

Swedish national roadmap for implementing the European Environmental Technologies Action Plan (ETAP)



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Introduction

Since the 1960s Sweden has worked with environmental considerations in the development of the society. Since then, environment has been a major political priority. Environmental legislation and major infrastructure investments have paved the way for the development of a Swedish environmental technology sector. Several Swedish companies active in this area have also been successful in offering their technologies, services and systems abroad.

The Swedish Government has increased its efforts to further strengthen and promote the environmental technology sector and create conditions to further stimulate the development of and demand for these technologies. A challenge faced by all countries is to decouple economic growth from environmental degradation. The Government's objective is to place Sweden at the forefront of the transition to a sustainable society by emphasising the need for an integrated policy for environmentally sustainable growth and welfare. Thus it is important that relevant measures at the political level, by industry, and by the labour market parties promote environment-driven business development, eco-innovations, clean technology and the environmental technology sector.

As a result of a policy with this aim environmental technology has developed to become an important industry sector for Sweden in economic terms, and the export of environmental technology currently generates substantial revenues. According to a report by the Swedish Trade Council from September 2005¹ Swedish companies exported environmental technology to a value of SEK 25 billion in 2004, with export growth approaching 15 per cent. The export of environmental technology has had, and will continue to have, a substantial impact on the creation of new jobs in Sweden.

In February 2004 the European Commission presented a Communication on Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union² (ETAP). The European Council meeting in March 2005 invited the Commission and the Member States to implement the action plan for eco-technology as a matter of urgency, including by specific actions on a time scale agreed with economic operators. As a result of this the Commission has asked the Member States to set national roadmaps for the implementation of ETAP. It is in response to this call that Sweden is now submitting this national roadmap for implementing ETAP.

This document presents a short overview of Swedish activities at national level with regard to the various ETAP actions. Sweden has also been active at European level, and is currently running two important projects with a

bearing on ETAP. The first is the UK-Sweden Sustainable Construction Initiative (see section 2.1) and the second the joint Swedish-Austrian Awareness Raising Initiative within the framework of ETAP.

The actions proposed in ETAP can contribute to the ambitions set out in the Lisbon process, where the overarching goal is to make Europe the most competitive and dynamic area in the world by 2010.

A report from 2002³ valued the global environmental technology market at about EUR 550 billion. The EU market share was about one third of the global market (EUR 183 billion), and together with United States and Japan, the EU has approximately 85 per cent of the global market.

The European Union has a progressive environmental agenda, combined with highly skilled companies and state of the art technologies. The EU should therefore become more pro-active and set an ambitious target for its share of the global market for environmental technologies by 2010.

The EU contribution to an improved global environment would be enormous; it would give Member States the opportunity to share with others the result of years of investments in R&D, large-scale testing and implemented innovative environmental technologies.

With ambitious targets, the EU would show global leadership and send firm signals to the market that the environmental technology sector is a good, safe and stable sector to invest in.

From a Swedish perspective, this is the essence of ETAP – creating conditions which will contribute to environmental improvements, social justice and economic development in the EU and thereby contribute to sustainable development all over the world.

¹ COM (2004) 38 final

² EU Eco-industries: Trade and international markets, A final Report to DG Environment, C1961, ECOTEC Research and Consulting Limited

³ EU Eco-industries: Trade and international markets, A final Report to DG Environment, C1961, ECOTEC Research and Consulting Limited

1 Research and development

1.1 Increase and focus research, demonstration and dissemination. Improve co-ordination of relevant programmes (Action 1)

The aim of research and innovation policy is to make Sweden a leading knowledge and research nation characterised by scientific excellence and a high capacity for product renewal. Sweden has already reached the 3 per cent goal, since its combined public and private investments in research and development (R&D) account for more than 4 per cent of GDP, with slightly more than 75 per cent of these investments being financed by industry. A target level of one per cent of GDP annually has been set for the public financed research. Swedish companies and universities are internationally oriented and have a high level of participation in international research and collaboration projects both in and outside the EU. Sweden is keen to increase the number of female researchers in all scientific areas. The recently presented research policy bill – Research for a Better Life⁴ – is in line with this ambition.

In an increasingly competitive environment, innovation is crucial for the transformation of knowledge into growth and renewal. This was an important factor behind the innovation strategy – Innovative Sweden – formulated in 2004 (see below for more information). The implementation of this strategy in the next few years through Government Bills to the Riksdag (the Swedish Parliament) and other initiatives will be closely monitored.

Research for a better life

The Government intends to take a number of measures in the coming years to stimulate investment in research and development, promote knowledge transfer, develop scientific excellence and encourage innovation.

- The Government has expressed the view in its Bill – Research for a Better Life – that government funding for research and postgraduate education should be increased by SEK 2.34 billion for the period 2005–2008, which represents an increase of 9.8 per cent compared with the budget for 2004. The main focus of these investments will be to further reinforce scientific quality and to ensure that the Swedish research system offers the best conditions for internationally competitive research. Efforts will be concentrated in areas that can contribute to social development and growth in

the business sector. Special initiatives are proposed in medicine, technology and sustainable development.

- To promote cutting-edge research, funding for strong research environments and centres of excellence that are internationally competitive in all scientific fields will be built up gradually to a level of SEK 300 million per year.
- The renewal of the Swedish research community will continue. Initiatives will be adopted for postgraduate education and postdoctoral positions. Resources will be made available to higher education institutions, the Swedish research councils and the Agency for Innovation Systems (VINNOVA). The councils and VINNOVA will also be allocated funds for schools of research in strategic areas.

Technology transfer and increased commercialisation

In the Swedish innovation system public research is mainly undertaken by the universities. In addition to carrying out research and higher education, they are also required work with society at large. This task includes promoting the valorisation of research results. Further measures will be taken to develop the universities' capacity for innovation and to facilitate the commercialisation of the research results.

- Resources have been set aside to promote new public-private partnerships in sectors of special importance. Programmes will be formulated in a dialogue between the Government and government agencies, industry and employee organisations. Several of these measures support the Swedish innovation strategy.
- The view of the Government is that ownership of their research results by the researchers (the academic exemption) may be a possible barrier to the intention of the Government to increase utilisation of research results. An inquiry chair is currently looking into the legal implications of a change in policy.
- Higher education institutions specialising in technology, medicine and natural sciences will be commissioned to develop action plans for commercialisation and technology transfer. Fourteen of the 37 higher education institutions have set up holding companies. The Government intends to appoint a negotiator to recommend a more effective structure with fewer holding companies and a reinforced capital base.

⁴ Government Bill 2004/05:80

- The research institute sector in Sweden is small by international standards and is sector-oriented. A restructuring process has started with the aim of creating larger and more broadly based institutes. Increased resources will be given to these institutes to facilitate access by industry, in particular SMEs, to research results.
- A lack of availability of seed capital has been identified as one of the bottlenecks to commercialisation. The Innovation Bridge, a regional structure for seed capital in seven university locations for the commercialisation of research results, has been strengthened and now has SEK 1.8 billion at its disposal over a ten-year period between 2005 and 2015.
- Knowledge-intensive companies that have close links with higher education institutions are generating a higher rate of growth than other companies. VINNOVA will accordingly be allocated resources to improve the access of SMEs to R&D.

Measures to increase protection of intellectual property rights

The protection of intellectual property rights is important, not only to promote investment in innovation and creativity, but also to increase employment and improve competitiveness. Unlike large companies, SMEs often lack the resources to defend their intellectual property rights. The Government therefore intends to take a number of measures to increase the protection of intellectual property rights:

- The Commission has started to draw up proposals for patent litigation insurance at European level. The Government will actively monitor this work with a view to providing companies with the opportunity to defend their rights by legal means.
- To give proprietors effective means of enforcing their rights, legislative measures are being taken to implement the Directive on the Enforcement of Intellectual Property Rights. The scope for strengthening action by the law enforcement agencies in this area is also being studied.
- Preparations are being made for the establishment of a court system with exclusive jurisdiction in all civil and criminal intellectual property cases in order to create an even more effective and more specialised court system than today's.
- Measures are being taken to encourage inventors and innovators to protect their rights, for example in the area of patent law, where the implementation of the "London Agreement" will lead to lower costs for European patent applications.
- A new Trademark Act will offer a simpler procedure for the registration of trademarks and the cancellation of trademark registrations, reducing the administrative burden on companies.
- A review is being conducted of the financial aspects of patenting on the growth of companies. The findings will be presented at the end of the current year

together with proposals to create understanding and appreciation, mainly among small knowledge-intensive companies, of the financial benefits – and costs – of patenting.

The innovation strategy

In an increasingly competitive environment, innovation is crucial to the transformation of knowledge into growth and renewal. This was an important factor behind the innovation strategy – Innovative Sweden – formulated in 2004. The implementation of this strategy in the next few years through government bills to the Riksdag and other initiatives will be closely monitored.

