



## Going green successfully

### Effective policy for sustainable growth

**One of the major challenges** of our time is to achieve growth that does not harm the climate and the environment. Trade and industry policy has an important role to play in this respect, since it can create clear frameworks and good conditions for trade and industry to develop sustainably. The question is how an effective policy should be designed. This is the theme of this year's Growth Facts.



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## Policy for green change in a global reality

Growth Facts 2013 is primarily intended for people working to create conditions for a green structural change in Sweden. It is both a national priority and a global challenge to succeed in this while at the same time continuing to strengthen our global competitiveness.

In Chapter 1, *Challenges and policy for a green structural change*, we discuss some fundamental concepts and objectives: we create a platform for understanding today's challenges and policy for a green structural change. The problems are extensive, as is the challenge of leaving a society where the major environmental problems have been solved for the next generation. And doing so in a way that at the same time creates new jobs and companies, increases export revenues and contributes to a better environment both at home and in the world around us.

In Chapter 2, *Structural change in Swedish trade and industry today*, we summarise some of Growth Analysis' work in this area, which has also been reported in previous issues of Growth Facts. Since the 1960s, enterprise and business dynamics have tripled the resources for prosperity and consumption but have also harmed the environment and reduced our reserves. In order to avoid further environmental problems, the hundreds of thousands of new jobs that these dynamics create every year must be greener than the jobs that disappear. Growth Analysis has seen from a number of studies that success often lies in an innovative interaction between service and manufacturing companies, not seldom within the framework of global value chains. The new production processes, products and services are the result of millions of innovations, both great and small. Every step has taken us towards greater prosperity, not only at home but also in other parts of the world.

Once again we see the connection to the green transition: the innovations have not only given us more of what we want for a better life but also smarter and more resource-efficient solutions. But we must go much further. Regarding carbon dioxide for example, we still have a long way to go to attain the government's goal of zero net emissions by 2050.

In Chapter 3, *Policy for green structural change – what Sweden is doing*, we take up in a more concrete fashion the measures that are being taken to realise this development. We briefly discuss important general measures such as taxes and emission rights trading. We then go on to study a substantial selection of the selective policy measures that are being applied to promote either the environment or growth.

Green structural change, however, requires us to attain *both* goals simultaneously. The chapter therefore discusses the great potential that lies in joining these two different types of measure into a single policy.

In Chapter 4, *Policy for green structural change in other countries – what can Sweden learn?* we give some examples from China, Japan, the USA and South Korea. These cover diverse areas from financing environmental technology companies and creating demand for environmental technology to creating completely new green business models. These global perspectives help us to think in new ways. They also remind us that structural change is taking place quickly on a global playing field and that the new solutions are often developed in international perspectives and collaboration.

In Chapter 5, *Knowledge for green transition – learning continues*, we summarise our own and others' evaluations of effective policy for green structural change. There is much to

indicate that today's state support for enterprise, innovation and regional growth may come to play an increasingly important role in the future. If we then add the resources within the environmental and aid policy the potential is even greater. There are also clear recommendations that the EU's structural funds are to emphasise green growth.

A great deal is thus already going on, but more needs to be done. The various measures must be continuously evaluated both individually and in a systems perspective to ensure that they really work. In this respect, Growth Analysis continues to execute its government assignments. But what determines success in practice is the extent to which those who work with environmental or growth policy measures set a green stamp on their practical implementation of programmes and projects.

This year's edition of Growth Facts is principally based on knowledge compiled by Growth Analysis over the past few years. Project manager for Growth Facts 2013 was Johan Harvard, who developed the book together with an internal project team.

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# **1 Challenges and policy for a green structural change**

## **Summary**

The focus in this year's Growth Facts is on green structural change and selective policy's possibilities to contribute to sustainable growth. This is one of the major challenges in achieving growth that does not harm the climate and the environment.

This first chapter therefore provides a broad introduction to today's climate and environmental problems, what the challenges are and the measures that are needed to overcome them in both the short and the long term. We also discuss how to meet these challenges with the support of various policy instruments and measures.

All business sectors will need to be developed in more sustainable ways. But this will not take place by itself. Governments can play a role by creating clear frameworks and good conditions for businesses to invest in sustainable growth models.

Policy instruments can be divided into two types: general and selective. Both types are necessary. At the same time, research shows that the selective instruments can fulfil an important function in promoting the development and implementation of new technology and new organisational solutions. In order to have any effect, however, they must be adapted to the conditions in different contexts.

We use an analytical framework to describe the selective policy instruments. The framework is constructed as follows:

- Type of policy instrument: Are the measures regulatory, communicative or financial?
- Phase in the innovation process: Do the measures focus on research and development, product development and commercialisation or expansion and export?
- Supply or demand stimulation: Do the measures aim to stimulate supply or demand in the market?

## **1.1 Challenges, objectives and ways forward**

Growth and economic development have dramatically improved our standard of living over the past 100 years by contributing to greater prosperity and health, technological advancements and a higher material standard. We also have more trade, more contacts and more exchanges between and within countries.

But growth has another side that may come at a very high price. Our common limited resources have been overexploited for a long time, which has put an unsustainable load on both environment and climate. If growth cannot be combined with a more sustainable custodianship of the eco-systems that constitute the foundation of economic development, the results might be disastrous – not only for nature but for all the social and economic prosperity that we have created.

### **1.1.1 High Swedish and international ambitions for sustainable development**

Sweden has been working for a long time to shift to more sustainable development on the basis of several national and international environmental and climate goals. The over-

arching – and ambitious – objective of the environmental policy is “to hand on to the next generation a society in which the major environmental problems facing Sweden have been solved, without causing greater environmental and health problems outside Sweden’s borders.”<sup>1</sup>

Connected to this ambition are 16 environment quality objectives where the climate objective has been given particularly high priority. The goal is to reduce emissions of greenhouse gases in Sweden by 40% by 2020 compared to 1990. This in turn is a step towards the long-term vision that Sweden is to have no net emissions of greenhouse gases by 2050. This would mean that Sweden would fulfil its undertaking as regards the so-called two degree goal, which means that global warming is to be limited to two degrees. The climate and environmental objectives for the period until 2020 also include Sweden changing its energy system such that half is made up of renewable energy and that energy efficiency is to increase by 20%.

There is an explicit political ambition that by focusing on sustainable growth and eco-innovation at home Sweden will be able to contribute both to creating new jobs and to reducing the environmental loading in other countries.

*“The Government’s ambition is for Sweden to be a pioneer in the environmental and energy field. While climate change and environmental degradation may be viewed as the greatest threats of today, they also represent an opportunity. An opportunity to create new jobs and new businesses, to boost export revenue and to help improve the environment, both in Sweden and in the world around us. More companies active in this sphere need to begin exporting or to increase their exports of environmental technology to the advantage of both Sweden and other countries.”<sup>2</sup>*

The challenge lies in combining continued growth with a gradually decreasing utilisation of natural resources, not least fossil-based forms of energy. Such a transition would undoubtedly generate both winners and losers both at home and around the world – but at the same time create conditions for the whole of society to be winners in the long term. An important task for governments and other public players is thus to strike a balance between these groups and find new ways forward.

The main issue is therefore not what the future will look like but how different general and selective instruments and levers can be designed and combined in order to create the right conditions for society to effectively handle the challenges that the transition will entail. The important question is thus which policies will best promote and stimulate the desired development regardless of how the future turns out.<sup>3</sup>

### 1.1.2 Sustainable development does not take place by itself

Switching to a resource-efficient economy and development of new green jobs will not be automatic in Sweden. Much of both the development and manufacturing of environmental technology solutions will instead probably take place in countries with lower cost levels, for example China. In the same way as in other sectors, Swedish companies will therefore need to be at the leading edge and actively participate in global production systems and be

<sup>1</sup> The Swedish Riksdag’s definition of the Generation Goal.

<sup>2</sup> The government’s environmental technology strategy.

<sup>3</sup> For a more detailed discussion of this please refer, for example, to Hallding et al (2013) Sweden in a World of Growing Uncertainties, Background Report no. 10 to the Commission on the Future of Sweden.

internationally competitive. This will require extensive investment in research, development and innovation.

Nor can a green structural change be limited to the environmental technology sector, but affects all industry sectors and thereby the whole economy. Even companies that deliver solutions in completely different areas of society will need to be environmentally sustainable. This also means that all industries and sectors will need to shift to a more environmentally driven business model.

To bring about a sustainable society substantial efforts will need to be made in several political areas together with the support of various policy instruments and tools.<sup>4</sup> Policy can play an important role by creating clear frameworks and good conditions for businesses to invest in sustainable growth models.

## **1.2 Principles for a green policy and green policy instruments**

According to economic theory, the aim of policy interventions is to correct for so-called market failures, which occur when the free market functions imperfectly and therefore does not lead to an optimal use of resources. Market failures may exist as a consequence of externalities, among other things.

Externalities, which are often the focus of environmental policy instruments, mean that a producer is paid either too much or too little for his product in relation to the societal benefit it creates. An externality can be either negative (i.e. creates a cost to society, for example environment-polluting emissions of carbon dioxide and toxins into water and air, high levels of noise and overexploitation of resources) or positive (i.e. creates a benefit for society, for example education and development of new environmental technology).

### **1.2.1 Policy instruments for better-functioning markets**

In simplified terms, the role of policy interventions in a market with externalities is to obtain more of the positive external effects and less of the negative effects by means of various policy instruments to correct the market for different kinds of market failure. Market failures can among other things occur as a result of

- difference between what is profitable from a business point of view and what is socio-economically profitable
- difference in companies' investment horizon; short-term vs long-term perspective
- lack of information and true uncertainty about future development
- lack of clearly defined ownership rights and responsibilities.

Policy instruments can be either general or selective depending on their purpose. General financial policy instruments are directed at the economy in its entirety and constitute an important basic building block in an overall policy or mix of policy instruments. The aim is to get the market's players to include the cost of for example environmental harm in their calculations and production costs, normally referred to as internalising negative externalities, and thereby change their prices. When the full cost is taken into account,

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<sup>4</sup> *Policy instruments are the different methods that governments and public authorities use to exercise their power in attempts to support, influence or prevent different forms of societal change. Vedung, E. (1998). Policy instruments: typologies and theories. Carrots, sticks, and sermons: Policy instruments and their evaluation, 21-58.*

production and consumption patterns change. The most important environmental policy instruments in Sweden today are the energy and carbon dioxide taxes and the EU's emissions trading scheme (EU ETS).

Selective, or directed, policy instruments are an important complement to general instruments and function through driving development and diffusion of innovations and technologies, or, in other words, obtaining more of the positive externalities.

Current research indicates that general policy instruments are not sufficient to drive the technological development needed to switch to a sustainable trade and industry.<sup>5</sup> General policy instruments seem to be able to promote step-wise innovation but selective policy instruments are needed to promote disruptive or radical innovation.<sup>6</sup> Economic policy for green structural change functions primarily through selective policy instruments since it attempts in different ways to promote the development and implementation of new technology and new organisational solutions. This is also the focus of this year's Growth Facts.

In this respect it is also important to point out that in the same way as the market can function imperfectly, policies and public interventions frequently fail to achieve their objectives. Even with the best public intentions, there is always a risk that so-called policy failures will occur that lead to inefficiencies and skewing of incentives to invest in and produce using new technologies. It is therefore crucial that the selective instruments are evaluated and continuously improved, to make sure that they deliver as intended.

As discussed further below, thorough evaluation, a working learning process and transparent policy are of central importance in this context. Policy must also be adapted to the prevailing conditions in each specific case and adjusted according to the experience that is gained along the way.

### 1.2.2 An analytical framework for categorising different kinds of selective measures

In order to provide an overview of the selective measures and the differences between them we use an analytical framework in our description and discussion. The framework has three starting points; type of policy instrument, phase in an innovation process and whether a measure aims to stimulate supply or demand. We use these to describe different kinds of policy measures aimed at promoting a green structural change.

#### *Three types of instruments*

Somewhat simplified we can say that there are three main types of policy instruments, regulatory, financial and communicative, whose usability depends on the kind of measure needed to drive desired changes in behaviour.<sup>7</sup>

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<sup>5</sup> For a more in-depth discussion of the need for selective efforts to drive technological development and examples of especially relevant areas, e.g. energy systems and environmental technology, please refer to Growth Analysis' report no. 2011:02.

