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Revolution of clean technologies. How to earn on innovations?

"When industry giants, such as General Electric, DuPont, Toyota and Sharp, as well as investment firms, such as Goldman Sachs, make multi-billion investments in clean tech, the message is clear."[1] After IT revolution and internet boom, another revolution in the industry and investments comes (or has already come), i.e., development of clean tech. The new trend offers a non-precedence chance for investments.

What is clean tech? What enhances investments in clean tech? Which enterprises are already leaders in clean tech? How to earn on clean tech? How can Polish investors participate in the new tendency in capital investments?

Some facts:

- In 2006, 100.4 billion USD was invested in the world in clean tech ventures;
- A number of countries have adopted strategies aimed at increasing the share of recoverable energy in the total consumption of energy in the years 2010-2030;
- The increasing environmental awareness among consumers enhances demand for clean tech – Toyota has already sold over 1 million hybrid cars (Toyota Prius);
- 20% of energy in Denmark is produced by wind power plants;
- Currently, Brazil receives 30% of fuels from renewable sources (ethanol);
- Having foreseen the boom for clean tech, the Japan Sharp increased its production of solar panels from 54 MW in 2000 up to 710 MW in 2007 and, currently, it has a 25% share in the world market of solar panels;
- DuPont plans that, in 2010, it will reach 25% of production from sources not connected with crude oil;
- In the USA, every tenth dollar from professionally managed assets is involved in socially responsible investments (SRI). At the end of 2005, American clients invested as much as 2.3 trillion dollars in this market, out of which 148 billion dollars were invested in SRI investment funds.

[1] R. Pernick, C. Wilder: The Clean Tech Revolution, HarperCollins, New York, 2007

What is clean tech?

Clean tech (clean technologies) refer to any product, service or process which provides value with the use of limited amount of non-renewable raw materials or without them at all and/or produces considerably less waste as compared with conventional technologies. Clean technologies cover a broad scale of products and services, beginning from the use of solar energy in mechanical vehicles to hybrid vehicles.

Clean technologies:

- enable use of renewable resources and energy or reduction of use of natural resources through their more efficient use;
- eliminate or limit waste and toxic pollution;
- offer better economic conditions as compared with conventional technologies; and
- offer higher profits, cost reduction and lower prices to investors, entrepreneurs and clients.

From the investment perspective, this sector offers extraordinary growth to investors involved in clean tech industries through venture capital, i.e., open- and closed-end investment funds.

Revolution: has it just come or it is coming?

The revolution is in place and it accelerates. Let us consider a few facts:

1. In 2004, the solar panel production sector manufactured panels which could produce 1 GW of power, in 2005 – 1.5 GW, and in 2006 - 2 GW of power, which caused that the entire photo-galvanic cell industry (photo cell, solar, solar cell) was worth over 16 billion USD;
2. At the end of 2006, the American market offered 15 hybrid car makes. Toyota is the leader in the sale of such cars. Polish clients may also purchase hybrid cars, for example, Toyota Prius and a few models of Lexus;
3. Germany and Spain are ranked first and second, respectively, in the world production of wind energy. Denmark satisfies 20% of its demand for energy thanks to wind farms. In Poland, the amount of investments in wind power plants has significantly increased;
4. The value of clean tech sector has increased up to the level which caused that not only specialised separate funds are established in the capital markets but also the entire capital groups, investing exclusively in clean technologies.

The example below shows the potential of clean technologies as well as the point to concentrate on: while boiling potatoes for lunch at home we use only 1% of energy (produced by the cooking machine or electric oven). Only 1% of the used energy makes the potato soft, while the rest is “wasted” for kitchen heating, pot heating, and heating of water in the pot which we subsequently pour away.

What enhances the increase of investments in clean tech?

There are six factors which enhance increase in the sector of clean technologies, i.e.: costs, capital, competition, China, consumers and climate.

Costs
Economy is the greatest power enhancing development of clean technologies. The reduction of costs becomes more significant in times when prices of non-renewable fuels (crude oil, gas) increase to an extraordinary extent. The research shows that the costs of obtaining clean energy decrease over years, while the costs of non-renewable fuels increase and will increase in the foreseeable future.

