

2010

Swedish Cleantech opportunities

A market overview from the Swedish Energy Agency



What is Cleantech?

Cleantech is an abbreviation of clean technologies and refers to energy and environment-related technologies developed with the objective of reducing harmful effects on the environment. The sectors included in the cleantech concept are energy, transport, waste, agriculture, water and air. The Swedish Energy Agency is active in the energy segment of cleantech. Global demand for environmentally conscious products continues to grow. Cleantech can thus generate new jobs, growth and tax revenues. This market overview outlines the current status of the sector.

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We aim to open the doors for Swedish cleantech

SUCCESSFUL GROWTH in China and India has resulted in a higher standard of living for millions of people. These countries' considerable purchasing power is pushing up prices for energy and other resources across the globe. This consumption has also made the environmental challenges facing our planet more pressing.

The markets for new, efficient technology offering high environmental performance has thus grown dramatically. The growth of companies in the cleantech sector is global and is not as dependent on the outcome of climate negotiations as many Europeans may believe. China is the country that is building the largest number of wind turbines and solar cells. North America is building more wind power than Europe. Many of the most energy-efficient processing industries are now being built in China or India.

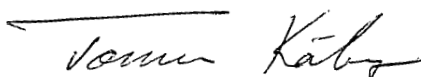
THE FACT that several powerful asset managers believe that oil will last forever and that the greenhouse effect and climate change are products of our imagination is not a problem. This reduces the competition and generates greater profit opportunities for those who can identify future business opportunities.

Nevertheless, successful investment in cleantech is not an easy task. Global growth for energy-efficient industrial processes, engines, light sources and vehicles, or the dramatic growth seen in the solar cell and wind industries opens opportunities for investors. However, growth does not always generate large gains and a rapid return on investment for investors. Investors must have the capacity to assess the technology and companies require industrial development expertise.

WITH THIS publication, the Swedish Energy Agency aims to enhance the understanding among the players who need to collaborate if the viable technological innovations and business ideas that exist in Sweden are to be developed into successful companies. Such companies have the double satisfaction of making the world a better place in the universe while also enhancing the wealth of their owners and employees.

We also hope that successful new companies in the energy sector will contribute by developing additional products. I personally hope that the women and men who have achieved success – with foresight and talent – will inspire others, prompting them to form additional successful companies in Sweden and in the world.

We welcome you to take part in this development!



TOMAS KÄBERGER

Director General at the Swedish Energy Agency





The Swedish perspective

During recent years, growth in the Swedish cleantech sector has outperformed other industries. Even during the financial crisis, investors continued to display an interest in cleantech companies. Surveys also reveal that many investors focused on supporting existing portfolio companies during the crisis. At the same time, the need for well-functioning networks between entrepreneurs and investors is increasing.

Cleantech – still a hot sector

Swedish investors maintained an interest in cleantech even during the financial crisis of 2009. The sector's share of total Swedish venture capital rose from 5 to 9 percent. However, the focus remained on supporting existing investments rather than initiating new ones.

THE FINANCIAL crisis severely impacted new Swedish investments. During 2009, the total number of investments dropped 14 percent compared with the preceding year, while the total amount invested declined 50 percent.

However, Swedish venture capital is beginning to recover after the financial crisis, according to surveys from the Swedish Venture Capital Association (SVCA). Firstly, the prices of the companies have fallen to more attractive levels and, secondly, the banks have started to lend money. Another important factor underlying the recovery is that during the financial crisis the companies had time to improve the structure of their operations and were thus able to prepare for injections of venture capital.

! During 2009, the Nordic cleantech climate was largely marked by more funding but fewer investments.

ALTHOUGH THE amount invested in Swedish cleantech companies declined in overall terms in 2009, the sector performed well in relation to other industries. The proportion of total investments of venture capital accounted for by cleantech companies rose from 5 percent to 9 percent. The cleantech sec-

tor also maintained its position in terms of the number of investments in Swedish companies. Cleantech accounted for approximately 12 percent of all investments, about the same share as in 2008.

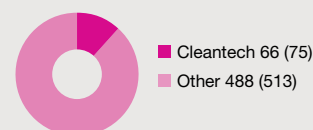
Buyout players in all industries increased their follow-up investments by 83 percent in 2009 compared with 2008, according to the same survey. This is proof that investors focused on supporting their portfolio companies during the crisis.

THE NORDIC cleantech climate was largely characterized by more funding but fewer investments in 2009. The amount invested increased from a total of EUR 372 million in 2008 to EUR 460 million during 2009. The number of investments declined from 202 investments in 2008 to 157.

One explanation is that the cleantech sector has started to mature and that investor interest and focus has moved to companies further along the development chain. The amounts required for an individual investment increase, while the number of investments decline. The fact that the number of investments in Norway dropped by nearly 50 percent while the total invested amount rose fivefold underscores this trend. Norway is now the Nordic country that accounts for the highest invested amount in cleantech, while Sweden accounts for the greatest number of completed investments. ❁

MAINTAINING POSITIONS

2009 (2008)

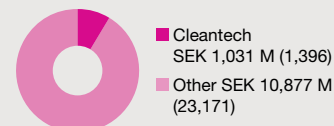


Cleantech companies accounted for slightly more than 12 percent of the total number of Swedish investments in 2009, about the same as in 2008.

Source: SVCA

MILLIONS INVESTED IN CLEANTECH

2009 (2008)

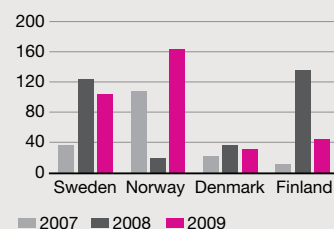


Of total investments of venture capital in Sweden, cleantech companies increased their share from 5 percent to 9 percent in 2009.

Source: SVCA

NORDIC CLEANTECH INVESTMENTS

2007–2009 (EUR million)



Norway is the country in the Nordic region that accounts for the highest investment volume in the cleantech sector.

Source: Cleantech Scandinavia

Top three sectors on the investor list in 2009

The Swedish sectors in which venture companies preferred to invest were:

- 1 Computers and consumer electronics
SEK 655 million (108 investments)
- 2 Energy and environmental technology
SEK 627 million (34 investments)
- 3 Life sciences
SEK 625 million (133 investments)

Source: SVCA

Comeback for Nordic venture capital in 2010

FOUR NEW VENTURE CAPITAL funds that focus fully or partly on cleantech were formed by nordic venture capital companies in the first half of 2010. This is a sign that the investor climate has eased; during 2009, no new funds were started at all. These were the funds:

* **Northzone Ventures** formed its sixth venture capital fund, with a focus on European technology companies in the growth phase. The aim of the fund was to reach EUR 150 million and it had attracted EUR 90 million from international and local investors by February.

* **Conor Technology** started its second fund with a focus on early-phase technology companies from the Nordic region and the Baltic countries. The fund, which also invests in cleantech, reached EUR 46.5 million in May.

* **SEED Capital** started its second fund with a focus on early-phase Danish technology companies. By February, the fund had attracted DKK 435 million and its target for 2010 was DKK 750 million.

* **Cleantech Invest** started its first Clean Future Fund with a focus on early-phase Finnish cleantech technology companies.

Wind-power turbines continue to turn

WIND POWER CONTINUES to grow in Sweden. From the beginning of the year up to August 2010, about 150 new wind-power turbines had joined the electricity certificate system. These jointly account for a contribution of 280 MW. In accordance with statistics from the electricity certificate system, there are now slightly more than 1,500 wind-power turbines with an installed output of nearly 1,730 MW.

The Swedish counties that have most wind power are, in order of ranking, Skåne, Västra Götaland and Jämtland. One of the reasons for the increase noted by Jämtland is that the Municipality of Strömsund was the area of Sweden where most wind power was constructed in 2010. As a result, the municipality rose to third position among the top 20 Swedish municipalities with most wind power, despite not having been ranked at all previously. This increase was attributable to Havsnäs, Sweden's largest land-based wind farm, which became operational in 2009. The farm comprises 48 wind-power turbines with an installed output of slightly more than 95 MW.





Emerging countries need more chances to develop cleantech initiatives.

More openings for pure energy technology

ACCESS TO CAPITAL is one of the impediments to the establishment of pure energy technology in emerging countries. However, the problem is actually not a shortage of capital or sound projects ideas but rather the fact that investors and project owners do not always reach each other.

An initiative with Swedish participation has now been formed to remedy this situation. CTI-PFAN, an acronym for Climate Technology Initiative – Private Financing Advisory Network, is an activity within the framework of the International Energy Agency (IEA). The initiative is intended to serve as a forum in which investors and companies can meet. The activity also includes identifying promis-

ing projects that are matched with global, regional and national networks of investors. PFAN assesses business plans and selects the most promising. The project owners receive support before the projects are presented to investors at special meetings – Clean Energy Financing Forums – in Asia, Latin America and Africa. During 2010, six forums were arranged that attracted a total of 1,100 participants. The activity is growing considerably and, in just a few years, has contributed to business corresponding to investments of USD 184 million. Additional business valued at USD 2 billion is expected in the future.

» Read more: www.cti-pfan.net

Gyllenhammar makes green investment

A NEW VENTURE CAPITAL fund focusing solely on investments in energy-efficient technology is the most recent move being made by former Volvo CEO Pehr G Gyllenhammar. He is Chairman of the company Sustainable Growth Capital, which is now raising SEK 1 billion to place in a fund for investing in companies active in renewable energy.

This is expected to become the Nordic region's largest fund for investments aimed at energy efficiency and energy technology. Jonas Eklind has operational responsibility for the fund. Investors include the wind power company Arise Windpower's founder Ulf Corné. The fund also hopes to attract major industrial investors. For example, the fund has already established cooperation with ABG Sundal Collier.



Regional networks support cleantech

SWEDEN HAS A NUMBER of networks that focus on supporting the efforts of cleantech companies to develop their competitiveness in and outside Sweden. Many of these are more or less delineated geographically with different focuses and strategies. However, what they have in common is their aim of capitalizing on their members' interests and that they work in a demand-driven manner. Links to several regional networks are found on the Swedish Energy Agency's website.

» Read more: www.swedishenergyagency.se



Yen, yuan and dollar attracted to Sweden

CHINA AND JAPAN have high rankings in terms of investment in Sweden. The US has also invested significantly despite its weak economy, according to Invest:Sweden. US companies in particular are normally the largest foreign investors and employ one-sixth of all employees in foreign-owned companies in Sweden. India is another country that is expected to ultimately develop strongly in this respect and to contribute in the long term to investments being attracted to Sweden, according to Invest:Sweden.

» Read more: www.investsweden.se

How the investment chain works

A prerequisite for Swedish cleantech companies' ability to attract venture capital is an increase in investor knowledge of the area. In addition, the cleantech companies need to enhance their knowledge of the venture capital market and to understand the workings of a well-functioning investment chain.

WELL-FUNCTIONING networks, analysis and communication combined with increased cleantech knowledge among investors are vital factors if cleantech companies are to succeed in competing with the other sectors vying for investments from the venture capital market. However, the cleantech companies also require insight into how investors operate. An entrepreneur looking for capital soon discovers great differences among the players. Both decision-making processes and investment amounts can vary considerably depending on who is investing.

The investors are often only named as venture capitalists. However, this is a very broad definition, since venture capital is a generic term for investments in the equity of companies and comprises investors in both listed and unlisted companies.

VENTURE CAPITAL is also often used somewhat misleadingly as a synonym for private equity. Private equity entails venture capital investments in unlisted companies in which the owners' commitment is active yet limited in terms of time. Private equity companies are in turn divided into business angels and venture capital or buyout companies.

The difference between these is that venture capitalists invest in companies in seed, start-up or expansionary phases, often with negative or weak cash flows, while buyout players are looking for investments in mature companies that usually have strong cash flows, and for making a profit on restructuring measures.

A business angel, is a private individual who invests his or her own money in companies. A key aspect for business angels is the ability to contribute their own personal knowledge in work on developing the company. A business angel can also opt to invest subjectively in a completely different way than, for

DIFFERENT INVESTORS IN DIFFERENT PHASES

» **1 CONCEPT AND DEVELOPMENT:** The race is about to start. The company is looking for help in its infant phases, usually from players such as the Swedish Energy Agency.

» **2 START-UP:** The company is up and running, a part of the business is in place and it has an idea of how it will develop in the future. During this phase, it is common that business angels participate actively and contribute both capital and knowledge. A few venture capital companies are also active at this early stage. Towards the end of the phase, many angels leave the companies by, for example, selling their interest to venture capital companies.