<sup>6</sup> Azar, C., & Sandén, B. (2011). "The elusive quest for technology neutral policies" *Environmental Innovation and Societal Transitions*, 1 pp 135-139. See also Acemoglu, D., Aghion, P., Bursztyn, L., & Hemous, D. (2009). *The environment and directed technical change* (No. w15451). National Bureau of Economic Research and Kemp, R., & Zundel, S. (2007). *Environmental Innovation Policy. Is Steering Innovation Processes Possible? Innovations Towards Sustainability*, 25-46.

<sup>7</sup> Bemelmans-Videc, M. L., Rist, R. C., & Vedung, E. (2003). *Carrots, sticks, and sermons: Policy instruments and their evaluation*. Transaction Pub.

Regulatory and administrative policy instruments involve direct regulation of individuals' and companies' behaviour by means of legislation, licence requirements, prohibitions and so on.

Communicative policy instruments have an indirect impact on individuals' and companies' behaviour through providing information, education, advisory services, negotiation and so on.

Financial policy instruments influence individuals' and companies' behaviour by means of financial incentives to adopt a desired behaviour. This might take the form of support for technological development, subsidies for new technology, tax relief and so forth.

Market-based policy instruments are economic policy instruments that involve setting a price for emissions in the same way as a tax on emissions (e.g. carbon dioxide tax) but which also mean that players have an opportunity for financial profit through trading. EU ETS (the EU's emissions trading scheme) and the Swedish green electricity certificate system are the two principal types of economic market-based policy instruments used in Sweden today.

### *Three phases in the innovation process*

We pointed out earlier that green structural change is highly dependent on innovation, which means that how innovation processes are targeted is yet another important aspect of how the policy instruments are designed.

Below is a schematic diagram of an innovation process, which is useful for showing in a simple way where in the process the focus of policy interventions lies. The innovation process usually follows a complex, non-linear path that is characterised by so-called feedback loops between different steps, here illustrated with two-way arrows. Expansion of new markets, for example, can stimulate R&D and technological development.

Figure 1.1 Schematic innovation process<sup>8</sup>



Development of innovations is associated with various challenges depending on which phase it is in, which holds consequences for any policy measures. In early phases, which are often characterised by high uncertainty, and involve a significant degree of risk, from the public point of view it may be relevant to support research, development and demonstration projects with funding or other resources.

Later on, in the development of new products and services and commercialisation phases, measures must often be of a broader nature to meet the needs that exist. Relevant measures in this phase range from direct funding and long-term basic support to information, education, networking and forging contacts with potential customers and suppliers.

In the case of innovation processes that have reached a phase of expansion and possible also export, public measures may for example be used to stimulate supply and demand by

<sup>8</sup> Model developed by Growth Analysis

means of subsidies to producers or consumers and also to initiate information campaigns, offer education, provide support for business development or offer export support.

*Measures to stimulate supply and demand*

One final way of categorising selective measures is based on whether they stimulate supply or demand in markets. The purpose of stimulating supply is to increase the amount of new technology by supporting those researchers and companies that develop new technologies, products and services. This is also known as creating *push* in the market.

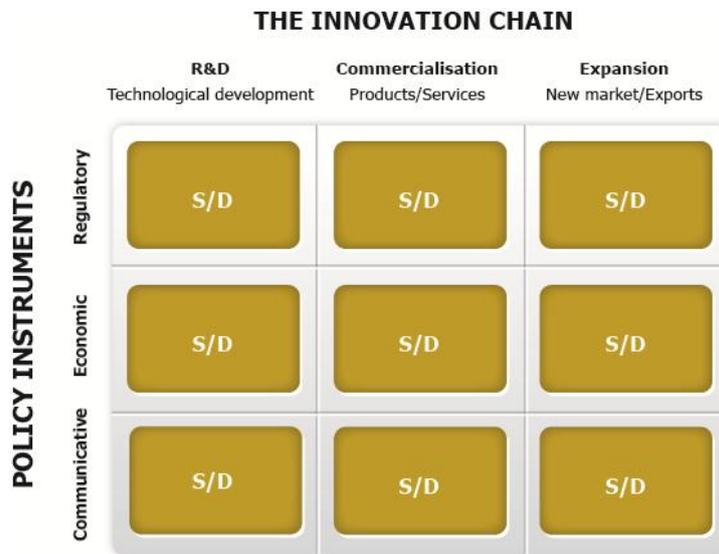
The purpose of stimulating demand is to increase the market’s demand for new technology and in various ways increase the incentives for households, companies and individuals to buy and invest in new technologies, products and services. This is also known as creating *pull* in the market.

Funding of R&D, product development and demonstration projects are examples of measures to stimulate supply, while subsidies and tax relief are examples of measures to stimulate demand.

*A general analytical framework for categorising policy measures*

On the basis of these three dimensions we have developed the following framework for describing and discussing measures. This analytical framework is used in the remainder of the book to illustrate where the focus of the studied measures lies and to compare the measures with each other and between countries.

Figure 1.2 Analytical framework for describing different selective economic policy measures



From top to bottom are the three overarching types of policy instruments and from left to right the three phases of the simplified innovation chain. The panes show whether a measure is primarily intended to promote supply (S) or demand (D).

## **2 Structural change in Swedish trade and industry today**

### **Summary**

The chapter begins with a picture of structural change in trade and industry over time and discusses what green structural change involves. It then goes on to describe what the environment sector looks like today. We also take up some of the obstacles to and driving forces behind more eco-innovation.

Structural change takes place continuously on both a large and a small scale. This means that companies grow and shrink or that production, the products and the services change. Over the past 30 years we have seen for example how globalisation and information and communication technology have led to substantial structural change through greater specialisation, service infusion, outsourcing and offshoring.

Structural change is “green” when industries and companies develop towards lower environmental impact, for example through a larger proportion of service companies or greater use of environment-friendly technology.

Growth Analysis’ review shows that Swedish companies perform well as regards environmental innovation measured in number of patents. Swedish trade and industry has also become more climate-efficient in recent decades and emits a lower amount of greenhouse gases per unit produced. The environment sector in Sweden has also clearly grown in the 2000s both in number of companies and in value added and exports.

The green transition involves great challenges for trade and industry but also opportunities. The biggest obstacles for the companies are uncertain market demand, return on investment and funding. The main driving forces are high energy and material prices, good demand for green products, good business partners and good availability of technology and leadership.

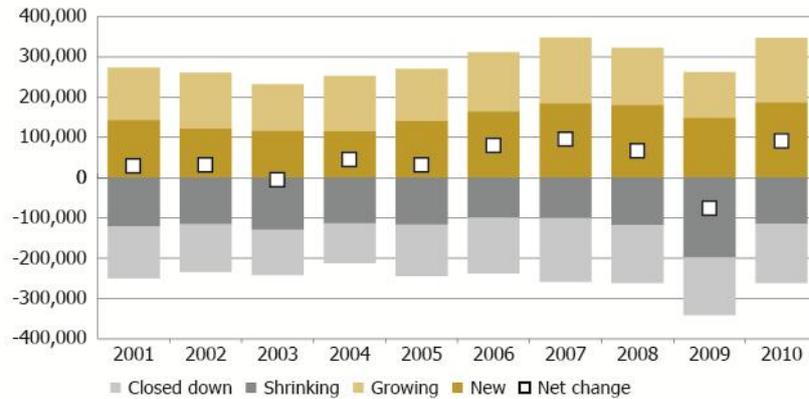
### **2.1 Continuous structural change and driving forces for a green transition**

Sweden’s trade and industry is in a state of constant change and over the past 150 years has undergone a sweeping structural change. This is both a consequence of and a driving force behind economic growth, since it redistributes resources to the areas of application, sectors and companies where they are of the greatest value. Structural changes are multifaceted courses of events that are among other things dependent on technological development, changes in demand, competitive conditions and possibilities to carry on international trade. They can for example manifest themselves in the form of entire sectors growing or shrinking, completely new industries appearing, individual companies growing or shrinking, new companies establishing themselves, companies going bankrupt or industries and companies remaining unchanged as regards size but with their production processes, products or services changing over time. Structures are thus transformed both on a large scale as with sectors and on a small scale as in the case of smaller companies.

Behind the process that we call structural change large fluxes take place in trade and industry every year where companies grow and new companies are established at the same time as other companies shrink or close down. One way of measuring the dynamics is

therefore to look at how many jobs are created and disappear every year, as illustrated in Figure 2.1.

Figure 2.1 Changes in employment in new, growing, shrinking and closed down companies, 2001–2010 (no. of jobs)<sup>9</sup>



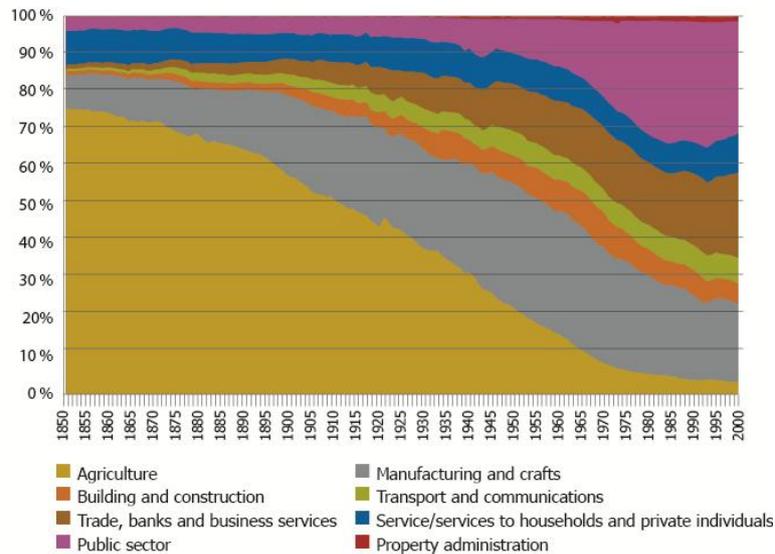
Approximately 300,000 new jobs are created every year in Swedish companies and at the same time slightly fewer disappear over the course of a normal year. These dynamics have been a central factor in Sweden's economic growth both in a historical perspective and over the last few decades.<sup>10</sup>

### 2.1.1 Structural change of Swedish trade and industry

To exemplify this development and transformation of the Swedish economy since industrialisation began, the figure below shows the distribution of jobs between the different sectors from 1850 to 2000.

<sup>9</sup> Statistics Sweden, *Companies' and workplaces' dynamics. A change in sources between 2003 and 2004 means that the time series is broken between these two years.*

<sup>10</sup> With approximately 3 million people employed in the private sector in Sweden, 300,000 is roughly equivalent to 10%.

Figure 2.2 Employment in 8 sectors of the economy. Proportion of total employment, 1850–2000<sup>11</sup>

The Swedish economy has undergone continuous change from being based on agriculture during the 1800s to being founded on industrial manufacturing for most of the 1900s, and finally coming to be increasingly based on goods and services with a high knowledge content.<sup>12</sup>

Over the past 30 years we have seen for example how globalisation and information and communication technology have led to substantial structural change through greater specialisation, service infusion, outsourcing and offshoring of some operations. Offshoring means relocating operations abroad while outsourcing means that operations previously within a company's domain are instead transferred to a third party, either in the same country or abroad.

Progress in ICT has both greatly reduced the cost of information and communication and made the transfer of information more reliable, which has allowed companies to divide up the value-creating activities that lead to a product (the value chain) to a greater extent. To exploit the differences in cost and competence between countries and players, the companies have spread the activities in the value chains over several countries and transferred operations from their own companies to external companies. The increase in service infusion is partly a result of this, since activities that were previously defined as part of the manufacturing process at a single company today consist of a range of services spread over a number of companies. Many of the major companies, whether they be manufacturing or service companies, increasingly operate by coordinating knowledge production and global flows rather than fixing them at a point and place as before.