Capital
A non-precedence increase in the value of investments in clean tech sector significantly changes this sector. In 1999, American venture capital investments in clean tech reached 468 million USD, while in 2006 they amounted to almost 2425 million USD (almost 2.5 billion). Over 100 billion USD were invested in the world in clean tech through venture capital, enterprise investments, government grants, investment funds and project financing.

Competition
Governments, local governments, and cities in the world compete in winning investments in clean tech in search for new places of work, a better environment for their residents and citizens as well as savings in consumption of constantly shrinking natural resources.

China
Chinese people say "Never trust a map which is older than three months". Currently, this country experiences the largest world migration from villages to towns. By 2020, over 400 million Chinese people will move to towns, which means the establishment of cities of the size three times the size of New York in a year. Concurrently, Chinese towns and cities are the most polluted ones – 16 out of 20 most polluted cities in the world are located in China. Over 600,000 Chinese people per annum die prematurely due to pollution of water and air. Toxic substances are used for manufacturing of almost all products, beginning from food to toys (cf. the recent affair with Mattel toys manufactured in China). Due to the above, the Chinese government has already adopted a programme for investments of 180 billion USD in clean technologies within the next 15 years.

Consumers
Wealthy consumers in developed and emerging countries are more environmentally aware and demand "cleaner" products and services which are simultaneously cheaper, of better quality and protect natural environment. In the USA, a group of people referred to as LOHAS (lifestyles of health and sustainability) includes over 50 million persons (1/6 of population of the USA) and it spends over 220 billion USD per annum for ecological products. Toyota has sold over 1 million hybrid cars in the world, which demonstrates the increasing environmental awareness of consumers.

Climate
In the recent years, the climate has been changing dramatically. 11 warmest years in the world history took place in the recent 12 years. The largest number of hurricanes and typhoons ever reported within one year took place in 2005. This is the effect of human activities, including, in particular, emission of carbon dioxide. Therefore, DuPont, Wall Mart, and GE have already invested in technologies reducing the emission of carbon dioxide to air. International treaties regulating the principles of

emission of carbon dioxide to air lead to increased demand for technologies which reduce or even eliminate the emission of carbon dioxide.

How will particular sectors of clean tech develop?

Energy
Forecasted growth of clean energy sector (in billion USD)

Sector	Sector value in 2006	Sector value in 2016
Bio-fuels	20.5	80.9
Wind energy	17.9	60.8
Solar energy	15.6	69.3
Fuel cells	1.4	15.6
Total:	55.4	226.6

Growth leaders – key sectors of development of clean technologies

Solar energy
This sector offers, most probably, the best investment opportunity from among all clean technologies. The world market of solar energy increases by 30-50% per annum. A decrease in prices of modules for production of solar energy may be compared to the decrease of prices of computer processors in the seventies – from 1979 to 2006 the price of photo-voltaic modules decreased from USD 32 per one watt of energy produced to USD 3 per watt, which causes that the cells are generally available.

Wind energy
A large market of significant growth. The global wind energy industry grew from 11.8 billion USD in 2005 up to 17.9 billion USD in 2007 and will, most probably, reach 60.8 billion in 2016. The investors include such giants as GE and Goldman Sachs. Germany, Spain, USA and Denmark are the largest producers of wind energy in the world. Leaders in this market include, among others, Spanish Acciona, Gamesa and Iberdola as well as General Electric.

Bio-fuels and bio-materials
It is forecasted that the market of bio-fuels will reach 80.9 billion USD in 2016. Currently, the market is dominated by large players such as General Motors, ChevronTexaco, Cargill, and Ford.

Transport
Due to increasing prices of fuels and a significant share of transport in the emission of carbon dioxide to air, transport is one of the key areas of application of clean technologies. Automotive concerns develop hybrid and electric vehicles, electric vehicles as well as vehicles powered by hydrogen cells. Even now consumers may chose among Toyota cars (Prius, Camry, Lexus), Ford cars (in the USA: Escape), Honda and GM cars. Toyota is undoubtedly the leader.

