Investments in Renewable Energy

March 2007

Renewable energy: a resource for investors

An approach to finding viable opportunities in 'clean' energy

By Investment Analyst Shechar Dworski on behalf of the Mackenzie Resources Team

There's been a surge of investor interest in renewable energy now that resource and environmental concerns have grabbed centre stage (quite literally, in fact, at the 2007 Academy Awards with global-warming documentary "An Inconvenient Truth").

Many people intuitively want to participate in the alternative energy sector, but are not sure how. For "clean" energy to succeed – to support development of viable alternative fuels and technologies – social and political activism can indeed go hand-in-hand with finding good investment opportunities in sound companies and industries.

This report provides a basic guide to sources of renewable energy and a view on investment opportunities and themes. While the renewable energy space is exciting, it comes with its own set of critics and opponents. Active monitoring, and the ability to recognize pitfalls as well as potential, is critical in making prudent investment decisions.

Through the management of our key resource-sector funds, Mackenzie Growth Fund and other funds such as Mackenzie Universal Global Future Fund, our teams actively monitor each sub-sector of the alternative energy market. We take a global outlook, spanning the planet from Brazilian biofuels, to Japanese and German solar cells to Danish wind turbines to Canadian fuel cell technology. As economic forces in the US and China try to catch up as technology leaders, we expect there will be much more activity to watch in this space.

Mackenzie INVESTMENTS 40 1967 2007

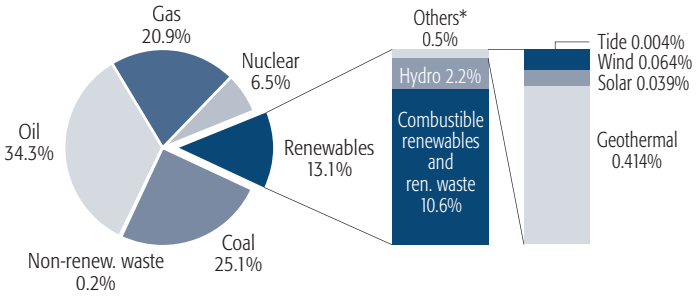
MARKET CONTEXT

Slice of clean energy in oil-based world

Renewable energy harnesses the forces of nature – sun, wind, earth and water – or is derived from sources that can be replenished, such as organic matter.

For transportation, renewable alternatives include biofuels derived from plant sources such as ethanol and biodiesel. Hydrogen gas, extracted from water, can power electric motors through fuel-cell technology. For electricity generation, hydro and solar power are well-established around the world, while wind, geothermal energy and organic biomass are also being used to produce power.

Energy sources in context



Supply is calculated using the IEA conventions. It includes international marine bunkers and excludes electricity/heat trade. Figures include both commercial and non-commercial energy for 2004.
*Geothermal, solar, wind, tide/wave/ocean.
Totals in graph might not add up due to rounding

Source: IEA Energy Statistics

While renewable energy has at least tripled production in 30 years, it is still a small slice of the energy supply (see chart, Energy sources in context). Hydro and biomass are the largest sources of renewable energy but present few direct investment opportunities for the public, mostly in the form of utilities. Much of today's investment activity is around production of biofuels (primarily ethanol) and solar energy (see table, Key sectors for investment). Their related technologies are fairly mature, proven and used around the world. There are numerous publicly listed companies to choose from, therefore, this report will emphasize biofuels and solar energy.

The wind sector is the next largest emerging sub-sector in terms of market capitalization, with investments possible in companies that make wind turbines, as well as utilities that build wind farms.

The hydrogen fuel cell sector is at the prototype stage, and may take years to materialize commercially on a large scale. The biomass sector holds promise, but is not easy to invest in directly, as ownership is embedded within the pulp and paper industry. The geothermal sector is small, with only a handful of companies publicly listed.

Key sectors for investment

Renewable energy sources fall into two main categories, transportation and electricity generation.

Energy source	Market cap of key listed companies (US$ Billions)
Transportation fuel	
• **Biofuels** Includes ethanol, biodiesel and other fuels (methanol, butanol) derived from plant sources, used to power combustion engines	$48
• **Hydrogen fuel cells** Gas generated from water via electrolysis is then used to run fuel-cell-powered electric motors	$3
Electricity generation	
• **Solar** Light energy harnessed through solar cells made from silicon crystals, thin-film semiconductors (CIGS, CdTe) or polymers	$71
• **Wind** Large turbines turn generators in wind farms, inland or offshore	$30
• **Geothermal** Deep pipes are used to power generators with heated water, using the earth's internal heat	$4
• **Biomass** Generated by combustion or decomposition of organic matter such as wood chips or plant waste	n/a
• **Hydro** Dams use running water to power generators. The energy of tidal forces and waves can also be captured	$3

As of March 26, 2007
Source: Mackenzie Resources Team

BIOFUELS

Ethanol: good buys below fair value

Ethanol is essentially made the same way as beer or vodka: through the fermentation of a starchy grain or sugary crop. The crops favoured by the world's two leading ethanol producers include corn, the main feedstock in the US, and sugarcane, used in Brazil where it grows quickly and inexpensively. Some European countries have made ethanol from sugar beets, but the costs are much higher.