### 2.1.2 What characterises a green structural change?

Green structural change is actually nothing new but rather a desired continuation of the continuous transformation of the economy. In essence, green structural change means a

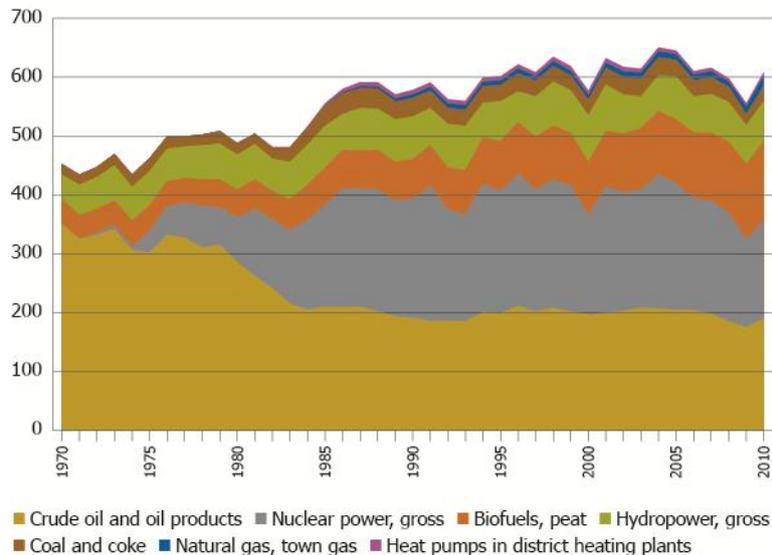
<sup>11</sup> Edvinsson, Rodney (2005) *Growth, Accumulation, Crisis* Stockholm: Almqvist & Wiksell International

<sup>12</sup> Ekonomifakta (2013). *Structural changes in employment*. <http://www.ekonomifakta.se> (retrieved 25 February 2013).

development of company and industry composition towards less environmental impact, for example through a greater share of service companies (that on the whole have a negative environmental impact) or greater use of environment-friendly technology in existing companies.

Sweden has already begun to change over to a more sustainable trade and industry and a more sustainable social economy, partly by switching to an energy system with lower emissions of greenhouse gases. Since the 1970s, the proportion of energy from crude oil, oil products, coal and coke has for example fallen from 81% to 35%. This was made possible by a substantial expansion of nuclear power in the late 1970s and the early 1980s and a steady increase in the use of energy from renewable sources, primarily biofuels and peat. Industries particularly exposed to international competition have also implemented extensive energy efficiency measures which at the same time have led to greater competitiveness and reduced environmental impact.

Figure 2.3 Sweden's total energy supply and distribution by type, TWh, 1970–2010<sup>13</sup>



There are differences in driving forces between the green structural change and earlier structural changes. The costs that the environmental problems and global warming give rise to are in many cases external for an individual company since no price has been set for using many natural resources. These characteristics differ from earlier major transformations, when driving forces existed for companies to be economical with scarce resources such as manual labour, and the role of the state was often to try to slow the transformation. Sweden's shipbuilding industry is one example and low-intensity agriculture in the European Union another.

This in turn means that the governments have a different, and apparently more important, role to play in driving the green structural change forward compared to many other transformations in trade and industry. At the same time it is important to once again point out that government policy, just like the market, risks failure and therefore needs to be evalu-

<sup>13</sup> Source: Swedish Energy Agency (2012). *Energy status in figures, 2012*.

ated and constantly improved. And, again just like in the market, it is important to be prepared for several attempts being needed before a measure is successful.

## **2.2 The role and importance of trade and industry in a green structural change**

The transition to a greener trade and industry is a sweeping one and among other things includes basic research, technological development, implementation of new technology and adaptation in the form of structural change and new consumption patterns. Trade and industry play an extremely important role in these efforts.

### **2.2.1 From traditional environmental technology to environmentally adapted goods and services**

The green transition thus means substantial challenges but also opportunities, for example in the form of export revenues for companies that produce competitive environmentally efficient products. This market has expanded considerably and is expected to continue to grow.<sup>14</sup> Environmentally adapted production of goods and services began mainly in the "traditional" environmental technology markets, i.e. those driven by demand for basic environmental services like waste management and wastewater treatment. Nowadays, development of environmentally adapted goods and services is often driven by a demand connected to environmental goals, environmental taxes and environmental legislation. One example is the EU's environmental objectives and national legal requirements with water quality goals and production targets when it comes to renewable sources of energy. In recent years, public and private funding of innovative environmental technology projects has increased.

Since the 1970s regulatory authorities have focused particularly on two kinds of sector. First, those that have the most visible problems as regards environmental pollution, e.g. problems related to waste and water and air pollution, and second, sectors whose production processes have been most harmful to the environment, e.g. steel production and energy production. During the 2000s, the companies have sought more environment-friendly input goods and made their manufacturing processes more efficient. The reason for this is partly more public interventions to limit environmental pollution and partly more strategic environmental planning within the companies. This change has stimulated new technological development and thereby created new markets for new environmental goods and services.

A great change is taking place today in the environmental field. Whereas the focus was previously on so-called aftertreatment goods and services, it is now shifting to more integrated "clean" technologies, processes and products (cf for example exhaust emission control and hybrid cars). In the long term, this change may have a radical impact on the environment sector as research, innovation, design, advisory services and other services are given greater emphasis than previously.

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<sup>14</sup> A study commissioned by the German government estimates that the global environmental technology market turned over EUR 1,930 billion in 2010, equivalent to more than 4 times Sweden's GDP. The market is estimated to have grown by almost 12% annually between 2007 and 2010. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2012), *GreenTech made in Germany 3.0 Environmental Technology Atlas for Germany*. [http://www.bmu.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/greentech\\_3\\_0\\_en\\_bf.pdf](http://www.bmu.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/greentech_3_0_en_bf.pdf)

We can say that trade and industry's role in a green transformation has two parts. One is that trade and industry in general is becoming increasingly environmentally efficient and environment-driven in its products and services. The other is those companies that operate directly in the environment sector and that contribute to less environmental and climate impact through their activities and operations or by developing new environmental technology products and services. The rest of the chapter is therefore devoted to giving a general picture of what the environment sector comprises and how it has developed before giving some examples of green transition through eco-innovation and environmental efficiency.

### 2.2.2 The environment sector's composition and development

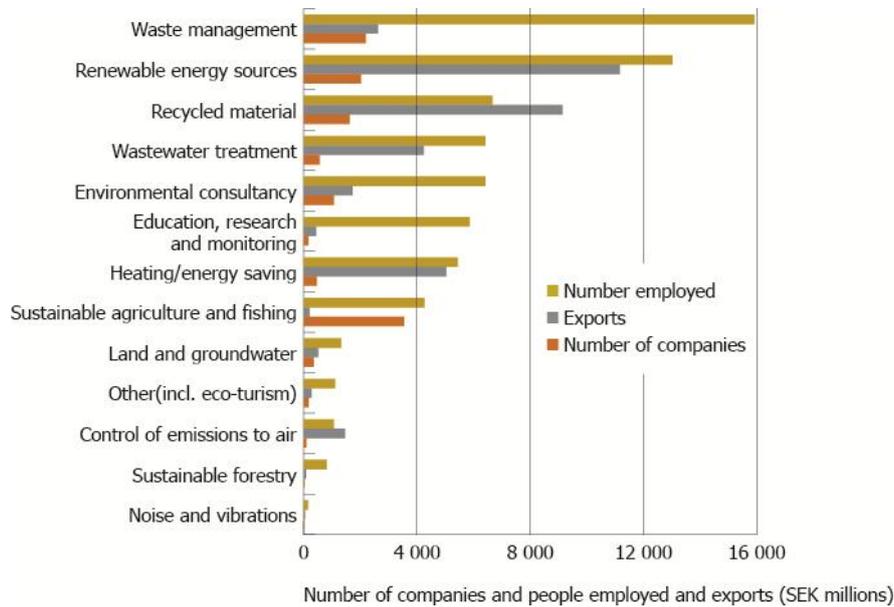
In 2012 Growth Analysis was commissioned by the government to draw up and further develop statistics on the so-called environment sector. One challenge in this was that the environment technology sector is a heterogeneous sector and is part of several other sectors. The statistics that exist today to describe the environment technology sector also includes operations in the more "traditional" environment sector such as air and water purification and waste management, but also operations carried on in a more environment-friendly way in the rest of trade and industry. It is not possible to capture the actual environmental technology sector with today's statistics as it largely constitutes a subset of the environment sector.

A first observation is that the environment sector in itself is relatively small, even though it plays a major part in enabling trade and industry's green structural change. In 2010, the sector consisted of approximately 12,300 companies or roughly 1% of all companies in Sweden. At the same time, exports from the environment sector the same year amounted to slightly more than 2% of the Sweden's total exports of goods and services, which shows that the sector has a strong export focus and potential.

Just under 70,000 people are employed in the environment sector, two thirds of whom are men. Although the sector is small, development over time has been extremely positive, with the exception of 2009 and 2012 due to the effects of the general decline resulting from the financial crisis. Between 2003 and 2010, the number of jobs has for example increased by 9% and the number of companies by 35% and turnover by 60%. It can also be seen that exports have seen strong development with a growth rate higher than for Sweden's total exports over the period, i.e. 60% and 50% respectively.

In the environment sector, waste management and renewable sources of energy are the two areas where most people are employed (Figure 2.4). Based on export value however, it is renewable sources of energy and recycled materials that account for the highest proportions. Measured in number of companies, sustainable agriculture and fishing are the largest with approximately 3,500 companies and renewable sources of energy with just over 2,000 companies.

Figure 2.4 Number employed, number of companies, and exports (SEK millions) per environmental area in 2010<sup>15</sup>



### 2.2.3 More signs of green structural change in trade and industry

In order to give a more complete picture of trade and industry's green structural change, Growth Analysis has also tried in its statistical commission to cover other elements that are of central importance in a structural change such as innovative capacity and environmental efficiency.

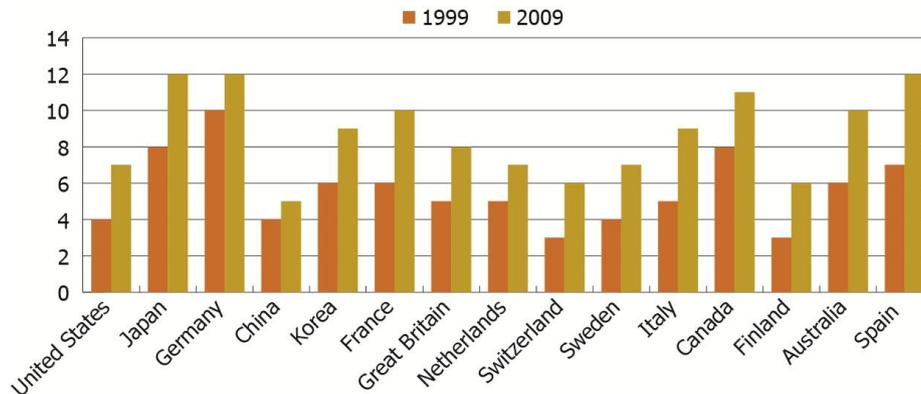
#### *Swedish environmental patents are increasing*

One way of measuring innovativeness is the number of patents, which captures many technological innovations. Our review of patents shows that Swedish companies have high values when it comes to patented innovations in environmental technology and measured as the number of patents in relation to GDP Sweden is fifth in the world, after Luxembourg, Japan, Denmark and Germany.

An inter-country comparison of the focus of the patents shows that they to a certain extent reflect the structure of the countries' trade and industry. In Sweden the automotive industry still accounts for a large part of the economy and it is here that we find a relatively large number of the environmental technology patents in the field of emissions and fuel efficiency in transportation. In a comparison of the development of environmental patents in the major patent countries Sweden ranks somewhere in the middle (Figure 2.5). All countries have seen a rapid growth in environmental innovations measured in number of patents over the past decade, which is also a good indicator of an ongoing green structural change.

<sup>15</sup> Report 2012:07, p 37

Figure 2.5 Share of environmental technology patents in the 15 largest patent countries in 1999 and 2009 by number of patent applications (all areas of technology)<sup>16</sup>



### *Intensity of greenhouse gases from Swedish trade and industry is falling*

One of the goals of a green structural change is to increase the environmental efficiency of trade and industry and to measure this statistics for greenhouse gas intensity from trade and industry are used. Statistics for greenhouse gas emissions from various industries per value added in processing show that trade and industry's greenhouse gas intensity decreased by 42% in the period from 1993 to 2008. This reduction is partly due both to the development towards an increasing proportion of biofuels in the energy mix and to greater energy-efficiency and new forms of production. Over the period, trade and industry's emissions of greenhouse gases increased by 6% while fuel consumption at the same time increased by 27% and value added by 75%.

Some sectors that account for considerable proportions of Sweden's total emissions of greenhouse gases have also reduced their emissions counted in absolute figures – not only in relation to value added. This applies to agriculture, electricity, gas and district heating supply, water treatment and waste management, the chemical industry and the pulp and paper industry. Regarding electricity, gas and district heating supply, the chemical industry and the pulp and paper industry, the reduction in emissions is to a great extent due to energy efficiency measures and a transition from fossil fuels to bio-fuels. Other industries with large emissions showed an increase over the period from 1993 to 2008 but at the same time succeeded to varying degrees in increasing their value added even more. One sector that stands out is car sales, wholesale trade and retail trade where emissions increased by “only” 10% while value added increased by 94%.

