</sup> Sustainable Development Technology Canada and Russell Mitchell Group, "The 2010 SDTC Cleantech Growth & Go-To-Market Report," [www.sdtc.ca/index.php?page=Other-Reports&hl=en\\_CA](http://www.sdtc.ca/index.php?page=Other-Reports&hl=en_CA)

# Structure and restructure to maintain agility and retain talent

Seizing generational opportunity requires managing generational talent. Think of the magnates of oil, steel, transportation and other industries of the 19th and early 20th centuries. While enterprise has come a long way since then, particularly in terms of social responsibility, we still have lessons to learn. If we are indeed exploring uncharted territory — as they did — what can we take away from their experiences? Similarly, what can we learn from the experiences of high-tech mavericks and life sciences inventors?

Above all, the lesson is that expansive vision is merely the first ingredient for success. For enterprises at the inflection point, steady leadership, adroit talent and capital management, and bold execution are the other keys to success.

Cleantech is a 21st century venture equal in magnitude to many others: oil, rail transportation, automotive and air travel, telecommunications, high-tech, and life sciences, to name a few. However, cleantech has unique pressures and challenges that make neat analogies to any other sector imperfect. Those of us in the global business community are only now coming to understand what “global business” actually means. Cleantech offers perhaps the first truly global, ground-floor-up opportunity for innovation, collaboration, success and impact.

Our experience not only with cleantech companies, but also with high-tech and life sciences companies, suggests that cleantech leadership must develop companies with the following in mind:

- protection of IP in international markets;
- development and maintenance of leading-edge, global technological acumen;
- establishment of business operations to capitalize on talent pools, manufacturing efficiencies, customer and value-chain relationships, raw material availability, and distribution channels;
- effective acquisition and management of capital to include: securing venture capital or other investment funds, planning for tax ramifications, and managing cash flow in a sector where significant ROI is not a reasonable near-term expectation;
- recruiting key talent and providing effective retention incentives — again, in a sector where significant ROI (in the form of stock options, for example) is a mid- to long-term prospect; and
- establishing senior management teams, advisory teams and boards of directors that can add value to businesses as they develop; necessarily, this process will involve shifts in leadership as a cleantech company resolves its key challenges, identifies its target markets and establishes itself within the sector.

At the executive, managerial and senior technical levels, cleantech as an industry is so new that there is simply not enough tested executive talent to go around. Routinely, clients of Grant Thornton International member firms address this issue by recruiting top people from comparable industries — specifically high-tech and life sciences. Many senior executives from these fields have been in the trenches. They’ve made sure that their product development moves forward in global markets even as they’ve kept regulatory and operational issues in mind. They’ve commercialized IP on shifting sands. They — and their advisers — have demonstrated their success in leading-edge, international environments.

If you’re already a cleantech executive, these characteristics may well describe you.



#### LOCATION OF IT TALENT

In June 2009, the Pew Charitable Trusts published a report indicating that clean energy accounted for 770,000 jobs in the United States, compared with 220,000 U.S. jobs in biotech; 989,000 U.S. jobs in telecommunications; and 1.3 million U.S. jobs in traditional energy. Collectively, this represents a workforce of 2.5 million people in the United States — most of whom are technically trained and hold college and advanced degrees in engineering and specialty sciences.<sup>20</sup>

For the past decade, China has outpaced the United States in terms of the number of engineers each country graduates: The gap is in the hundreds of thousands annually. In 2003, India also surpassed the U.S.<sup>21</sup>

All decisions regarding recruitment, facilities location, and technology R&D and services need to be filtered through the realities of talent availability. To some extent, the notion of offshore or outsourced labor is a 20th century paradigm with no relevance to cleantech. In a global market, global enterprises behave globally. In other words, global companies employ global talent, and they do so by operating where talent is available. There are no shores in today’s world, so the notion of offshore operations is moot.