We believe there is a good opportunity to buy ethanol-related companies right now at below fair value, given lower sentiment for the industry caused by a recent hike in corn prices. Over the next few years, we think there is room for this industry to more than double. Keeping costs down over the long term will depend on increased corn production or breakthroughs to make ethanol from less expensive plant sources known as cellulose.

How it works: The production process extracts the crop's starch and breaks it down into simple sugars. Yeast feeds on the sugar, producing ethanol, which is distilled for purity. A dash of gasoline gets mixed in – making it unfit for cocktails – before the ethanol is shipped to a refinery to be added to the fuel supply.

Two main processes are used to make ethanol on a commercial scale, known as wet mill and dry mill. US producers favour dry mill production for its lower capital costs and higher ethanol yield: 2.8 gallons per bushel of corn, versus 2.6 gallons in a wet mill. However, wet mill creates more marketable organic byproducts – such as animal feed – recovering 50% versus 30% for dry mill.

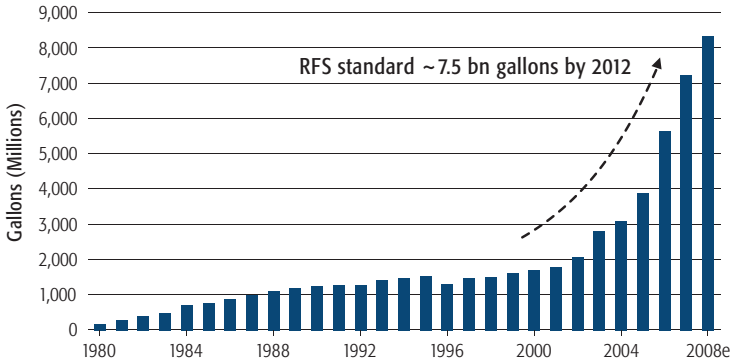
At the tank, ethanol/gasoline blends can be identified by the "E" prefix: E85 means 85% ethanol. Ordinary cars can run on up to 10% ethanol blends. Minor engine modifications allow flex-fuel cars to use higher blends. Ethanol's energy content is about 25% lower than gasoline. This is hardly noticeable when using a 10% blend, but can be an issue with higher blends.

3% to 4% of US fuel supply, and growing

The US recently edged out Brazil as the world's largest ethanol producer, with 114 distilleries producing about five billion gallons in 2006 – about 3% to 4% of the nation's fuel supply. Production has been growing at a rate of more than 20% per year (see chart, US ethanol production steps up). Some 78 new plants and seven expansions are planned, which could double the US capacity in the next few years. The largest producers in the US include Archer Daniels Midland, VeraSun, US BioEnergy and Aventine. Brazil, whose major producers include Cosan, enjoys a cost advantage over the US because sugar cane is cheaper to grow there. However, the US imposes a tariff on ethanol imports to support domestic growth.

The US government has called for production of 7.5 billion gallons of ethanol by 2012, but a new mandate has been proposed to produce 35 billion gallons of biofuels within 10 years. Incentives include a US$0.51 per gallon tax credit to the blender.

US ethanol production steps up



Source: Merrill Lynch

Corn prices eat into ethanol profits

Government subsidies aside, the economic viability of ethanol production has to factor in prices of crude oil and the feedstock. In the US, government incentives that led to a spike in ethanol production have also resulted in higher corn prices – now about double the long-term average price. Farmers have been encouraged to increase their acreage devoted to corn, which should help moderate corn prices in the next year. Ethanol production eats up about 20% of the US corn supply, but this could rise to 30% within a decade.

Due to this supply volatility, we would avoid any highly indebted, greenfield ethanol producers that may not survive periods of unfavourable pricing as the industry grows. Strong balance sheets, experienced management and cost advantages, such as proximity to feedstock, can help weather fluctuations.

Cellulose could transform ethanol economics

One industry estimate suggests corn crops could ultimately produce no more than 10% to 15% of the US fuel supply, given land limitations. That's why the race is on to develop a viable method to produce ethanol from cellulose – the fibrous part of plants that can include switchgrass, wheat chaff, corn cobs and husks, sugar cane husks and wood waste. The main advantage to cellulose-derived ethanol is that the feedstock is cheap – even free, in some cases, as plant waste.

Cellulosic ethanol is touted as a long-term answer for a renewable fuel source on the scale of current petroleum needs, its promise recently lauded by proponents such as US President George W. Bush.