In summary, trade and industry's climate adaptation has thus partly been accomplished by replacing energy from fossil fuels with other kinds of energy, which reduces emissions of fossil carbon dioxide per unit refined. There are, however, other greenhouse gases that are of great importance and where totally different mechanisms drive energy efficiency measures, first and foremost new waste management methods and increased efficiency in agriculture.

The overall picture is that Sweden performs relatively well within the environmental technology area and Swedish companies rank high when it comes to environmental technology innovations measured as the number of patents. Swedish trade and industry has also

<sup>16</sup> Rapport 2012:07, p, 21

become more climate-efficient as regards greenhouse gas intensity in recent decades. Sweden's environment sector has also clearly grown in the 2000s both in number of companies and in value added and exports.

#### 2.2.4 Driving forces for and obstacles to more eco-innovation

Developing more eco-innovations is imperative to achieve sustainable development and strengthen trade and industry's international competitiveness. A survey<sup>17</sup> of over 5,000 companies in the EU regarding their view of eco-innovation showed great variation on this point. Most of the companies invest less than 10% of their innovation budget in eco-innovation at the same time as a small number appear to account for a very high proportion of the total investment in eco-innovations.

All of two thirds of the companies stated that the biggest obstacles to more investment in eco-innovation were uncertain market demand and uncertain return on investment, and almost the same number stated that obstacles connected with funding (such as access to own funding, insufficient availability of subsidies or tax relief) were serious obstacles. The Swedish companies in the survey generally made the same assessment of the obstacles as other European companies.

The most important driving forces for more investment in eco-innovation for both Swedish and European companies were expected and current energy prices and material prices. For Swedish companies, greater demand for green products, good business partners and the availability of technology and leadership were important driving forces for investment in eco-innovation.

Availability of funding was not the major obstacle for the Swedish companies although many companies stated that this was a central challenge. In a separate study, Growth Analysis looked at the conditions for more venture capital investment in the environmental technology area. In this respect it should be noted that private venture capital accounts for only a small proportion of the investments made in Swedish trade and industry every year and of these venture capital investment in environmental technology in itself constitutes only a very small part. At the same time experience shows that private venture capital can be of very great importance in the environment sector as regards commercialisation of new eco-innovations. The primary motive for the venture capital companies to invest in this kind of company is that the sector is characterised by high expectations regarding future market expansion. Even though the proportion of venture capital is small, figures from recent years show that the sector has had a steadier investment trend than other sectors.

The biggest obstacles to more venture capital investment in the environment sector are stated to be that measures are too capital-intensive, long-term and difficult to scale up, and that the risks related to both technology and policy are considered to be higher. All in all, this leads to environmental technology and first and foremost the energy sector becoming less attractive to private venture capital, which then tends to prefer small capital-intensive investments with lower risk and faster return on investment.

It is also clear that many of the factors that limit venture capital's interest in investing in environmental technology can also be found in other fields, for example pharmaceutical development, which is both capital-intensive and has long time horizons. But at the same

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<sup>17</sup> Eurobarometer "FL315 attitudes of European entrepreneurs towards eco-innovation", 2011.

time the environmental technology field differs from other fields, among other things in that policy plays a greater role.

### **3 Policy for green structural change – what Sweden is doing**

#### **Summary**

This chapter discusses the implementation, results and effects of selective measures to promote a green structural change. We review the knowledge status of the Swedish measures, including the government's environmental technology strategy.

Growth Analysis has conducted a study to analyse some 30 measures and programmes from the past 10 years that focused on environment-driven business development. The study showed that most measures are aimed at promoting supply rather than demand. They are also in general focused on commercialisation and expansion rather than the early phases of the innovation process and on economic and communicative policy instruments.

Our commission also includes evaluating the government's environmental technology strategy. It is still too early to draw any conclusions but we make a few first reflections concerning the measures' focus and spread. The communicative policy instruments are at the centre of the strategy and the measures are focused on only a few of the areas that drive company development. We also note that the measures almost exclusively promote supply and that the emphasis is on the later stages of the innovation process.

One important question to discuss is measures that stimulate demand since new markets cannot grow without innovative buyers.

Many initiatives to promote environment-driven business development are applied at regional level, where they are often coordinated on platforms where many players can come together and share responsibility. Examples are presented from Västra Götaland and Skåne.

In conclusion we can say that knowledge of the effects of the measures should be developed. Evaluations that are made often show that the participants are satisfied with the measure but seldom whether a similar development could have taken place even without the measure. With evaluations of higher quality it would be possible to design a more effective policy.

#### **3.1 Selected measures in retrospect**

Many different programmes and measures have been carried out in Sweden in recent years to promote environment-driven business development both nationally, regionally and locally. Some are still ongoing while others have been concluded and in several cases have also been evaluated. What has been lacking, on the other hand, is a holistic view of environment-driven business development and the outcomes, knowledge and lessons it has generated.

Growth Analysis was therefore commissioned by the government to carry out a meta-evaluation of some 30 selected measures and programmes conducted over the past 10 years with a focus on environmental and business development.

##### *Few measures combine environment and trade and industry objectives*

Our ambition was not to cover everything that had been done but to capture initiatives of central importance with clear linkages to environment-driven business development and

which had also been evaluated. We ignored purely environmental projects and research-promoting measures since the study had its starting point in economic policy. We therefore defined environment-driven business development as measures and support with the ultimate aim of developing trade and industry by promoting environmentally sustainable development. The concept's starting point was thus the fact that a sustainable environment can also be profitable for companies.

Our first observation was that the measures had a broad range of players and that they exhibited a relatively weak focus specifically on environment-driven business development. Several initiatives had a strong environmental perspective but no or only a very vague trade and industry perspective or a clear growth and business perspective but a vaguer environmental focus. The first delimitation resulted in the picture shown in Figure 3.1.

Figure 3.1 Distribution of selective policy measures based on the motive for the initiative<sup>18</sup>

		DEVELOP TRADE AND INDUSTRY	
		Secondary	Primary
DEVELOP THE ENVIRONMENT	Secondary		<b>Mainly trade and industry development</b> <ul style="list-style-type: none"> <li>• Sustainable visiting industry</li> <li>• Regional subsidies – company development and investment</li> <li>• Entrepreneurship and innovation</li> <li>• Local and regional growth efforts</li> <li>• Promote entrepreneurship among women – pilot scheme for green industries</li> </ul>
	Primary	<b>Mainly environmental development</b> <ul style="list-style-type: none"> <li>• Investment support for biogas and renewable energy</li> <li>• Renewable vehicle fuels (pump support)</li> <li>• Investment support for solar heating</li> <li>• Energy Service directive</li> <li>• Energy survey check</li> <li>• Mountain region adapted sustainable local and regional development</li> <li>• Regional energy offices, municipal energy and climate advisory services</li> <li>• EEEF investment fund – sustainable energy solutions</li> <li>• State grants for energy-efficiency measures in municipalities and county councils</li> <li>• Electricity certificates</li> <li>• Local investment programmes (LIP)</li> <li>• Climate investment programmes (Klimp)</li> </ul>	<b>Environment-driven business development – combines environmental and trade and industry objectives</b> <ul style="list-style-type: none"> <li>• Eco-innovation</li> <li>• Environment-driven markets</li> <li>• Environment-driven exports</li> <li>• DemoMiljö</li> <li>• Rural Area Programme (parts)</li> <li>• Business development loans</li> <li>• The EU's regional programme for strong competitiveness (parts)</li> <li>• R&amp;D and innovation</li> <li>• Energy-efficiency measures in energy-intensive industry – PFE</li> <li>• Technology procurement, market introduction of energy-efficiency measures in the transport sector</li> </ul>

Only a third of the roughly 30 measures studied were judged to fall within the definition of environment-driven business development. Another consequence of the delimitation was that diversity among the authorities and players in the initial group fell considerably. Of the remaining one third with a focus on environment-driven business development, the Swedish Energy Agency was one of the key players alongside principally the Swedish Agency for Economic and Regional Growth with measures under their own auspices and in collaboration with other national or regional players.

<sup>18</sup> *Growth Analysis (2012) Report 2012:02, Miljödriven näringslivs- utveckling – Några grundläggande utgångspunkter för en verksam, effektiv och lärande politik. [Environment driven development of trade and industry – Some fundamental starting points for an operative, effective and learning policy]*

### *Wide range of measures to promote environment-driven business development*

The remaining measures within environment-driven business development, however, also show great breadth as regards both focus and scope. Some are national programmes with clearly focused aims and measures, while measures funded by the EU's regional fund and the rural area programme have a very broad aim and can only to a certain extent be considered to be aimed at environment-driven business development.

The measures are often aimed at certain phases in a company's innovation process, depending on the type of environmental sustainability in focus. This might be developing new environmental technology for energy efficiency, creating more environment-friendly production processes or developing demo products, commercialising new products and services with lower environmental impact or launching products for new export markets. This means that the measures on the whole fit reasonably well into the general analytical framework presented earlier and that is based on three development phases, viz. research and development, commercialisation and expansion.

### *Reflections on the focus of the implemented measures*

The eco-driven measures cover all parts of the innovation chain but have their origin in different contexts and aims, and do not give any overall picture of where their focus lies. The rural area programmes and the EU's regional programme are so broad that they cover all phases. Only three of the initiatives, R&D innovation, Eco-innovation and Eco-driven innovation, have a focus on any distinct part. It can also be noted that the Swedish Energy Agency's initiatives are primarily aimed at technology and energy efficiency while the Swedish Agency for Economic and Regional Growth's initiatives concern commercialisation and development of new markets, in line with the respective agency's commission.

The initiatives that have been studied have exclusively used economic and communicative policy instruments and often in a combination of direct financial support together with advisory services and knowledge-enhancing measures. All in all, financial policy instruments tend to dominate somewhat in the form of support and subsidies.

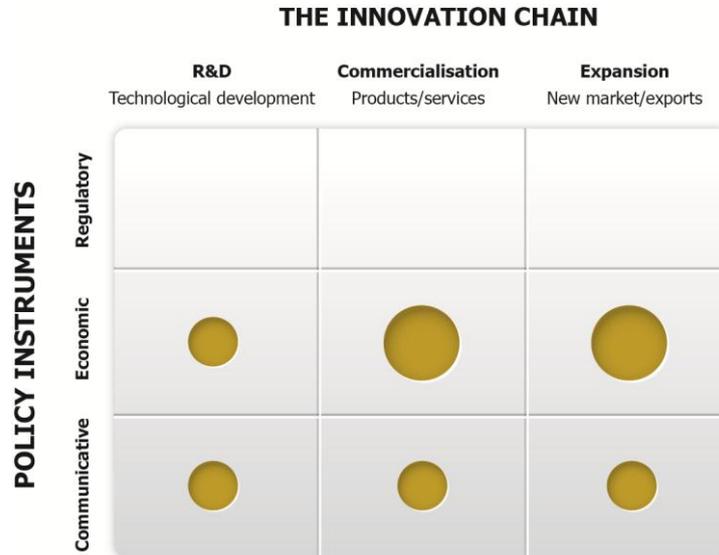
A further reflection is that almost all measures are aimed at changing supply and that only one is clearly aimed at the buyer and the market with the aim of changing demand. The focus is instead on developing new knowledge and transferring it to new, more environmentally efficient products and services that are later launched in a market.

It is difficult to clearly point out where the policy's focus as a whole lies, since several of the measures in practice use several policy instruments in parallel and cover several innovation phases. Summing up the "panes" that the initiatives cover, however, it is clear that there is a degree of bias towards the later phases of the innovation chain, with a focus on commercialisation and expansion, and that financial policy instruments have been used to a slightly greater extent than communicative policy instruments.<sup>19</sup>

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<sup>19</sup> Three differently sized circles are used to give a general picture of where the emphasis in the different measures lies. The larger the circle the more extensive the initiative.