The commitment to research for sustainable development also includes an important component of research on environmental technologies. This funding is allocated to the Swedish Research Council for Environment, Agriculture Sciences and Spatial Planning (Formas) and the Swedish Agency for Innovation Systems (VINNOVA). Formas and VINNOVA have been commissioned to develop a cooperative research programme for environmental technology research together with the business community.

VINNOVA integrates research and development in technology, transport and working life. The mission of VINNOVA is to promote sustainable growth by financing RTD and developing effective innovation systems. The agency has no specific programme for environmental technology. Instead environmental aspects are mainstreamed in its different programmes. Examples of VINNOVA activities in regard to environmental technologies are:

- Green materials from renewable resources, which includes cooperative research, demonstrations and centres of excellence.
- A green car programme under the programme council for automotive vehicle research (PFF). This programme is run in cooperation between the state and the car industry and.
- Together with its Finnish counterpart, VINNOVA has carried out the programme Modification and Processing of Wood Raw Material into *Innovative, Eco-efficient Products*. The objectives of this programme are to increase the competitiveness of forest-based industries, create added value in the wood products industry and promote sustainable use of natural resources.

On the researcher side, *a number of cooperative research institutes*, including the Swedish Environmental Research Institute (IVL), the Swedish Institute for Food and Biotechnology (SIK), SP Trätek (addressing the Swedish timber and wood manufacturing industries) and the Swedish National Testing and Research Institute (SP) have joined forces to form *United Competence (UC)* with the vision of addressing the challenge of maintaining efficient production and growth in a sustainable perspective.

UC's activities include applied research in the fields of sustainable urban and rural development, energy, environment and materials.

Research and new technology for the future energy system

A programme of energy RD&D is a major component of Swedish energy policy. It is through research, development and demonstration of new technology that sustainable energy systems are created. Funding for this programme has recently been increased and the Swedish Government has just presented a bill with guidelines for further action in this area. The guidelines and proposals in the bill aim at ensuring an increased strategic focus in the programme as well as a higher ambition in promoting the development of new products and services that can contribute to the realisation of a sustainable energy system as well as to economic growth. Additional emphasis will also be put on systems analyses and on economic and social issues related to energy technologies.

Energy-related R&D and demonstration work is characterised by a system-based approach. The overall goal is to create the scientific and technical competence and knowledge base needed at universities, research institutes, government agencies and industry to enable the development of a sustainable energy system in Sweden, and to develop technology and services that can be commercialised through Swedish industry to contribute to sustainable energy systems both in Sweden and in other markets.

These overall goals are complemented by a set of specific goals and targets and by sets of criteria for prioritisation. The Swedish Energy Agency has responsibility for creating a balanced project portfolio to fulfil the goals. A good mix between action on energy supply and energy use is sought. A number of different types of support are available, from support for university research to support for industrial development and demonstration.

The activities in the programme are not defined in terms of technologies but in terms of overall goals and thematic areas.

The six thematic areas are Buildings, Transport, Fuel-based Energy Systems, Energy Intensive Industry, the Power System, and Energy Systems.

In general the efforts are directed at efficiency in supply, distribution and use of energy, and at renewable energy technology. Important areas are energy efficiency and renewable energy technology for heating and cooling in the buildings sector and second-generation biofuels for transport. Bioenergy from forestry and agriculture is a high priority, as is action relating to energy use in industry. Renewable technologies for electricity production like solar, wind, hydro and wave power as well as technology

for the transmission, distribution and storage of electricity are also included. The programme General Energy System Studies has a socio-technical profile and plays an important part in the Swedish energy research portfolio. This programme augments technically oriented research, development and demonstration activities.

The Swedish Energy Agency is also engaged in supporting technical research and development on issues related to road vehicles and the production of renewable fuels within the framework of the special collaborative programmes with the vehicle industry like the Green Car Programme.

Other activities

The *Foundation for Strategic Environmental Research, Mistra*, supports strategic environmental research with a long-term perspective, aiming to solve major environmental problems. The main part of Mistra's funding is focused on broad-based interdisciplinary programmes. An endowment of more than SEK 3.2 billion, as of 1 January 2005, makes it possible to allocate an annual sum of some SEK 200 million to research funding.

The Swedish Government contributes to the *development of cleaner production* through co-financing of research projects in industry, which is coordinated by IVL - *Swedish Environmental Research Institute*. The purpose of this research is to contribute to an adaptation of society to more sustainable production and products, through a production where the negative environmental impacts of the production facility have been minimised and resource utilisation in the production has been optimised. Over the years projects have been carried out in areas such as monitoring and optimisation of production processes, ecological product design, minimisation of discharges from different processes and the minimisation of resource use through internal measures in processes.

The Swedish Environmental Protection Agency is funding two five-year research programmes on sustainable production and consumption. One programme (FLIPP) deals with furthering lifecycle considerations through integrated product policy. The other (SHARP) on sustainable households combines political, economic, legal, psychological and time-geographical methods and employs a bottom-up perspective to understand how environmental

policies and intentions are perceived and implemented in Swedish households.

The Swedish Environmental Protection Agency and VINNOVA participate in the ERA-NET “Sustainable Enterprise” (SUSPRISE) project with the objective of strengthening European efforts to realise sustainable development in industry in accordance with the EU policies IPPC, IPP, ETAP and FP6 by enhancing the coordination and cooperation of national sustainability RTD programmes.

1.2 Establishing technology platforms (Action 2)

The aim of Swedish industrial policy is to strengthen competitiveness in the short and long term by supporting important sectors of the economy and ensuring the development of new markets and companies. An important part of the policy thus focuses on actions to improve Sweden's capacity for renewal.

Innovative and competitive industry

The impetus for the new industrial policy is presented in the innovation strategy “Innovative Sweden – a strategy for growth through renewal”. A central part of this strategy is the Government's discussions with representatives of industry, public authorities, researchers and the social partners from six important sectors of the Swedish economy (automotive, IT/telecom, biotechnology, pharmaceuticals, metallurgy, and pulp and paper). The aim is to jointly develop an action plan for each of these industrial sectors, based on an analysis of the current situation and the strengths of the Swedish players. The effects of any synergies between initiatives in different sectors must also be identified. The proposed measures can include regulatory reform, research programmes in public-private partnerships and creating a forum for cooperation. The purpose is to improve communication between the actors and to create better decision-making and prioritisation of reforms. A similar project has been concluded with the Swedish aerospace industry.

Another forum that supports and develops industrial policy is the Industry Committee, made up of 8 trade unions and 12 employer organisations. The Committee has been involved with industrial development since the start of 1997 and has taken the initiative for an annual forum, “Industry Days”, to discuss industrial competitiveness. In October 2004, the Industry Committee presented an action programme entitled “Research for competitiveness – industry's offer to Sweden”. This marked the start of regular discussions between the Government and both sides of industry aimed at strengthening competitiveness in Swedish industry.

Regional competitiveness

To support regional competitiveness and to make the regions visible to foreign investors, innovation initiatives based on close cooperation between industry, universities and the public sector are being implemented.

- The Visanu programme supports the development and marketing of regional clusters with the potential to become internationally competitive. The programme is run by the Agency for Innovation Systems (VINNOVA), the Swedish Agency for Economic and Regional Growth (Nutek) and the Invest in Sweden Agency (ISA).
- Regional clusters are evaluated and supported to a certain degree at national level in the Vinnväxt programme operated by VINNOVA. Until now, 10 clusters have been selected to receive grants for a 10-year period. In addition to national funding, support is also available at regional level.

The European Technology Platforms are an important tool for enhancing Europe's future growth, competitiveness and sustainability. Swedish organisations aim to be active participants in a number of Platforms in which environmental aspects are strongly relevant, including the Hydrogen and Fuel Cell Technology Platform and the Forest-based Sector Platform. Through this participation, Swedish industrial needs can be taken into account in the design and priorities of the seventh framework programme for R&D.

1.3 Establish European Networks of technology, testing, performance, verification and standardisation (Action 3)

Today's internal market is extensively regulated and the focus in the future must be on application, enforcement and implementation. Much needs to be done at national level to remove barriers and facilitate cross-border trade. The Government will adopt a number of measures for this purpose:

- An inventory of the legislation affected by the Services Directive will be initiated, and national rules will be screened and revised to promote a more effective market for services.
- With regard to market surveillance, stricter application with clear obligations will be imposed in the coming years. The responsibility of the relevant authorities for the CE mark will be clarified. Measures to streamline the enforcement and application of internal market legislation, and to improve relevant information, have been investigated, and the work will continue. A national conference on the internal market was held in October 2005.
- A screening exercise will be initiated concerning the free movement of goods and the application of the

principle of mutual recognition in non-harmonised areas.

- The possibility of applying a model similar to the certification system in EC legislation on goods (the New Approach) in relation to national non-harmonised legislation will be investigated.
- A national strategy for standardisation will be prepared in consultation with the stakeholders. National coordination needs to be improved, and actions will be taken to increase the understanding of the importance of standardisation.
- It must be made even easier for Swedish businesses to participate in cross-border public procurement. It is also desirable to encourage foreign companies to participate in Swedish public procurement.