While ethanol is already being produced from cellulose in labs and small-scale facilities, it is not proven on a large commercial basis. Production costs are high, because the fibrous plant material is difficult to separate and break down into sugars. Biotechnology is used to extract the cellulose and add enzymes into a multi-step fermentation process – think of an industrial version of a cow's digestive tract with her many stomachs.

We are monitoring companies in this space including a Canadian firm trying to market a patented process to separate cellulose from the lignin that binds plant material. Another route is through companies that research and make industrial enzymes to break down the cellulose, such as Denmark-based Novozymes. While most ethanol producers claim to be doing research in cellulosic ethanol, it is difficult to assess privately held companies. Among those focused primarily on cellulosic ethanol, one leader is thought to be Ottawa-based Iogen, a private company, but it's too early to assess a definitive ranking.

A technological breakthrough is still needed to make cellulosic ethanol economically viable. This may come via the discovery of a simple chemical reaction to break down cellulose. If there were a low-cost process available, ethanol could become a major part of the fuel supply using abundant plant waste from forestry, agriculture and other industries.

Biodiesel: want fries with that engine?

The diesel engine was originally conceived to run on vegetable oil, so it should be no surprise that plant-based biodiesel is being rediscovered as an alternative fuel – it turns out you can, indeed, get fries with that mileage.

On a commercial scale, biodiesel is made by extracting oil from seeds and modifying its chemistry to be more combustible and stay fluid at low temperatures. In practice, biodiesel is primarily derived from crops already in large-scale production for food, such as soy, rapeseed (canola) and palm. Demand has grown and stock prices have risen to the benefit of companies like Malaysian palm oil producer IOI Corp. as well as soybean producer Bunge Corp.

The obvious advantage of biodiesel is that it can be used in any standard diesel engine and transported through existing infrastructure. In practice, biodiesel is usually mixed with petroleum diesel, helping it burn cleaner. At the pump, the mix is indicated by a "B" prefix, and B20 is a commonly found 20% biodiesel blend.

While very few North American vehicles have diesel engines, they make up half the fleet in Europe. As a result, many of the publicly listed biodiesel companies can be found in Germany and Britain. The industry remains much smaller than the ethanol industry.

Alternatives worth keeping an eye on

Methanol and butanol are among other fuels that can be unlocked from organic compounds through a fermentation process, although typically in lower yields than ethanol. Butanol has advantages over ethanol, since it is physically more like gasoline (see chart, Butanol most like gasoline). It can run on standard gasoline engines in high concentration, unlike ethanol which requires engine modifications for blends of more than 10%. Butanol gets better mileage. It can also be transported through existing infrastructure, including pipelines.

Other technologies include early-stage research to convert organic wastes and even plastics into liquid fuels. Several companies are currently working on ways to extract natural gas from rotting landfill. One Canadian firm is even processing unsorted household waste into components, while producing natural gas.

Butanol most like gasoline

Methanol	Ethanol	Butanol	Gasoline
Energy Content (Btu's per Gallon)			
63k	84k	110k	115-125k
Pump Octane			
120	113	87	86-94
Air to Fuel Ratio			
6.6	9	11-12	12-15
Vapour Pressure (psi@100F)			
4.6	2	0.33	8-15

Biofuels: risk and reality check

It's unrealistic to think crop-based biofuels can completely displace petroleum-based fuel, since current production competes with the food supply and may deplete the land. We expect crop-based biofuels to reduce reliance on petroleum-based transportation fuels in the nearer term. For instance, the US is seeking to replace 10% to 15% of gasoline which leaves room for the biofuel industry to more than double its current size. Higher penetration would require the ability to convert organic waste or weed-like plants into fuel through cellulosic ethanol production. It is important to keep in mind that such a large-scale production process is only in the experimental stage and, in the end, may never be proven.

Hydrogen fuel cells: early days yet

It's hard not to be compelled by the story of hydrogen power in transportation: its energy is converted to electricity through a fuel cell to silently power an electric motor – leaving nothing but water vapour as exhaust.

As such, fuel-cell technology is extremely environmentally friendly, but there are significant issues to be overcome. It's important to keep in mind that hydrogen is not a fuel source, but an energy medium. Ideally, a clean energy source such as solar or wind would produce the electricity to separate hydrogen from water. The short life span of fuel cells makes them too expensive to be practical. Hydrogen doesn't compress or liquefy easily, so it's hard to carry sufficient quantity in a vehicle. Then there is the question of infrastructure and what comes first: a hydrogen supply or a hydrogen-capable fleet?

Research continues on all these fronts. A handful of early initiatives to build a network includes the California Fuel Cell Partnership, whose members claim to operate more fuel-cell vehicles and hydrogen-fuelling stations than any other region in the world.

Innovative ideas, like hydrogen at home

While the widespread use of hydrogen for transportation is probably years away, innovative companies have developed applications in other areas.

