Calvert White Paper: The Future for Alternative Energy



*By **Paul A. Hilton**, Calvert*



***Jens Peers**, KBC Asset Management International*

Higher oil prices and growing worldwide demands for energy are straining traditional energy resources globally. At the same time, alternative energy has captured public, media, and political attention as a potential solution to the pressing issue of climate change — which is widely believed to be not only threatening the environment, but adversely affecting companies, industries, and whole economies. Thus, the prospects for alternative energy sources, including wind, solar, and bio-based energy appear bright, and potentially profitable, over the long term.

In just the last five years, alternative energy has emerged on the investment landscape as a distinct asset class that demands attention. The term generally encompasses companies involved in developing technologies that reduce our reliance on traditional fossil fuels such as coal, oil, and natural gas. That could include companies involved with 1) new energy sources (e.g., wind, solar, bioenergy, geothermal, wave/tidal power, and small-scale hydro), 2) conservation and efficiency technologies (e.g., energy efficient lighting, efficient engines /turbines), or 3) storage mechanisms (e.g., fuel cells, hydrogen generation and storage, batteries).

The rapid ascendance of alternative energy is directly linked to five key drivers: increasing global energy demand, scarcity of oil and natural gas, investment in technology, climate change, and a changing regulatory landscape.

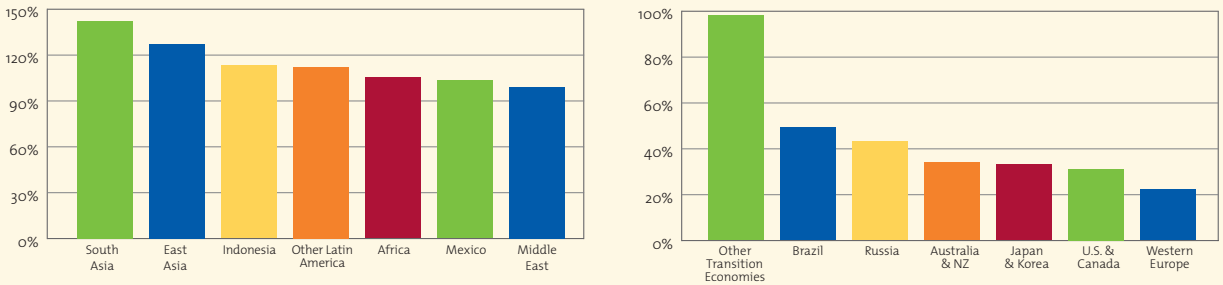
Rising Global Energy Demand

The world's population continues to grow, doubling from 3 billion to 6 billion in the 40-year period from 1959 to 1999.[1] While population growth is projected to slow worldwide, reaching 9 billion by 2042, demand for energy is expected to increase exponentially, particularly as emerging economies work to raise the standard of living for their people. The International Energy Agency predicts that global primary energy demand will increase by 50% between now and 2030, with over 70% of the increased demand coming from developing countries.

China alone will account for 30% of the increase in energy demand over the next 20 – 25 years. By 2010, China will have 90 times more cars than in 1990. By 2030, China could have more cars than the U.S.

PROJECTED INCREASE IN ENERGY DEMAND FROM 2002 TO 2030

Between now and 2030, global demand for energy is projected to increase by 50% — to 16.3 billion tons of oil equivalent — with 70% of that demand coming from emerging economies working to increase their standards of living.



Source: International Energy Agency

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China alone will account for 30% of the increase.[2] Oil consumption in China is growing by 7.5% per year, seven times faster than the U.S., as more and more drivers are added each year. In fact, by 2010 China will have 90 times more cars than in 1990 and by 2030 China could have more cars than the U.S.[3]

Scarcity of Accessible Oil

In combination with this growing energy demand, we have started to see fuel shortages and rising oil and natural gas prices because of global supply constraints — from production to refining. Easy-to-reach supplies of oil are beginning to run out in many parts of the world, and more costly and potentially environmentally destructive methods for producing oil will be necessary to keep up supply. *Some speculate that, despite the development of new extraction technologies, we may be at or close to a point where total oil production volumes globally are in decline,* ***a concept known as peak oil***. According to one source, 54 of the largest 65 oil-producing countries in the world have begun to see a decline in oil production, and another five will join them over the next six years.[4] The rising cost of oil makes new, more expensive methods of oil production more viable (e.g. oil shale and tar sands), but it also creates opportunities for competing energy sources like alternative energy.