2 Verification of technologies

2.1 Develop an EU catalogue of existing directories and databases on environmental technologies (Action 4)

Sweden views this as an important instrument to spread awareness of what technologies are available and what can be achieved with them. As already mentioned in the introduction to this paper, the Swedish Trade Council is running a programme to promote exports from Swedish companies in the areas of water and wastewater treatment, air pollution control, waste management and renewable energy. The programme has a website⁵ and a directory of around 800 Swedish companies in these fields.

Within the framework of the Joint UK-Sweden Initiative on Sustainable Construction a website⁶ was inaugurated at a conference in Malmö last June. The aim of the website is to disseminate case study examples and the results of joint UK-Sweden projects and to foster new joint projects related to the use of environmental technologies in sustainable construction and refurbishment. The initiative aims to facilitate dialogue across all elements of the construction chain from policy makers and regulators to investors, architects and tradesmen. The initiative's website acts as a portal for sharing best practice and establishing new joint projects.

Sweden find websites valuable as they can be a practical way of presenting sustainable solutions to environmental

problems, reaching a big audience and giving good references to companies, projects and other experts. Sweden would welcome a European environmental technology website, which could serve as an entry point for those seeking information about what European companies can offer in the environmental technology area.

Such a website could also be an information resource providing references to national and regional websites and documents relevant to environmental technology, innovations and best practices. The long-term aim of this activity could be to provide a European gateway for environmental innovations, similar to the gateway of US EPA on environmental innovations and best practices, for example.

⁵ www.swedentech.se

⁶ www.ukswedensustainability.net

3 Performance Targets

3.1 Develop and agree on performance targets for key products, processes and services (Action 6)

An example of how to develop and agree on performance targets for key products, processes and services is the Japanese Top Runner Programme. The target is to increase energy efficiency when using selected product groups, i.e. reduce the environmental impacts and at the same time achieve economic growth.

The Swedish Environmental Protection Agency has studied⁷ the environmental effectiveness and the political implications of the programme in Japan, including possible barriers to introducing the model in Europe.

The Top Runner Programme is based on a value system for maximum standards, i.e. the product with the highest energy efficiency on the market at a given point will be the starting point for the standard. At the same time the potential of other producers is considered, so that they also will have a reasonable chance to reach the standard set. The standards differentiate within the 18 products groups, which are included in the programme today. The programme is regulated in legislation.

The Top Runner Programme is seen as an effective tool in reducing negative environmental impacts through its increase in energy efficiency, support to new innovations and spreading of information about best available technologies. Japanese producers feel that the Programme has contributed to an increase in competitiveness. Potential obstacles to introducing the model in Europe might be problems with setting standards and measuring methods, due to the heterogenic European industrial structure and differences in consumption patterns and in economic conditions.

Sweden would like to see something similar to this programme being developed and agreed at European level. The construction sector is an area with major variations in environmental performance and with a big potential for major improvements. It is well known that in general this sector accounts for 40 per cent of the energy used, waste produced and hazardous substances used in a society. Not to mention the effect that the construction sector has on climate change. The sector is quite homogeneous

across Europe. The Commission should therefore develop and agree with Member States performance targets for energy efficiency in new-built as well as in refurbished buildings.

Requirements concerning best available technique within the framework of the IPPC Directive as well as in environmental labelling have similarities with best performance targets.

One objective of the IPPC Directive is to see to it that Best Available Techniques (BAT) are used in the sectors of the Directive, mostly major industrial sectors. One instrument to promote that is the exchange of information on what should be considered as BAT between Member States, i.e. the BREF documents (BREF= BAT Reference Document), one for each IPPC sector. These documents are produced in cooperation between Member States and industry, according to a timetable that also involves revision of the documents.

In these documents BAT is often expressed as intervals of possible performance such as emission values or resource consumption. Some parties advocate higher values, others lower. Sweden mostly advocates lower values, representing better performing processes or equipment. Sweden has thus promoted implementation of more stringent BAT descriptions in the EU.

Labelling processes can be used to decide minimum levels of environmental performance that can be agreed on and implemented voluntarily by industry.^{8,9}

The official Nordic environmental label, the Swan, has been in place since 1989 and now covers more than 60 product groups and around 800 licences. Another example is the EU energy labelling system for domestic appliances that has been a success in Sweden.

There are also several private labelling schemes such as Bra Miljöval, which covers about 800 products, services and shops, and KRAV for ecological products.

⁷ The Top Runner Program in Japan – its effectiveness and implications for the EU, Swedish EPA, Report 5515, November 2005

⁸ Nordiska Ministerrådet (2001), Evaluation of the Environmental effects of the Swan Eco-label, 2001:516

⁹ AEAT (2004), The Direct and Indirect benefits of the European Ecolabel

4 Mobilising financial instruments

4.1 Mobilising financial instruments to share the risks of investing in environmental technologies (Action 7)

The Swedish Government launched the *Local Investment Programmes* in 1996 with the aim of supporting programmes at local level containing measures to transform society in the direction of more sustainable development. During the period 1998-2003, a total of SEK 6.2 billion was assigned for this purpose and the total environmentally related volume of investment amounted to approximately SEK 21 billion. About a third of the funds were allocated to projects for energy conversion and energy efficiency measures while transportation, waste and water management etc. received ten per cent each. Approximately half of the projects have had positive effects on the climate.

In 2002, a new programme, known as the *Climate Investment Programmes*, that is more focused on climate measures was launched. In total, SEK 1880 million has been allocated for these programmes. Around 25 per cent of the funds have been distributed to investments in the transportation sector, primarily to biogas vehicles, and over 50 per cent have been allocated to energy projects, primarily district heating and conversion to biofuels.

Investment programmes such as local investment and local climate investment programmes are based on co-operation between different local operators. Investment programmes can stimulate counties, companies and other local operators to make long-term investments that improve the environment and encourage local commitment and local initiatives and thereby support the introduction of new environmental technology in the market.

Sweden considers that a greater emphasis should be placed on communicating knowledge and experience from large project-oriented programmes, such as these investment programmes, but also similar programmes funded by the European Union. Experience of appropriate methods of doing this is needed, particularly when it comes to identifying and communicating the results of successful projects.

4.2 Public/private partnerships (Action 8)

In this context we would like to mention that the Swedish Government has initiated two dialogues – “*Building and Living*” and “*Tomorrow's Grocery Market*” – with the relevant stakeholders. The aim of the first dialogue, in which the National Board of Housing, Building and Planning, the industry and the municipalities are involved, is the more efficient use of energy and resources, a good indoor environment and sound choices of materials. The aim of “*Tomorrow's Grocery Market*”, in which the Environmental Protection Agency, the Swedish Consumer Agency, industry and the municipalities are involved, among others, is a sustainable trade in convenience goods. This dialogue focuses on logistics, e-commerce and the content and manufacture of products.

The different investment programmes mentioned in section 4.1 also contribute to public/private partnerships.

In cooperation with industry the Swedish Government has developed “the Sustainable City” concept. It was launched in 2002 and shows how the model of public-private cooperation can be used in the phases of planning and implementation of city development. The Swedish Government, the Swedish Trade Council and Swedish industry have presented the concept all around the world as a model for sustainable urban development.

4.3 Promote new business niches (Action 9)

Under this heading we would like to refer to what is said about *Local Investment Programmes* and *Climate Investment Programmes* under section 4.1.

Access to finance is an important prerequisite for the establishment and development of enterprises. A sound business environment and clearly defined rules of the game are essential requirements if small and large companies are to engage in competitive activity. A commonly encountered problem, however, is the lack of capital at an early stage. To facilitate the establishment of new businesses, the Swedish Government has taken measures to increase access to capital for both newly started and established businesses. Measures have been taken to improve the opportunities for reconstructing companies and

avoiding bankruptcies. The Swedish Government intends to launch further measures in this area in the near future. The reorganisation and reform of the public providers of risk capital has strengthened and simplified access for companies to finance at an early stage.

Established businesses can apply for a government product development grant that is assessed through partnerships in the Swedish regions. Part of these grants is earmarked for ecodesign projects in industry.

Nutek, the Swedish Agency for Regional and Economic Growth, has financed several cluster initiatives to develop new business niches in partnership with public stakeholders in the ongoing Environment-Driven Industry Development initiative. Examples of these are Biofuel Region, BioEnergy Småland, Sustainable Indoor Air Quality, Sustainable Sweden Southeast and Sustainable Hospitals. Other financiers are the Swedish Energy Agency, the Invest in Sweden Agency and VINNOVA, as well as regional bodies. Various studies have also been undertaken in the Nutek initiative to promote new business niches, such as Applications of Swedish Waste Management and Waste Technology for Thailand, Wastewater Treatment in Sweden, Clinical Waste – the Swedish Experience and Why Does Swedish Venture Capital not Invest in Renewable Energy Technologies?