Figure 3.2 Focus of measures implemented in Sweden to promote environment driven business development.<sup>20</sup>

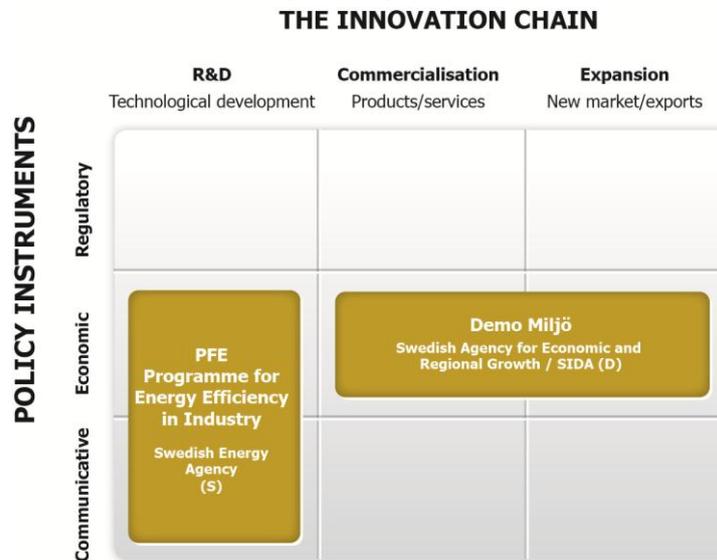


*Two examples of measures implemented to promote environment-driven business development*

Here we describe two measures implemented in recent years. The first is DemoMiljö (Demo Environment) which the Swedish Agency for Economic and Regional Growth was commissioned by Sida to run between 2007 and 2012 and the second is the Swedish Energy Agency's programme for energy efficiency in energy-intensive industry that ran between 2004 and 2009. The programmes are of interest since they concern measures in different phases in the innovation chain. Both programmes have also continued. The measures have been placed in the analytical framework on the basis of an assessment of their principal focus and use of policy instruments.

<sup>20</sup> See also Growth Analysis (2012) Report 2012:02, Miljödriven näringslivs- utveckling – Några grundläggande utgångspunkter för en verksam, effektiv och lärande politik. [Environment driven development of trade and industry – Some fundamental starting points for an operative, effective and learning policy]

Figure 3.3 Categorized view of the two examples of implemented measures.



*DemoMiljö – for international dissemination of environmental technology*

DemoMiljö was run by the Swedish Agency for Economic and Regional Growth between 2007 and 2010, commissioned by Sida, with the principal aim of introducing modern, environment-friendly technological solutions in some 40 of the countries with which Sida cooperates. Five, however, were prioritised in the programme: Botswana, Namibia, South Africa, Indonesia and China. Due to delays, only one third of the budget, SEK 28 million of SEK 83 million had been used up to and including 2010.

The objective was to support the development of new business and markets for Swedish companies in the environmental technology field. The measure was primarily aimed at promoting demand for environmental technology through the support that the Swedish Agency for Economic and Regional Growth and Sida offered buyers of the new technology.

In autumn 2010, the programme was evaluated in a process and outcome evaluation which was largely based on interviews with and questionnaires sent to the participating players. Both the design of the programme and its implementation received some criticism, since they were considered to be based on vague aims, objectives and control. At the same time the evaluation says that the programme largely succeeded in its aim of getting new environmental technology into the markets in question. DemoMiljö was also one of few known instruments that involved trade and industry and combined environmental goals and goals for cooperation on development with promoting the companies' business opportunities.

The Swedish Agency for Economic and Regional Growth has since then also begun another programme period, beginning in 2012, that will end in 2013. The focus is based on recommendations from the evaluation and the government's policy for global development, Sida's goals and the government's strategy the countries in question.

### *Programme for energy efficiency in energy-intensive industry (PFE)*

The aim of the PFE was to increase energy efficiency in Sweden's energy-intensive companies and also to give the companies the possibility to receive tax relief on electricity used in the manufacturing processes. The background to the programme was that the tax on process-related electricity was raised in 2004 in line with the European Union's energy tax directive. The measure can principally be considered to be technology development oriented coupled with advisory services and financial support. It also focuses on developing the supply of new environmental technology and new energy-efficient solutions.

The results from the first programme period up until 2009 show that some hundred energy-intensive companies in Sweden have achieved electricity efficiency improvements of 145 TWh per year, equivalent to the annual electricity consumption of approximately 80,000 electrically heated detached houses. This has been achieved by applying a range of electricity efficiency measures and improved routines for energy-efficient purchasing and planning. According to the Swedish Energy Agency, the companies have together implemented over 1,200 measures and invested over SEK 700 million.

The evaluation of the PFE made in 2008 shows that the programme in total contributed to both energy efficiency improvements and greater competitiveness for the companies. The evaluation, however, also to a degree criticises the strong focus on electricity efficiency with the chance of tax relief since it might involve a risk of other efficiency measures concerning for example heating and fuel being given lower priority. The Swedish Energy Agency, however, considers that the programme has a holistic approach to the energy issue and that the systematic work method gives results in both the short and the long term.

The Swedish Energy Agency has begun a new programme period that will run until 2017.

### **3.2 The government's environmental technology strategy – an example of a current focused policy**

One current selective measure focused on environment-driven business development is the government's strategy for strengthened environmental technology and exports of environmental technology. Within the framework of the strategy, SEK 100 million will be invested annually in the project between 2011 and 2014 – a total of SEK 400 million. The aim is to create better conditions for the development of environmental technology in Sweden through measures over the entire innovation chain from research and development to export promoting efforts. The strategy has three explicit objectives:

- create good conditions for the development of environmental technology companies in Sweden
- promote exports of Swedish environmental technology
- promote research and innovation in the field and make it easier to commercialise innovations.

Growth Analysis has been commissioned by the government to evaluate the environmental technology strategy during and after implementation.

*The commissions have been given a degree of concentration on fields, players and resources*

The definition used to determine potential measures in the field of environmental technology is a broad one and is expressed in the strategy as "all technology that is less harmful

to the environment than available alternatives". At the end of 2012, 18 assignments worth a total of approximately SEK 340 million have been divided among roughly 10 players. Players in the growth policy field, for example Vinnova (The Swedish Governmental Agency for Innovation Systems), the Swedish Agency for Economic and Regional Growth, the Swedish Trade Council, Invest Sweden and Innovationsbron<sup>21</sup>, account for two thirds of the assignments. Vinnova and the Swedish Trade Council alone have together received half of the available funding.

The strategy thus has a distinct growth policy aim, with a focus on promoting innovations and growing companies. Several of the assignments are also aimed at promoting exports of environmental technology to various countries. At the same time it can be noted that there is a great need to develop a thorough analysis of what measures are really needed. It is therefore difficult to draw any definite conclusions as to how the strategy should be designed to best complement the work that various authorities are already doing until Growth Analysis has completed its evaluation.

#### *A comprehensive but complex support system in the environmental technology field*

It is important to emphasise that the environmental technology strategy constitutes only a part of the measures being implemented today to promote Swedish environmental technology and that some players like Vinnova, the Swedish Energy Agency, the Swedish Agency for Economic and Regional Growth. In the same way, there are of course many other promoting players, for example Almi, the Swedish Export Credits Guarantee Board (EKN), the Swedish Export Credit Corporation (SEK), the Swedish Environmental Management Council (SEMCo), the Swedish Environmental Protection Agency, Sida, Swedfund and Mistra. They also work directly or indirectly with measures connected with the environmental technology field and environment-driven business development, but not within the environmental technology strategy.

All in all, there are some 30 national public players alone with connections to the environmental technology field. This might not only constitute a challenge to companies to find the right one(s), but also involve a risk of unnecessary work duplication and suboptimal use of public funds. At the same time, this division of measures over different players was necessary since there are areas that are so complex and unique that they require players with specialist competence to handle the different measures.

- *Focus on communicative policy instruments.* The environmental technology strategy has its emphasis in informative and knowledge-promoting instruments, so-called communicative policy instruments, even though financial policy instruments are used to some extent. The strategy, however, includes no regulatory policy instruments.
- *The measures are focused on a few of the areas that drive company development.* The strategy has a clear focus on export-promoting measures and promoting collaborations and networks. On the other hand, it focuses to only a small extent on central entrepreneurial driving forces such as funding, incentives or culture – areas that are also important for promoting enterprise.

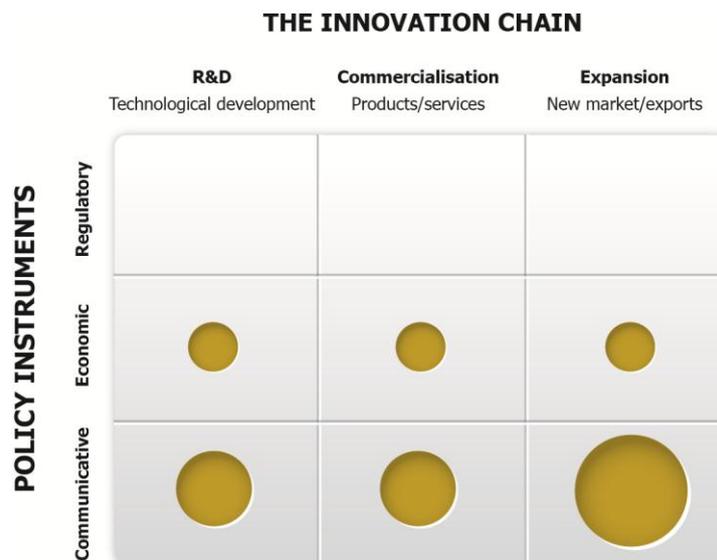
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<sup>21</sup> Since the beginning of 2013 Innovationsbron has been integrated with Almi and the Swedish Trade Council and InvestSweden have merged to form a new organisation, Business Sweden.

- The measures within the strategy are with one exception focused on promoting supply. The exception is Vinnova's and the Swedish Energy Agency's joint assignment concerning innovation procurement.
- The initiatives are primarily focused on companies that have come a relatively long way in the start-up or innovation process, while little emphasis is given to measures to promote entrepreneurs. Most of the measures lie in the field of commercialisation of products and services, and primarily on developing new, foreign markets. An important prerequisite for the measures to succeed is then that a sufficient number of companies have advanced so far that they are ready to take advantage of the measures.

Since the strategy is still in its early stages, it is too early to draw any conclusions as to whether the priorities are right or not, which is however an important question to consider as the evaluation process continues. The figure below gives a generalised picture of where the emphasis in the environmental technology strategy lies on the basis of the focus on measures and use of policy instruments.

Figure 3.4 Focus of current Swedish measures within the framework of the environmental technology strategy<sup>22</sup>



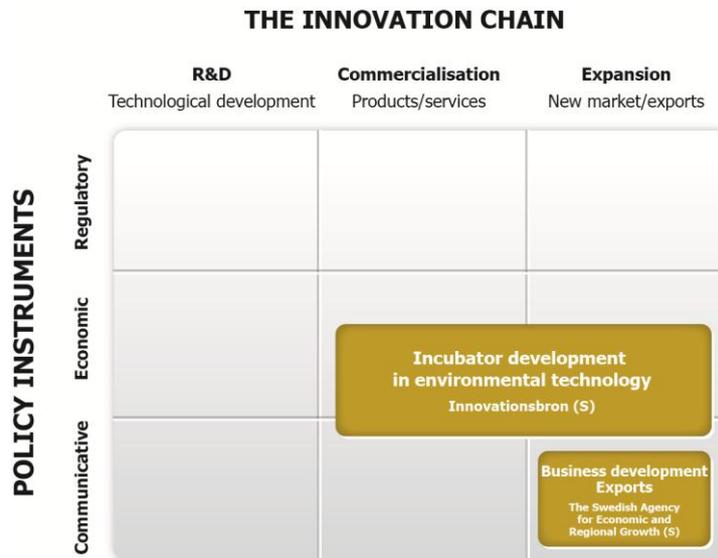
### *Two examples of current measures within the framework of the environmental technology strategy*

We have also chosen to present two measures from the current environmental technology strategy. The examples show the strategy's bias towards measures in the innovation chain's later phases and where two different kinds of policy instrument have been used to promote the development of environmental technology companies. The first is Innovationsbron's initiative to develop methods and ways of working to attract more environmental technology companies to the country's incubators, while the second is the Swedish Agency for Economic and Regional Growth's programme for business development with a focus on promoting internationalisation of the environmental technology

<sup>22</sup> See also *Growth Analysis (2012) WP/PM 2012:20, Utvärdering av regeringens miljöteknikstrategi Delrapport 1: Utvärderingsansats och tidiga reflektioner. [Evaluation of the government's environmental technology strategy, Interim report 1: Approach and early reflections]*

companies. They have been placed in the analytical framework on the basis of their main focus and use of policy instruments.