PRIVATE EQUITY – AN ENGINE IN THE SWEDISH ECONOMY

The private equity sector has a major impact on the Swedish economy. The sector is contributing to an increase in the number of new high-tech growth companies and in job opportunities in Sweden. Today, private equity companies in Sweden own interests in 1,200 companies. Some 7 percent of all Swedish private-sector employees, meaning about 150,000 people, work in companies financed by venture capitalists. In turn, these operations have a number of suppliers, such as lawyers, consultants and investment banks.

Source: SVCA

usually strong, active owners during a company’s development phase.

Together, all of the participants form a chain in which different investors are more suitable according to the position in the companies’ lifecycle. The participants may be likened with runners in a funding relay. This is how the relay can be described:

IN A COMPANY’S start-up phase, a business angel could be the most suitable form of investor, offering equity and own knowledge. For a business angel, the individual challenge and interest are at least as important as the investment amount.

When the operation has passed the start-up phase and made progress, it is time for the next phase, expansion. In order to expand, and to develop the operation, it is usually necessary to procure much more capital. This is when the venture capitalists enter the scene. The buyout players do not arrive

FOUR QUICK FACTS ABOUT VENTURE CAPITAL

9 of 10

venture capital-owned companies take a positive view of venture capital as a form of ownership.

7 of 10

venture capital-owned companies would not exist without venture capital.

9 of 10

venture capital-owned companies would not have had the same development without venture capital.

7 of 10

companies owned by buyout players would not have had the same development without venture capital.

Source: SVCA

example, a venture capitalist, who has usually set predetermined return requirements and other criteria for the type of investments that can be made. What business angels and venture capitalists have in common is that they are

until the company has matured so much that it is ready for major restructuring measures, which normally means long after the venture capitalists have left the company.

Although all of these players live in >>

>> **3 GROWTH:** It is now time to up the pace. The company has customers and sales. The need for capital often increases and venture capitalists enter the scene. They are more governed by figures and earnings. The company usually get support for three to five years. Then which the venture capitalist make an exit.

>> **4 MATURITY:** The company has been running on its own steam for a while; however, if it risks stagnating, a buyout player could enter the scene. Such a player could invigorate the company through, for example, a restructuring.



GRAPHICS BY TOMAS ÖHRLING

» some sort of symbiosis with the entrepreneur, the relationship is not always simple. For example, business angels often want to sell exactly what the venture capitalists want to buy, and the entrepreneur is keen to do business with the player who can offer the highest investment amount. However,

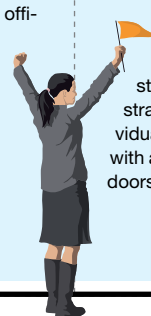
this can also entail that the parties end up in a conflict of interests: The business angel wants to make a profit on his stake, for example, by selling it the venture capital company. For its part, the venture capital company wants to find an object with a favorable price tag.

If the founder's and the business

angel's views of the company's value differ excessively, this could impede a sale, and possibly also make it more difficult for the company to raise fresh capital. Accordingly, the business angel risks being "locked into" his own investment and being impeded from cashing in on his stake. ✿



	BUSINESS ANGEL	ANGEL NETWORK	VENTURE CAPITAL COMPANY	BUYOUT COMPANY
WHAT IS IT?	Private individual who contributes capital and expertise to unlisted companies. A business angel serves as a complement to formal venture capital usually by entering the company early in its growth phase. The number of active business angels in Sweden is estimated at between 3,000 and 5,000.	Business angel networks (also known as BAN) serve as a broker between companies and business angels. There are number of unofficial networks, in Sweden. The 26 official networks usually have a host organization, are in part publicly funded and have close links to universities and colleges, so that they can broker contacts between entrepreneurs and angels.	An investor aiming to attain a favorable return by increasing the value of portfolio companies. Most invest in funds in which primarily banks, pension funds or insurance companies invest money. They also include listed companies state-owned companies and foundations such as Industrifonden and companies owned by such players as Volvo, Midroc and RWE.	These are players that invest later in the companies' development process. They focus on acquiring the whole or parts of mature companies with stable cash flows, development potential and a need for active owners with financial assets.
TYPICAL INVESTMENT	Each year, Swedish business angels invest about SEK 2 billion, corresponding to approximately half of the venture capital companies' early-phase investments. An average angel investment amounts to some SEK 500,000. In terms of growth factors, knowledge and the network that the business angel usually possesses can be as important as the actual investment.	The network can attract companies, following which the angels individually choose whether to invest in these companies. Another way is for the business angels to contribute capital to the network, which then invests these funds. There are also combinations involving both network investment and additional capital from an individual angel.	These usually invest when the company moves from a development phase to launching sales or further expansion. This commonly occurs through an exit whereby the company is sold or publicly listed. The life of a private equity fund is normally about ten years. The fund's investment horizon usually encompasses the first three to five years.	There are many forms of buyout investment: Spinoff of operations, takeover of family businesses facing a generation shift or infusion of new life into an undervalued listed company.
COMMENT	Without business angels, there would be fewer innovations. Business angels make decisions quickly and in a non-bureaucratic fashion since they work with their own money. A broad network of contacts that can open doors to other financiers, suppliers and/or customers is one of the key contributions. The companies can thus develop more rapidly and avoid pitfalls.	Networks can jointly evaluate investment proposals. An official point of contact also facilitates an increase in the flow of proposals, elimination of unsuitable proposals and marketing of the network based on joint contacts.	Venture capital companies can often contribute to adding considerable sector knowledge, streamlining a company's strategy, recruiting key individuals, creating contacts with authorities and opening doors to potential customers.	Buyout players are normally the only investor category that finances its investments through a combination of equity and loans.



“One of the most expansive future-oriented sectors we have”



Personal chemistry, shared outlook and good planning are important. Business angel Uno Alfredén gives his best advice to investors in the cleantech industry.

What is your view of the cleantech sector?

“Like all virgin industries, it is initially viewed with suspicion and I can see a distinct copycat tendency, whereby everyone is waiting for the major players to show the way. But it is one of the most expansive future-oriented sectors we have, a sector that doesn’t only feel good in terms of dollars and cents but also when you think with the heart.”

What is the best advice you can give to investors in the sector?

“My advice is generally the same regardless of industry. As an investor, you must remember that you will be a partner not just a financier. The people in the company are always more important than the actual concept – it’s better to have good people with half-good ideas than the other way around. Create a complete team for the entire journey. Innovators are rarely good entrepreneurs, so maybe you need several people with different experiences. Carefully track the backgrounds of all those involved. And decide who is to be in charge if several investors get involved. Apply high transparency to avoid hidden agendas.

“Personal chemistry is particularly important when things don’t

go so well. Make sure at an early stage that you have a shared vision in terms of aims, exit horizon and the pace that should be maintained. Since building a business jointly is really much more a matter of coexistence rather than law, the ownership agreement should be a combination of a prenuptial agreement and a travelogue. Determine whether the purpose of the partnership is profitable coexistence or a profitable divorce. The latter is more common. However, if you plan to work together for a long time, agree on the looting policy to be applied if you are successful.

What next, when things are about to take off during the start-up phase?

“Although you don’t need to understand all the technical details of the investment object, it is important to understand the business logic and customer value behind it. Is the market mature and does it have potential? Start marketing work at an early stage, preferably together with the customers. Sharing development work with customers is usually a recipe for success. Join forces with other players if that speeds up the journey, and why not cooperate with challengers in the market. Then make sure that all the IPR (Intellectual Property Rights) are brought into the company; license relationships are not sufficient.

“Avoid financial overwatering, whereby the company receives a large lump-sum investment. Instead

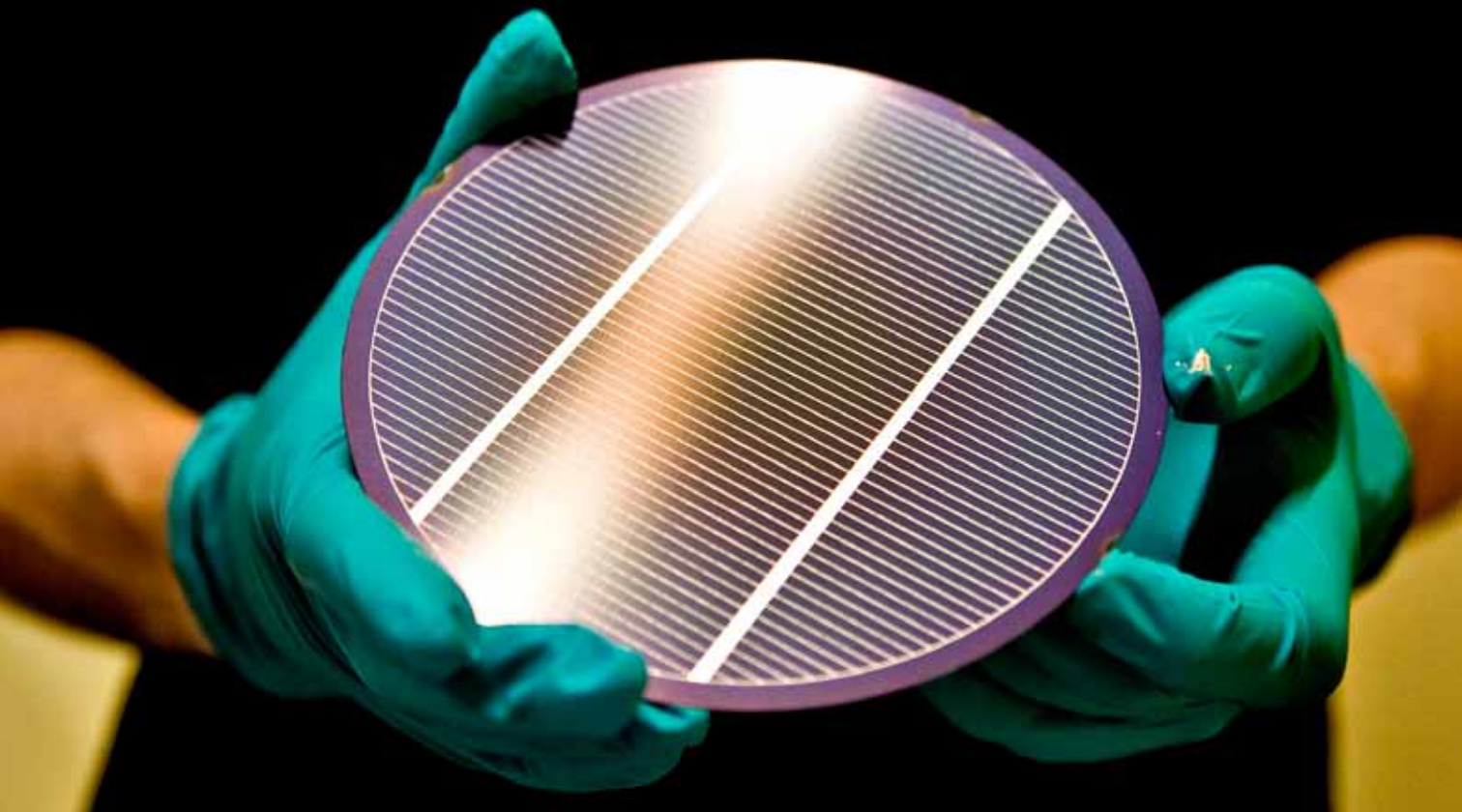


UNO ALFREDÉN,
50 years as an industrialist, venture capitalist and author. Has run the Take Off program for knowledge-based growth companies since 1985.

divide it into portions linked to clear milestones. As an investor, your potential to influence will be greatest immediately prior to each new piece of the financial pie. Nor should you aim too high. Pick the low-hanging fruit first and pay attention to time-to-cash. A short period up to the first paid invoice generates new energy and increases the will to continue. And think positively about competitors. Where there are competitors, there is also a market. But be observant so that you know the interests that your investor object threatens. That is where you can be actively fought against.”

And ahead of the continued journey?

“It can take much longer than expected to launch new technology in the market. Work actively and with long-term vision in a bid to describe a suitable exit partner and to formulate a Plan B should the exit not come to fruition. Also consider how the role of the entrepreneur can change over time. Combine various financial instruments to ensure that the entrepreneur receives a sufficient ownership share; if it is diluted too much, the entrepreneur could lose interest.”



MIDSUMMER | ERIK OLSSON

“Midsummer has enormous global potential right from the start”

ALMOST ALL of the solar cells sold today are based on silicon, which is in short supply. However, there is an alternative. Midsummer, a company based in the Stockholm suburb Järfälla, manufactures second-generation solar cells, in which the light-absorbing layer comprises thin film. With the help of such funding as a conditional loan from the Swedish Energy Agency, Midsummer has been able to develop a factory and initiate mass-production. This support increases the opportunities to establish a Swedish industry with significant export potential. The Swedish Energy Agency’s reasoning was as follows:



Erik Olsson

“Although the global market for solar cells is growing sharply, many players have found it difficult to generate profitability from their products. Midsummer has found an efficient solution

for producing solar cells inexpensively,” says the Swedish Energy Agency’s Business Developer, Erik Olsson.