4.4 Financial instruments for renewables and energy efficiency technologies (Action 10)

Sustainable energy

The Government's long-term and short-term energy policy objectives are to secure a sustainable and reliable supply of electricity and other forms of energy on internationally competitive terms. The Government has set itself a new objective of creating conditions to break the dependence on fossil fuels by 2020. Energy policy must also create the conditions for a less negative impact on health, environment and climate, and must facilitate the transition to an ecologically sustainable society. Sweden's energy policy focuses on the efficient use of energy and a transition to the increased use of sustainable and renewable sources of energy. Production of biomass accounts for a significant part of Sweden's energy production, e.g. by converting residual products from logging operations into solid biofuels. It is thus of great importance for Sweden to achieve a balance between the conservation of its natural resources and the sustainable use of its forest ecosystems.

After the referendum on nuclear energy in 1980, the Swedish Parliament declared that nuclear power will be phased out at a rate that is practically feasible consistent with the demand for electricity. Until now Sweden has

reduced the number of reactors in service from 12 to 10. The next step is an assessment of the oldest remaining reactors, which is due to take place in some years.

Increased resources have been made available for research, development, demonstration and commercialisation in the energy area from 2006 onwards. These actions will be implemented with a sharper strategic focus as well as a higher ambition in promoting the development of new products and services that can contribute to the realisation of a sustainable energy system as well as to economic growth.

Renewable sources of energy

The present target, which has been adopted by Parliament, is to increase the consumption of electricity from renewable sources of energy by 10 TWh between 2002 and 2010. The Government has recently submitted a bill to the Riksdag proposing a new target of increasing consumption by 17 TWh by 2016 compared with the 2002 level. Today almost one-third of the total energy supply already comes from renewable sources of energy. The long-term objective is to base the entire supply of energy on renewable sources. So far, the main instruments used to promote renewable technologies have been taxation, the electricity certificate system and increased support for wind power and planning. The EU's system of emission trading according to the Kyoto Protocol also contributes to the promotion of renewables.

- The electricity certificate system (introduced in May 2003) is the most important financial instrument in this context. The system makes it mandatory for a certain proportion of electricity consumption by consumers to be obtained from renewable sources. As an integrated system for all sources of renewable energy, it encourages competition between different forms of renewable energy, thereby increasing the cost-effectiveness. The system has been evaluated, and the Government has recently submitted a proposal for its prolongation to Parliament.
- Additional funding has been allocated, including for a national planning objective for wind power generation of 10 TWh by the year 2015 and investment grants for the large-scale expansion of wind power, e.g. offshore wind power.
- A special programme extending a total of SEK 2 billion to promote investments in the use of renewable energy and energy efficiency in public buildings was launched in

May 2005, and this will increase the rate of conversion. A further SEK 2 billion during the period from 2006 to 2010 has been earmarked for conversion from direct electric heating and oil-fired heating in private housing to heating systems with renewable energy, district heating or other sustainable alternatives.

Increased energy efficiency

The other main focus of energy policy is increased energy efficiency. The Government has initiated several programmes targeted at housing and housing construction with a view to decreasing the need for energy and, at the same time, contributing to lower costs for households:

- A total of SEK 1 billion has been allocated for information and the dissemination of knowledge through cooperation at local, regional and central level, and for stimulating the development of environmentally friendly products in the period from 2003 to 2007. The programme includes support for technology procurement and market introduction of energy-efficient technology and the development of tools and methods for energy-efficiency measures.
- The Government has delivered a proposal to the Riksdag concerning a national programme for energy efficiency and energy-smart construction. The programme aims to release the high potential for energy efficiency in the current building stock and addresses the importance of and the opportunity for energy efficiency in conjunction with renovation and new construction projects. A national target for energy efficiency in the housing sector is proposed. According to this target energy use per square metre should decrease by 20 per cent to 2020 and 50 per cent to 2050, in comparison with use in 1995.
- A programme of increased energy efficiency measures in energy-intensive industry entered into force in January 2005. This will play an important role in speeding up the more efficient use of energy in electricity-intensive industry, and as such will contribute to the more efficient use of energy sources in our society.

In 2003, more than a quarter of Sweden's total energy supply came from renewable energy sources. Our ambition is to increase this share.

Moreover, the Swedish Government has set a new policy target: the creation of the conditions necessary to break Sweden's dependence on fossil fuels by 2020.

This is not a totally new policy. The established energy policy already expresses the long-term vision that the Swedish energy supply in time should come from renewable and mainly domestic sources of energy. This policy target means, however, a sharper focus and a much more ambitious vision to make a real difference in the near future. To that end, the Swedish Prime Minister is heading

a special commission¹⁰ with representatives from industry, universities, and society to further analyse how this break on Sweden's dependence on fossil fuels by 2020 shall be achieved.

Sweden has an active policy to increase the share of renewable fuels in the transport sector and thereby decrease the dependency on fossil fuels. A tax strategy for alternative fuels was decided in the budget bill of 2002. In the budget bill of 2004, the strategy was modified and carbon dioxide neutral fuels were exempted from the carbon dioxide as well as the energy tax for the period of 2004-2008. In the 2006 Budget Bill, the Government announces its intention to continue the use of tax exemptions to ensure that biofuels can remain competitive.

The tax strategy is accompanied by other measures to promote the introduction of renewable fuels and environmentally friendly cars. During the autumn of 2005, the Riksdag passed the law (2005:1248) on the obligation to supply renewable fuels. The law obliges filling stations to sell renewable fuels, starting with the largest stations in 2006 and then gradually extending the obligation to medium-sized stations until 2009. The expansion will allow a radical increase in the number of filling stations selling renewable fuels and thereby increase the accessibility to those fuels. As the new law will probably promote ethanol filling stations primarily, it is accompanied by a special measure focused on filling stations for other alternative fuels. SEK 50 million for 2006 and SEK 100 million for 2007 are designated for this purpose.

Environmentally friendly cars have a reduced value of fringe benefit for tax assessment in comparison with conventional cars. This tax exemption was recently prolonged until 2011. To further increase the number of environmentally friendly cars used by the state agencies, the Government has decided that at least 25 per cent of all cars bought by these authorities during 2005 should be environmentally friendly cars (biogas, ethanol or electricity/hybrid). For 2006 the goal is 35 per cent.

Taken together, these measures have contributed to Sweden's leading position when it comes to the introduction of renewable fuels and environmentally friendly cars. In 2004 the use of biofuels for transport was already well above the EU reference value of 2 per cent and the total number of environmentally friendly cars amounts to approximately 25 000. These economic instruments to promote the introduction of renewable fuels are accompanied by research and development in the fields of renewable fuels and new car technologies.

The climate investment programmes referred to in section 4.1 are intended, on the one hand, to reduce emissions

¹⁰ Kommissionen mot oljeberoendet (Commission on Oil Independence)

of greenhouse gases and to contribute to the transition to alternative sources of energy and, on the other hand, to save energy by encouraging municipalities, companies and other local and regional players to make long-term investments. The Swedish Government assesses that the investment programmes have been and will continue to be an important complement to other economic instruments in the environmental field.

A special programme extending in total to SEK 2 billion to promote investments in the use of renewable energy and energy efficiency in public buildings was launched in May 2005. This will increase the rate of conversion from electricity and fossil fuel heating systems and will enhance energy saving investments. A further SEK 2 billion has been earmarked during the period from 2006 to 2010 for conversion from direct electric heating and oil-fired heating in private housing to heating systems based on biomass, district heating, heat pumps or solar energy.

4.5 Measures in support of eco-industries (Action 11)

Introduction and export of environmental technology

In 1996 the Swedish Government established the *Environmental Technology Delegation (Miljöteknikdelegationen)*. Its task was to promote the introduction of environment-friendly products, processes and techniques furthering ecologically sustainable development and also to strengthen the competitiveness of Swedish industry and to further increase employment. Important elements of the activities of the Delegation were to establish arenas where supply and demand could be connected, to support environmental technology competitions and to formulate specifications for, and support, technical procurement and demonstration projects to advance the front line of technology. The Delegation worked until 2000 when it presented its report to the Government. In its report the Delegation proposed a concerted national approach in support of environmental technology.

In 1998 the Government appointed a committee of inquiry to analyse the possibilities of *increased Swedish exports of environmental services and products* and to propose a comprehensive strategy and an action plan. The committee presented its final report "Sustainable Sweden as a SUCCESS story" (SOU 1998:118) at the end of 1998.

In 1999 the Swedish Trade Council was commissioned to set up a programme to promote the export of Swedish technology and know-how in the areas of wastewater treatment, air pollution control and waste management.

The programme is called the *Swedish Environmental Technology Network* (www.swedentech.se) and has, since it started, brought together more than 650 Swedish companies in these areas. Since 2005, the programme has included renewable energy technologies¹¹ and today around 800 Swedish companies belong to the network. The programme offers SMEs expertise and access to the international networks of the Swedish Export Council. The annual programme budget is some SEK 10 million. Today the network consists of roughly 800 Swedish companies in these areas.