Figure 3.5 Categorized view of the two examples from the environmental technology strategy.



*Incubator development with a focus on the environmental technology field  
– Innovationsbron (Almi)*

Innovationsbron contributes funding to incubators all over the country and among other things runs a national programme that includes 46 incubators. They report that they have hitherto had relatively few environmental technology companies in the incubators and have therefore been given SEK 10 million within the framework of the environmental technology strategy to strengthen this.

This will be done in two ways, where one is to increase the inflow of commercialisable innovations in the environmental technology field to Swedish incubators and provide support for the development of such innovations down to new growth companies, and the other to improve support for business development at the incubators. Innovationsbron have chosen a model based on implementing pilot projects in large incubators and disseminating the lessons learned from them. The intention is for the incubators themselves to work with spreading the method to other incubators in Sweden later in the project. The first project is being led by GU Holding with the aim of expanding collaboration with various industrial players. The method follows normal incubator operations but with a parallel bench learning programme between the incubator and the industrial partners. The second project is being run by STING and is focused on internationalisation and builds further on an existing concept called Go Global to test it at environmental technology companies.

Innovationsbron considers both projects to have been given a clear focus on increasing the inflow of environmental technology companies to the incubators. They also see that there are great similarities and synergies with other players' initiatives, which have among other things led to collaboration with the Swedish Energy Agency.

As of 2013, Innovationsbron is part of Almi.

### *Business development for internationalisation in the environmental technology field – The Swedish Agency for Economic and Regional Growth*

The Swedish Agency for Economic and Regional Growth is conducting a special initiative in the area of business development with the aim of strengthening networks' or small and medium-size companies' possibilities to do business in the international arena. The initiative is intended for established companies in the Swedish market that have a turnover of at least SEK 8 million and potential for international growth. It has SEK 24 million in funding and will run until 2014. Prioritised areas are renewable energy, wastewater treatment, sustainable building, sustainable transportation and waste management.

The Swedish Agency for Economic and Regional Growth's motive for the initiative is that opportunities for internationalisation strengthen growth potential and competitiveness and increases their long-term viability. Even though companies have a stable domestic market and see the advantages of internationalisation, it is often a long step to get there. Obstacles can be anything from knowledge and contact networks to financial resources.

Through the projects, companies can get support to, among other things, develop competence, conduct market studies, develop contacts into international partners and networks and adapt a product to a specific market. The initiative as a whole therefore concerns market-proximate commercialisation and internationalisation, where most of the support lies within the communicative policy instruments. It can also be considered to be predominantly supply-oriented.

Approximately SEK 10 million was divided among 10 projects in 2012. The project also collaborates closely with for example the Swedish Trade Council and the Swedish Energy Agency, who also have ongoing initiatives in the field.

### **3.3 Some comparisons between the environmental technology strategy and earlier measures**

Earlier measures that focused on environment-driven business development were not gathered together in a strategy and therefore had greater breadth regarding goals and focus. The assignments and commissions in the environmental technology strategy on the other hand are based on a unified goal and strategy. It is also a somewhat narrower approach with its focus on environmental technology (despite its relatively broad definition) than the environment-driven business development concept. But at the same time there are great similarities between the measures' overall focus and use of policy instruments.

A first observation is that the measures cover all development phases from research and development to new markets – but in both cases we see a degree of emphasis on later stages. Generally speaking, the environmental technology strategy has a more distinct starting point in the combination of growth and the environment. This can also be seen in the strategy's practical distribution of resources over innovation, commercialisation and exports.

Second, the choice of policy instruments is very similar in all cases. Regulatory policy instruments are not used in this kind of focused policy for environment-driven business development and environmental technology enterprise. Instead, a combination of different communicative and financial policy instruments is used. The communicative instruments often concern knowledge development, advisory services, information, networking and coordinating policy measures for companies or in the system as a whole, while financial policy instruments often take the form of grants and subsidies for measures applied at

companies directly. In the environmental technology strategy the communicative policy instruments tend to predominate in the measures, while the earlier measures instead had a focus on financial policy instruments.

A third similarity is a supply orientation, which is evident in almost all the measures that have been studied. Admittedly, some measures have elements that focus on strengthening or building up demand, but as a whole the picture is quite clear. This can also be said to lie in the very design of the focused measures to promote environment-driven business development, viz. that the focus is on developing new, efficient technologies and eco-innovation solutions. Since new technology can be regarded as a central part of the concept of creating a green transition, policy will also generally be supply-oriented. But new markets cannot develop without innovation-oriented buyers. Studies conducted by the OECD have shown that it is important to combine supply and demand side measures to promote environment-driven business development and environmental technology enterprise. The lack of measures to stimulate demand in the relatively newly presented strategy is an important question, since there seem to be few such measures in the Swedish support system outside the environmental technology strategy.

In conclusion, we can also note that the support system associated with environmental technology enterprise and environment-driven business development is extensive as regards the number of players and support structures. In the environmental technology strategy, only some of the players have direct assignments and most of the measures are implemented alongside the strategy (for example regional structural fund programmes and Vinnova's different programmes). It can also be said that the strategy's SEK 400 million<sup>23</sup> in a wider context is not so extensive resource-wise. It can, however, also be noted that the strategy has allocated a large part of the funding to a limited number of players.

### **3.4 Environment-driven business development from a regional perspective**

The policies that have been implemented have primarily been based on measures initiated and funded at public level. In practice, however, many of the actual measures, and the strategic work behind them, are conducted in a regional context. The funding is often based on a mix of national, regional, municipal and EU funding and there is sometimes also an element of private co-financing and funds provided by universities and other institutions of higher education. The strategic starting point for the focused policy at regional level is often the regions' own strategic priorities in the regional development programmes.

A regional focus on sustainable growth has existed for many years. Many regions both problematise and visualise environmental sustainability and associate it with greater opportunities for growth and development in trade and industry. In practice, however, there still appears to be a division between measures that focus on environmental sustainability and those that focus on business development in general – in the same way as was noted at national level. At the same time a strategic and growth-oriented attitude is developing in the regional work on green transition that has its origin in environment-driven business development.

Two regions that have developed this as part of their regional growth efforts are Skåne and Västra Götaland.

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<sup>23</sup> Roughly SEK 340 million of which has been decided by the government until the end of 2012.

### *Region Skåne*

Region Skåne has been working with environment-driven business development for several years, but notes that since 2007 funding from the EU's regional fund has made it possible to raise the level of ambition. What primarily makes Region Skåne stand out is its initiatives concerning so-called platforms for regional development and growth, where one of these focuses specifically on environment driven business development. The platforms are intended to constitute organisational bases for different kinds of projects with similar aims. Most of the platforms, however, have an important financial foundation in the form of funding from the region.

The platform for environment-driven business development is called the Sustainable Business Hub (SBH). It is run as a limited company, where the owner is a non-profit-making association with about 100 members (both companies, organisations and public players) but receives basic funding of SEK 400 million a year. The projects that are conducted within the platform's framework receive funding from multiple sources, one of the major ones being the EU's regional fund. The platform has five explicit purposes:

- contribute to the creation of more new environmental companies
- get more companies to understand the environment markets' business development potential
- increase the environmental companies' competitiveness
- increase the environmental companies' growth
- increase the environmental companies' exports.

Alongside the platform, Region Skåne is also collaborating with Region Västra Götaland, among other things on the VÄX project which aims to promote exports from eco-driven companies. They are also conducting a project called Cleanovation, which contains some activities to promote innovation.

### *Region Västra Götaland*

Region Västra Götaland has in recent years done much of its work within the InMotion programme. The programme began in 2009 and was partly a response to the financial and business crisis, which hit Västra Götaland and its automotive industry particularly hard. InMotion became one of the strategic programme initiatives that were implemented with the aim of making Västra Götaland one of Europe's leading regions in environment, energy and next-generation sustainable transportation solutions.

The programme received SEK 150 million in funding from Region Västra Götaland, which was intended to be used as counterfunding in concrete projects. The work has been conducted in six different areas:

- environments for knowledge development, testing and demonstration
- development of goods, services and processes
- internationalisation
- measures to influence markets
- funding of companies
- strengthening of collaboration platforms.

In addition to its InMotion programme, Region Västra Götaland collaborates with Region Skåne on several issues of relevance to environment-driven business development. They also work with energy issues in several projects not associated with the automotive industry. Energy-efficient buildings is one example of a programme to support the development of more energy-efficient construction. Biogas i Väst is an example of a platform to increase the production and use of biogas as vehicle fuel in Västra Götaland. Region Västra Götaland is also running a project called Clean Shipping, which among other things aims to make shipping cleaner but also to stimulate shipping companies and agents around the world to convert to cleaner fuels and other chemicals.

### *Reflections from a global perspective*

Many of the measures in environment-driven business development thus take place regionally and are also based on a long-term strategy in turn based on the particular region's conditions. The larger regions, Region Västra Götaland and Region Skåne, demonstrate this quite clearly, but the examples could just as well have been taken from other parts of the country. It is interesting to see that the Regions' initiatives in both cases focus on promoting the development of new environmental technology solutions and have a clear focus on strengthening commercialisation, market development and internationalisation.

This supports the picture of government interventions being driven on the basis of a relatively broad innovation perspective but with a certain degree of emphasis on later phases, which also stood out in the design and implementation of the national programmes that were discussed earlier. In a regional perspective, the platforms are also an interesting feature as they mean that many different players, and also companies, can come together and share responsibility for the measures.

In conclusion it is also important to look ahead to the next EU structural fund period from 2014-2020, where climate, energy and energy efficiency improvement will be given greater scope. This opens up for substantial possibilities to further strengthen environment-driven business development from a regional perspective. Several authorities have also shown interest in taking part in giving the regional growth programmes that are to be developed in 2013 more of a green growth character.

## **3.5 More and better impact assessments**

Most of the completed measures within environment-driven business development have also been followed up in one way or another – but only one contains any real impact measurement.

Most of the evaluations of the measures are also purely qualitative and focused on results, where companies and players have mainly been asked about their perceived value of the support. Qualitative impact assessments often show that the participants are satisfied with the measure and the support, but seldom whether a similar development could have been achieved without the measure. An impact assessment involves trying to isolate the measure's impact compared to what would have happened if the measure had not been implemented, i.e. a counterfactual situation.

Both qualitative and quantitative evaluations of the impact of programme are therefore in short supply. In the case of several measures it is also noted that the focus of the evaluations has not been on the question of the companies' development but rather on the impact of the measure on the environmental objectives or similar. Ideally, both aspects should be included.

However, it is important to point out that the lack of impact assessments is not unique to Sweden or to the sustainable growth context – compared to many other developed countries Sweden has a far more evidence-based policy. Impact assessments require considerable resources and adequate conditions. Even with substantial resources putting a value on the benefit of an individual measure may still be a challenge since it is not always possible to link effects to a particular measure because many other factors than the measure itself affect the outcome.

The small number of impact assessments with any real ambition makes it difficult to give an opinion on what extra value public policy measures have added so far. Knowledge of results and impacts of public measures to promote environment-driven business development is thus relatively limited. Nor is there any knowledge of the measures' effectiveness in relation to the resources applied and other kinds of measures.

It is thus complex and resource-consuming to carry out sound impact analyses but without them it is difficult to improve knowledge of what works.

Our survey of the selective policy for environment driven business development leads us to three general conclusions:

*1. More analyses and evaluations based on a system perspective are needed.*

With a broad definition of environment-driven business development the design of the measures is both broad and complex to analyse. This makes it difficult to draw any clear conclusions about environment-driven business development as a specific area. Since many measures interact there is also an imminent risk that individual evaluations will not capture the whole picture. It is therefore important that more analyses and evaluations are made on the basis of a system perspective, with the challenge of being able to unite goals from several policy areas.

*2. Measures should be preceded by development of clear priorities to avoid goal conflicts between different policy areas.*

This type of measure risks being affected by conflicts between overarching and collateral goals, which leads to a lack of clarity both in execution and for future evaluations. Clear priorities and goals should therefore be developed first.

*3. There is currently too little knowledge of the results, outcomes and effectiveness.*

The knowledge that exists about the results is almost exclusively based on interviews or questionnaires aimed directly at the target group. Such evaluations can give positive results for the companies in many of the measures. At the same time it is difficult to know whether these results can really be attributed to the measures and whether the right target groups have actually been reached, and that the value of the effects is greater than the costs.