Water
The problem of lack of access to potable water does not concern African countries only. In Europe, the lack of sufficient water resources has already been experienced by Malta and Romania. Low

recourses of potable water are also in Poland. China approaches the crisis too. The prices of potable water have already increased but in many countries these prices do not reflect the actual value of water exploration and treatment. Having noticed the increasing problem, the government of China has decided to invest 128 billion USD in this sector by 2010. Consequently, the Chinese water Market is highly attractive to foreign water enterprises. What makes the water sector unique? There is no water substitute and purchasers cannot postpone their purchases – this is a day-to-day demand. Water companies are monopolists on regional basis – competition faces strong barriers to entering the market. The demand for water is not affected by inflation, recession, percentage rates, or changes in consumer preferences. The current price of water still does not take into account its true economic value, leaving too much space for price increases.

How to earn on clean tech?

On a long-term basis. Be patient. Today's "small technologies" will be commonly used for the improvement of consumption and storage of energy, water consumption, transport and will improve efficiency of power systems and water management. A critical element for development of the use of clean technologies is the scale. The economics of scale will contribute to reduction of prices of clean technologies, and thus, to their common use and increased demand of consumers. Obviously, the system changes need time – the introduction of computers to villages took two decades – common use of clean technologies cannot be introduced immediately.

In the world, there are specialised investment funds which have invested in clean technologies for years now. They are available to a wide group of private investors. Funds investing in water processing, new materials, or energy, show a few year history and results above the average.

The table below presents a few examples from the water sector and new technologies in material sector (for comparison purposes we have presented MSCI World Index TRI (TRI-total return Index)):

FUND	2002	2003	2004	2005	2006	2007*
Pictet Water Fund	-31.30%	7.78%	17.70%	26.90%	23.70%	5.29%
SAM Sustainable Water Fund	-27.08%	16.13%	15.76%	22.28%	20.93%	7.00%
ASN Bank Milieu & Waterfonds	-44.10%	15.97%	9.27%	27.26%	28.84%	5.29%
SAM Smart Materials Fund**	+9.20%	8.59%	-	-	-	-
MSCI World Index (TRI)	-31.73%	11.28%	6.95%	26.78%	7.93%	5.59%

* until 17.09.2007
** established on 1.10.2006

How can Polish investors participate in the new trend in capital investments?

The offer of Investment Fund Managers, a leader in offering foreign funds in Poland, includes a fund from the sector of clean technologies, i.e., BlackRock Merrill Lynch New Energy.

The table below presents the results of the fund (return rates for the given period as at 17 September 2007):

FUND	6M	12M	2 years	3 years
BlackRock Merrill Lynch New Energy	+19.5%	+36.7%	+58.5%	+146.2%

Other planned products of this type in the offer of Investment Fund Managers Sp. z o.o. will include SAM funds (Sustainable Asset Management, Robeco group, www.sam-group.com), which will be made available to the clients in Poland at the end of 2007 in the form of a structure product prepared by Robeco. This product will offer exposure to clean tech market with the capital guarantee option upon buy-out.

SAM funds in the form of open-end investment funds will be available to Polish clients in 2008.

Prepared on the basis of materials from Robeco Clean Tech Forum (Amsterdam 5 September 2007) and the book entitled "The Clean Tech Revolution" (R. Pernick, C. Wilder: The Clean Tech Revolution, HarperCollins, New York, 2007)

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Investment Fund Managers
Investment Fund Managers Sp. z o.o. is a boutique financial institution offering investment solutions based on the best investment funds available in the Polish market. The offer of Investment Fund Managers includes over 250 Polish and foreign open-end investment funds, managed by 14 world financial institutions (AIG, BPH, ING, Fortis, Franklin Templeton, HSBC, KBC, Legg Mason, BlackRock Merrill Lynch, Robeco SEB, Skarbiec, Superfund, Union Investment). Our solutions enable the Client to benefit from investment opportunities in all key financial markets in the world. Our Clients are offered a full possibility of investment risk diversification through, for example, currency, regional and asset diversification. The offer of Investment Fund Managers covers also specialised investment areas such as, among others, technological funds, bio-technical funds, raw material funds or funds focused on selected small- and medium-sized companies in the given region. The firm was incorporated in December 2003. The operating activity was started in April 2004 on the basis of a permit from the Financial Supervision Commission. The firm's share capital amounts to PLN 1,375,000. Investment Fund Managers is headed by Aleksander Jawień and Izabela Piecuch-Jawień.