In 2004 the Swedish Government commissioned an inquiry to propose a suitable organisation for a national environmental technology centre (Terms of Reference 2004:25). It was also asked to recommend how improved coordination and focus could be achieved with the public funds set aside to further promote the environmental technology sector along the product chain.

The inquiry finalised its work in August 2004¹² and SWENTEC – the Swedish Environmental Technology Council – was established in 2005. SWENTEC is situated in Göteborg and is linked for administrative purposes to Nutek – the Swedish Agency for Economic and Regional Growth.

Its tasks are:

- to develop networks and strengthen existing networks between the different market actors in order to strengthen the development and marketing of Swedish environmental technology,
- to identify and communicate Sweden's competitive strengths in the area,
- to collect, analyse and disseminate significant information and knowledge in the area,
- to draw the attention of the Government to obstacles to the coordination of state-financed action to further innovation, product development, market introduction and exports of environmental technology and environment friendly products and services,
- to assist the Government in its international contacts in the environmental area.

The board of SWENTEC has ten members representing some of the government agencies with the most important roles in furthering environmental technology, as well as regional business networks and the academic world. The

¹¹ First introduced as a separate programme in the Swedish Trade Council in 2002

¹² SWENTEC AB – för en nationell kraftsamling på svensk miljöteknik (SWENTEC AB – for a national focus on Swedish environmental technology) (SOU 2004:84).

Office of the Council is small as it is not intended to take over tasks from other government agencies active in the area of environmental technology.

Other activities

Nutek is the central government agency responsible for the realisation of enterprise policy. The focus of the agency is to implement government actions to support economic growth through supporting new business starts and the growth of SMEs.

In March 1996 Nutek launched a programme called *Environmental Management in Small Companies*. In 1996–1998 Nutek offered financial support and guidance for projects designed to promote the use of *Environmental Management Systems in SMEs*. Environmental management is an effective tool for creating a framework for corporate environmental work. The framework is then filled with activities and commitments, which will generate market and environmental benefits for the individual company. Such activities can be environmental adaptation of an organisation, of goods, of services and of production. It can also include strategic decisions with the result that the business concept is modified and new production processes or products are developed. The overarching purpose of the programme was to increase the awareness among SMEs of environmental management, what it entails and how it can influence a company's profits. The applicants have been business organisations, company networks, local and regional authorities, etc. Nutek has financed more than 48 environmental management projects in which more than 400 companies participated.

In 1998 Nutek launched a programme *Design for the Environment in SMEs*, which ran until the autumn of 2001. The purpose of the programme was to strengthen the growth potential of SMEs by supporting networks consisting of enterprises, universities and other institutions cooperating in the development of check-lists and other LCA (Lifecycle Assessment)-based instruments adapted to the special needs of SMEs. The total cost of the programme during the period 1998 – 2001 was approximately SEK 50 million, of which the financial support from Nutek amounted to SEK 25 million. Thirteen projects with more than 120 participating SMEs have been completed. The result of the programme has been an easily accessible brochure and a web-based design for the environmental tool on the national Entrepreneur's Guide website aimed at all Swedish citizens who run or want to run a company¹³. The external evaluation showed that the environmental impact of products developed in the programme has been halved in some cases, and that most companies feel that the work has had a positive impact on the companies' development. Three years after the end of the programme a quarter of the companies thought that participating in the programme had had a direct positive impact on their competitiveness.

The Environment-Driven Business Development (MAF) programme was implemented 2001–2005. Can the forward-looking company make great gains by acting as an initiator in the transition to a sustainable society? How can small companies continue to improve their environmental efforts and earn more money from them after they have already introduced some form of environmental management system? In brief, these were the questions which the Environment-Driven Business Development Programme sought to answer, using more than 400 "environmentally mature" companies as "guinea pigs". The aim of the programme has been to boost the competitiveness of small and medium-sized companies by encouraging operational and product development from the point of view of sustainability. The programme has consisted of two different themes.

Directly after the Environment-Driven Business Development Programme half the companies thought that participating in the programme had had or would soon have a positive impact on their competitiveness. The improved results related to competitiveness were the result of making the programme less research-oriented and more market-oriented. The programme takes into consideration the fact that knowledge, maturity, and motives vary in the environmental work of companies. Applicants for project support can choose between two different themes. One stresses the development of sustainable products and the other is directed at environmental management systems and continuous improvements. The projects will be conducted in networks with the active participation of small and medium-sized enterprises. Nutek co-finances projects with up to 50 per cent of the total project cost. The programme has an annual volume of SEK 10 million.

The aim of Theme I, "Environmentally sound products as a competitive device", was to encourage small and medium-sized enterprises to make product development a natural part of their operations. With the assistance of new working methods and tools, the companies would be able to take account of ecological, economic and social aspects. Great emphasis was also put on plans for developing the products (goods and services) so that they could be commercialised. Theme I of the programme addressed small and medium-sized enterprises which were already active in environmental management before the programme started and saw market value in making their products environmentally sound and developing them to be more sustainable.

The aim of Theme II, "Operational development focusing on continuous improvements" was to encourage, measure and communicate continuous improvements from a sustainability perspective on the basis of the companies' environmental and quality management systems. The emphasis was on participation, leadership, organisation, communication and building up expertise. Theme II was mainly targeted on small and medium-sized enterprises

¹³ www.nutek.se/foretagarguiden

that already had some form of environmental and quality management systems and that were facing a risk that their improvement efforts would come to a halt.

4.6 Promote socially and environmentally responsible investment (Action 12)

The Swedish Government has long had the ambition of promoting social and environmental considerations in the financial services sector. As a result of the volumes of capital handed by the institutions in this sector, it is possible to set high standards for direct investments in companies through investment criteria, and this can lead in the direction of sustainable consumption and production. Indirect financial investments are another possible way to influence developments in the direction of more sustainable consumption and production.

State-owned companies

The public sector has major opportunities of stimulating the introduction of new technology both through its own agencies and also because it owns and manages companies.

For instance, state-owned companies and central government agencies in Sweden own buildings with an area of 14.5 million m², corresponding to 2 per cent of the total area of the Swedish building stock.

In February 2003 the Government decided to instruct a number of state property managers to report on the conditions for greater energy efficiency and to assess the potential for reducing the use of fossil fuels (reg. no M2003/599/Hs). In June 2004 the National Property Board, the National Fortifications Administration, the National Rail Administration, the Civil Aviation Administration and the National Road Administration each reported on energy use and the potential for increasing energy efficiency in their building stock. The conditions for the different property managers varied and the potential savings were put at between 10 and 50 per cent. They stated that the savings could be achieved using existing technology. Significant savings could already be achieved in the short term with a depreciation period of less than three years. Other measures would be profitable in the longer term with a depreciation period of around 4 to 6 years. For example, the National Property Board has estimated that the total savings on operating costs would be SEK 41 million per year if only the measures that were profitable in the short term were carried out in the whole of the Board's building stock.

In view of this, the Government assessed in the Bill presented to the Riksdag on 22 March 2006 (National Programme for Energy Efficiency and Energy-smart Construction) that central government agencies and state-owned property companies should take a lead-

ing role, within business constraints, in the transition to ecologically and economically sustainable management and work for greater energy efficiency in their property portfolios. The Cooperation Forum for State Developers should promote more exchange of experience among its members within the framework of this work and should follow up the results achieved and report them to the Government each year.

The Cooperation Forum was set up in 2001 and currently has 13 members. The following agencies are members: the National Rail Administration, the National Property Board, the National Fortifications Administration, the Swedish Civil Aviation Administration, the Swedish Environmental Protection Agency, National Heritage Board, the Swedish Maritime Administration, the Riksdag Administration, the Swedish National Grid and the National Road Administration. The state-owned companies Jernhusen AB, Specialfastigheter Sverige AB and Vasallen AB have also chosen to join the Cooperation Forum on their own initiative. Together they represent properties with a building area of almost 10 million m².

Another example is that the energy companies operating in the Swedish market are now carrying out major investment programmes. Major buyers of electrical power engineering equipment and energy engineering equipment can do a great deal to help new technology gain ground in the market. State-owned Vattenfall AB, whose main task is to produce and deliver electricity, is a major actor in the market. Within business constraints, Vattenfall has the mission of being the leading company in the transition to a Swedish energy system that is ecologically and economically sustainable. At its annual general meeting in 2005 an amendment was made to the company's articles of association, and the reasons for the amendment state that Vattenfall ought to be capable of being Sweden's leading buyer of ecological production technology that is technically and economically viable.

4.7 Dissemination of good practices among financial institutions (Action 13)

Under the Public Pension Funds Act (2000:192), the National Pension Funds shall take account of environment and ethics in their investment activities without deviating from the overall objective of a high rate of return. The National Pension Funds have to adopt a business plan each year that contains guidelines for their investment activities. The preparatory documents to the Act state that the business plan shall describe how environmental and ethical considerations are to be taken into account in investment activities.

