

# Public Policy and Cleantech – Obstacle or Asset?

A. Wardak\*, V. C. Taneja\*\*

\*University of Virginia, Charlottesville, VA, USA, [ahson@virginia.edu](mailto:ahson@virginia.edu)  
\*\*Clear Element Consulting, Kingstowne, VA, USA, [vivektaneja@gmail.com](mailto:vivektaneja@gmail.com)

## ABSTRACT

Alongside the development, commercialization, and entrance of clean technologies, cleantech, into mainstream Northern American markets, has been the North American investment community, which has made great strides to support cleantech innovations. As stated by James Stack the principal author of *Cleantech Venture Capital: How Public Policy Has Stimulated Private Investment*, "In 2006, cleantech became the third-largest North American venture capital investment category", with \$2.9 billion invested. As exciting as the growth has been in the cleantech industry, it is important to examine the deep impact public policy has had on its recent development.

The focused public discussion on global warming has been a publicity boon with regards to numerous clean technologies. Stack states, "National and state policies have provided early foundations for many cleantech sectors, although investors do not expect those policies to continue in the long term." The growth within the cleantech sector may appear to be a win-win for all stakeholders, however current and future government regulation may stand in the way of the rapid, successful adoption of these new technologies. In this paper, we aim to present a deeper look into a series of scenarios describing the future of clean technologies within the United States for the audience to consider. We hope that this will increase dialogue amongst all parties that have a hand in the fruitful development of the cleantech industry.

**Keywords:** cleantech, public policy, regulation, global warming, public opinion

## 1 INTRODUCTION

Clean technology, or cleantech, is a broad term given to an assortment of technologies, including alternatives energy options for information technology, electric motors, and lighting applications. The main goal of the industry is to create electricity and fuels with a smaller environmental footprint than traditional forms, such as oil, coal, and other nonrenewable resources. Clean technologies are noncompetitive or superior to their conventional counterparts, as they are presented as market-based solutions to the environmental implications of conventional energy sources. Many also offer significant additional benefits, notably their ability to improve the lives of those in both developed and developing countries.

Investments in clean technology have grown considerably since coming into the spotlight around 2000. Research has found that U.S.-based venture capital investments in clean energy technologies nearly tripled from \$917 million in 2005 to \$2.4 billion in 2006. As a percent of total venture capital investments, clean energy increased from 4.2 percent in 2005 to 9.4 percent in 2006. Research by the Cleantech Group in 2007 found that venture capital investments in the sector are projected to exceed \$19 billion by 2010 [1]. For the foreseeable future, investment in clean technologies will continue to grow.

## 2 THE VALUE OF SWOT ANALYSIS

SWOT Analysis, is a strategic planning tool used to evaluate the strengths, weaknesses, opportunities, and threats as a first step towards supporting decision-making a business environment. It involves specifying the strategic objective of the business and identifying the internal and external factors that are favorable and unfavorable to achieving that objective. The use of SWOT analysis initially grew in popularity in the 1960's as Harvard academics developed the methodology as part of strategic management [2].

## SWOT ANALYSIS



Figure 1: The Anatomy of a SWOT Analysis (Source: Wikipedia)

The value of a SWOT analysis has been questioned with respect to its rigor and ability to shape making the correct decisions. In practice, SWOT requires no previous knowledge or training. Most of the time, it results in long lists that are not beyond three or four-word phrases. These descriptive lists do not add value to decision-making situations. These warnings for SWOT analysis are well-founded and supported by systematic studies [3]. Research has been conducted in advancing SWOT analysis in concert with other systems analysis methods to evolve SWOT analysis past its weaknesses [4].

## 2.1 The Use of SWOT Analysis for Cleantech

Given the criticism of SWOT analysis above, the goal of this paper is to present SWOT analysis as a mental model for grouping the relationships between current public policy and political events with the development of the cleantech industry. A previous paper has highlighted the effects of certain policy-making decisions on the development of the cleantech industry. The use of SWOT analysis in this context does not constitute a strategic planning tool, but the paper ends with recommendations for the cleantech industry to maintain its resilience in the face of a changing public policy landscape.

# 3 SWOT ANALYSIS OF THE CLEANTECH INDUSTRY

In performing a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of the effects of U.S. public policy on the growth of both the cleantech industry and investment arenas, we have been able to focus our attention on four key areas. The areas are as follows:

1. The inherent strengths of the cleantech industry not affected by outside events.
2. The inherent weaknesses of the cleantech industry not affected by outside events.
3. Outside events that could help build and improve the cleantech industry.
4. Outside events that could threaten the maturation of the cleantech industry.

## 3.1 Strengths

The inherent strengths of the cleantech industry are readily visible through its explosive growth in what is renowned as the technological hotbed of the world: Silicon Valley. The Valley is considered by many to be the hub of innovation within the entire world, and with regards to the cleantech industry, this is also the case. However there are other areas within the U.S. that are also particularly strong and gaining steam when it comes to the development of clean technologies, and these include areas such as the Northeast, Mid-Atlantic, Southwest, and Pacific Northwest [5]. The growth in all of these areas has brought increased

recognition to the clean-technology field, developing it into a qualified industry and investment field. This has been indicated through the creation of new global investment indices, as well as increased venture capital and private equity investment into cleantech companies [6]. These aforementioned points, coupled with the yearly increase in the number of IPOs occurring within the U.S., assist in creating greater value for consumers, companies, investors, and other shareholders [7].