For example, hydrogen is being effectively used to store energy for back-up power on stationary telecom equipment. Another advancement is a home system that converts natural gas to hydrogen, which can then be used to produce electricity at a potentially lower cost than from the grid in addition to generating heat. Such home systems could form a decentralized infrastructure for refuelling hydrogen.

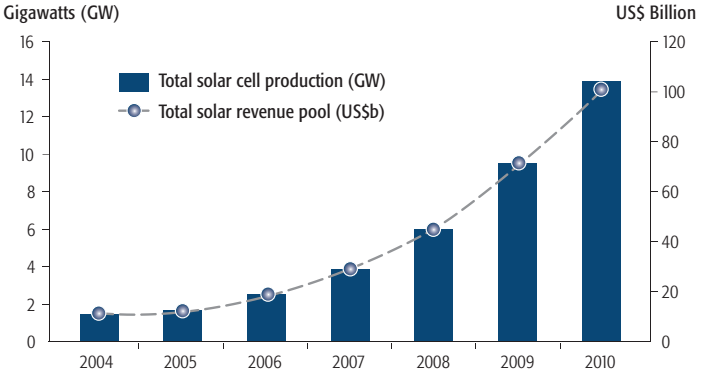
SOLAR ENERGY

Shining times for solar power industry

The solar industry has increased production at an average rate of about 30% per year for the last 30 years, accelerating to 40% a year in the last 10 years (see chart, Stellar outlook for solar industry, p.6). With the demand for solar cells rising, their manufacturers are expected to consume more silicon this year than the semiconductor industry. Most solar cell panels are made from the same kind of semiconductor material used to make chips in computers and electronic devices. The combined demand for silicon is proving greater than the capacity of the industry supplying it.

Two good investment opportunities appear to be presenting themselves in this field: one driven by the expected shortages in high purity silicon, the other prompted by low-cost producers making solar cells from lower-grade silicon and other kinds of material.

Stellar outlook for solar industry



Source: CLSA 2006

Snapping up high-grade silicon

Silicon dominates the market for making solar cells, although there are a growing number of alternatives. After being extracted in raw form from the earth – it is abundant in rocks and sand – the silicon is purified into crystals through a costly and precise chemical process.

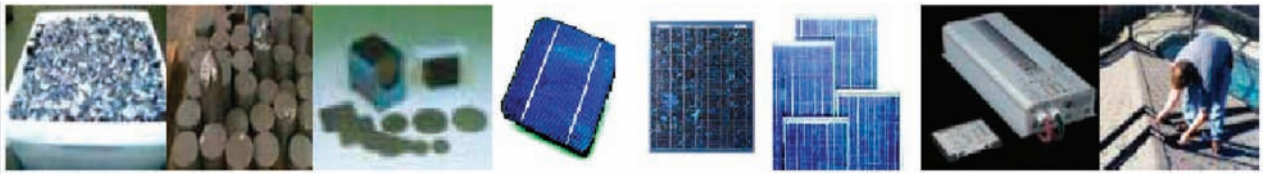
Only a handful of companies worldwide can purify silicon into its most pristine, single-crystal form, so demand is expected to create shortages this year. Price hikes will benefit silicon wafer producers, but will add costs to solar cell makers. Global companies producing high-purity silicon include MEMC Electronic Materials, Shin-Etsu, Wacker Chemie, Tokuyama and Renewable Energy Corp.

Supply-chain companies can produce value

There are publicly listed companies all along the solar supply chain (see table, In the solar space). Solar cell manufacturers take silicon wafers that are made photoactive, and string them into larger modules and panels. Other companies add system components such as inverters, to change solar module DC output to standard AC voltage for residential use. A sun-tracking device

In the solar space: from rocks to power

A partial list of key listed companies in the supply chain of silicon-based solar technologies



	Silicon	Ingots	Wafers	Cells	Modules	Components	Wholesale/ Installation
Market Value (US$M)	720	2,900			3,500	3,700	
Typical Gross Margins (2005)	40-50%	20-30%			20-30%	25-35%	15-20%
Partial list of companies	Wacker Chemical	SunPower					
	Hemlock	Sharp				Carmanah	
	Mitsubishi	Suntech				Conergy	
	REC	Evergreen					
	Tokuyama	ATS Photowatt				Xantrex	
	MEMC			Motech		Solon	
				Qcells			
	Solar World						

Assumes 1.8 GW market for residential and commercial at $6,500/kW
Source: NBF estimates and analysis

may be added before mounting and installing a system. A solar farm operator may add a concentrating mirror to focus the light.