Midsummer’s production method derives from the founders’ knowledge and experience of the manufacture of CD and DVD discs and LCD displays. The method is completely automated and highly cost effective.

DEMAND FOR solar cells is also expected to remain favorable and has grown 40–50 percent annually in recent decades. Solar cells are used primarily for solar cell farms in Germany, Spain, the US and Japan, and as solar panels on roofs. Solar home systems for emerging countries comprise another growing market that could suit Midsummer. About 1.5 billion people worldwide have no access to electricity. A solar panel and a battery could supply them with light at night through a LED light, as well as opportunities to charge mobile phones and listen to the radio. They would also be able to avoid buying costly kerosene.

Midsummer expects that its solar cells in particular will have great potential in emerging countries, since the manufacturing cost is low, they are indestructible and they do not contain environmentally hazardous materials, which is the case with many other thin-film solar cells.

ALL PRODUCTION will be exported to module manufacturers, primarily in Asia.

“It’s fun being able to support companies such as Midsummer, which has such considerable global potential and can see the opportunity for this right from the start. While many other companies that the Swedish Energy Agency has supported have a more distinct domestic market, Midsummer has enormous potential in the global market as a whole,” Erik Olsson explains.

The Swedish Energy Agency’s financing during the year has been matched by counter-financing of SEK 60 million from Midsummer’s owners, with the aim of ensuring that a commercial production line will be ready by the end of 2010.

“We’re looking for an inner driving force”

DOES THE ENTREPRENEUR possess that inner drive? This is one of the most important questions that Hans Otterling, Manager of venture capital company Northzone, asks when exploring potential investments in cleantech.

“We want the entrepreneur to have a vision of what he or she wants to achieve with the company. If they know where they are going and can describe the way there, it is much easier to make a decision,” Hans Otterling explains.

Northzone Ventures has existed since 1994 and its investments are characterized by being Nordic with a focus on technology. Northzone has been behind such successful companies as Stepstone, Pricerunner, Spotify and Climatewell. Northzone’s various investments currently amount to approximately EUR 355 million.

Cleantech accounts for about one fifth of all the companies that Northzone looks at over the course of a year.

“We look at 500–600 companies a year. Of these, we invest in a maximum of 1 percent. This means that of the 100

cleantech companies we actually evaluate, we invest in probably just one,” says Hans Otterling.

He states that he usually asks three questions when new companies are to be scrutinized: does the entrepreneur have the ability to build the company, what market will they be attacking and, finally, what is the product or the service?

“If the answers to all three questions feel good, then we proceed. But it can take time. An investment is a bit like a marriage; you need to get to know each other well before taking the plunge,” says Hans Otterling.

HOWEVER, THERE ARE cases when things feel right pretty quickly too. When Hans Otterling met the representatives of Climatewell, which had developed technology for converting solar heat into air conditioning, all the pieces fell into place immediately.

“They had already made a great deal of progress, they had a finished technology that they could demonstrate for me and they had the drive that I was



HANS OTTERLING,
Manager Northzone
Ventures



looking for,” Hans Otterling explains.

When the date of the marriage has been decided, the next step was to formulate a business plan, calculate capital requirements and perform a valuation.

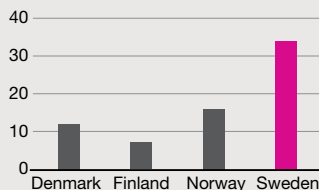
“We usually operate on the basis of several stages of financing. In other words, we make sure that one step has proceeded well before taking the next step”.

Then it’s a matter of having patience.

“As an entrepreneur, you must be prepared for the fact that it usually takes longer than you think to build up the company. Cleantech companies are also very capital intensive. Something usually has to be built, such as a plant or a demonstration facility. Initially, it is not unusual for the entrepreneurs to underestimate the capital requirements,” says Hans Otterling in conclusion.

NORDIC INVESTMENTS FIRST HALF OF 2010

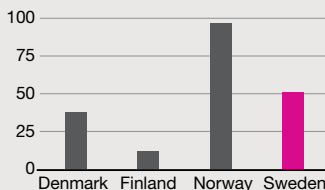
(number of investments)



Sweden has the largest number of completed investments compared with the other Nordic countries. Source: Cleantech Scandinavia

INVESTED AMOUNT FIRST HALF OF 2010

(EUR million)



Norway accounted for the highest amount compared with the other Nordic countries. Source: Cleantech Scandinavia

TOTAL INVESTMENTS IN NORDIC CLEANTECH

First half of 2010

199
EUR million

69
transactions

5
new funds

Source: Cleantech Scandinavia

2

The international perspective

Swedish cleantech has major export potential and the outlook for foreign investments in Swedish companies is once again positive. But continued efforts are needed to put Swedish cleantech on the international map. Opportunities in the growing market for emission allowances are particularly bright.

International upswing for cleantech

The financial crisis reduced international willingness to invest, but interest in cleantech held firm. Growth in Swedish cleantech exports in particular show that this trend is gaining momentum.

INTERNATIONAL WILLINGNESS to invest in Sweden was significantly impacted by the financial crisis.

However, the opinion is that the bottom has now been reached, and surveys conducted by the Swedish Private Equity & Venture Capital Association show that the outlook for venture capital investments is once again positive.

Swedish environmental technology exports have remained strong during recent years compared with traditional industry. Total Swedish exports fell 16 percent in 2009, while cleantech exports fell only 8 percent. Environmental technology now represents 3.2 percent of total exports, according to the Swedish Environmental Technology Council (Swentec).

GLOBALLY, VENTURE investments in cleantech fell to USD 5.7 billion in 2009. This is a one-third decrease compared with 2008, according to the Cleantech Group. Cleantech remained strong compared with the decline in the total venture capital market.

The positive trend also looks set to continue. During the first quarter of 2010, 189 venture investments were made globally, which is a record for a quarter.

The leading investment sectors in cleantech during 2009 were solar

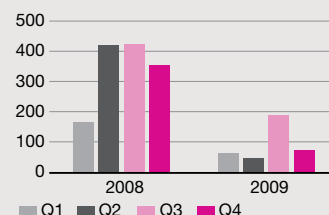
energy, transport and energy efficiency. Both the transport and energy efficiency sectors increased their shares while solar energy's share fell for the first time in many years because of the rapid decline in the price of solar cells.

NORTH AMERICA ACCOUNTED for 64 percent of the total sum invested in cleantech in 2009. During the first quarter of 2010, North America increased its share substantially to 82 percent. China, formerly a small cleantech player, invested most of all in new wind power during 2009. The total capacity increased 13,000 MW, more than one-third of the world's total newly installed wind power. China also leads the production and installation of solar water heaters, and produces most solar cells in the world.

2009 was a strong year for European cleantech, even though the total invested amount dropped to USD 1.6 billion compared with USD 1.83 billion in 2008. The number of investments exceeded the previous record by 221, and the share of the total amount invested in cleantech around the world increased from 22 percent in 2008 to 28 percent in 2009, according to figures from the Cleantech Group. ❁

FOREIGN VENTURE CAPITAL IN SWEDISH COMPANIES

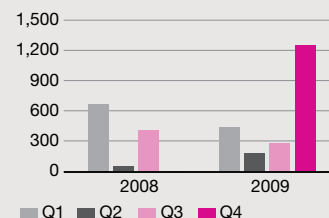
SEK million



Willingness to invest in Swedish companies was significantly impacted by the financial crisis. Source: SVCA

FOREIGN BUYOUT INVESTMENTS IN SWEDISH COMPANIES

SEK million



The fourth quarter of 2009 showed a clear trend break in the willingness to invest by buyout companies. No buyout investments were made during the fourth quarter of 2008. Source: SVCA

Largest importers of Swedish environmental technology

1. Germany	SEK 5.4 billion
2. China	SEK 2.2 billion
3. Norway	SEK 2 billion
4. United States	SEK 1.9 billion
5. Denmark	SEK 1.6 billion

Source: Swentec

This is where global investments are made

- 1 United States**
USD 136 billion
- 2 China**
USD 90 billion
- 3 France**
USD 65 billion

Source: Invest:Sweden (figures from 2009)

Top three for cleantech investments in Europe

Countries that invested most in 2009

1. United Kingdom
2. Germany
3. Norway

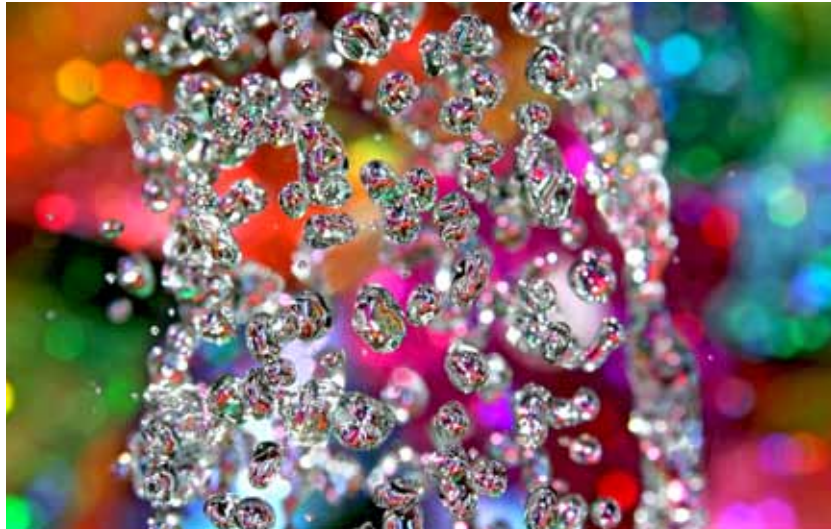
Source: The Cleantech Group

Investor's favorite industries

Areas that attract most investors.

- 1. SOLAR ENERGY**
- 2. TRANSPORT**
- 3. ENERGY EFFICIENCY**

Source: The Cleantech Group



Swedish technology exhibited in Delhi

WASTE MANAGEMENT and water purification pose major environmental challenges in India. As a result, the Swedish Energy Agency, in partnership with the Swedish Trade Council, the Swedish International Development Cooperation Agency (Sida) and the Swedish Embassy, organized participation in the Delhi International Renewable Energy Conference (DIREC) in October 2010, as part of efforts to identify ways for introducing Swedish technology in the area. The DIREC conference was one of several follow-up events resulting from the Johannesburg Summit 2002 – the World Sum-

mit on Sustainable Development. One of the main components in the Swedish attendance was a pavilion that exhibited Swedish solutions, technology, systems and companies with a “Water & Waste to Renewable Energy” theme. Another central feature was a “Bio-methanation - upscaling, challenges and opportunities” session. Participation at DIREC was based on the Swedish-Indian Memorandum of Understanding that was signed in April 2010.

» Read more: pages 24–26

Cleantech drives international economy

THE CLEANTECH SECTOR has become an international driver of economic recovery after the recession, according to a report from Clean Edge. Around USD 100 billion is expected to go to cleantech investments in the US over the next few years, South Korea is expected



to invest USD 84 billion by 2013 and China could invest between USD 440 to 660 billion in cleantech over the next ten years, according to the same report.

» Read more: www.cleantech.com

Swedish benefits

Foreign investors are attracted by:

- ❁ International and innovation-focused R&D and the private sector
- ❁ Specific business opportunities through deep industry contacts
- ❁ Developed collaboration between regions and other promotional partners

Source: Invest:Sweden

Progress for European collaboration

AT A CONFERENCE in Madrid in June 2010, the four first European Industrial Initiatives were launched within the framework of the Strategic Energy Technology Plan (SET Plan), the EU's strategic plan for research and development in low-carbon technologies. Representatives from European industry, member countries and the European Commission presented a formal statement of intent concerning strengthened collaboration in energy research. The four prioritized areas are wind, solar, smart grids and carbon capture and storage (CCS).

» **Read more:** www.swedishenergyagency.se



"The Breakstra" – a combined accelerator and brake pedal – was one of the innovations presented at the race.



Green architecture hot in the US

GREEN ARCHITECTURE continues to win new ground in the US. In an effort to increase opportunities for Swedish cleantech companies in the US market, the Swedish Energy Agency and the Swedish Trade Council arranged a Swedish pavilion in 2010 at the world's largest congress devoted to sustainable building, the Greenbuild International Conference and Expo in Chicago. The congress is a key strategic arena for energy efficiency and green building.