All in all, in our judgement and on the basis of the survey, knowledge of the results, effects and effectiveness of environment-driven business development needs to be improved. This in turn means that there is at present a significant risk that the wrong measures will be implemented but also that the right measures will be implemented but in the wrong way. With evaluations of higher quality it would be possible to design a more effective policy.

It is important to be humble when evaluating the effects of economic policy measures since these complex contexts can be extremely challenging to evaluate with high quality – but this does not make it any less important to do so. Both more and better impact assessments are needed of the measures that aim to promote a green structural change.

Growth Analysis works continuously to develop evaluation methods for these purposes, both through our own work and by keeping up to date on international research in the field. We see it as a central task to improve knowledge of the effects of selective measures in the field of environment-driven business development.

## **4 Policy for green structural change in other countries – what can Sweden learn?**

### **Summary**

In this chapter we take a look at some other countries: the USA, China, Japan and South Korea. We look at these countries' environmental challenges and the kinds of policy and measures that are used. We highlight examples that are of particular relevance for Sweden. We draw conclusions about how these foreign examples can provide inspiration as regards Swedish policy for green structural change.

Common to all the countries studied is that they emphasise development of trade and industry to a greater extent than environmental issues. At the same time the countries have different focuses: the USA is to a large extent driven by energy security, China by the need to combine continued high growth with ecological and social sustainability, Japan by energy and resource efficiency, and South Korea by energy security and ecological and economic sustainability.

South Korea's strategy for sustainable growth stands out by reason of its focus on the entire innovation chain and also uses all types of policy instrument. Swedish policy is quite clearly less comprehensive by comparison.

Both China's and South Korea's initiatives combine measures to stimulate supply and demand in specific technology areas to increase the use of new environmental technology. Sweden can use some of these ideas to construct a policy that promotes both supply and demand.

### **4.1 A comparative analysis of four countries' policies**

Green growth and environment-driven business development are high on many countries' agendas but scope and focus vary widely. Here we will describe some selected strategic initiatives from the USA, China, Japan and South Korea. We have chosen the USA, China and Japan because they represent the world's three largest economies and therefore have a great influence on both global emissions of greenhouse gases and international climate policy. They are also important export markets for Swedish environmental technology. We have chosen South Korea because they have an offensive national policy for green growth. One common denominator for the four countries is that policy and the measures that are implemented emphasise development of trade and industry and growth rather than environmental issues and climate.

The examples give an insight into individual countries' strategies for green transition, what policy instruments and measures are prioritised and what trends can be seen. It also gives an opportunity to compare policy and mix of policy instruments, which can be useful when defining the focus of Swedish policy for green transition and environment-driven business development.

Below follows an overview of the four countries' motives, measures and trends.

Table 4.1 Motives, measures and trends in the policy for green transition in the USA, China, Japan and South Korea<sup>24</sup>

Country	Motive	Measures and policy instruments	Trends
USA	Energy security, growth, creation of green jobs, domestic production.	Focus on flexible administrative and financial instruments, e.g. education, information, standards, voluntary local and regional initiatives and subsidies. Often market-based. Government investment in infrastructure and initiatives for green jobs.	More interaction between states while waiting for federal policy breakthroughs. Party-political polarisation on the climate issue.
China	Development in harmony with economic growth and ecological sustainability, energy security, energy and resource efficiency, exports.	Focus on regulation and standards, e.g. national carbon dioxide tax and a ceiling for energy use in 2015. However, financial policy instruments, e.g. subsidies for technology in prioritised areas and attempts at emission rights trading, are being increasingly used. Bilateral collaboration agreements.	Greater focus on renewable energy and nuclear power and exports. Introduction of market-based policy instruments. Adaptation to climate change, more bilateral collaboration agreements.
Japan	Energy- and resource-efficiency, stimulate growth, energy security, exports.	Focus on flexible administrative and financial instruments, e.g. information, persuasion, subsidies and feed-in-tariffs <sup>25</sup> . Bilateral agreements as alternatives to the Kyoto protocol.	Greater focus on renewable energy, primarily solar power, green jobs, exports.
South Korea	Sustainable growth, greater resource and energy efficiency, lower emissions, green jobs, exports.	Combination of regulatory and economic instruments, e.g. standards, state support for development of environmental technology in strategic areas and to create green jobs. Investment plan for new technology.	Greater focus on technological possibilities, new forms of energy (incl. nuclear power), regional collaboration and bilateral agreements to promote green growth.

### *General emphasis*

Greater energy security, energy- and resource-efficiency, job creation and growth lie behind almost all countries' work but the emphasis varies between the countries. The USA is to a large extent driven by energy security, China by the need to combine continued high growth with ecological and social sustainability, Japan by energy and resource efficiency, and South Korea by energy security and ecological and economic sustainability. The analysis of the countries' policies also shows a general trend for the priorities in the national development policies to be given a greater role as driving forces for concrete climate measures.

In the USA the energy issue is totally predominant; energy security and energy dependence are emphasised as crucial issues for the country's future growth and competitiveness.<sup>26</sup> Priority has therefore been given to using more renewable energy and complementing this

<sup>24</sup> *Growth Analysis' own analysis.*

<sup>25</sup> *Feed-in tariffs mean that suppliers of for example renewable electricity are guaranteed a fixed price or payment that follows the development of the price of electricity. The purpose of the model is to compensate for renewable electricity being more expensive than conventional electricity. See Growth Analysis, Report 2011:02*

<sup>26</sup> *In the American debate about energy security and energy dependence shale gas has come to play a very substantial role in the 2000s, where the USA has over a period of just a few years gone from being a major importer of gas to being almost self-sufficient.*

with smart electricity grids for efficient delivery. There is a fundamental conviction that these investments will create jobs that can not be moved abroad. Making homes and public buildings energy-efficient is also emphasised. American policy has in recent years also been characterised by disagreement in Congress and failure to introduce federal climate and energy legislation and national emissions trading scheme.

Securing the availability of energy supply is a prerequisite for continued economic growth and success in this regard is the Chinese government's major objective. The Chinese government is increasingly emphasising the importance of harmonious development, which means both economic growth and social security and environmental sustainability. In addition to the energy issue, environmental problems in the country's large and growing cities, desertification, acid rain and the availability of resources and energy raw materials are also emphasised. China's energy and climate policy is characterised by the balance between domestic policy, with the focus on continued economic growth and social stability and foreign policy ambitions to safeguard the country's global reputation and integrity. The conflict between the overarching objectives is complicated by the fact that regional and local pressure for growth is considerably stronger than the foreign policy ambitions. This makes the climate policy difficult but at the same time highlights how important it is to integrate growth and concern for the environment.

Japan's greatest challenge as regards sustainable growth is its lack of energy raw materials (and raw materials in general) of its own. This is true to an even greater extent after the tsunami and the nuclear disaster at Fukushima in March 2011. Its dependence on imported fossil energy, mainly natural gas, is putting great pressure on the country's already stretched economy. Traditionally, in its work to meet this challenge the government has prioritised research and development to develop new forms of energy, energy-efficiency improvements and more efficient use of resources and measures to stimulate demand for renewable energy. The resource issue has historically been a central one in Japan and is characterised today by a focus on recycling and reuse. In many areas, for example as regards the transport system and its industry's resource efficiency, Japan has come a very long way while in other areas, for example household consumption and sustainable building, much remains to be done.

South Korea is the country whose policy for green transition stands out as being most focused, where *the Low Carbon, Green Growth* legislative framework and accompanying national strategy and five-year plan are unique in both scope and focus. The extensive initiatives to accelerate green structural change are driven among other things by the country's dependence on energy imports, substantial domestic environmental problems, and the challenges of a stagnating economy. By stimulating new growth motors in renewable energy technology, the intention is to reduce energy dependence and environmental pollution, increase growth and create new jobs. At the beginning of 2013, Park Geun-Hye was elected the country's first female president and discussion of her priorities as regards green growth is still in its early stages. There is, though, much to indicate that the new government will give priority to renewable energy, green vehicles and other other industries with a distinct environmental profile.<sup>27</sup>

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<sup>27</sup> Park Geun-Hye represents the same political party as previous president Lee Myung-Bak.

### *Implementation and control of the policy – principles and choices of policy instruments*

There are also similarities and differences regarding the countries' choices of policy measures. They all work on a broad front with selective policy instruments and support technological development, throughout the innovation chain, from research and product development to commercialisation and stimulation of demand. But the choice of specific policy instruments naturally varies depending on economic conditions, political system, industry structure and culture.

The USA relies as tradition dictates on softer, flexible policy instruments such as optional standards, certification, information and subsidies. Policy is also relatively decentralised compared to for example Japan and South Korea; money is for example provided to research and technological development by a very larger number of stakeholders of different kinds and from different places. The USA also has a tendency to apply a more market-oriented policy and support technologies by stimulating demand, for example through tax relief and subsidies, at the same time as research and development are also very extensive.

Japan has also historically relied on soft policy instruments, for example persuasion, information and advisory services rather than regulation, taxes and sanctions. Industry's interests have been continuously woven into the policy through well-developed collaboration between the private and the public sectors. This has resulted in emission reductions often having a step-by-step character. The government that came to power in the December 2012<sup>28</sup> election has also clearly indicated that it intends to continue on the same path rather than introduce extensive mandatory regulation or strong economic policy instruments.

China's policy is controlled from Peking and by the national five-year plans, where environmental technology and energy-efficiency measures have been given a greater role in recent years. The state relies mainly on regulation, information and education. Market-based policy instruments such as feed-in tariffs, green electricity certificates and emissions trading were unusual in the past but are now beginning to be implemented to an increasing extent. They also use certification as a way of getting round the problem of lack of knowledge and contradictory legislation. China's main challenge is to make the implementation of the five-year plans more effective at regional and local level, where the concrete policy is drawn up. Here the country has come up against recurring problems, not least in the areas of environment and energy.

South Korea's national strategy for sustainable growth is unique in its ambitions and focus. The measures are broad and multifaceted and focus on the entire innovation chain, from research and innovation to commercialisation and export. The instruments are thus aimed at both supply and demand, often in the form of funding of research and technological development, at universities and companies on the supply side and coupled with the introduction of standards and subsidies to consumers on the demand side. The measures also cover all types of policy instrument, with an emphasis on economic and regulatory instruments.

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<sup>28</sup> *The Liberal Democratic Party, LDP, was returned to power after only 3 years in opposition. The LDP had previously been in power for over 50 years, except for a brief hiatus in the 1990s.*

### **Green features of the crisis package**

There are some common denominators between the countries as regards how they handled the financial crisis of 2008-2009 and measures for green transition. In all the countries, parts of the crisis package were clearly aimed at green jobs, R&D in environmental and energy technology and sustainable infrastructure and urban development. In the USA this represents almost 100 of the crisis package's 900 billion USD; in China, a corresponding proportion (26 of 300 million yuan) has so far been paid out. In Japan it is more difficult to estimate the amount of resources directed at eco-efficiency but it is clear that the area has high priority. In 2009 the South Korean government launched its Green New Deal initiative with the aim of creating almost a million new jobs with a four-year stimulation package.

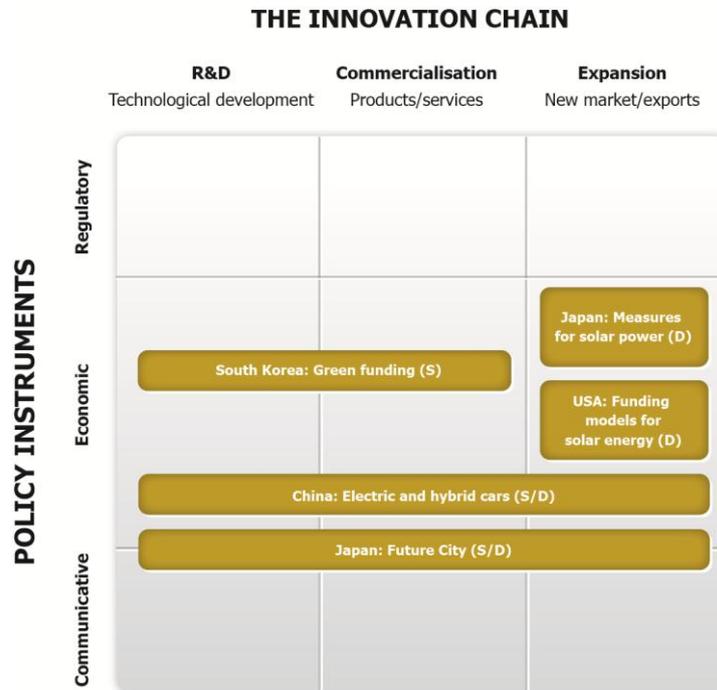
## **4.2 Measures of particular relevance for Sweden**

In our earlier review of Sweden's selective policy measures we observed that there appears to be an unexploited potential when it comes to for example stimulating demand and to a certain degree also the availability of capital for investments in environmental technology. In both areas there are lessons to be learned from other countries' experience, both as regards strategies for the future and overarching policy design. The following section illustrates this with some examples taken from a number of studies conducted over the past four years.