The Seventh Swedish Pension Fund (AP7) can be used as an example of how one of the funds takes account of environmental and ethical considerations. Investments are only made in companies that, in the view of the Fund, follow the requirements of the international conventions signed by Sweden in an acceptable way. Businesses that operate in Sweden must also comply with Swedish law. The main conventions are:

- Conventions on human rights
- the Convention on the Rights of the Child
- ILO Conventions
- International environmental conventions
- Conventions against bribery and corruption.

Investments are possible in a total of around 1 500 companies throughout the world. All of these companies have been examined on the basis of these principles. Investments are not permitted in companies that have not been approved in such an examination.

On the basis of the work being done on environmental information under the Århus Convention and the Protocol on Pollutant Release and Transfer Registers (UNECE PRTR) and other national and international obligations, the Swedish Environmental Protection Agency is working on the development of a Swedish National Pollutant Release and Transfer Register. This Register contains information on the environmental impact of permit-holding companies and it will be made available on the Internet. The Register is based on the information given by these companies in their environmental reports to the supervisory authorities. The Swedish Environmental Protection Agency has also to adapt the Register to the needs of the financial services sector concerning searchability and content.

4.8 Identification of opportunities to integrate environmental technologies when capital stock is replaced (Action 14)

The Local Investment Programmes mentioned above have resulted in some demonstration facilities and other interesting results, relevant for upgrading environmental technologies when existing infrastructure or other types of capital stock is replaced. Some Swedish examples are given below:

Solid Wood – prefabricated wooden house

Solid Wood is a prefabricated wooden house designed with the focus on recovery, recycling and reuse of building materials: 90 per cent of the house consists of renewable resources. The entire building can be dismantled and all parts reused.

Cost-effective removal of lake mercury

Lake Turingen west of the town of Södertälje has long been contaminated by mercury released from a local paper mill in the 1940s. Instead of decontaminating the lake by means of costly dredging, the contaminated lake bed sediment has been covered with a gelatinous artificial sediment, which isolates the mercury from the water. The method has been developed and patented in Sweden.

Renewable energy in housing areas

The Västra Hamnen housing development in Malmö is entirely self-sufficient in energy. A heat exchanger enables seawater and groundwater to be used to produce heat. Additional heat is provided using solar panels. Wind power is also used to generate electricity. Local waste is used to produce biogas, which is in turn used for domestic heating.

5 Market based instruments

5.1 Review state aid guidelines (Action 16)

Sweden supports the reform of the state aid guidelines so that these guidelines will better support the competitiveness of the European Union, a well functioning internal market, social cohesion and sustainable development in order to achieve the Lisbon targets. Improved possibilities to support innovative environmental technology are of central importance in this regard.

Concerning state aid for environmental protection, Sweden welcomes an overview in accordance with the timetable proposed by the Commission. The Swedish view is that it is important to acknowledge the special case of *environmentally related taxes* in this context. Differentiated tax levels are sometimes a prerequisite for the conduct of an ambitious environmental policy by the Member States and should not therefore be viewed as state aid. There must be a possibility for Member States to support sustainable development, even when the complete internalisation of external costs is not possible. This is something the present environmental guidelines do not fully meet.

There are several *connecting points* between support for research, development and demonstration, for example in the energy field, and support for environmental technology, environmental investment and innovation. Better coordination is needed between the guidelines for environmental protection and the guidelines for innovation and R&D.

The permitted level of support should be higher in the case of support for new environmental technology and demonstration projects. Such projects often include greater risk and this should be taken into account. One problem is that there are funds for R&D projects, but when it comes to demonstration projects and market introduction, the level of support is generally too low.

5.2 Encourage systematic internalisation of costs through market-based instruments (Action 17)

Sweden probably uses more economic instruments in the environmental area than any other country. The revenue from environmentally related taxes and fees amounts to approximately SEK 73 billion per year with 98 per cent related to the energy and transport sectors.

The Swedish Environmental Protection Agency and the Swedish Energy Agency have been commissioned to carry out an analysis of economic instruments currently used in the environment field. A report is to be presented by 1 October 2006. A committee of inquiry will then use this information to propose new or improved economic instruments that may be used to reach the environmental objectives in a cost-efficient way.

Responsibility for costs is a fundamental principle in Swedish transportation policy. It means that taxes and fees in the *transportation sector* should be based on a well-defined responsibility for costs, including the external effects caused by the traffic.

Fuel taxes, i.e. taxes on carbon dioxide and energy and taxes on petrol and diesel, are the most important economic instruments for internalising the external costs of the transportation sector. The carbon dioxide tax was introduced in 1991 and has been raised several times since, primarily as a part of the green tax shift.

During 2006, *the vehicle tax for light vehicles* will be reformed from a tax based on weight to a tax based on carbon dioxide emissions. Such a shift is intended to give consumers efficient economic incentives to choose more fuel-efficient vehicles. Temporary tax relief will be introduced to support the introduction of diesel vehicles with particulate filters.

In the Government Bill on Environmental Objectives (Govt Bill. 2004/05:150), the Government acknowledges that a *kilometre tax for heavy vehicles* can be an important measure to support sustainable development in the road sector as well as to contribute to the fulfilment of the environmental objectives. Such a tax can be a good way to internalise the external costs of road traffic.

Congestion taxes have been introduced in Stockholm for the period 3 January to 31 July 2006. The tax is differentiated according to the day and time of the passage. Environmentally friendly cars are exempted from the tax. The project will then be evaluated and a referendum will be held where the inhabitants will be able to vote on whether or not the system should be made permanent.

Sweden is part of the EU *emission trading system*. The idea of emission trading is to reduce emission of greenhouse gases in as cost-effective a manner as possible. Emissions are regulated with the help of market trading. Approximately one third of the total carbon dioxide emissions in Sweden are included in the trading system.

Since 1 January 2006 carbon dioxide tax will be completely eliminated for industrial plants covered by emissions trading. This tax will also be abolished for high-efficiency cogeneration and will be reduced by SEK 0.13 per kilogram of carbon dioxide for other plants in the energy sector included in the trading system.

The Riksdag has decided on new economic incentives for switching from direct electricity heating or oil heating to more environmentally friendly energy sources by means of new tax deductions for building repairs, maintenance and improvement (RMI) work. This will involve a tax relief totalling SEK 400 million per year over a five-year period.

A few pilot projects are also being conducted in this area. One is looking into linking Environmental Management Accounting to the declaration of taxes and another, A Flexible Pollution Tax, is a model where the tax level depends on the development and adoption of cleaner technology.

5.3 Review environmentally harmful subsidies (Action 18)

The Swedish Environmental Protection Agency (EPA) has made an overview of *environmentally harmful subsidies*. This overview was reported to the Ministry of Sustainable Development in June 2005. The Agency identifies three sectors with a large number of environmentally harmful subsidies:

- transportation
- energy
- agriculture

The report contains an overview of environmentally harmful subsidies in these sectors and establishes that most of the environmentally harmful subsidies in the energy and transportation sectors are tax exemptions. Most of the environmentally harmful subsidies in the agricultural sector are regulated through the EU Common Agricultural Policy. The report also concludes that most of the environmentally harmful subsidies have not been analysed sufficiently and that it is inefficient to analyse them separately. Future work on reducing and reforming environmentally harmful subsidies should instead focus on the policy mix of subsidies and other environmental policy instruments.

The Government has commissioned the Environmental Protection Agency to analyse how *legal, economic and information instruments* can be made more efficient by introducing a life-cycle perspective on products in policy-making. The Agency should investigate how different combinations can improve the efficiency of the policy mix. This work is to be reported to the Ministry of Sustainable Development by June 2006.

The Swedish Environmental Protection Agency and the Swedish Energy Agency have been commissioned to *perform an analysis of the economic instruments currently used in the field of environment*. A report is to be presented by 1 October 2006. The remit includes analysing taxes and fees as well as tax exemptions and tax reductions. It also includes fiscal taxes that have an impact on the environment and that might be obstacles to an efficient environmental policy mix.

6 Procurement

6.1 Encourage procurement of environmental technologies (Action 19)

The Swedish Government regards *green public procurement* (GPP) as an important tool for promoting more sustainable production, thus also taking advantage of business opportunities from future market demands for sustainable products, techniques and production processes. In the EU public procurement amounts to approximately 14 per cent of GDP or EUR 1000 billion. It is easy to see the potential of clearly defined and targeted GPP in enabling Sweden and the EU to position themselves as powerful global actors with the competitive advantage of sustainable products, processes and techniques in future markets.

Sweden is at present implementing the recently revised EC Directives in national legislation on public procurement. This also includes investigating the possibility of strengthening our legislation by encouraging public purchasers to consider environmental, as well as social, criteria in their purchasing. Currently this is voluntary.