"Sweden lies at the cutting edge of energy efficiency in buildings, which creates plenty of opportunities for entering the US market. The congress also aligns with the bilateral collaboration on energy efficiency that Sweden has with the US," says Jennie Cato from the Swedish Energy Agency.

» **Read more:** www.greenbildexpo.org

Five patents after innovation race

A METHOD FOR reusing dishwater, a refrigerator that is cooled by outdoor air and building blocks made from construction and demolition waste. These were three of the five inventions that could be patented after Time 2 Innovate, the Swedish Energy Agency's innovation race at the World Expo in Shanghai in June 2010. Two teams, both consisting of two Swedes and two Chinese, competed against the clock to produce energy-smart ideas for new systems and products within 72 hours.

"This has been a fantastic journey and shows what can actually be achieved in just 72 hours, when you focus and gather a range of skills and experience," says Christopher Waldén, Project Manager at the Swedish Energy Agency.

The other two patent applications were for a computer with a solar cell case that provides light protection and can charge the battery, and a simple replaceable zip. Fourteen other innovations were also demonstrated, two of which may lodge a patent application at a later date following further development.

» **Read more:** www.swedenexpo.cn/en



GOALART

JAN ERIC LARSSON

Control of alarms in tomorrow's smart grid

FALSE ALARMS. Alarms generated by other alarms. Thousands of alarms going off at the same time. The monitoring systems that so many modern operations are dependent upon – from power grids to the aviation industry – can have serious implications for users if something goes wrong. One of the major challenges, particularly for tomorrow's smart grid, is to rapidly separate primary faults from consequential faults. GoalArt from Lund has found a solution.

“Major power outages or large-scale disasters like the Gulf of Mexico oil spill are often preceded by alarm cascades. The monitoring systems may have sent thousands of alarms but isolation of the root cause has not taken place rapidly enough. We have software and an algorithm that can distinguish primary faults from consequential faults. This will help operators understand and respond to complex fault situations faster,” explains Jan Eric Larsson, CEO of GoalArt.

In a nutshell, the software can distinguish cause from consequence by feeding in information regarding the system's connection down to minute details into a database.

The system can be applied in a wide range of industries and has major export potential. GoalArt has also attracted international interest and received around SEK 2 million in financial support from the Electric Power Research Institute (EPRI) in the US.

TO DATE, the products have only been installed in two power networks. They are large-scale however: Svenska Kraftnät and its US equivalent, New York ISO. The closest development plans also target the power industry. GoalArt will develop solutions for tomorrow's smart grid. Today's grid has been adapted for a small number of central plants but in future, an increasing number of small local units will exist, where customers can actively control their consumption and even deliver the surplus back to the grid.

All units must communicate to achieve this goal.

An increased share of electricity from renewable energy sources also increases demands on the grid. It must be more effective, more reliable and more controllable.

“This is promising technology for the effective fault management of a smart grid operation, which can play a key role in the integration between the electric grid and information infrastructures. One benefit of GoalArt's technology is that it can handle an upscale to large systems with a huge amount of signals,” says Helene Axelsson, from the Business Development Unit at the Swedish Energy Agency.

GOALART HAS recently received funding from the Swedish Energy Agency in the form of a conditional loan. The Agency granted SEK 940,000 for the development of GoalArt's products. Vinnova has granted SEK 1.4 million for the project.

“Our financial support to GoalArt will create conditions for the company to offer a long-awaited solution in an area that is facing major global investment,” says Heléne Axelsson.



Heléne Axelsson

Emission allowances open doors for cleantech

By helping cleantech companies utilize the international emission allowances market, Sweden can contribute to a global environmental collaboration and simultaneously promote Swedish export opportunities. But how does the market work? The Swedish Energy Agency explains.

1 What are CDM and JI?
There are several ways to offset or balance our own emissions of greenhouse gases. The CDM (Clean Development Mechanism) and JI (Joint Implementation) are project-based flexibility mechanisms that are central elements in the Kyoto Protocol. The purpose of the CDM and JI is to create incentives for sustainable development and contribute to cost-effective emissions reduction that would not otherwise have taken place. Technology transfer is not a main purpose or requirement for the CDM or JI, but should be considered a desirable by-product. The CDM relates to climate-change projects that are implemented in emerging countries. JI builds on the same principles as the CDM but these projects are fewer and implemented in countries that have quantitative emission reduction commitments in the Kyoto Protocol. In practice, JI projects are most prevalent in so-called “economies in transition” such as Eastern Europe and the former Soviet Union. The purpose of JI projects is to contribute to the reduction of greenhouse gases, but their contribution to other aspects of sustainable development is clearly positive. The CDM and JI imply financial support for the projects, supplemental financing, by creating Certified Emission Reductions (CERs) for

UNCERTAIN FUTURE FOR FLEXIBLE MECHANISMS

Due to the lack of decision regarding a post-2012 agreement, the future for flexible mechanisms is still uncertain. JI projects will only operate until 2012, while CDM projects will continue after 2012 in the EU's emissions trading scheme. Some restrictions on project types and geographic areas will then apply however.

the CDM, and Emission Reductions Units (ERUs) for JI for the successful reduction of emissions equivalent to one ton of CO₂, which is then purchased by a buyer in an emissions trading scheme.

2 How can CDM and JI contribute to technology exports?

The international emissions trading market has created demand for emission reductions from CDM and JI projects. Plant owners and contractors in the host countries have been able to create supplemental financing for investments that reduce emissions of greenhouse gases, investments that were previously difficult to implement. This has enabled the execution of more projects and investments, which in turn

has created new business opportunities for energy and cleantech exports.

3 What areas of technology apply for CDM and JI projects?

The technology and services that are in demand for CDM or JI projects include technological solutions for renewable electricity generation, steam and gas turbines, the use of solid biofuels, heat exchangers, biogas generation, utilization of landfill gas and coal mine gas and various types of energy efficiency. Companies that already have established export and technology in place, however, have good opportunities today for utilizing the CDM and, to a certain extent, JI.

4 What do companies need to consider?

Companies that are interested in CDM and JI projects face several challenges:

Knowledge of the system: Assessing the total financing of a project requires knowledge of the regulatory framework around the CDM and JI, and knowledge of international emissions trading.

Handling financing and risk: It is usually the supplemental financing that the CDM and JI contribute that makes the



» financial calculation for a certain investment add up. This is because of the central requirement that reductions from the project are in addition to that which otherwise would have taken place. As a result, investments that will be made anyway cannot utilize the CDM.

Subsequently, projects are usually financially weak at the beginning. The risks are also associated with investment conditions in the host countries. Large, already exporting companies are often accustomed to handling a wide range of risks in new markets and therefore possess a greater potential for utilizing CDM and JI for their exports. Small-sized companies, however, usually have limited opportunities for

investing and handling any additional costs that can arise.

Seek partnerships: The government players and export promoters who handle project financing (particularly the Swedish Export Credit Corporation, Exportkreditnämnden (EKN) and Swedfund) have begun to expand their internal competence within the flexible mechanisms. Their ability to help companies assess financial opportunities and identify the risks associated with potential export projects within the framework of the CDM and JI has thereby improved. ✨

SUPPORT THROUGH PROGRAMS

THE SWEDISH ENERGY AGENCY has initiated and supported CDM and JI projects since 2002 through Sweden's international climate-change investment program. The aim is to foster international collaboration for the development of project-based flexibility mechanisms, to contribute to sustainable development and to build Swedish experience. The Swedish Energy Agency is currently involved in projects in Africa, Latin America, Asia and Central and Eastern Europe with a focus on renewable energy and energy efficiency.

INTERVIEW | MARCO BERGGREN

“We open completely new business opportunities”

CDM IS AN IMPORTANT tool for reducing carbon emissions at global level. But technology providers are not always accustomed to handling and financing the projects. Selling new technology where it has never been used before is not always easy, while the demand for investments intensifies within the company.

“That’s when technology providers usually contact us,” says Marco Berggren, responsible for the Tech Transfer initiative at Tricorona.

Tricorona’s operations are conducted within the area of environment-related market instruments, mainly via investments in, and trade with, project-related emission allowances, within the framework of the Kyoto Protocol. The Tech Transfer initiative aims to purchase emission allowances from emerging countries, while simultaneously enabling a technology transfer.

“If technology providers find an inter-

esting project, they can contact us. We look at whether the project can lead to emission reductions. If the project can potentially be approved as a CDM project, Tricorona can go in as a partner and buy emission reductions and finance the costs that arise in connection with the CDM development.”

TRICORONA INVESTS in the development of the CDM component of the project and then buys the emission allowances that are generated. Tricorona also coordinates the entire project procedure until the emission allowances are delivered. If the project does not succeed in generating emission allowances, neither the project owner nor technology provider needs to repay the development costs to Tricorona.

“Tech Transfer gives technology providers completely new business opportunities and financing options,” says Marco Berggren.



MARCO BERGGREN,
responsible for
Tricorona’s Tech Transfer
initiative.

“Because we have such a broad network, we sometimes contact the technology providers to find a specific technology for a project.”

MARCO BERGGREN says that Sweden has cutting-edge environmental technology, and many promising technology companies.

“Sweden is fantastic at developing technology that is well-known and appreciated all over the world. Unfortunately, the capacity to sell is often lacking. That’s where technology providers must improve.”



CDM | MOEMA IN SAO PAULO

From sugar cane to more efficient electricity

TRANSFORMING WASTE products from sugar cane to electricity – that is a brief description of the CDM project in the Brazilian sugar refinery, Moema. Moema is located in the Sao Paulo region and produces sugar and ethanol. A waste product from the production is bagasse, which represents around one-third of the cane plant's energy content. Using bagasse is a sustainable form of energy generation, with great potential in Brazil.

The Moema project is based on increasing the electricity generation in cogeneration plants at the sugar refinery by chang-

ing from conventional low-pressure systems to modern high-pressure systems. By purchasing Certified Emission Reductions (CERs), Sweden contributes to the financing of the system shift.

ELECTRICITY that is not needed in the plant is sold to the regional grid. The project contributes to reduced carbon emissions because the surplus electricity reduces the need for electricity from other plants that use fossil fuels. The increased electricity generation from Moema also increases operational reliability for the

electricity-intensive industry during Brazil's dry period – almost 90 percent of the country's installed output is derived from hydropower.

THE PROJECT is progressing on schedule and the refinery now exports electricity to the regional grid. Certified Emission Reductions have been generated since 2001. Sweden will, in the first instance, buy 50 percent of the CERs that are generated during the first seven years. This means that the Swedish Energy Agency will buy 43,565 CERs.

INTERVIEW | ULRIKA RAAB



“See the international opportunities”

There is a clear link between CDM projects – projects that reduce carbon emissions – and cleantech investments, according to Ulrika Raab, Senior Adviser at the Swedish Energy Agency.

ULRIKA RAAB, Senior Adviser at the Swedish Energy Agency, sees a clear link between CDM and cleantech.

“Investments and new technology are needed to enable new projects. The CDM generates many new business and investment opportunities. I think it is important that entrepreneurs see these international opportunities.”

At the same time, she warns about the widespread reliance on technology in regard to climate change.

“The US has been pushing hard for new technology, but it doesn’t always provide the best solution. We should be looking at a combination of new technology and a technology transfer. There is a lot of knowledge out there that can be applied in new sectors.”

But she is convinced that cleantech is the right way to go.

“Climate change is real and constantly requires new solutions. This is a golden opportunity for new investments.”

BY 2020, Sweden will reduce its carbon emissions by around 20 million tons compared with 1990 levels. Ulrika Raab has been working with climate-change issues for many years and knows that the problem cannot be solved overnight. There is a long way to go.

“When climate change first appeared on the political agenda, not many Swedish companies were interested. But the debate has intensified over the past few years and engagement has soared.”

IN DECEMBER 2009, Ulrika Raab was part of the Swedish delegation to the international climate-change conference (COP15) in Copenhagen. Hopes were high before the conference, but no agreements with binding undertakings were reached.

“A lot of people saw the conference as a “now or never” event. But our climate problems cannot be solved at a two-week meeting. It took a long time to cause the problems, and now we need a long-term approach. We have to take many small steps in the right direction.”

Despite the negative coverage after the UN meeting, Ulrika Raab still believes that the negotiations around CDM and project-based mechanisms that she took part in were successful.

“I can understand why people were disappointed after the Copenhagen Conference. But many of the suggestions that my group presented were accepted.”

“I can understand why people were disappointed after the Copenhagen Conference. But many of the suggestions that my group presented were accepted, so I was happy.”

The CDM, a central element of the Kyoto Protocol, relates to climate-change projects that are implemented in countries without emission caps.