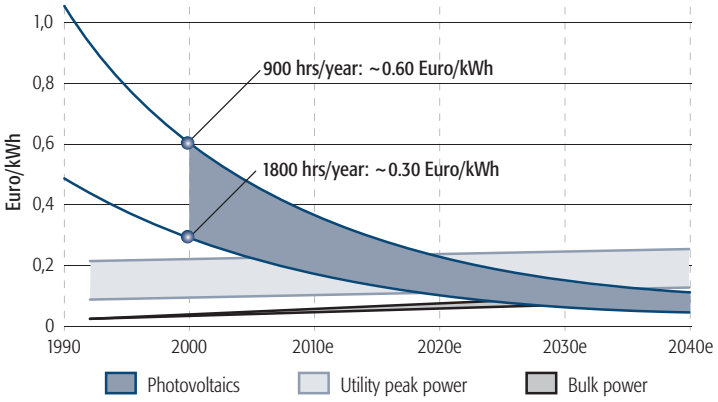
Most solar power companies are currently priced based on their expected production capacity a couple of years out. Nonetheless, if growth persists – and we expect it to – there is still room for stocks to appreciate at the industry's growth rate past 2008, which we think can be 15% to 20% annually.

A typical solar rooftop installation may consist of about 25 modules and produce 4kW to sustain a standard family home. Some countries offer a solar incentive by buying surplus energy. In several European countries, this payment can be many times the cost of grid electricity. German utilities buy back solar electricity at up to 0.57 euro/kWh, while the average grid price is only 0.17 euro/kWh. Incentives are also based on rebates on the cost of installing a solar panel system.

Japan was one of the first nations to promote solar power, giving generous incentives to businesses and residents for more than a decade. Those inducements ended recently, but they did create a high growth market for solar panels, allowing companies like Sharp to fund research and lower production costs. As a result, solar energy costs nearly the same as grid electricity in Japan. Similarly, costs are projected to go down as solar energy is adopted around the world (see chart: Cost of solar headed downward).

Cost of solar headed downward

A European analysis shows solar costs declining toward grid utility prices. The range represents the planet's varying hours of sunlight based on geography.



Source: REC, based on EC Vision Report 2005, EPIA: Towards an Effective Industrial policy for PV (RWE Schott Solar)

Run on silicon encourages solar contenders

Price hikes in silicon will have more impact on profits in the solar industry than on those of semiconductor chip manufacturers. Silicon is only a minor cost to a computer chip maker, and producers are willing to pay more to secure supply. In contrast, silicon is a major part of costs for a typical solar cell manufacturer, so high prices cut into margins.

According to Goldman Sachs research, it is expected that a 50% growth in silicon capacity will meet demand by 2008, though others have forecast a shortage until 2010.

From an investment point of view, we believe this may create an opportunity for solar cell makers who do not use silicon, or who use lower-purity silicon. These include Energy Conversion Devices, Evergreen Solar, and ATS Photowatt.

A number of solar cell makers, such as SunTech Power, have hedged against price volatility by locking in favourable long-term contracts for silicon.

Thin-films and light-eating plastics

Several manufacturers make solar cells from poly-crystalline or amorphous silicon – a less pure form of silicon less efficient at converting light to energy, but cheaper to make.

Non-silicon alternatives are relatively new. They include what are known as thin-film materials such as cadmium telluride and copper-indium-gallium-diselenide (CIGS) – less efficient than silicon at converting light into energy, but much less expensive. Some thin-film cells are now entering mass production. Most advanced is First Solar, which has been steadily increasing production of cadmium telluride solar cells. It claims the lowest cost in the industry at $1.35 a watt – about half the cost of pure silicon. Private company Nanosolar is set to bring to market a CIGS solar cell, which can be printed onto any surface.

Emerging technology includes innovative, light-catching plastics – solar cells made of low cost polymers that convert light into energy. Still at the lab stage, these materials capture the imagination with their promise of being integrated into building materials or even clothing. Companies in this space are privately owned, but worth watching if they can commercialize production and enter the capital markets. Massachusetts-based Konarka is

among the more interesting with its Power Plastic™ product, recently awarded funding by the US Department of Energy as part of President Bush's Solar America Initiative.

Cost per watt will be the ultimate test

We believe that, ultimately, cost per watt in producing solar energy is more important than cell efficiency. Higher cell efficiency is only critical in applications where space is limited, such as small rooftops. For solar farms, space is usually not an issue. The company that can produce solar cells at the lowest cost per watt will get the most business and dominate the market.

Until a clear leader emerges, there is enough demand for solar panels of all types to be used. But expect to see more divergence in the long run, once supply and demand relaxes and competition intensifies.

Risks: Will it ever be cost effective?

Solar power is still too expensive to be economically meaningful until costs come down, with the exception of a few regions like Japan. Without government support and incentives, costs may never come down enough to attract businesses, despite all the best hopes and promises. It is conceivable that electricity prices worldwide will one day become so high that solar-based electricity would become cost competitive, but this could take years or decades.