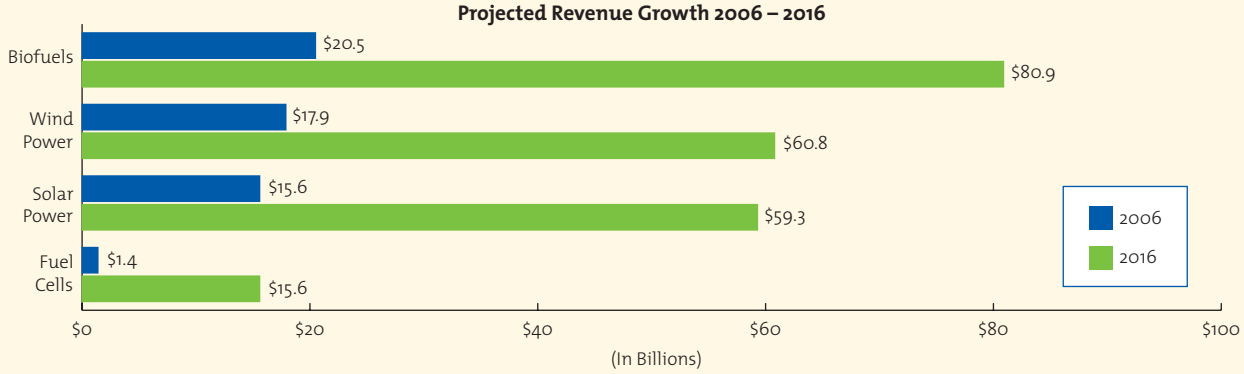
The rising prices of fossil fuels used for different applications will create markets for alternative energy in different ways. Utilities commonly generate electricity by burning coal and natural gas, so increased prices of those fuels would make alternative energy more desirable for electricity generation. Of course, oil powers most forms of transportation, so there is a direct correlation between the cost of oil and the attractiveness of developing alternative energy technologies for transportation.

Growing Investment in New Energy Technologies

The growing worldwide demand for energy and the declining availability of easy-to-reach oil and gas presents a tremendous need and opportunity for investment in new alternative technologies and energy sources. Increased investment in

CLEAN ENERGY PROJECTED REVENUE GROWTH (2006 – 2016 ($U.S. BILLIONS))

The markets for these technologies have climbed substantially in recent years, with annual revenue up 39% in one year — from $40 billion in 2005 to $55 billion in 2006. Looking ahead, industry experts see continued rapid growth.



Together, revenue from these four clean-energy technologies is projected to quadruple to more than $226.5 billion within a decade.

Source: Clean Edge, 2007

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new technology will help drive down the costs of competing energy options, such as solar, wind, biofuels, and hydrogen sources. Of total venture capital investments in the U.S. in 2006, 9.4% was related to energy technologies, up from just 0.8% in 1999.[5] Based on these trends, a growing number of investors and analysts see alternative energy as a new horizon for long-term investment.

In view of scientific and public concern, and the growing support of governments worldwide in seeking alternative and more efficient sources of energy, we will likely see a rapid pace of innovation within this sector. Over the long term, there is no question that alternative energy technologies will become an increasingly significant solution to our global energy problem. In fact, the cost of electricity from utility-scale wind systems has fallen by over 80% over the last 20 years, from 30 cents per kilowatt-hour to less than 5 cents/kWh with a Production Tax Credit, on par with coal- or gas-fired power plants.[6]

Climate Change

The growing scientific consensus about the potentially catastrophic impacts of climate change has captured significant public attention over the last year. The earth is clearly warming, and human activity appears to be the cause. According to NASA, the five hottest years ever globally since the late 1880s have been (in order) 2005, 1998, 2002, 2003, and 2006.[7] This warming is connected to concentrations of man-made Green House Gases (GHG) — primarily carbon dioxide (CO_2) — in the atmosphere. CO_2 is a direct result of the burning of fossil fuels. Current CO_2 levels are at 380 parts per million (ppm), up from a pre-industrial-age number of 280 ppm.