By investing in climate and environmentally adapted investments or projects, the CDM contributes to sustainable development, greater environmental awareness and reduced emissions. Projects also receive financial support because of the Certified Emission Reduction units that are achieved and can be sold on the emissions trading market.

ULRIKA RAAB hopes that CDM projects can increase awareness among Swedish investors for the global market.

“Sweden accounts for only 0.2 percent of the world’s total greenhouse gas emissions. It is vital that the problems are seen from a global perspective and not restricted to within our own borders.”

The Swedish Energy Agency Swedish is responsible for purchasing the Swedish government’s CERs from CDM projects. In the most common form of contract for the Swedish Energy Agency and other buyers in the emissions trading market, money is paid after each reduction has been achieved. Ulrika Raab believes that advance payments would be better from an investment perspective.

“Not all projects can wait for two years until they receive any money. Although the contract for selling emission reductions makes it easier to acquire loans for investment, money upfront would further facilitate financing. I think control measures should be developed and supplemented so that projects can gain access to some of the money for emission reductions already in the investment phase. That would increase investments and speed up climate developments.”



International agreements can lift Swedish cleantech

The Swedish Energy Agency is responsible for many of Sweden's international partnership agreements for cleantech research and development. China, India, the US and Brazil are some of the most interesting future markets.

SWEDEN DEVOTES major resources to research, development and demonstration in the energy area, calculated in terms of GDP. Programs in the area still constitute a very small percentage of the world's combined investments. At the same time, the challenges involved in developing a sustainable energy sys-

tem are large, and tasks for the research community are increasingly complex. This raises the significance of international collaboration.

The Swedish Energy Agency's efforts in research, development, demonstration and innovation are increasingly shaped against this background. Sweden has therefore signed bilateral agreements in the energy

area with several countries. Since 2008, appropriation to the Swedish Energy Agency has been increased with the purpose of fostering partnership through bilateral agreements with e.g. India, the US, Brazil and China. The goal is that the partnerships will create major benefits for both Sweden and the partner country.

TWO INTERESTING and rapidly growing markets for Swedish environmental technology are India and China. Both countries are battling with major environmental technology issues, such as electricity supplies,

12.4

USD billion will be invested in green solutions in major Indian cities in the next few years

10

USD billion is the estimated value of the Indian cleantech industry

waste management and water purification, and therefore investing large amounts in the development of cleantech solutions.

In India alone, the cleantech industry is growing by around 15 percent per year. In 2005, Sweden and India signed an agreement to foster collaboration in science and technology. A new partnership agreement was signed with an Indian government ministry on April 18, 2010 concerning new and renewable energy, comprising wind power, bioenergy, energy from waste and energy efficiency. The partnership will include joint research

and innovation projects, demonstration projects, exchanges for science and technology staff and capacity-building.

BIOGAS HAS been identified as an extremely interesting area for collaboration. The Swedish Energy Agency and the Swedish International Development Agency are working together, and have already supported a number of partnerships and projects. The Swedish Energy Agency arranged a visit to India for a delegation of Swedish experts and technology providers. Another initiative that aims to

assist Swedish companies in India is the Swedish Trade Council's investment in an environmental technology office, and the placement of an environmental attaché in the country (see the interview on the next page).

In China, the government is planning to increase the share of renewable energy sources in the energy sector to 15 percent by 2020. Potential Swedish-Chinese partnership projects in the bioenergy area have been discussed since 2005. A pilot project has been started to identify the research environments and areas that will need to be prioritized.

10,000

Swedish companies trade with China

550

Swedish companies are currently operating in China



» The work includes analyzing what added value can be expected for Sweden from the identified collaboration areas. An exchange program for researchers has also been started between the countries. Applications are accepted on a continuous basis and information is published on the websites of the Royal Swedish Academy of Engineering Sciences (IVA) and the Swedish Energy Agency.

The Swedish Embassy in China has made a special investment by establishing CENTEC, a dedicated cleantech center, tasked with identifying projects and supporting Swedish companies in the cleantech sector. Together with the Swedish Chamber of Commerce in China, the Embassy conducts an annual survey aimed at Chamber of Commerce, in which it gathers information about trade problems, trends and challenges, and suggestions for how the Embassy can improve their support for companies. The Swedish Trade Council has offices in Peking, Shanghai, Canton and Hong Kong. ✨

INTERVIEW | MIKAEL KULLMAN

“Find a local business partner”

Putting Swedish cleantech on the world map is a challenge, but there is no lack of initiative. Mikael Kullman, Environmental Attaché at the Swedish Embassy in New Delhi, works to promote Swedish knowledge and experience in this area.

What opportunities exist for Swedish cleantech companies in India?

“Generally speaking, the cleantech market is huge. Needs are enormous, but resources and support for investments exist. That’s why we are currently producing an improved “cleantech map” to compare India with the resource base and technical knowledge that we have in Sweden. This aims to better match Swedish cleantech with the prerequisites in India.”

What industries are most attractive?

“The energy sector first of all. India has a huge electricity shortage, but the country is also trying to become less dependent on imports of fossil fuels. Renewable energy, particularly solar energy, but also wind power, hydro-power and bioenergy, are constant discussion topics. Energy efficiency is also a sector with opportunities. One example is that cooling buildings today is almost exclusively carried out with small units in each room. Centralized, energy-efficient cooling would save a lot of energy. There is also demand from public authorities for waste management and water purification. Sweden has vast amounts of valuable experience and knowledge in most of these areas.”

What should Swedish cleantech companies think about if they want to succeed in India?

“Most things take time, from customer contacts to permits, so patience is essential. You should also find a local



MIKAEL KULLMAN, New Delhi-based special attaché for environment, climate-change and energy issues

partner, partly to secure a local presence, partly to increase your own understanding of what happens – and doesn’t happen. A key aspect is that Indian buyers expect to see the specific technology and how it works, preferably on site to see whether the system can handle local conditions such as the climate. This can be difficult to satisfy, but you should still invest in a working reference or demonstration plant at an early stage.”

What significance does an environmental attaché position have?

“That we increase our own knowledge of the cleantech area in India in general, and that we create a more focused platform for contacts and long-term partnerships between Swedish and Indian players. The long-term contacts in particular are strengthened, which is essential for partnerships and business relations with public players – where specific measures are required. I believe that the environmental attaché position will help put Swedish cleantech on the Indian map.”



RWE INNOGY | PETER RÅKE

“Sweden’s investments in cleantech are noticeable”

IF YOU ARE one of Europe’s largest energy companies, you have to be on the cutting edge when it comes to renewable energy, according to Peter Råke, Vice President of RWE Innogy’s venture capital operations.

“We have to move forward and have a vision to drive development one step further. New technology and innovative solutions are part of the future.”

RWE Innogy, formed in 2008, is a subsidiary of RWE – Germany’s largest energy producer and one of Europe’s five largest energy companies. RWE Innogy builds and operates renewable energy resources. The company has also established a venture capital fund that finances the development of innovative renewable energy technologies with venture capital.

“We are constantly looking for promising cleantech companies to invest in,” says Peter Råke.

To date, RWE Innogy has invested around EUR 50 million in eight companies from seven European countries. One of these is Swedish cleantech company Mantex, which has developed a method for detecting the moisture content of biomaterial fast and accurately, allowing raw products to be utilized more effectively.

“We invested in Matex in June 2009 when we saw how the company had such an interesting and innovative solution. Watching Mantex grow and develop has been very exciting. This is a promising company with excellent opportunities.”

PETER RÅKE BELIEVES that Sweden is a cutting-edge country in the cleantech market.

“Sweden’s investments in cleantech are noticeable. New innovations and entrepreneurship are widely supported. STING (Stockholm Innovation & Growth) is one of

the excellent initiatives that I stay in touch with. You don’t see these types of investment in many countries.”

THREE OF EIGHT companies in RWE Innogy’s portfolio are from Scandinavia and Peter Råke is keenly interested in the region’s future development. But he also says that RWE Innogy invests in technology companies from all over Europe and that part of the company’s portfolio strategy is to spread the risks and not put all their eggs in one basket.

“We invest in a range of technologies and in companies with varying degrees of maturity that are spread across Europe. That gives us a good balance,” he says.



Peter Råke

3

The growth perspective

A growing cleantech sector can generate Swedish job opportunities and important advances in the environmental technology field. At the same time, the sector is faced with numerous challenges. Among other measures, Sweden must identify additional paths that enable it to take the step from research and development to actual cleantech innovations.

Introducing the cleantech investment opportunities of the future

New, intelligent production technologies, new energy sources and new vehicle solutions can all contribute to lasting and sustainable growth. The Swedish Energy Agency is carefully monitoring technological advances to contribute to the achievement of Sweden's and the EU's climate goals in the best manner possible. Some of the most interesting development areas at this time are presented below.

FUEL-BASED ENERGY SYSTEMS

FOSSIL FUELS account for more than 80 percent of the planet's collective supply of energy. To achieve the climate goals, it is thus crucial to reduce the use of fossil fuels. Many analysts also forecast a significant rise in oil prices in the decades ahead. Accordingly, a rapid transition to renewable energy sources could also be worthwhile financially.

Sweden has significant advantages with its enormous land areas dedicated to forestry and agriculture. Combined with stable rules of play with respect to such aspects as control measures and taxes, the building blocks are in place to significantly increase the production of domestic biofuels, in particular for the supply of energy. In the longer perspec-

tive, demand will primarily increase for biofuels for fuel production to enable Sweden to achieve the goal of a zero-fossil fuel vehicle fleet by 2030. The need for expertise in the field will also increase, particularly to meet future recruitment requirements in the biofuels industry. ❁



“ Sweden has significant advantages with its enormous land areas dedicated to forestry and agriculture.”

SOME KEY SWEDISH GOALS FOR 2020

- » Increase biofuel production from forest and cultivated land
- » Increase production of electricity from biofuel and wind
- » More biofuels derived from cellulose raw material offering favorable energy efficiency
- » Increased integration of the supply of heat to housing and commercial premises using the local district heating network
- » Biofuels will comply with environmental and sustainability requirements and used in a resource-efficient manner



ENERGY-INTENSIVE INDUSTRIES

THE ISSUE of climate change has had a significant impact on energy-intensive industries, such as pulp and paper mills, iron and steel works, and mining and chemical companies. One-fourth of the energy consumed by Swedish industries is fossil-based. Industry requires cost and eco-efficient energy, which is effectively utilized with the minimum of energy conversions.

The energy-intensive sectors are faced with a number of common problems. One of the key issues is how to utilize waste heat generated by industries as a result of their huge turnover of energy. Only half of this potential is utilized today.

Another shared issue is energy efficiency. In the future, more emphasis will be placed on sustainable development and resource utilization. Energy

“One of the key issues is how to utilize waste heat generated by industry.”

efficiency can be achieved by continuously fine-tuning the individual process steps and equipment or by introducing entirely new processes and systems.

Identifying more efficient ways to utilize raw materials is also high on the agenda, for example, by using raw materials that are less energy-intensive. These often include various types of recycled material, since these raw materials require less energy input in the production phase.

There is great potential for increasing energy efficiency in industry, which will

concurrently boost competitiveness by reducing production costs and creating scope for production growth.

SOME KEY SWEDISH GOALS FOR 2020

- » Reduce oil consumption by 30 percent to 13 TWh, compared with the reference year 2007
- » Establish material recycling centers in 100 locations
- » Increase collection and recycling of fiber, plastic, glass and steel
- » Professorships in “Product development for recycling” and “Bio-refineries and industrial parks”
- » Bio-based fuel will account for a significant share of industry’s own transport requirements

THE BUILDING AS AN ENERGY SYSTEM



” In the future, buildings could also be used as energy sources.

BUILDINGS WILL play a key role in the realignment of the energy system. In Sweden, these account for about one-third of total energy consumption. Furthermore, energy use can be significantly reduced without adversely impacting the indoor climate and other functional requirements. Success depends on cooperation between companies and developers, landlords and authorities, and – in part – technology, work methods and other conditions required to make the transition viable. Both professional operators and households need innovation to achieve energy goals. Although the construction of new, low-energy buildings is important, the efficiency of existing buildings must also be enhanced to reduce energy consumption. This means that new technologies must be developed in relation

SOME KEY SWEDISH GOALS FOR 2020

- » End-use of energy in housing shall be reduced by 21 TWh
- » Of the total reduction, reduced energy consumption for heating of hot water will account for 13 TWh
- » Of the total reduction, reduced energy consumption for common-area electricity, household electricity and electric heating will account for 8 TWh

to such items as the building shell and fixtures and fittings, including ventilation systems, heat exchangers and lighting. In the future, buildings may also be used as energy sources, for example, to recharge electric cars.