If governments worldwide were to reduce incentives to produce solar energy, it would give us pause on the industry's growth outlook. With new capacity coming in the solar industry, diminished government support could slow growth, make prices unreasonable and erode profits. Companies that have not already reached a cash-flow break-even point may find themselves facing serious risks.

WIND POWER

Shifty, yes, but wind delivers the goods

Wind energy is now close to being competitive in cost with fossil fuel energy sources. A new generation of wind mills are larger, wider and more efficient. They sit on taller towers, capturing the strong air currents on high.

Another factor spurring growth are companies buying wind turbine equipment and farms in anticipation of meeting environmental obligations and clean energy mandates. TransAlta is one such company that now includes wind power in its portfolios, anticipating that it will be an asset in meeting a regulatory need to sequester "carbon credits" for the net carbon released by burning fossil fuels.

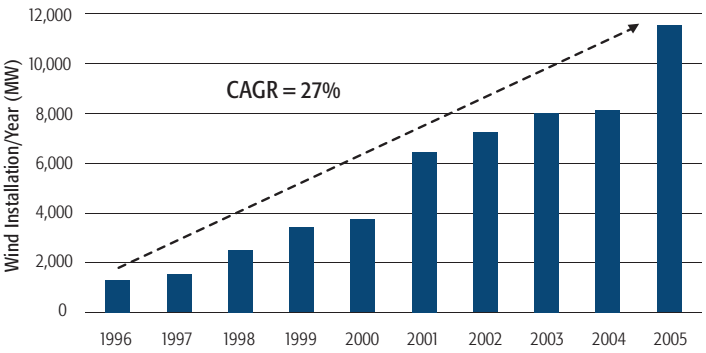
Wind power is one industry where "location, location, location" holds true. It can take years of surveying wind intensities to select an optimal spot for a wind farm. Even the windiest location may only operate at around 30% efficiency, given the nature of this energy source. That said, there are vast amounts of land viable for wind farms in Canada. Domestic utility companies expanding into wind power include Canadian Hydro Developers. There is also activity around the world, notably in India, where Suzlon Energy is an Asian market leader in wind power.

Wind energy is not suited for baseline energy needs, since there isn't a constant supply. Power can be stored in a solid battery or

in a newer hydrogen generating system – the technology used by the landmark windmill on Toronto's CNE fairgrounds.

Over the past 10 years, the base of wind power installed around the world has grown tremendously: about 27% a year (see chart, Soaring growth). The cost per watt of wind farm projects has dropped to economically viable levels.

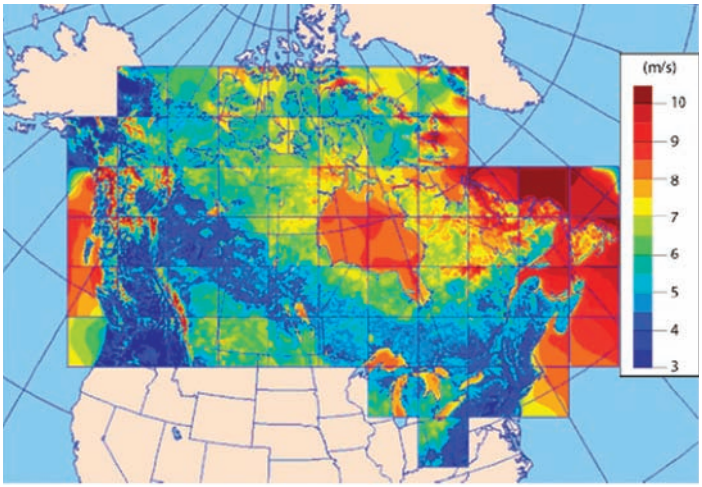
Soaring growth for wind generators



Source: GWEC with NBF analysis

Recent demand for wind turbines has been so high that producers are having trouble filling orders. Companies selling out of product lately include market leaders Vestas and Gamesa, as well as the GE Energy wind division. Companies that build and develop wind-driven resources are expected to provide a return commensurate with capacity growth rates. Investing in wind equipment providers requires an understanding of usage capacity as well as profit margins.

A Canadian wind map



Source: Environment Canada

Risks and realities: barriers to growth

It may be harder than anticipated to find ideal wind farm locations. Many offshore locations look good from a power generation perspective, but significant amounts of energy can be lost over power lines.

There may also be resistance to wind farm developments near residential areas, and it may prove difficult to obtain necessary permits. If this creates indefinite delays, the investment community could have second thoughts on its involvement.

Continued growth will depend on finding more affordable systems for storing electricity. Windmill designs must still prove the test of time – if maintenance and repair costs prove higher than expected, you can expect to see a plunge in profits for wind farms and declining growth of windmill makers.