<sup>20</sup> Pew Charitable Trusts. “The clean energy economy: Repowering jobs, businesses and investments across America,” [http://www.pewcenteronthestates.org/uploadedFiles/Clean\\_Economy\\_Report\\_Web.pdf](http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf)

<sup>21</sup> Gereffi, Garry et. al. “Getting the Numbers Right, International Engineering Education in the United States, China, and India,” [http://www.cggc.duke.edu/pdfs/Gereffi\\_JEE\\_Gettingthenumbersright-USChina&India\\_Jan2008.pdf](http://www.cggc.duke.edu/pdfs/Gereffi_JEE_Gettingthenumbersright-USChina&India_Jan2008.pdf)

# Viewpoint from China

## Yu Tao

Partner,  
Grant Thornton Jingdu Tianhua  
yu.tao@cn.gt.com

China's assertive commitment to the development and production of power, both traditional and alternative, has been spurred by huge increases in the demand for energy, which has grown exponentially as the country has pursued economic and market reform. More importantly, for investors with long-term horizons, energy demand will escalate as the country develops its industrial capacity, consumer base and environmental commitment.

China's emergence as a cleantech market leader is unique among other dominant players because it is guided by centralized governmental authority. The Chinese government began formal commitment to environmental initiatives with its 10th Five Year Plan (2001-2005), which established a goal to increase the country's forestation and urban green rates. The 11th Five Year Plan (2006-2010) significantly expanded environmental goals to include a 20 percent reduction in energy consumption per unit of GDP, a 30 percent reduction of water consumption per unit of industrial value added, and a 10 percent reduction of major pollutant discharge.

China's ability to execute against goal is a distinguishing quality among both developed and emerging economies. The country's ability to set and achieve economic, market, environmental and other policy goals has encouraged rapid international investment in the past decade. Within the cleantech sector, this track record has secured China's global leadership position for investment.

China's 12th Five Year Plan (2011-2015) establishes the country's most ambitious commitment to environmental resource conservation and management. By 2015, the government plans for non-fossil fuels to reach 11.4 percent of its energy portfolio, for CO<sub>2</sub> emissions to decrease by 17 percent per unit of GDP and for an 8 to 10 percent reduction of major pollutants.

In parallel with these policy commitments, we have seen cleantech investment in China skyrocket.

Despite these clear reasons for optimism, international investors must approach opportunities in China with a note of caution. China's rapid and ongoing transition creates a range of uncertainties in terms of business transactions, regulatory compliance and cultural expectations. Perhaps more than with any other advanced country, investors and corporate leaders must engage on-the-ground advisors to develop and implement successful business plans.

# Stay focused

When Grant Thornton looks at two decades of experience with clients in high-tech and the life sciences, one common risk rises above all others: the risk of losing focus on the core technology one is bringing to the market.

This is not surprising. At any given point, an executive team in cleantech, high-tech or life sciences is likely to be juggling balls of various sizes and shapes, literally around the world. Think of this scenario as the 24/7 challenge in 3-D.

In some ways, cleantech resembles high-tech. Both are innovation-driven. Both are directly linked to the market value of IP. Both require extremely broad perspective. On the other hand, cleantech may be far more capital-intensive and far more subject to national and international regulation. And there is an additional key factor influencing the demand for clean energy – the rise or fall of oil prices – something that no entrepreneur can control or even influence.

In other ways, cleantech resembles life sciences. Both are newer enterprises than high-tech. In both, proof of concept and adoption — and therefore yields on investments — require long-term effort. Compared with life sciences, cleantech may have a somewhat easier row to hoe, particularly in terms of bringing products to market. While cleantech companies face a raft of international environmental and regulatory requirements, they do not have the time challenges of clinical trials or international health approvals. On the other hand, not a single wave-energy device has survived a winter off the coast of Scotland, despite millions of dollars in investment. Proof of concept is not a given in cleantech.

Cleantech executives, their senior management teams and their boards need to develop corporate structures that enable technological work to advance without impediment — while also tending to the myriad marketing, operational, financial and global dynamics discussed in this white paper.

Ultimately, capitalizing on a generational opportunity requires the balanced, keenly focused eye of a seasoned executive. Environmental technology has been around for decades, but cleantech as a 21st century enterprise is untested. The greatest experience many cleantech leaders can bring to the table is having been there, done that — that is, having managed or operated in environments with global pressures, global challenges, global perspectives, global opportunities and perhaps more than a few global failures along the way.