TRANSPORT SECTOR

SINCE THE transport sector accounts for nearly 40 percent of Sweden’s total

SOME KEY SWEDISH GOALS FOR 2020

- » Energy saving of 50 percent (kWh) from passenger cars
- » Energy saving of at least 20 percent (kWh/ton km) from commercial vehicles
- » At least 20 percent of fuel consumption will be derived from renewable sources
- » Increased commercial maturity for biomass-based fuels
- » Accumulation of knowledge of electromobility

fossil carbon emissions, environmental and energy supply issues are major challenges for the sector. Meanwhile, the volume of transport is growing in Sweden and the rest of the world, and it is expected to continue to grow for both light and heavy-duty vehicles. Consequently, a high priority has been assigned to the development of more energy-efficient vehicles and renewable energy to replace fossil fuels. Production of biomass-based fuels can potentially increase, both in Sweden and globally. One challenge, however, is to manage the risk of competition between energy crops and food production to ensure that food supply is not reduced. Furthermore, bioenergy in itself will not be sufficient to cover the needs of the

transport sector, although electric and hybrid technology – along with measures that reduce the weight of vehicles – will continue to play a key role.

” Electric and hybrid technology – along with measures that reduce the weight of vehicles – will continue to play a key role.



THE POWER SYSTEM

THE POWER sector is facing the prospect of major investments in infrastructure, including the large-scale expansion plans for wind power and the changes that this will entail. Extensive new investment will also be necessary in hydroelectric power, and such new technologies as wave power are approaching commercialization. The development of simple and cost-efficient connections for renewable energy sources to the electricity grid – while maintaining reliability, safety and electricity quality – is thus a crucial factor for the future. As a result, research and development relating to the transmission and distribution grid is mainly focused on intelli-

” New technologies such as wave power are approaching commercialization.

gent grids, encompassing such aspects as control and monitoring. Sweden has a strong industry within electric power technology, both in terms of transmission and electricity production. In the years ahead, a breakthrough is expected for silicon carbide power electronics, which will be highly significant for Swedish industry.

SOME KEY SWEDISH GOALS FOR 2020

- » Increase the share of hydroelectric power in relation to total annual electricity generation
- » Build out electricity derived from wind power and establish a wind power industry that contributes to growth and employment
- » Establish solar cells as an energy source in urban environments in Sweden
- » Develop Swedish industry in new conversion technologies, such as wave power
- » Eliminate fossil carbon emissions from Swedish power and heat production

Knowledge is the way out of the Valley of Death

As demand grows for technology solutions that advance welfare with the minimum environmental impact, so too do the growth opportunities for Swedish cleantech companies. There are many challenges along the way, one of which is the phase between seed financing and commercialization – also called the Valley of Death.

CLIMATE CHANGES, higher energy prices and legislation are factors that have driven interest in cleantech. These have also helped change the perception of the commercial potential of environmental technology. Today, it is not only new products that attract interest, since the companies that develop applications for various technologies are also becoming increasingly attractive for investors.

One challenge, however, is the tendency of venture capitalists to invest in companies that have achieved a higher degree of maturity. They are significantly less inclined to invest money in companies that are at earlier stages of development. The lack of venture capital in the start-up and expansion phases means that many companies never have the opportunity to introduce their products in the market. The gap between seed financing and commercialization is sometimes referred to as the Valley of Death, since many companies encounter problems when raising capital at this stage.

While the Valley of Death is an issue for young companies in all sectors, it perhaps represents an extra large challenge for cleantech companies. Often,

a long time passes before the companies generate any revenue and their need for capital and long-term ownership is thus substantial.

The development of a working prototype or the construction of a demonstration facility for renewable energy is often a prerequisite for the technology to achieve commercial breakthrough. A capital requirement of SEK 100 million or more is not uncommon. The lack of capital means that it is often difficult for cleantech companies to realize their ideas which in turn could mean that job opportunities and crucial cleantech innovations are missed out.

THE FACT that it is a new industry and that entrepreneurs and financiers have a lack of knowledge and understanding for the other party probably also impacts the willingness to invest. At the same time, venture capitalists are interested in investing in the cleantech industry (see page five and 15). Companies that operate in the cleantech area must comply with the same requirements as other industries to gain access to venture capital.

Other industries, such as life science, are also finding it difficult at present to raise capital at the early stages. Clean-

NEW EU FINANCIAL SUPPORT TO MAJOR ENERGY PROJECTS

THE SWEDISH Energy Agency will administer new EU financial support, known as the NER300 programme, which is aimed at financing major innovative energy projects. The support is funded through the sale of 300 million emission allowances and will finance eight commercial Carbon Capture and Storage (CCS) facilities, and 34 innovative production facilities based on renewable energy sources. The forecast is that revenues could amount to about SEK 45 billion and will be passed directly onward as EU financial support to approved projects.

The aid will be allocated through two application rounds, thus enabling financing of mature projects within the framework of the first round and adjustments to technical or geographical imbalances in the second round. Project approvals are expected to be issued not later than December 31, 2011 and December 31, 2013, respectively.



» tech and life science are similar in many respects. They both have long development cycles, regulated markets and substantial investment requirements in conjunction with industrialization. Despite this likeness, life science attracts a significantly larger number of venture capitalists in both the early and late phases than the cleantech sector. The difference is that life science is an established industry with a favorable track record. There is considerable know-how among corporate management teams and investors, and cooper-

ation and networking between the parties in effective.

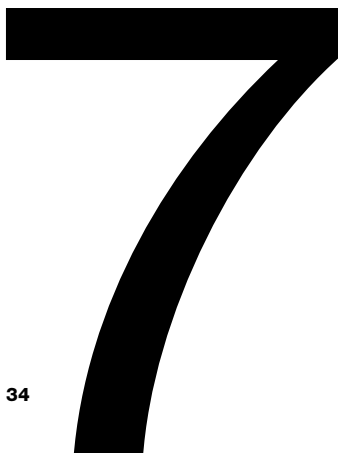
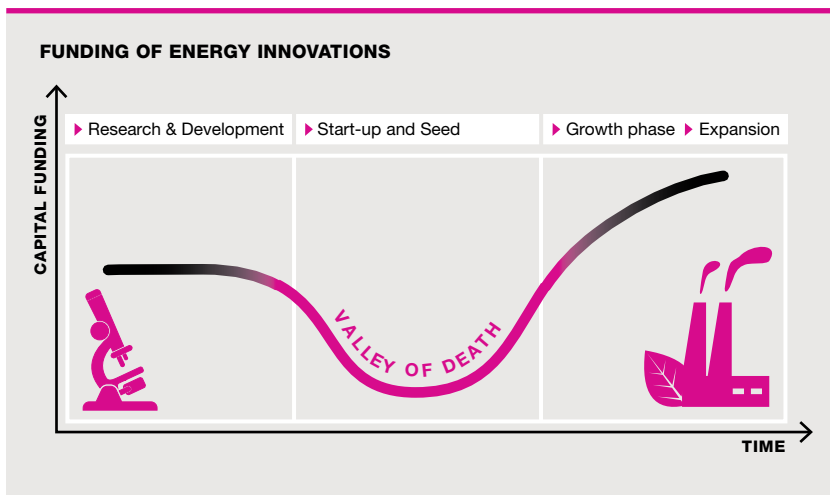
The Swedish Energy Agency acts on behalf of the government and the Swedish Parliament to ensure a secure, environmentally friendly and efficient energy system. The government has proposed the allocation of extra funds during the 2009–2011 period. The combined amount to be allotted to the development, commercialization and dissemination of new technology is SEK 1,214 million during the 2009–2011 period.

AN IMPORTANT step in the development from concept to commercial product is the demonstration of technology and manufacturing. The government has thus earmarked SEK 875 million to be used over a three-year period for demonstration and commercialization. As a result of this move, the Swedish Energy Agency issued a call for proposals in December 2008 to identify projects mainly for second-generation biofuels and other energy technology of major national importance for commercialization, for example, technology involving vehicles and electricity generation.

THE CALL drew considerable interest: 39 projects submitted applications for a total of SEK 8 billion. The Energy Development Committee at the Swedish Energy Agency has decided to award financial support totaling SEK 1,101 million to five projects. These are:

- * Chemrec AB
- * Göteborg Energi AB
- * Södra Cell AB
- * Seabased Industry AB
- * Volvo Personvagnar AB

For the first four of these, the support is subject to a positive result from the European Commission's state subsidy review.



HOT CLEANTECH TRENDS

1 Venture capital is recovering: More stringent environmental policies will boost market demand for cleantech, resulting in more capital from investors.

2 Green race: The green economy will become the new "space race." Asia – with China and Korea at the forefront – will lead the way with green innovations and green infrastructure.

3 Clean cars: Electric cars will play an integral part in efforts to achieve the "greater goal," eco-designed cities, which will affect more than the transport sector.

Growing interest in green patents

Although the number of green patents is increasing, they are still fewer than in the medical and communication areas, for example. However, efforts are now being increased to speed up patent applications in the field of renewable energy technology.

IT IS DIFFICULT to gain an overview of the extent to which innovations in renewable energy technology are patented, since the patenting authorities have not kept a record of applications in this field. To fill this knowledge gap, the European Patent Organization, EPO, has tried to identify trends in patenting of renewable energy technology by studying the patent applications submitted. The results were presented in its 2009 Annual Report and showed that the number of patent applications involving wind power increased by 51 percent in 2009.

APPLICATIONS related to photovoltaic (PV) cells increased by 10 percent, water, wave and tidal power by 26 percent, biomass by 6 percent and solar heat by 39 percent. However, in numerical terms, the volume remains significantly below the number of applications submitted in

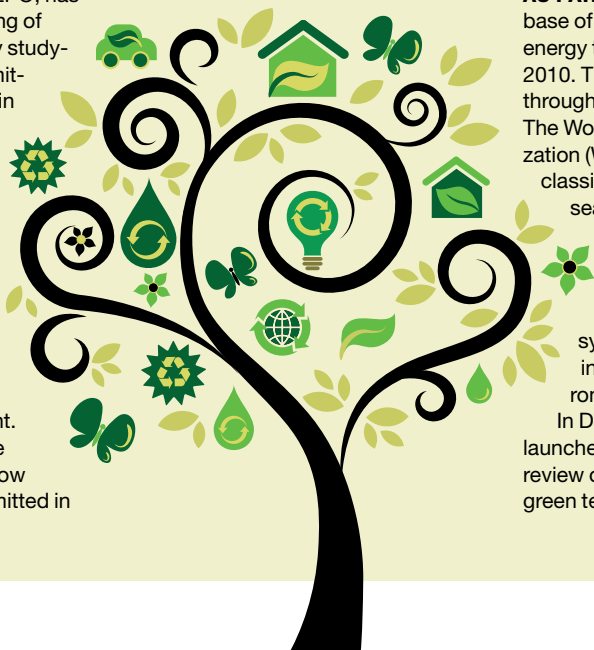
the medical and communications areas.

In April 2009, the EPO, the United Nations Environment Programme (UNEP) and the Geneva-based organization the International Centre for Trade and Sustainable Development (ICTSD)

agreed to jointly prepare objective data and analyze patenting trends and access to eco-friendly technology, particularly in the energy area. A final report was presented in September 2010.

AS PART OF this project, a new database of patent applications in the area of energy technology was launched in June 2010. The database is accessible through the search engine esp@cenet. The World Intellectual Property Organization (WIPO) has also developed a classification system to facilitate searches for green patents. In

recent years, certain national patent authorities, such as those in the UK and South Korea, have introduced priority systems and more rapid processing of applications relating to environmental technology innovations. In December 2009, a program was launched in the US to accelerate the review of certain applications involving green technology.



Source: The Cleantech Group

4 More expensive raw materials: If the price of raw materials rises, this could lead to trade disputes that also impact the cleantech sector. For example, a lithium shortage could give China a competitive edge, since it controls large parts of the market.

5 IT giants are entering the frame: Major IT companies, such as Google and Microsoft, will increase investments to be able to deliver solutions in the environmental sector, including intelligent electricity grids and industrial design.

6 Marketing will gain in importance: Differentiating the offering and communicating the specific features of a party's specific environmental technology will become increasingly important.

7 Acquisition and consolidations: Over-establishments and over-investments will have an impact. China and Germany have been singled out as countries where companies will be bought up or go bankrupt despite the growth in demand.

The Swedish paradox a challenge for the industry

Why is it that Sweden – despite investing billions of Swedish kronor in research and development – creates relatively few profitable innovations and commercial products? The phenomenon is called the Swedish paradox and is an issue that is attracting the interest of an increasing number of players.