## 3.2 Weaknesses

While strengths help to mitigate weaknesses, weaknesses must still be analyzed, especially with regards to a booming new industry within the U.S. and the world. The fact that Silicon Valley and the U.S. Northeast, (Boston, MA and its surrounding areas) receive the vast majority of cleantech venture funding and reap their rewards, is not only a strength, but a weakness as well. With the majority of start-up capital flowing into the two distinct regions, various fledgling regions of innovation find themselves facing an upward battle to attract talent, develop positive growth trends and establish themselves as a player in the cleantech industry [8]. In addition, start-up costs for typical cleantech ventures average around \$15 million, much more than the now seemingly endless array of Internet-related software ventures which can utilize numerous “free” items utilizing the LAMP stack – Linux, Apache, MySQL, and PHP [9].

## 3.3 Opportunities

With respect to external opportunities, there are four key events that have taken and are currently taking place. Increasing oil prices are a constant reminder of the United States’ dependence on foreign oil, and have caused a downward shift in the public’s consumption of energy. This change in energy use is provoking consumers to conscientiously choose cleaner energy solutions, which are all a part of the growing cleantech industry [10]. Coupled with the rise in oil prices has been U.S. President George Bush’s announcement in 2005 stating that the U.S. needs to end its dependence on foreign oil. This led to increased venture capital funding for alternative forms of energy [11] while acting as a further catalyst in shifting the public’s opinion towards the potentially catastrophic effects of that global warming can and will have on the world without immediate corrective action [12]! Aside from the focus on the price of oil and its effect on the environment, is the movement of venture capital and private equity investment from the realm of nanotechnology to cleantech - encouraging the creation of applications that merge technologies in both fields [13].

### 3.4 Threats

Various external actions may threaten the expansion of the cleantech industry at a time when its development is crucial to America's economic competitiveness. From an economic standpoint, delays in enacting consistent, federal public policies could drive start-up ventures overseas, threaten America's status as the epicenter of cleantech innovation and as a major recipient of venture capital funding, and contribute indirectly to continuing environmental damage and negative implications [14]. Aside from delays, negative public policy implications could equate to longer periods of dependency on foreign sources of oil, energy, and other nonrenewable resources, which in the long run could create more transportation disasters, such as oil tanker leakages and oil platform fires, and expose the U.S. to greater foreign security risks [15]. Both of the aforementioned points would join together in stifling cleantech innovation, which could cause a trickle effect into other important high technology industries, such as software and electronics, thereby creating a mass exodus of industries abroad. As mentioned earlier, this could cause job losses and the development of new technologies resulting in hundreds of billions of dollars of lost opportunities for the U.S. economy [16]. The U.S. was built on the notion that its citizens run the show, so how come the vast majority of the nation is not educated on the benefits of utilizing cleaner technologies [17]? This has to do with the historical and prolonged use of conventional power sources within the United States, which presents yet another hurdle on the path towards widespread cleantech use and acceptance.

## 4 DISCUSSION

At this point, cleantech is still a maturing industry, and the continued capital investments are needed to develop not only cleantech, but also a cohesive industry around cleantech that can achieve the dual aims economic viability and decreased environmental footprint for alternative energy solutions and technologies. The SWOT analysis provides a high-level overview of the public policy drivers for the cleantech industry. The continued viability of the industry will continue to depend in some way on the public policy landscape.

### 4.1 The Parallel with Nanotechnology

Given the recent shift in private venture investments away from nanotechnology and into cleantech, as mentioned above, it is interesting to note the similarities and differences between the two broad industries.

As with nanotechnology, cleantech's identity is tied up in its inability to define itself. Currently, several national and international agencies are sifting through definitions and a formally acceptable nomenclature for naming

nanomaterials. Examples include the Chinese Academy of Sciences, the American National Standards Institute (ANSI), the American Society of Testing and Materials (ASTM), the British Standards Institute, and the International Standards Organization (ISO).

Though the cleantech industry is receiving federal and state-level government investment, it does not compare to the magnitude of publicity and energy of the National Nanotechnology Initiative, where over a billion dollars of federal money is funding nanotechnology research and development.

## 5 INCENTIVES FOR POLICYMAKERS IN ADVANCEMENT OF CLEANTECH

Given this SWOT analysis, the bullets below represent incentives for policymakers to continue to encourage innovation in the cleantech industry.

- Policymakers can start the predicted cleantech economic and technology surge. The U.S. can be at the forefront of innovation, economic value-creation, and public policy models that would promote growth. Other countries could learn from this modeling and develop their own national incentives to encourage the growth of cleantech for their environment and economic competitiveness.
- With federal and state investments, the U.S. will suffer less brain-drain, as currently most graduate students in science and engineering are foreign-born. Keeping cleantech firms from shifting their engineering overseas or off-shoring other functions should provide a small economic lift in the coming recession.
- If the federal and state governments become consumers of clean technologies and alternative sources of energy, this will encourage cleantech companies to solicit further government investment. With the government procuring large volumes of clean technologies, the industry can take advantage of economies of scale in production lowering costs and increasing their economic viability.
- With the already generally recognized impact of human-influenced global warming, government investment in cleantech could inspire environmental innovation across the globe, and make an impact in reversing global warming.