BROAD EFFECTS OF GLOBAL WARMING

Economic

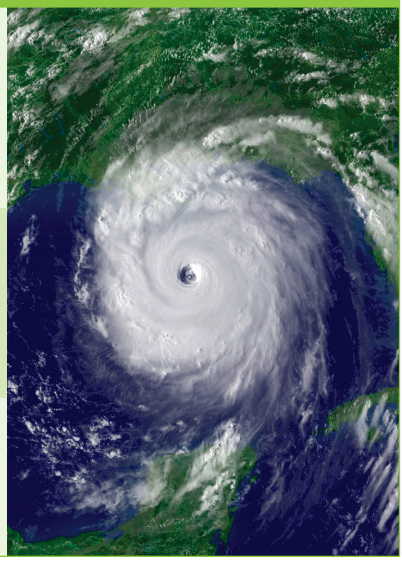
- Global Economic Growth
- Energy availability and cost
- Transport
- Agriculture
- Insurance

Environmental

- Shrinkage of glaciers and thawing of permafrost
- Floods, hurricanes, storms
- Water scarcity
- Changes in Crop Yields
- Declines in some plant and animal populations

Societal

- Effects of drought, crop failure
- Migration
- Spread of disease



The National Center for Atmospheric Research reports, "[t]he level of CO_2 in the atmosphere is now higher than it has been in at least 750,000 years and is approaching levels that have probably not occurred in the last 20 million years."[8] Based on current projections, the International Panel on Climate Change (IPCC) in their latest 2007 report cites a potential increase of temperatures over the next 100 years of between 2 and 11.5 degrees Fahrenheit (1.1 and 6.4 degrees Celsius).[9] This is hugely significant because, over the last 10,000 years, we have not seen a change of more than 1.8°F (1.0°C), and the last ice age was only 5° – 9°F cooler than today.[10] With the projected magnitude of warming, we could see a significant rise in sea levels, increased flooding, impacts on various ecosystems and agricultural zones, and changes in pest infestation and disease patterns.

The drive to slow the rate of climate change has already imposed some risks on corporations that they need to consider. Companies whose operations emit greenhouse gases need to be able to reduce those emissions and develop systems to manage the regulatory implications of climate change in order to compete effectively. Firms that do not take steps to reduce emissions and manage their impact on global warming also now face significant reputational risk as a result of increasing public concern about climate change. Additionally, the increasingly severe weather that many scientists believe is being caused by global warming has resulted in growing business risk for insurance companies that insure property in areas subject to storms such as hurricanes.

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Changing Regulatory Landscape

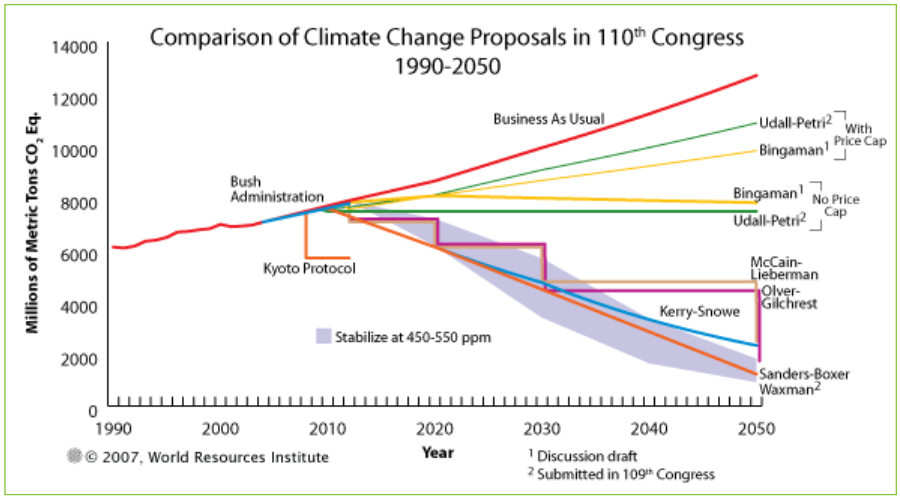
A variety of new regulations are in the works to combat both climate change and a perceived over-reliance on foreign oil. In addition, we are seeing additional subsidies to promote alternative energy sources. This will drastically change the energy landscape and help make alternative energy much more competitive over the coming years. There is now a growing U.S. movement to push for federal climate change regulation as well as initiatives at the state and regional level. Internationally, we are also seeing increasing regulatory action to address climate change. Recent actions include:

United States

- In May 2007, the U.S. Senate deliberated proposals to significantly increase motor vehicle fuel efficiency standards.
- California Governor Arnold Schwarzenegger signed a new state bill in September 2006 that would require reducing carbon emissions in the state to 1990 levels by the year 2020 and reduce emissions to 80 percent below 1990 levels by 2050.
- The Bush Administration set a national goal of reducing oil imports from the Middle East by more than 75% by 2025 and introduced the Advanced Energy Initiative, which will increase clean-energy research at the Department of Energy (DOE) by 22%.
- The 2005 Energy Legislation doubled the renewable energy budget to $852 million in 2009.

Europe and Worldwide

- Kyoto Protocol — The Protocol covers the EU and 35 other countries and requires these industrialized economies — which represent 55% of global emissions — to reduce GHG emissions by 5.2% from 1990 levels through a cap and trade system. The U.S. and Australia did not ratify the protocol.
- EU — The European Union has set a goal to generate 10% of total power from renewable sources by 2010.
- China — As of yet, China has not established a formal climate policy, but intense internal discussions are under way. Seed Magazine says that "Beyond its disproportionate contribution to the world's greenhouse gas levels, China looms large because any policy it adopts could set an example for the developing world." [11]
- Germany — Germany passed a new renewable-energy law in 2004 requiring utilities to pay an attractive set price to consumers for electricity produced from solar panels. Wind and solar power account for over 10% of the country's electricity production.



With the evolution of these five key drivers, we see the dawning of a new age for alternative energy, one that may hold significant promise for equity investors looking to diversify their investments and gain access to a new high-growth area. In fact, according to Clean Edge, total revenues from biofuels, wind, solar, and fuel sales in the U.S. are projected to increase from $55.4 billion in 2006 to $226.5 billion in 2016.

Types of Alternative Energy

Wind — Global wind use for energy generation more than tripled from 1998 to 2003.[12] Wind is one of the most cost-competitive alternative energy sources for larger, mega-watt facilities. However, there are still some concerns about wind turbine location, noise, and resulting bird kill.

Solar — Technology in the solar industry is growing and improving at one of the fastest paces of any renewable energy sector. According to the solar industry association Solarbuzz, the solar industry is expected to grow by 20% annually up to 2010. Yet, solar power installations currently represent less than 0.1% of total power generation capacity worldwide. Germany, Japan, and the U.S. are the three largest markets in the solar industry, accounting for 78% of the total market in 2004.

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Biofuels — Biofuels are currently the only renewable alternative to traditional transportation fuels. Biofuels include ethanol (derived from starch-based plants such as corn, wheat, or sugar) and biodiesel (derived from vegetable oil such as palm or soy). The U.S. administration aims to decrease the country's dependency on oil imports. In 2005, a Renewable Fuel Standard (RFS) targeted a minimum usage of 7.5 billion gallons of ethanol by 2012, and an ethanol blending excise tax credit of $0.51 per gallon now supports the industry. The EU promotes the use of biofuels through its usage target of 5.75% of all fuel by 2010.

Geothermal — Geothermal energy stems from the natural heat of the earth. Unlike solar or wind, geothermal power is available throughout the day, regardless of weather conditions. The most efficient modern geothermal facilities can produce electricity at wholesale prices and be competitive with traditional fossil fuels. The sector is very capital intensive, but it does benefit from low operating costs since the fuel is free and constantly available. The Energy Information Administration (EIA) estimates that geothermal energy produced 0.36% of the electricity generated in the U.S. in 2005.

Ocean — Ocean or wave power is an emerging power generation technology not yet deployed commercially on any significant level. However, it has great potential because abundant wave power resources are available globally. According to the U.S. Department of Energy, wave power could produce 40MW to 70MW of power per kilometer along the western U.S. coastline. As an emerging technology, cost efficiencies and further improvements in technology will be necessary to enable large-scale applications of ocean power.

Hydro — Hydro is a long-established technology. The advantages of hydro power include minimal pollution levels, good reliability compared with other renewables, low operating costs, and cost competitiveness with fossil-fuel power generation. Disadvantages of hydro include very high initial capital costs, as well as some environmental and social concerns about the location of hydro power plants.