ALTHOUGH SWEDEN is one of the countries that invests most in research and development in Europe, these initiatives have not resulted in a particularly high return on investment. It is known as the Swedish paradox, and is a problem at a time when growth is created through high-tech small companies. Over a period of many years, Sweden has been outstanding in its ability to create new, innovative processes, for example, automation in industry or the computerization of the services sector. However, to generate higher growth, more product innovations are required, since these are what create most new jobs and businesses.

” It is better to build a competent innovation team than large plants.

The Swedish Energy Agency plays an active part in the debate surrounding the Swedish Paradox. During the Almedalen political week in 2010, the Agency arranged a seminar on how the business community and energy researchers can generate better growth, as well as on the relationship between university researchers and investors in

the private sector. Participants were invited from trade and industry, politics and the research world.

“Sweden is not a world leader in terms of new enterprise, but it is for innovations,” said Lars Leijonborg, Chairman of the Globalisation Council, in his opening address.

THE DEBATE was an effort to challenge the Swedish paradox and the participants pointed out that growth did not come automatically as a result of investments in research. The chief economist of the Confederation of Swedish Enterprise Stefan Fölster believed that major technological advances were necessary and that the government should invest in more large pilot plants. Saeid Esmailhdeh, President of the business incubator Serendipity Innovation, identified capable entrepreneurs as success factor.

“It is better to build a competent innovation team than large plants, particularly if you have a customer at hand who can provide knowledge of the industry,” said Saeid Esmailhdeh.

Tomas Kåberger, Director General of the Swedish Energy Agency, focused on knowledge transfer and highlighted the need for people with know-how in the area of energy production who are willing to invest both knowledge and

capital in newly started companies; a method he referred to as intelligent sparring. He said that the Swedish Energy Agency’s business development operation could function as an intermediary in these contexts. Lena Sommestad, Professor of Economic History at Uppsala University, was of the opinion that growth is generated from in a larger context in which liberal arts also played an important role. ✨

THE SWEDISH PARADOX – AN UNRESEARCHED OPPORTUNITY

The Swedish paradox represents an unexploited opportunity for growth, according to researcher Charles Edquist at Lund University, who has written a report on the area. As stated in the report, the reasons for the paradox are that investments in needs-driven research are too low, that research is being partly conducted in the wrong areas and that the importance of demand is being overlooked in the innovation processes. However, the report states that by creating and developing uniform innovation policies, a better-functioning innovation system can be achieved.

“Dare to work close to the customer”

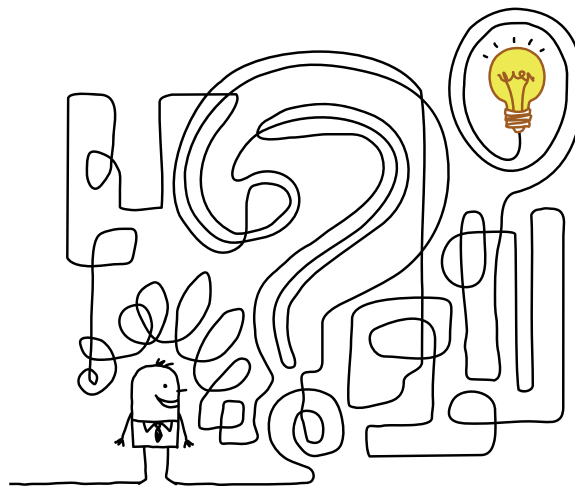
The end-product rarely resembles the original idea. Possible paths out of the Swedish paradox include willingness to move away from initial ideas and daring to work close to the customer,” writes Saeid Esmaildeh and Ashkan Pouya from the business incubator Serendipity Innovation.

A THE CREATION of job opportunities with high knowledge content and the ability to produce and sell unique knowledge has become an increasingly important goal for most modern societies. There is excellent potential to shape Sweden into a world-leading innovation nation. Sweden is one of the countries that invests most in research and development; we possess all the components that are necessary to generate new knowledge and plenty of statistics show that we are among the most productive nations in the world in terms of producing unique knowledge.

Unfortunately, we are not quite as successful when it comes to converting this knowledge into new products and generating economic value.

THERE ARE many different ways to create new innovative products and build technology companies with potential for future growth opportunities. At Serendipity Innovations, we have focused on the importance of building a team with complementary skills and the ability to shape the process in close interaction with paying customers already at an early stage of the company’s development.

It is seldom that the original idea becomes the successful product. The path from concept to product is usually not particularly linear. Both the technology



and the product have the time to change considerably before reaching the market. It is therefore important to focus on building a skilled team of creative researchers, driven business developers and experienced entrepreneurs with broad and relevant contact networks. It is equally important to drive the development work in cooperation with a paying customer right from an early stage. In this manner, it is possible to gain a considerable amount of information regarding the product, the technology’s applicability, the market and how the innovation team’s expertise can match the customer’s requirements.

PUT SIMPLY, willingness to change and readiness to move away from your initial ideas are vital. Take the step and go out and meet customers and allow them to challenge the concept and the product, and be receptive and open to the customer’s problems and responses. By doing this, the customer will not only become a recipient of the innovation, but also partake in the innovation process.












ASHKAN POUYA Founder of the business incubator Serendipity Innovation together with Saeid Esmaildeh. Since its foundation, Serendipity has built and operated more than ten companies. In July 2010, he took up the position as Director of Innovation at Lund University.

SAEID ESMAIHLDEH Professor in Material Chemistry at Stockholm University and founder of the business incubator Serendipity Innovations, which helps to build research-intensive companies in cooperation with universities and innovators.




Industry structure in renewable energy

The matrix below presents a simplified picture of the Swedish industry structure in the areas of wave, solar and wind energy. Although Sweden has a strong industry within renewable energy, with many companies in a start-up phase, the illustration also shows that many companies are at development phases where there is a shortage of capital.

	BASIC COMPONENT MANUFACTURERS Players that manufacture components that are relatively easy to produce. These are often mass-produced and sold and purchased by several different players.	KEY COMPONENT MANUFACTURERS Players that manufacture key components that are relatively difficult to design and produce. These products are often manufactured by only a few players.	SYSTEM MANUFACTURERS Players who assemble components into complete systems.
R&D/SEED/START-UP Newly started companies that are often based on some type of research results. The company may be in an incubator or similar situation and is working to refine its business model. The company often seeks external capital.	 Today, there are many players, and there will probably be many more in the future. However, since these companies are small and new, it may be difficult to link them to a particular industry.	 Within key components, it is easier to link players to industries. There are many companies here, such as Midsummer and Applied Nano Surfaces.	 Includes companies in solar, wind and wave power. These are newly started and innovative companies that supply complete systems. Examples include Vertical Wind, Absolicon and Seabased.
GROWTH These companies are established in the market, have a clear strategic focus and plan, and a clear offering. They often have a principal product and are focused on a single sector.	 Since most players who manufacture basic components supply products to several industries, there are few players in this category.	 This area includes companies in both the wind and solar industries, such as companies that manufacture solar cells.	 Includes several companies in the solar industry that assemble components into complete systems. A number of wind power companies have also established themselves outside the major markets in niches with less competition.
EXPANSION These companies have grown and are established in several markets with several products.	 This area contains many players that currently manufacture basic components for the automotive industry, for example, but which plan to enter other markets, such as renewable energy.	 Sweden is strong as a sub-supplier of key components for the renewable energy industry. Examples include SKF, which produces bearings, and ABB, which develops and sells power transmission systems for wind farms.	 Thus far, there are few Swedish companies in this category.

 = Many companies in each industry

 = Some companies in each industry

 = Investors



WIND POWER

THE WIND sector is one of the cleantech areas in which development has been greatest. Today, certain companies can be placed in nearly all cells in the matrix. Most companies, however, are in the basic and key component categories,

Although Sweden has no large system manufacturer of wind turbines, it has a robust wind power industry among sub-suppliers and newly started innovative companies. The major foreign manufacturers of wind turbines depend on a number of sub-suppliers that provide them with the necessary components and subsystems. Several of the largest sub-suppliers are in Sweden and have established a favorable position in the international wind power market. This is where real growth for technology companies in renewable energy is occurring in Sweden.



WAVE POWER

THE ENTIRE ocean energy segment in Sweden consists of a few companies, as well as companies that can supply services to them. In the future, this segment, like the wind power segment, will probably also consist of sub-suppliers that are more or less specialized in this area.



SOLAR POWER

THE SOLAR-POWER segment in Sweden includes highly attractive companies with considerable growth potential. A few companies are working with solar cells for electricity generation, while others are focused on solar heat. There are also several key-component manufacturers. The industry structure for both solar cells and solar heat is relatively specialized and different companies work at various stages of the manufacturing process. Solar cells are usually manufactured by one company, for example, while assembly of solar panels is performed by other companies, although sometimes with common owners.

The Swedish solar-energy industry is completely integrated with and dependent on the international solar-energy industry. It is therefore necessary that development in Sweden does not deviate too sharply from development in the market as a whole.



INVESTORS

INVESTORS USUALLY enter a company when the technology has been verified and the risk is thus lower. These technology companies have normally been in operation for some time and have sales but need capital for further expansion. Investors also want to see that the company can supply several markets or industries, since that reduces the market risk. Investors are therefore most often interested in companies in the lower right portion of the matrix.

Compete for success

Each year, The Swedish Energy Agency partners a number of competitions that aim to encourage new Swedish innovations and companies. A list of forthcoming competitions and last year's winners are presented below.



Mats Westermark, Niclas Stenlund and Richard Nilsson were rewarded for their innovative environmental ideas.

ENVIRONMENTAL INNOVATION

THE NATIONAL CONTEST Environmental Innovation (Miljöinnovation) has been in existence for 11 years and is open to anyone with a commercially viable innovation that reduces environmental impact. Each year, the ten to 15 best entries are selected for the final. The total prize sum is SEK 350,000, of which the first-prize winner receives SEK 100,000. Private individuals are also allowed to compete. All finalists have an opportunity to obtain help with the development of the business through cooperation with various innovation com-

panies and incubators. The jury also nominates Swedish candidates for the European Commission's European Business Awards for the Environment. The most recent Environmental Innovation competition was won by Mats Westermark's cost-efficient system for utilizing waste heat in industry and in connection with cogeneration. The innovation is primarily aimed at smaller facilities. Second place was awarded to Niclas Stenlund, Solarus, and third place went to Richard Nilsson, Hyra Solceller (Rent solar cells).

RESEARCH&GROWTH

RESEARCH&GROWTH (Forska&Väx) was started by VINNOVA in 2005 with the objective of providing financial support for small and medium-size companies wishing to focus on innovative work with research and development. Companies can seek funding from three types of offerings: conducting R&D projects (up to SEK 5 million), conducting pre-studies for R&D projects (up to SEK 500,000) and requirements identification prior to R&D projects (up to SEK 100,000).

The Swedish Research Agency is on the panel of judges that determines which of the energy-related contributions in Research&Growth should proceed in the process. In the spring of 2010, two companies with the relevant energy operations were granted financing for the implementation of R&D projects. One of the companies, Climatewel – whose technology can store energy from solar collectors in a battery of salt to be extracted later as heat or cooling – received SEK 4 million. The other company was GoalArt, which had developed a product to manage alarms in the power industry's smart grids. GoalArt received SEK 1.4 million.



WIN NOW

WIN NOW (Vinn Nu) is organized by the Swedish Governmental Agency for Innovation Systems (VINNOVA) and the Swedish Energy Agency and targets newly started companies that base their business on research and development results. The objective is to support newly started R&D companies and to prepare and describe commercially attractive development projects at an early stage so that the companies can develop, find subsequent financing and eventually become successful. Each year, up to 20 companies are selected to receive SEK 300,000 each in financing.

In spring 2010, two companies won: The first of these was Perendinus Technologies, whose goal is to produce electrode material for an eco-friendly energy storage system. These algae batteries are made up of cellulose, a leading polymer and saltwater. The second winning company was 3eflow AB, which has developed a new technology for hot water tapping. The advantages of the solution include lower energy consumption and reduced water usage and it also offers the potential for individual control over tap water consumption.



Tomologic from Stockholm won the Venture Cup with its optimization system for metal cutting.

VENTURE CUP

VENTURE CUP, which was started in 1998, is the largest contest of its kind as measured by the number of industries and participants. The Swedish Energy Agency is the national partner for Venture Cup. The contest, which is arranged in four regions in Sweden, starts in September and ends with a national Swedish final in early June. The winner of the Venture Cup 09/10 was the Stockholm-based Tomologic, which

has developed an optimization system for metal cutting in the manufacturing industry. The system can generate major savings for customers and considerable energy savings for society. The jury's commendation read: "A combination of practical and scientific knowledge forms the basis for solving an obvious problem, with the potential for considerable business success. A very well-written business plan and a complete team!"