The overall impact of public policy and political events will impact the volatility of the cleantech industry. Clearly, cleantech is needed, but the time to maturity for the industry and its economic significance will be highly impacted by public policy decisions.

## 6 FUTURE WORK

Future work should center on utilizing other strategic planning methods for the cleantech industry. Trade organizations and other consulting firms should assist in creating, maintaining, and pushing forward of a collective vision of the cleantech industry, as large and small cleantech firms have different incentives to participate in such a vision. Third-parties can act as conduit towards realizing the goals of both kinds of firms.

### REFERENCES

- [1] C. Pernick and C. Wilder, *The Clean Tech Revolution: The Next Big Growth and Investment Opportunity*, New York: Collins, 2007.
- [2] K. R. Andrews, *The Concept of Corporate Strategy*, Homewood, IL: Irwin, 1971.
- [3] T. Hill and R. Westbrook, "SWOT Analysis: It's Time for a Product Recall," *Long Range Planning*, 30, 46-52, 1997.
- [4] M. Kurttila et. al., "Utilizing the analytic hierarchy process (AHP) in SWOT analysis - a hybrid method and its application to a forest-certification case," *Forest Policy and Economics*, 1, 41-52, 2000.
- [5] G. P. Zachery, "When It Comes to Innovation, Geography is Destiny," *The New York Times*, 11 Feb 2007. Retrieved 11 Jan 2008 @ <http://www.nytimes.com/2007/02/11/business/yourmoney/11ping.html>
- [6] W. Karlenzig, "Top US Cities for Cleantech Incubation Clusters" *SustainLane Government*, 2006. Retrieved 11 Jan 2008 @ <http://www.sustainlane.us/articles/cleantech.jsp>
- [7] Anonymous, "Initial Public Offering," *Wikipedia*, 2008. Retrieved 12 Jan 2008 @ [http://en.wikipedia.org/wiki/Initial\\_public\\_offering](http://en.wikipedia.org/wiki/Initial_public_offering)
- [8] P. Mazza, "Surf's Up: Catching the Next Green Innovation Wave," 2008. Retrieved 12 Feb 2008 @ <http://www.cleantech.com/views.php?id=5041>
- [9] A. Madrigal, "Powerset Co-Founder to Launch Crowdsourced Green VC Fund," *Wired*, 27 Feb 2008. Retrieved February 29, 2008 @ [http://www.wired.com/techbiz/startups/news/2008/02/crowdsourced\\_greenfund](http://www.wired.com/techbiz/startups/news/2008/02/crowdsourced_greenfund)
- [10] E. Rhein, "Why high oil prices are a force for good," *Energy Bulletin*, 20 Oct 2005. Retrieved 29 Feb 2008 @ <http://www.energybulletin.net/8589.html>
- [11] Environment News Service, "Bush Orders First Federal Regulation of Greenhouse Gases," 14 May 2007. Retrieved 29 Feb 2008 @ <http://www.ens-newswire.com/ens/may2007/2007-05-14-06.asp>
- [12] S. Kull, "International Polling on Climate Change," *World Public Opinion.org*, 6 Dec 2007. Retrieved 2008 Mar 1 @ [http://www.americans-world.org/digest/global\\_issues/global\\_warming/gw1.cfm](http://www.americans-world.org/digest/global_issues/global_warming/gw1.cfm)
- [13] J. Kao, "Bringing Innovation to Innovation," *innovation: America's Journal of Technology Commercialization*, 5, online, Dec 2007/Jan 2008. Retrieved 1 Mar 2008 @ <http://www.innovation-america.org/index.php?articleID=391>
- [14] "How the government forces businesses overseas," *Washington Examiner*, 29 Feb 2008. Retrieved 1 Mar 2008 @ <http://www.examiner.com/a-1249692~How%20the%20government%20forces%20businesses%20overseas.html>
- [15] A. MacDonald, "Pollution Issues: Petroleum," 2008. Retrieved 1 Mar 2008 @ <http://www.pollutionissues.com/Na-Ph/Petroleum.html>
- [16] G. Patterson and T. Patterson, "Retooling high tech for clean tech," *SCAN*, Jun 2007. Retrieved 2 Mar 2008 @ [http://www.nationalcapitalscan.ca/news/2007/06/retooling\\_high\\_tech\\_for\\_clean.html](http://www.nationalcapitalscan.ca/news/2007/06/retooling_high_tech_for_clean.html)
- [17] R. Kang, "Tree Huggers Unite! A Survey of Cleantech ETFs," *Seeking Alpha*, Nov 2006. Retrieved 2 Mar 2008 @ <http://seekingalpha.com/article/20598-tree-huggers-unite-a-survey-of-cleantech-etfs>