Sweden has, nevertheless, worked with *environmental criteria in public procurement* for a long time and is now beginning to see practical results. Local and regional initiatives were developed in the early 1990s. The Government appointed a *Committee for Ecologically Sustainable Procurement* that worked between 1998 and 2001 to encourage the use of public procurement as an instrument for promoting sustainable development. In an open participatory process the Committee developed an Internet-based tool and guidelines for public purchasers called the ECU tool. This tool is now managed by the Swedish Environmental Council (SEMCO). SEMCO has the ambition of further developing the database and keeping it updated, partly through the revision of the proposed criteria for various product groups. This work is being done in a structured way in an open multi-stakeholder process. In 2006 the Government strengthened the financial resources for this work.

Currently Sweden is focusing its activities on *spreading knowledge of the environmental potential of GPP* and information about the ECU tool. The goal is to raise awareness and knowledge among public entities at different levels, and to support them. Another part of this

work is to develop an action plan for environmentally conscious procurement in Sweden. Target groups are public purchasers, politicians and other relevant actors. The goal is also to achieve top- and middle management commitment and to reach maximum use of the ECU tool. It is also important to develop the ECU tool so as to foster a further spread of GPP activities, as well as raising the level of ambition in criteria development to move the market towards environmentally sounder alternatives. The action plan will contain objectives and measures to reach those goals and will be presented in 2006. It will assist the efficient and strategic management of green public procurement in Sweden in the future.

It is important to show how central government agencies can act responsibly. Since 2005 all Swedish central government agencies use procurement to promote *environmentally friendly vehicles*, namely vehicles that can run on ethanol or methane, hybrid electric vehicles and also petrol and diesel vehicles with extremely low fuel consumption levels. The goal for 2006 is that at least 35 per cent of all cars purchased or hired by state agencies shall be environmentally friendly.

GPP is being dealt with in many different organisations nationally, regionally and globally. GPP is a very broad concept covering everything from paper cups to large construction projects. The potential for moving the market towards better environmental technologies therefore differs considerably depending not only on the product in question, but also on what kind of procurement technique is used for GPP. Its potential therefore depends on the maturity of the product group and the competence of the purchaser.

Sweden will continue to cooperate, share experience and develop common tools, guidelines and knowledge. Together with other Nordic countries, Sweden is developing a common Nordic format for setting criteria and setting the framework for future Nordic cooperation on GPP and criteria development. It is important to demonstrate the benefits and potential of green procurement to help European business meet future global market demands concerning sustainable products, techniques and processes.

6.2 Life cycle costing promotion (Action 20)

The price of a product or service does not reflect the actual lifecycle cost, e.g. the impact it has on the environment and human health during the different stages of its lifecycle. Companies and households often make their decisions based on apparent costs and benefits when choosing among several alternatives. This results in short-sighted investments and hence the production of products and services which are not considered to be environmentally friendly. This is not in line with the long-term objectives of sustainable development. One way to demonstrate environmental benefits is to calculate the lifecycle costs for all alternatives.

The Swedish Energy Agency has produced a tool “Counting on LCC energy” that is intended to describe how to calculate life cycle costs (LCC) to obtain the best results in procurement. The Swedish Energy Agency and the Swedish Environmental Protection Agency have shown in a joint report that energy costs can be calculated during the purchase and use phases and have given a series of examples of profitable measures in various industries.

The Swedish Government considers that it is desirable for more use to be made of LCC. Today LCC is a resource-consuming tool that is mainly intended for experts. To increase clarity and comprehensibility for recipients of the results and to increase the efficiency of future work on calculating LCC, a standard needs to be developed for what costs should be included in an LCC study and a uniform method needs to be developed to enable comparisons to be made between different alternatives. There is also a need to communicate the total cost of purchase and use to consumers and procurement officers in the form of simplified LCC, mainly for products where a large part of the environmental impact and cost arises when the product is in use.

6.3 Investigation of technology procurement (Action 21)

Technology procurement is an instrument to promote new technology. Technology procurement can be seen as a complement to market forces. There is a whole series of examples of how technology procurement has given very good results with the assistance of aggregated knowledge and aggregated purchase volumes. Some of the key factors for a successful result of technology procurement are: choice of right technology and market for the project; well conducted preparations; a well conducted risk analysis; good project management; an implementing organisation that has high credibility and works actively to build trust; and an implementing organisation and buyer

group that show commitment throughout the technology procurement process.

Fresh thinking by both public and private actors is required to establish cooperation based on mutual trust between the market and government agencies. An increased exchange of experience between government agencies and business can contribute to this. To be more widely used as a working method, technology procurement may perhaps need to be “repackaged and given a new logo”. To spread technology procurement as a working method, experience-broadening and knowledge-building seminars should be held for procurement officers and their managers. These seminars should, for example, deal with technology procurement as an instrument and working method and give examples of good and bad technology procurements.

Additional drivers for increased use of technology procurement as an instrument and working method can be expected in the future. One such driver is the climate issue and another is changes in the Government budget – it is getting harder and harder to get a hearing for pure grants and subsidies. Coordinated measures like technology procurement can therefore expect to receive more consideration. The work of the European Commission, such as the Energy Services directive (the ESCO Directive) and the Ecodesign Directive, are other drivers that may result in increased use of technology procurement as an instrument and working method. Increasing globalisation gives reason to assume that joint initiatives by groups of buyers in the form of technology procurement will be required in order to influence manufacturers of products, systems and processes.

To be able to meet the need for and accelerate the development of new energy efficient technology more buyer collectives/buyer groups are required. They do not have to be permanent, but they do need to have staying power. Whether fixed or specific buyer groups are best depends, for instance, on what product, system or process is being procured. Certain problems are associated with the implementability of technology procurement, as co-financing of at least 50 per cent is required for the projects. For instance, there is a risk of artificial or inflated budgets. This, in turn, seriously risks undermining confidence both in individual technology procurement projects and in technology procurement as an instrument and working method. The co-financing requirement can also lead to difficulties in implementing technology procurements on account of the inability of individual buyers or buyer groups to finance work to carry out feasibility studies and produce specifications. In the early phases of a technology procurement, such as a feasibility study and the drafting of specifications, it is not always clear that the buyer group can invest more than its own time, and in these phases it may be uncertain whether the project can lead to a full technology procurement. These problems are particularly

noticeable for industries that consist of a large number of small buyers that each has neither sufficient resources nor sufficient authority to influence manufacturers.

One way of assisting technology procurement is to make greater use of programme-linked funds. To a great extent work on specifications has the character of applied research. One way of assisting technology procurements and thus stimulating the development of new technology could be to use research funds for the drafting of specifications. In technology procurements it is important to also describe and market the advantages for the manufacturers taking part in the project. For instance, manufacturers have the opportunity of better communication with their customers, access to the real requirements and needs of buyers, opportunities to develop their own products, opportunities to reach new customers, attention from the media, etc.

All actors should participate in diffusion activities, from financiers, the buyer group, manufacturers, suppliers and contractors to industry organisations. It is of great importance that buyer group representatives actively communicate information and knowledge about the new technology to their organisations throughout the technology procurement project. Forms for cooperation in diffusion activities and the coordination between the actors should be developed further.

The Swedish Energy Agency has carried out several technology procurements that have achieved their objectives well. A number of technology procurements are in the evaluation phase where the expectations of producing new energy efficient technology are high. The following examples can be mentioned: Needs-driven ventilation in new multi-dwelling housing, standardised information in the sawmill industry and control and monitoring systems for properties. Several technology procurements are in their diffusion phase. These include resource-efficient water tap fittings, which has had a good reception among buyers and users and will be of great importance in reducing hot water use in households. The Swedish Energy Agency considers that, as a method, technology procurement is an effective procedure for producing new products, systems and processes.

7 Raising awareness

7.1 Raise business and consumer awareness (Action 22)

Without seeking to give a complete overview of activities in Sweden, we would like to mention the dissemination of results by the Swedish Environmental Protection Agency (EPA) from national or municipal environmental programmes that are related to environmental technology, e.g. the Local Investment Programme (LIP), the Climate Investment Programme (Klimp) and the LIFE Programme. The Swedish EPA will publish guidelines for identifying and describing best practices, and also provide an overview on its website of links to other websites and information resources in this area. The Swedish Association of Environmental Managers (NMC) is providing examples of best practice of private companies supplying environmental technology products and services. The work done by the Swedish Trade Council and its activity The Swedish Environmental Technology Network is also part of this development. Its business concept is to promote and support new business opportunities in the environmental technology area through joint actions. A website makes it easy to find practical and sustainable solutions to environmental problems as well as partners who can help implement new technologies.

Work with environmental awards, innovations for clean and sustainable production and new environmental technologies is being carried out by, for example, the organisation MInT (Environmental Innovations Marketplace), which is run by the Rural Economy and Agricultural Society of Jämtland, in conjunction with Mid Sweden University, Halland Environmental Forum and University College of Halmstad as a commission from the Swedish Agency for Economic and Regional Growth (Nutek) and the Swedish Agency for Innovation Systems (VINNOVA).

Nutek has also worked extensively with reports and information material giving good examples of enterprises working successfully with environmental technologies and sustainability.