HYDRO, GEOTHERMAL AND BIOMASS

More alternatives, from the earth

Hydroelectric power is one of the most widely used sources of renewable energy on earth, capturing the energy of flowing water through turbines to produce electricity. Hydro-related companies offer a very different type of investment in contrast to the high growth, technology-intensive companies in the renewable energy space. They offer a more steady cash flow and utility-like return, with less technology risk. Most risk lies in the development of sites.

From Canada to China, most of the world's hydro mega-projects are either government-owned or not open to capital market investment. More opportunities are available through smaller scale projects that use the flow from rivers and lakes.

A more experimental kind of hydro power harnesses energy from the ocean's tides and waves to generate electricity. As the tides rise and recede, water flow powers turbines to create electricity. Similarly, the continuous motion of ocean waves can be captured by a power generator. These technologies are still emerging.

Geothermal energy taps into the earth's latent heat by drilling into reservoirs of hot water and steam in the ground. Geothermal power plants are feasible in areas where the earth's crust is thinner. The US is the largest user of geothermal energy. Next is the Philippines, where a unique utility company, PNOC, has created the second largest installed geothermal capacity in the world.

Finally, biomass energy can be harnessed by burning plant waste products to generate heat and electricity. The main users are the pulp and paper industry to more effectively deal with its wood waste, using it to power production plants. While not a pure investment in biomass, Brazilian forest products companies like Aracruz, Suzano and VCP use biomass energy to reduce energy costs, while enhancing corporate image as leaders in sustainability.

CONCLUSIONS

Must factor in government incentives

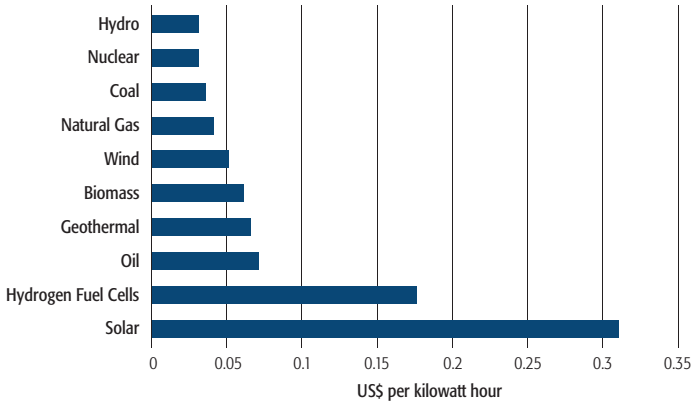
The renewable energy sector is still largely dependant on government incentives and any reductions in support could be detrimental to the sector's growth and viability, particularly for nascent technologies. The main motivators for government support have been energy independence and the desire to control the energy supply which is so critical to a country's economic well being. In recent years, the debate on environmental impact has made its way into government policy as well, promoting legislation that is favourable to renewable energy sources.

The incentives can be generous, around the world, as a way to prompt investment and development of infrastructure. The US has earmarked $1.7 billion for hydrogen fuel cell development, while the Million Roofs program is a boost to the solar industry. The UK grants as much as 40% of eligible capital costs to promote offshore wind energy production. Italy gives tax credits for biomass and geothermal energy production. The list goes on. Nevertheless, energy policy and worldwide demands may change, and all this support may not always be as promised.

There is also a risk that one renewable source will get support at the expense of others. For example, the discovery of a cheap solar cell that can be integrated onto any surface may draw all government support, eroding support for other sectors. In the transportation fuel space, the discovery of a cost-competitive biofuel process may eliminate support for all other unrelated biofuel industries.

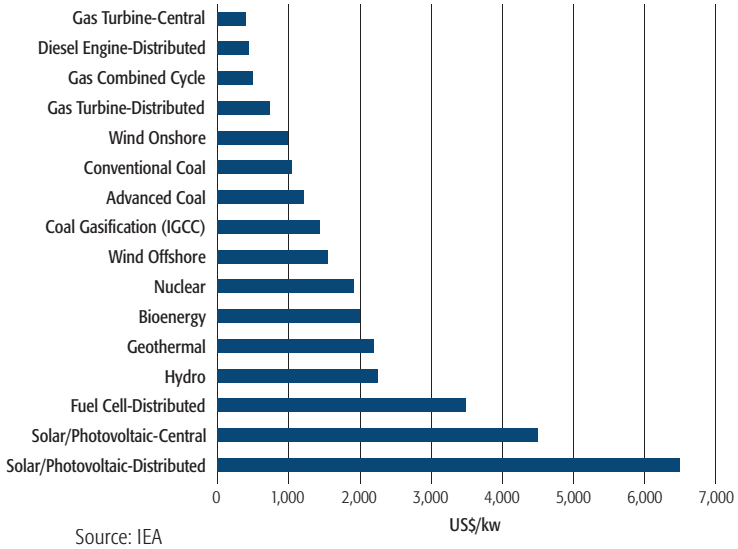
Relative cost of power

The sun may be free, but capturing its power is still relatively expensive. Average total cost of generating energy, per kilowatt hour. Includes capital costs and fuel costs.