Fuel Cells — The market for fuel cells is still at a very early stage. As an emerging technology, many products related to fuel cells are still in the testing and development phase, with large investments in research and development being committed to the industry. Fuel cells generate electricity from an electrochemical reaction in which air and a fuel, such as hydrogen, combine to form water. There are many different types of fuel cells which suit various applications, ranging from large-scale stationary power to portable (lap-top computers, cell phones) and automotive applications. Fuel cell vehicles are the furthest from commercialization as a result of their high cost. In combined heat and power applications, fuel cells can increase energy efficiency significantly.

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A FEW EXAMPLES OF ALTERNATIVE ENERGY LEADERS

WIND ENERGY: VESTAS WIND SYSTEMS*

Vestas Wind Systems A/S develops, manufactures, markets, and installs wind turbines that generate electricity. Based in Denmark, Vestas is the world's largest manufacturer of wind turbines, with about 30% of the total market. The company ranks within the top three players in nine of the top 10 wind power markets (the exception is China, where it is the fourth largest). It is the second-largest player in each of the three top wind turbine markets — Germany, the U.S., and Spain. The wind turbine industry is very competitive, and Vestas' peers in the industry include General Electric, Gamesa, and Suzlon Energy.

SOLAR ENERGY: Q-CELLS*

Q-Cells AG's core business is the development and production of mono- and polycrystalline silicon-based solar cells. It has a global market share of more than 9%, ranking it second only to Sharp. Almost two-thirds of Q-Cells' customer base is in Germany, where the company is based. The company plans to expand into developing markets such as China, Korea, and Spain. Q-Cells has diversified its exposure to the solar cell industry by signing joint venture agreements with Evergreen Solar and REC Solar. The venture with Evergreen aims to exploit that company's unique ribbon string solar technology; the REC joint venture hopes to develop thin film modules using crystalline silicon.

ENERGY CONSERVATION/ EFFICIENCY: PHILIPS ELECTRONICS*

Royal Philips Electronics' principal activity is the development and manufacture of electrical products through its consumer electronics, lighting, medical systems, domestic appliances, and personal care divisions. With this broad product coverage, Philips is well placed to benefit from energy conservation and energy efficiency measures. In particular, the Dutch company's advances in lighting energy efficiency are significant. Lighting accounts for 19% of the world's electricity use. Low-energy lighting makes up 30% of Philips' total lighting sales. Low-energy light bulbs use one-fifth of the electricity consumed by a standard incandescent light bulb in one year.

Conservation/Efficiency — Lower emissions of greenhouse gases can also be achieved by using energy more efficiently — using or wasting less energy for the same output. Energy conservation technology mainly involves developing more efficient machinery; energy efficient lighting, building techniques, and materials; superconducting techniques for transportation of energy; and improved energy storage.

Summary

Calvert believes that this backdrop presents significant long-term growth opportunities. The strategy of the **Calvert Global Alternative Energy Fund (CGAEX)** is to invest in an internationally diversified selection of companies involved in alternative energy activities across the full spectrum of areas outlined above. The Fund will invest across all parts of the alternative energy industry, including companies that are active in alternative power production or manufacturing or supplying equipment related to wind power, solar energy, hydro-power, biomass, and fuel cells. ■

Calvert Global Alternative Energy Fund is subject to the risk that stocks that comprise the energy sector may decline in value, and the risk that prices of energy (including traditional sources of energy such as oil, gas, or electricity) or alternative energy may decline. The stock markets in which the Fund invests may also experience periods of volatility and instability. In addition, shares of the companies involved in the energy industry have been more volatile than shares of companies operating in other more established industries. Consequently, the Fund may tend to be more volatile than other mutual funds. Lastly, foreign investments involve greater risks than U.S. investments, including political and economic risks and the risk of currency fluctuations.

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6. American Wind Energy Association, http://www.awea.org/faq/wwt_costs.html
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*As of June 1, 2007, Vestas Wind Systems represented 5.13% of Calvert Global Alternative Energy Fund and Q Cells represented 4.42% of the Fund. Philips Electronics represented 0.48% of the Calvert World Values International Equity Fund and 0.43% of CVS Calvert Social International Equity Fund.

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