At regional level, the West Sweden and Stockholm regions have implemented web-based catalogues of environmental technology and best practices, supported by partnerships of regional stakeholders.

Since 1996 Nutek has been running the programmes “Environmental Management in Small Companies” and “Design for Environment in Small and Medium-sized

Companies”. Implementation of the programmes has increased awareness of the business opportunities offered by meeting the demands from an increasingly environmentally aware market. One lesson learnt from these programmes has been that when a company makes an effort to move towards sustainability its entire business strategy is often affected. Customer relations, marketing and the commitment of the staff are examples of factors to which insufficient attention has been paid. This led Nutek to launch the programme “Environment-Driven Business Development Programme” (EDBD) in 2001. In 2004 the agency widened the programme so as to also cover Socially-Driven Business Development”. In 2005 the EDBD programme was linked to the Product Development Programme, which is also run by Nutek. The EDBD programme is continuing in 2006 with a budget of SEK 10 million. This budget is expected to be enhanced through the connection of EDBD projects to the Product Development Programme.

Since 1995 the Swedish Environmental Management Council (SEMCO) is responsible for supporting enterprises with information on EMAS environmental managing systems. The organisation is a limited company owned by the Government, industry and the municipalities. Its task is to support industry and public administration in developing environmental work in a systematic and cost-efficient way and to provide entities who openly describe the results of their environmental work with an official acknowledgement nationally and internationally. The Council has the task of administering two systems, EMAS and certified environmental product declarations, on behalf of the Government and its other owners.

SEMCO also administers a checklist for environmental criteria that could be applied to public procurement. This checklist is intended support those in charge of public procurement in local government and central government bodies.

An improved *exchange of knowledge, experience and good practices* relating to environmental technologies could be an important tool for raising awareness in the business community and among the general public. Working with good practice examples is also one way of communicating knowledge and experience and utilising the results from project-oriented programmes, such as ETAP itself but also other national or community-based programmes.

The dissemination of information on good practices for

sustainability is an area where Sweden has extensive experience. The concept of good practice is roughly synonymous with labels such as good examples, best practices, positive innovations, good project results, success stories, front-line demonstration facilities etc. A good (or best) practice could be new innovative technology in products or processes, new system solutions in services, maintenance or distribution, better ways of utilising natural resources, new working methods or tools or new ways of organising cooperation between consumers, producers or intermediaries, that give *positive results* for the environment, for business development, economic growth and other social goals.

Good practices are promoted and used as a means of raising awareness among decision-makers at all levels and in all parts of society and among the public of front-level solutions to common social, economic, environmental problems, and the potential opportunities they offer. By showcasing and analysing the best examples of technical system solutions decision-makers and regulators in the public sector can improve public policy based on what actually gives positive effects for the economy and the environment. The dissemination of good practices could also be a core issue in the sharing and transferring of knowledge, expertise and experience through networking and learning. The promotion of demonstration projects and examples of good practice is also a mean of building bridges between R&D and a wide, full-scale implementation of new eco-efficient products and services.

Some good examples of the effort to disseminate project results are:

A practical working method for selecting and describing the best project results from the EU Programme Life Environment has been developed and implemented. The Swedish Environmental Protection Agency and the Swedish Agency for Economic and Regional Growth have developed, together with the Netherlands Ministry for Spatial Planning, Housing and the Environment, a set of criteria (direct economic and environmental effects, long-term effects and strategic assessment criteria) and a scoring procedure for selecting the best project results from EU Member States for the Life programme. The method also includes a structured way of producing fact sheets, in-depth descriptions and thematic focus reports for these innovative examples. The method has been adopted by the EU Commission, and the information is available on the Commission website.

New solutions and new approaches are developing in the Swedish environmental technology sector as a result of the grants distributed within the Local Investment Programmes (LIP). The Swedish Environmental Protection Agency has identified (in cooperation with the Swedish International Development Cooperation (Sida), Nutek, the

Swedish Trade Council and the Swedish Institute for Sustainable Development) a number of these technologies offering great potential for export to Eastern Europe and developing countries in particular. The projects have been assessed on levels of innovativeness, global utility, market availability, economic feasibility and environmental effects.

At the initiative of the Government, the Swedish EPA and other public agencies have put together the report entitled “LIP – Environmental Technology for Export” which describes 34 projects in fields such as waste, site remediation, energy efficiency, water supply and waste water that are suitable for other markets. The report outlines each technology, commenting on its advantages and drawbacks, as well as the potential for transfer to Eastern Europe and developing countries.

Results from the Climate Investment Programme (Klimp) and LIP are available on the web. The Swedish EPA is documenting all programmes and project results from the two investment programmes in its web-based database MIR (Environmental Investments Directory), which will also be made available in English (www.naturvardsverket.se). The best project results from the programmes will be identified, based on a guidance document on how to identify, document and disseminate good practice results.

7.2 Provision of targeted training (Action 23)

Targeted environmental training of students, professionals and other key actors in society is something that Sweden has put a lot of emphasis on. The development of education on sustainable development has begun and the Ministry of Education is developing a work-programme for how this can be achieved. There is a need to include sustainable development in all curricula. People studying engineering, product design, industrial design, architecture, marketing and leadership are examples of categories of people who should be targeted.

Sweden also attaches great importance to targeted training for people already in their career. A project in the “Building and Living” dialogue may be mentioned as an example. In

this dialogue representatives of companies and municipalities have agreed on a voluntary basis on measures in the building and construction sector. The agreement defines several long-term targets, all emanating from a vision in which a sustainable building and construction sector can be achieved within one generation. As a tool to further promote the transition towards a more sustainable building and construction sector, the Swedish Government has committed itself to develop a national professional development programme – the “Building and Living Training” (*Bygga-bo-utbildningen*). The training is a short programme directed at construction workers, installation engineers and contractors, and personnel engaged in facility management. At a later stage the programme will also encompass staff involved in contract work, project design, planning etc.

Several Swedish companies, (approximately 3 800) are certified under the environmental management system EMAS and/or ISO 14001. These programmes include training in environmental issues for the employees of the companies. The employees play a significant role helping to develop the local environmental management system. The Swedish Government is positive to this form of targeted training since it provides employees with general knowledge about environmental issues as well as more specific knowledge in relation to their own company.

8 Acting globally

In order to further spur the deployment of technology and service-based solutions to environmental challenges Sweden has been an advocate since 1997 of the dismantling of barriers on trade in environmental products and technology. In the Doha 2001 Ministerial Declaration trade ministers agreed to negotiations on the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services.

8.1 Promotion of environmental technologies in Developing Countries (Action 24)

Although access to environmentally friendly technology is considered to be an important precondition for sustainable development, the introduction of new environmental technologies is lagging behind in many countries, especially poorer countries. The taxation of imported environmental technology through tariffs and other trade barriers runs counter to the strong calls for increased transfer of technology. Sweden therefore continues to support the EU position on the reduction or elimination of tariff and non-tariff barriers to environmental goods and services in the WTO Doha Development Agenda, DDA.

8.2 Promoting responsible investments in and use of environmental technologies in developing countries and countries in economic transition (Action 25)

An additional SEK 330 million of the increased Swedish development assistance budget will be dedicated to action in the environmental field during 2006. Initiatives will be taken in areas where Sweden has well-developed know-how and can make a valuable contribution. The aim is to interweave solidarity, gender equality, ecological considerations and economic growth both in Sweden and in countries with which Sweden cooperates. Special fields of interest are renewable energy and climate, water and sanitation, chemicals safety, sustainable use of natural resources and protection of the environment and sustainable urbanisation.

Sustainable Urban Development

One part of the Swedish contribution to sustainable urban development is channelled through the concept of *"The Sustainable City"*. The Sustainable City is a holistic concept for urban planning and development that focuses on important synergies between, for example, planning of water and wastewater treatment, waste management, energy systems and traffic and transport. Waste and sludge from the sewage system can be reused for production of energy for transportation, heating and electricity. Biogas being produced in an energy plant can be utilised as fuel for cars but also for the generation of electricity. Waste water can be reused after purification and the sludge can serve as fertiliser in the rural areas surrounding a town. In the context of urban renewal in poor areas the focus should be on low cost and small-scale solutions, for example innovative ecological sanitation systems and waste minimisation through source separation and garden waste/household waste composting.

A prerequisite for these types of solutions is a planning process that can be developed on the basis of open, creative and constructive communication and cooperation between decision-makers, experts and citizens. Two ongoing planning tasks will be used as a platform for developing visionary concepts. Luodian Town outside Shanghai represents the planning of a satellite town "from scratch" while Buffalo City in South Africa reflects the renewal and modernisation of an existing town. These two examples illustrate how the general design principles could be applied in urban areas of different income levels. The expected benefits of the project include facilitation of the management of sustainable urban growth by the dissemination of best-practice solutions that promote leaps from a low-technology to a high-technology level. By integrating all the relevant dimensions of sustainability in land-use planning, synergies and sustainable solutions can be attained that are not achievable if each aspect is handled separately.



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