Lamera's micro-sandwich technology for stainless steel components won the jury's favor.

INVESTOR FORUM

THE SWEDISH Energy Agency arranges an Investor Forum each year at the Swedish Annual Energy Summit. As of 2011, the Investor Forum will take place at the Swedish Energy Agency's new Nordic Energy Outlook conference (see pages 46–47). A number of energy technology companies will be given the opportunity to introduce their activities to the jury.

The Gothenburg-based company Lam-

era won the 2010 Investor Forum. Lamera has developed a new micro-sandwich stainless steel technology. The technology is based on a layer of air and fiber between the metal sheets, thus saving considerable weight and transportation costs. Uno Alfredén from the jury presented the commendation "The prize goes to a company that takes a focused approach to its market area, where the time to profitability is deemed short."

4

Introducing the Swedish Energy Agency

The Swedish Energy Agency focuses on developing an energy system that will enable future generations to have at least the same welfare as we have. Sweden's energy system shall develop to become securely, ecologically and financially sustainable.

This is the Energy Agency

THE SWEDISH Energy Agency is a government authority that works for a secure, environment-friendly and efficient energy system. The agency finances research and development of new energy technology and actively supports business concepts and innovations that can result in increased growth in companies. The Swedish Energy Agency's overall task is to promote the Swedish

energy system's development so that it becomes secure, ecologically and financially sustainable. This means that energy shall be available at competitive prices and the energy supply and energy usage shall have less impact on people and the environment.

THE AGENCY SUPPORTS viable concepts and smart inventions that comply with this mission of generating growth in the Swedish market. We also support

the development of existing products and functions so that they become more energy efficient. Through international cooperation and commitments, the Agency aim to contribute toward achieving the climate goals. We also guide Swedish households toward smarter energy usage. ✨



WE ANALYZE

THE AGENCY WORKS with analyses and investigations. These comprise the decision base for the government, as well as the basis for the agency's work in such areas as research financing, renewable energy and secure energy supply. The investigations also contribute to increasing knowledge of all sections of the energy system and how they interact.

WE DRIVE TECHNOLOGICAL DEVELOPMENT

WITH TECHNICAL SOLUTIONS, both the supply and usage of energy can be made more efficient. New smart production technology, new fuels and new vehicle solutions can enhance the efficiency of the supply and usage of various forms of energy, and extend the sustainability of our products.

WE GENERATE GROWTH

NEW TECHNOLOGY and research results should be commercialized in the market. We have the resources and the contacts to build an excellent foundation on which to base new concepts from innovators, researchers and companies. International climate initiatives can also contribute to disseminating good Swedish ideas and products around the world.

WE PROMOTE ENERGY-EFFICIENCY ENHANCEMENT

WE PROMOTE energy efficiency enhancement and smarter energy usage in transport, industry and construction sectors. This is accomplished through focused information, the procurement of technology and monitoring and evaluating good examples, as well as through tests and labeling of products. This work is conducted in municipal partnerships and in collaboration with existing national networks, such as trade associations and various local and regional players.

Three contributory units

In this document, the Swedish Energy Agency's views of cleantech have mainly reflected the perspectives of three different units: Business development and commercialization, the International secretariat and the Climate unit.

Business development and commercialization

The unit supports innovative companies active in the energy field in their efforts, through Swedish enterprise, to drive the development and adjustment of the energy system. The unit contributes to the financing of technical expertise, market information and active business development. Through information and networking, the unit also works to improve the investment climate in the area. The unit offers innovation support in the form of conditional loans to companies with business concepts in the energy area. Support is approved based on the following criteria:

Energy relevance, commercial potential, development potential, unique business concept and co-financing.

The unit's established network includes the business community, investors, colleges and universities, trade organizations, authorities and decision-makers, both national and international.

» **MORE INFORMATION AT:**
www.swedishenergyagency.se

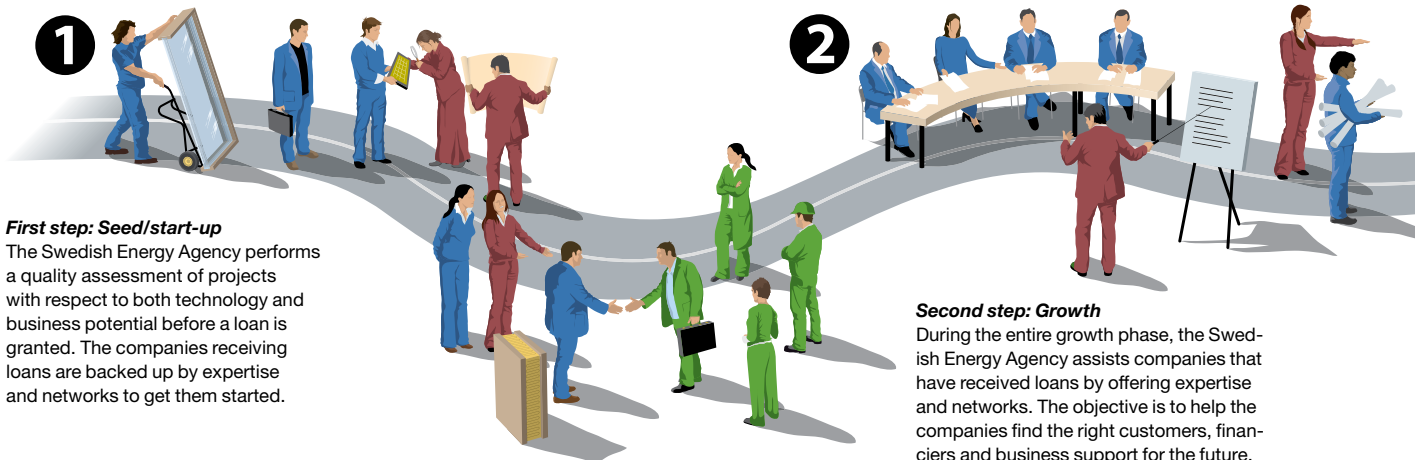
International secretariat

This is the agency's unit for coordinating and developing various strategy issues in respect of the IEA, EU, bilateral agreements, SIDA cooperation and other international partnerships. The agency's internal support requirement in the international effort is key to the assignment. The secretariat is also responsible for internal participation in international activities. The operative role includes promoting Swedish energy technology in international markets. Activities encompass delegation trips and matchmaking events. In this work, the Swedish Energy Agency cooperates with other players, such as the Swedish Trade Council. The unit's goals are cooperation, efficiency and thus a positive impact in international circles for the agency's international team effort. The strategy pursued to achieve the goals is to increase and further develop coordination and overview, while providing internal support and training.

» **MORE INFORMATION AT:**
www.swedishenergyagency.se

THE SWEDISH ENERGY AGENCY'S CONDITIONAL LOANS

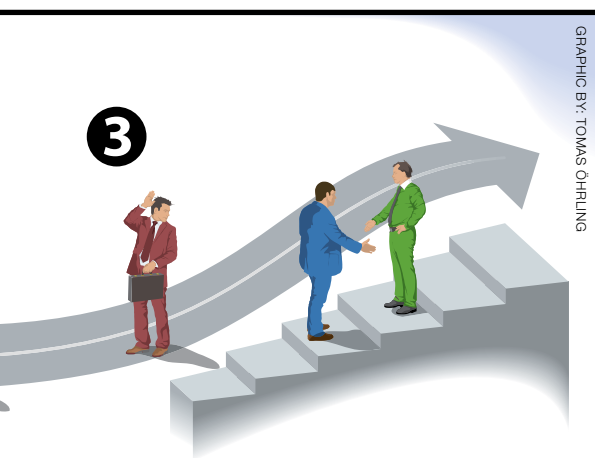
The road from concept to commercial product or service can be divided into three steps. The Swedish Energy Agency supports companies with loans and expertise in steps one and two. The objective is to help companies reach step three.



The Climate unit

The Swedish Energy Agency is a national expert authority for a Clean Development Mechanism (CDM), mechanisms for Joint Implementation (JI) and International Emission Trading (IET). In this role, the agency provides companies with support and expertise prior to project investments for the acquisition of emission rights. The agency is also the official Swedish contact point for JI and CDM in relation to the climate convention, which means that the authority approves projects and authorizes companies to participate in the flexible mechanisms on behalf of Sweden. The Swedish Energy Agency's climate unit is responsible for this work. The Climate unit also works to promote technology export within the framework of the flexible mechanisms and capacity expansion in emerging countries. In addition, the agency acts as the support function to the Government Offices' work on international energy and climate efforts through participation in international procurements, as well as international and regional energy and climate cooperation. Moreover, the Climate unit works with the climate policy research program.

» **MORE INFORMATION AT:**
www.swedishenergyagency.se



GRAPHIC BY: TOMAS ÖHRLING

Third step: Expansion

When a company is ready to expand, the Swedish Energy Agency exits the project. It is now time for the company to grow on its own feet subject to the market conditions.

Companies in the business development unit's portfolio

These companies comprise the portfolio of the business development unit. Being included in the portfolio signifies that the company receives innovation support from the Swedish Energy Agency. The support is created to develop business and to commercialize the companies' ideas.

Absolicon

Easily transported solar collector opens doors to a global market

Airglass

Insulating material that makes a more efficient solar power plant

Airec

Energy-efficient air conditioning

Applied Nano

Surfaces Sweden
 Less friction losses in mechanical system

Artic Nova

Competitive peat usage with a superior process

Cleanergy

Environment-friendly Stirling engines

Compower

System for own heating and electricity in single-family homes

Ecospark

Major step toward better and less expensive lighting

El-forest

Environmental operation in forests using the first electric forest tractor

ETC Battery and FuelCells Sweden

Global market for more energy-efficient batteries

Fibre Tornado

Energy-efficient sludge dewatering in the paper industry

FlexiWaggon

Unique solution for reducing truck transport

GETTFuel Cells International

Swedish-Chinese cooperation for fuel cells in lower temperatures

Flinga Biogas

Facilities for farm-based biogas production

GoalArt

Smart fault detection in intelligent electricity network

Kyab

Energy saving measuring system for properties with district heating

Mantex

New measurement method with the potential to save large amounts of energy in industries

Midsummer

Cheaper solar cells for a growing market

Noda

Energy saving control of district heating grid

Powercell

Fuel cell system and reforms for the transport industry

ProForestry

Enhances the efficiency of biomass production in an environment-friendly manner

SenSiC

Better efficiency in boilers

Vasasensor

Measurement system for energy efficiency in the paper industry

Vehiconomics

New solution for shorter passenger transport



Welcome to the **NORDIC ENERGY OUTLOOK**

IN MARCH 2011, the Swedish Energy Agency's new conference, the Nordic Energy Outlook (Energiutblick), will be held in Gothenburg. Participants from the Nordic countries' energy authorities along with industry players, research institutes and other players from the Nordic countries will gather at one of Northern Europe's largest energy conferences. The conference, which will focus on five different themes or arenas, will be the gathering place for debates and discussions on the most important energy issues.

On March 16, the conference will commence with a general introduction, featuring opening speeches by officials including the Swedish Energy Agency's Director General Tomas Kåberger. The opening session will

then proceed to a conference program, with parallel sessions arranged in the five arenas: Global trends, Efficient energy users, Technology for growth, Energy and the market and Energy of the future.

In conjunction with the conference, companies and organizations will have the opportunity to present their businesses in a corporate exhibition. The 2011 Nordic Energy Outlook, the exhibition and other meeting facilities will be opened for a sneak premiere at 1:00 p.m. on March 15.

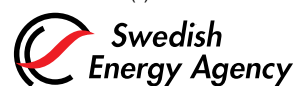
At www.energiutblick.se, you will find all the information you need to attend – as visitor, speaker or exhibitor.



PHOTO: SWEDISH ENERGY AGENCY

Editor: Ada Mujkanovic,
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Production: Intellecta Publicisterna,
www.intellectacorporate.se
Translation: The Bugli Company
Photographer: Pages 3, 6: Anette Andersson.
Page 12: Anette Nantell/Scanpix. Page 17:
Tobias Andersson Åkerblom. Page 18: André
de Loisted. Pages 7, 21: United Nations Photo.
Page 22: Jennifer Nemie. Page 27, 31, 43: Per
Westergård.
Illustrations/graphics: Tomas Öhrling
Printing: CM-gruppen, Bromma
Edition: 1,000
ET2010:54

© Swedish Energy Agency
Publications issued by the Swedish Energy
Agency can be ordered or downloaded via
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