Source: Simmons & Co

The capital costs of various energy sources



Source: IEA

The "conservation" effect on energy

While not an energy source in itself, interest in energy conservation technology will impact the renewable energy market. There's recognition that it can be more economical to save energy than to build new power plants. For instance: if a city using 1,000 megawatts of electricity can reduce use by 10% using conservation technologies, it's the same effect as a new 100-megawatt power station.

Conservation can effect both transportation fuel and grid electricity usage and economics. We can illustrate with a couple of examples: hybrid cars in the transportation fuels sector, and the case for solid-state lighting in the grid electricity sector.

The electric hybrid car: Hybrid cars can reduce fuel consumption by half. Their ingenuity lies in a regenerative braking system and use of both electric and gasoline engines. The braking system recaptures energy normally lost when applying the brakes, saving it for later use. When braking, a large magnet approaches a coil, slowing the wheel while generating electricity. The energy is stored in a battery and used to run the electric motor. This motor shuts off, rather than idling, while stopped or coasting. The gas engine only kicks in if the battery runs out or more power is required.

So, what about a hybrid diesel car that could achieve 70 miles per gallon? Mileage varies, but you can roughly expect fuel efficiency of 25 miles per gallon for a regular car, 35 miles to a gallon for a diesel engine and 50 miles per gallon for a hybrid vehicle. Put them together and the higher cost of biodiesel may no longer deter consumers. Between improvements in diesel and hybrid technology, as well as lighter vehicles, it is not inconceivable to reach efficiencies of 100 miles per gallon one day.

LED lights: Only 10% of the power used by incandescent light bulbs is emitted as visible light. Compact fluorescent bulbs use four to five times less power for the same brightness. Even with a higher initial cost, bulbs last longer and pay for themselves over time. The next generation of light source uses LEDs – light-emitting diodes – also known as solid-state lighting. LEDs are similar to solar cells, converting electricity to light, minus the usual losses to heat in an electrical circuit. In theory, a solid-state lamp could use about 1/10th the energy of a traditional light bulb.

In practice, today's best white LEDs, announced by leader Seoul Semiconductor, are only 50% more efficient than fluorescent bulbs. Solid-state light bulbs cost much more than traditional bulbs or compact fluorescents: A 9-watt solid-state bulb – equivalent to a 70-watt incandescent bulb, will set you back about $65. But as costs come down, we expect to see wider use of LED lighting over the next few years.

What all this means to investors

As with all prudent investment practices, there is always a need to diversify. It is also crucial to maintain a global context in the field of renewable energy. As new technologies and business models emerge rapidly, our investment team monitors developments closely, inspecting management ability and the impact of technology changes.

The renewable energy industry is evolving quickly, making it necessary to actively manage investments. Not every sub-sector is advancing at the same rate, suggesting a need to be selective in technologies as well as companies. As each area of the industry develops in waves, it creates cyclical opportunities to buy and trade. A few well-selected long-term holdings could persist through the years. As sub-industries mature and rationalise, these renewable energy markets should eventually become less cyclical.

Mackenzie Financial is an established leader in this developing opportunity. In Mackenzie's resource funds as well as in Mackenzie Growth Fund, and Mackenzie Universal Global Future Fund, the managers are actively pursuing the best investments in this exciting sector. We take an approach that is diverse, global and value-driven. The funds seek out opportunities in both the latest innovations and decades old established business models, closely monitoring industry developments and changes as they occur.

Mackenzie Regional Sales Offices

TORONTO
Mackenzie Financial Corporation
150 Bloor Street West, Suite M111
Toronto, ON M5S 3B5
T 416 922 5322
1 888 653 7070
F 416 922 5660
1 866 766 6623
E service@mackenziefinancial.com

CALGARY
Mackenzie Financial Corporation
Bankers Hall
855-2nd Street S.W., Suite 3810
Calgary, AB T2P 4J8
T 403 205 4500
1 888 650 4500
F 403 205 4501
E calgary@mackenziefinancial.com

MONTREAL
Mackenzie Financial Corporation
1250 René-Lévesque Blvd. West
Suite 4010
Montreal, QC H3B 4W8
T 514 937 1505
1 800 363 4357
F 514 937 8281
E montreal@mackenziefinancial.com

VANCOUVER
Mackenzie Financial Corporation
HSBC Building
1440-885 West Georgia Street
Vancouver, BC V6C 3E8
T 604 685 6952
1 800 944 6225
F 604 257 6609
E bc@mackenziefinancial.com

Choose Wisely.

Mackenzie INVESTMENTS 40 1967 2007

MF3881 3/07

9866