## THE TAKE-AWAY

On top of all other considerations, players in the cleantech sector must continually assess, reassess, refine and recommit to their focus on core products and services.



# Final words

For cleantech stakeholders — IP holders, technologists, business and government leaders, and venture capitalists — opportunities in this sector are generational. They are also global in a way the world has not seen before.

To succeed in cleantech, executives must balance an enormous and complex range of issues, challenges and opportunities in the context of 21st century globalization. Cleantech leaders will need to assemble astute senior management teams, managers, boards and advisers — people who are proficient in their specialty areas, flexible enough to capitalize on shifting opportunities and committed for the long term. In addition, all of these teams and professionals must bring international experience and global reach to the table. In the cleantech industry, decisions regarding investment capital, facilities location, talent recruitment, R&D operations and customer access frequently require international strategy and activity. Ultimately, operating globally means working with teams or people who have deep, thorough knowledge of local markets — whether in India, China, the EU, North or South America, the Middle East or elsewhere.

For executives who can assemble the right teams, balance competing demands for time and resources, and maintain an unbroken focus on developing and commercializing their core technologies, the opportunities for success are significant and growing. Despite uncertainties in terms of governmental support — and despite the long lead times for generating ROI in the cleantech sector — the first decades of this century are likely to see historic shifts in how the global community thinks about, produces and uses energy. The window of opportunity is open for serious, committed cleantech players to become generational leaders in one of the most important fields of our time.

Each of the Grant Thornton professionals quoted in this white paper is available to provide further information, discuss industry- or country-specific experience, and to assist you in your journey toward success.

We look forward to helping you solve your business challenges, achieve your goals and reduce the risks associated with operating in a global environment.



# Office listing

## National Office

175 W. Jackson Blvd., 20th Floor  
Chicago, IL 60604-2687  
312.856.0200

## Washington National Tax Office

1250 Connecticut Ave. NW, Suite 400  
Washington, DC 20036-3531  
202.296.7800

## Arizona

Phoenix 602.474.3400

## California

Irvine 949.553.1600  
Los Angeles 213.627.1717  
Sacramento 916.449.3991  
San Diego 858.704.8000  
San Francisco 415.986.3900  
San Jose 408.275.9000  
Woodland Hills 818.936.5100

## Colorado

Denver 303.813.4000

## Florida

Fort Lauderdale 954.768.9900  
Miami 305.341.8040  
Orlando 407.481.5100  
Tampa 813.229.7201

## Georgia

Atlanta 404.330.2000

## Illinois

Chicago 312.856.0200  
Oakbrook Terrace 630.873.2500  
Schaumburg 847.884.0123

## Kansas

Wichita 316.265.3231

## Maryland

Baltimore 410.685.4000

## Massachusetts

Boston 617.723.7900

## Michigan

Detroit 248.262.1950

## Minnesota

Minneapolis 612.332.0001

## Missouri

Kansas City 816.412.2400  
St. Louis 314.735.2200

## Nevada

Reno 775.786.1520

## New Jersey

Edison 732.516.5500

## New York

Albany 518.427.5197  
Long Island 631.249.6001  
Downtown 212.422.1000  
Midtown 212.599.0100

## North Carolina

Charlotte 704.632.3500  
Raleigh 919.881.2700

## Ohio

Cincinnati 513.762.5000  
Cleveland 216.771.1400

## Oklahoma

Oklahoma City 405.218.2800  
Tulsa 918.877.0800

## Oregon

Portland 503.222.3562

## Pennsylvania

Harrisburg 717.265.8600  
Philadelphia 215.561.4200

## South Carolina

Columbia 803.231.3100

## Texas

Austin 512.391.6821  
Dallas 214.561.2300  
Houston 832.476.3600  
San Antonio 210.881.1800

## Utah

Salt Lake City 801.415.1000

## Virginia

Alexandria 703.837.4400  
McLean 703.847.7500

## Washington

Seattle 206.623.1121

## Washington, D.C.

Washington, D.C. 202.296.7800

## Wisconsin

Appleton 920.968.6700  
Milwaukee 414.289.8200

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