The section begins with a brief review of the countries' policies to strengthen their domestic market to both show how they are working to create a domestic demand and market for environmental technology, and put the Swedish environmental technology strategy and its focus on exports into perspective. We then go on to describe

- South Korea's initiative for sustainable growth and funding,
- two programmes in the USA that work by stimulating demand for solar cells,
- how China uses complementary measures that drive supply and demand for electricity and hybrid cars, and
- Japan's work in sustainable community planning and stimulation of solar power installations.

The 5 policy examples are shown below in the analytical framework on the basis of the measures' choice of policy instruments, focus within the innovation chain and the stimulation method.

Figure 4.1 Categorisation of the 5 policy examples in green structural change<sup>29</sup>

### *Policy for strengthened domestic industry and demand in China and the USA*

Export successes are often based on a strong domestic market and many countries therefore work to develop a favourable domestic market in order to create a strong domestic industry for environmental technology.

China is a good example of how protection against third parties and support systems for domestic companies, including tax relief, VAT rebates and establishment support, are used to strengthen industry. The USA has a similar strategy with subsidies to domestic producers and rules to ensure that authorities, companies and individuals buy American goods.<sup>30</sup> South Korea is the exception that has made the same analysis but has partly gone in the opposite direction – they facilitate imports of environmental products to create green growth. As far as Sweden is concerned, it is a matter of studying the measures being implemented today to create conditions for a strong domestic market for environmental technology and learning what other incentives and policy instruments can be used.

The countries studied are all building high walls to protect their own interests, which makes it more difficult for individual Swedish companies to break into new markets regardless of any technological lead they might have. In some cases companies are required to form a joint venture, as in China, or to follow certain special domestic standards, as in Japan. The USA uses patriotism as a motive for authorities, companies, and individuals to “buy American”. National security is also used as a motive for keeping other

<sup>29</sup> *Growth Analysis' own analysis.*

<sup>30</sup> *Growth Analysis. Growth Analysis (2011)WP/PM 2011:34, Svensk miljöteknik i en värld av handelshinder och nationellt främjande – En global utblick från Kina, Japan, Sydkorea, USA, Danmark och Brasilien. [Swedish environmental technology in a world of trade barriers and national promotion – a global view from China, Japan, South Korea, the USA, Denmark and Brazil]*

countries' companies outside certain markets. In Sweden, we need to decide what attitude we should take towards international trade barriers to exporting environmental technology exports and navigate round existing barriers as nimbly as possible.

### *Sustainable growth and funding in South Korea*

Sustainable growth was formally integrated into the South Korean government's political agenda in August 2008, when it launched its national *Low Carbon, Green Growth* vision in conjunction with the country's 60th birthday. Shortly thereafter the government also launched a national strategy and five-year plan for sustainable growth with the aim of implementing the overarching vision and driving sustainable growth in a more systematic and consistent fashion. *The Green New Deal* policy package, which aims to stimulate the economy in a more sustainable direction, was also presented. The idea behind the Korean policy measures is that a transformation of traditional industries into environment-friendly businesses with low carbon dioxide emissions will establish a positive linkage between company development and the environment, which in turn will lead to sustainable growth.

The South Korean government points to measures to promote so-called green funding as central to achieving sustainable growth. By using various measures to make capital available to environmental technology companies – which in many cases would be impossible otherwise – the companies can take advantage of national and international market opportunities and develop environment-friendly products.

Table 4.2 Green funding alternatives for companies<sup>31</sup>

Type	Content
Bank loans	Private and state-subsidised banks offer loans to green companies that manufacture environment-friendly products.
State loans	Loans for example for installing solar panels, switching to renewable sources of energy and reducing energy use.
State credit guarantees	Guarantees from KIBO (Korea Technology Finance Corporation) and KODIT (Korea Credit Guarantee Fund) for special loans for environment-friendly technology/product/companies. The guarantee makes it possible for companies with insufficient collateral to borrow from banks.
State fund	Fund for private and public investors who invest in environment-friendly companies.
State insurance	A type of insurance product that eliminates risks in export and credit business for environmental companies.

Green bank loans are given by both state-subsidised banks (e.g. KIBO and KODIT) and ordinary commercial banks, but the state-subsidised banks at present account for 75% of the green loans and the commercial banks for 25%. There are three types of bank loan for environmental companies, where the first is ordinary direct loans, i.e. the bank lends capital to a company directly. On-lending is the second model and is based on a publicly financed loan system, where the state provides capital to commercial banks, which then make this capital available to environmental companies. Finally, green borrowing, based on the state providing tax advantages to savers who can thereby deposit their money in a low-interest account. This gives the banks access to cheap capital which they can in turn lend to environmental companies at low rates of interest.

<sup>31</sup> Report 2012:02, p 114

In South Korea, state credit guarantees are considered important for the development of environmental companies because of environmental technology's high risk levels and difficulties in assessing future revenues. The guarantees are given by both private and public players, but most are at present provided by public players. The semi-state-owned financial institutes KIBO and KODIT are the two principal actors as regards credit guarantees. They can today guarantee loans of up to the equivalent of SEK 65 million for green small and medium-size companies. KIBO and KODIT plan to together issue guarantees SEK 45 million in 2013.

A certification system has also been developed to make it easier to identify companies that are entitled to green funding solutions and facilitate the difficult assessment funding providers face when funding early environmental technology companies. There are three types of environmental certification: technology, projects and companies. In the case of environment-friendly technology the state has chosen almost 2,000 specific technologies spread over 10 categories. In the case of environmental projects, there are more than 100 types of project spread over 9 categories. For an entire company to be environmentally certified, 30% of the company's income must come from certified environmental technology or environmental projects.

#### *Innovative funding models for solar energy in the USA*

The high installation costs associated with solar cells have been a problem for private house-owners in the USA so a number of innovative funding solutions for solar cells have been developed. We describe two of these below.

The Property Assessed Clean Energy (PACE) funding system allows property owners to pay for a solar cell installation and energy-efficiency measures by means of an increase in their property tax instead of taking out a loan or paying a lump sum. The tax is tied to the property and not the owner for a set period of time (generally 15 or 20 years). The town or state, which often has better credit worthiness and can therefore borrow money on better terms than an individual householder, issues bonds to pay for the installation, which in turn are paid for with the extra tax revenue from the property so that the programmes do not burden the local budget. Berkeley in California was first to introduce the PACE system, in 2005, and the system is in operation today in 29 states.

Other interesting examples are leasing models with third-party funding, which were introduced by companies such as SolarCity and SunRun. The leasing companies rely on federal tax credits and state rules regarding solar energy, and have designed funding models that mean that house-owners do not need to pay high down payments to install solar cells. The leasing companies install, maintain and own the solar energy installations that their customers, the house-owners, only lease. The companies then receive the state subsidies and the 30% federal tax credit available for solar cells, while their customers pay a leasing fee that is generally somewhat lower than their original electricity bill. The leasing companies finance the installations through big, financially strong companies like Google who are interested in the tax relief and the long-term return of 6% over 20 years that the leasing companies offer. The model has proven to be very successful – In California, America's biggest solar energy market, the proportion of solar cells installed at the homes of private house-owners and that are owned by a third party has risen to 75%.

### *Sustainable transport sector by developing electric and hybrid cars in China*

New kinds of vehicles, mainly electric and hybrid cars, are emphasised as a sector of the future by the Chinese government in the current five-year plan. The driving forces behind the initiative are, among others, greatly increased imports of oil and a desire to reduce oil dependency and increase energy security, a determination to “switch development model” and move upwards in the value chain from simple production to advanced manufacturing and innovation, and to improve air quality. This is an area where Chinese ambitions to become a world-leading exporter of environmental technology can be seen quite clearly and the government’s research funding must be viewed in this light.

The Chinese government focuses on funding research and technological development at institutions, universities and state-owned companies in the fuel cell, electric car and hybrid technology fields. These are thus classic supply-stimulating measures. The remaining measures are of a more demand-stimulating nature and focus on popularising the vehicles through pilot and demonstration projects, expanding the charging infrastructure and offering consumers subsidies and tax relief.

### *Sustainable city building and solar power in Japan*

Japan’s New Growth Strategy contains an extensive initiative to promote sustainable city building – Future City. The aim is to create successful examples of town planning and building based on the substantial challenges that some Japanese cities are facing: a declining and ageing population and energy and environmental problems. The initiative is intended to lead not only to better urban living conditions and disseminate the Future City concept to more cities in Japan but also increase domestic demand for new environment-friendly technologies in the areas of renewable energy and smart power grids.

Since 2009 Japan has also been concentrating on expanding solar power as an alternative form of energy, which is being done against the background of a long tradition. The initiative has its origins in the oil crises of the 1970s, which resulted in a number of laws for the use of renewable energy and investment in research and development. Between 1992 and 2005 the state ran a subsidy programme to promote installation of solar power by both households and commercial players. The programme was revived in 2009 for households, due among other things to falling demand for solar cells after the subsidies were abolished. In addition to state subsidies, which cover approximately 10% of the cost of installation, households can receive financial support from local authorities such as municipalities or towns/cities<sup>32</sup>.

In July 2012 the government broadened its initiatives by introducing feed-in tariffs for renewable energy, including solar power, wind power, geothermal energy, hydropower and biomass. The system means that producers of renewable energy can sell electricity at a price set by the state for a long period of time (10-20 years). Prices and terms vary between different kinds of energy. The price for solar power is 42 yen per kWh, which is high compared to the other four kinds of energy. The price will fall gradually as the price of solar power comes down. The Japanese government estimates that the new initiatives will increase the production of electricity from solar power tenfold by 2020 compared to 2005.

<sup>32</sup> Ministry of Energy, Environment and Industry, Japan (2012). *Feed-In Tariff Scheme in Japan*.

### **4.3 Reflections and policy inspiration for Sweden**

It is clear that the policy to promote sustainable growth in the countries studied works to by stimulating demand to a greater extent than Sweden's policy. Clear examples of this are the USA's funding models for solar power, China's initiatives in the area of electric and hybrid cars, Japan's initiatives for sustainable city building and subsidies for installation of solar power, and South Korea's promotion of environmental technology within the framework of the national strategy for sustainable growth. China's and South Korea's initiatives also take the policy a step further by linking measures to stimulate supply and demand in specific areas of technology to work to accelerate development and dissemination of the technology. Here Sweden can find inspiration for a policy that strengthens the linkage between supply and demand and thus increase the use of environmental technology.

South Korea's green funding initiative is an example that needs to be studied further against the background that availability of funding appears to be an important obstacle to the development of environmental technology. The South Korean government has implemented a number of funding models where the state to a greater or lesser extent directly covers some of the risks that investments in environmental technology entail. This enables more environmental technology companies to develop and market environment-friendly products. This is an assessment that the South Korean government has made on the basis of in-depth analyses of the environment technology companies' funding situation and Sweden might do well to study its own situation more deeply.

All the countries studied also use job policy as an arena for pushing green structural change forward. This is particularly interesting in times of economic instability with high unemployment and transitions in trade and industry. South Korea, first and foremost their Green New Deal, but Japan, China and the USA are also working actively to promote conditions for the development of green jobs.

In conclusion, Sweden's policy to promote green structural change stands out as being less comprehensive, cohesive and ambitious than that of other countries, primarily South Korea. That the measures are spread about and fragmented is not necessarily wrong in itself; complex problems often require complex solutions. Greater complexity in the measures, however, involves greater challenges and risks in both the implementation and the evaluation. This therefore needs to be addressed already when the policy is drawn up. Inspiration for a more cohesive policy for environment-driven business development can then be found in South Korea's national legislation and strategy for sustainable growth.

## 5 Knowledge for green transition – the learning continues

### Summary

This final chapter will summarise the most important conclusions of Growth Analysis' work in the field. On the basis of these conclusions, we also look ahead and reflect on how a more efficient and knowledge-building policy can be shaped.

Growth Analysis' work of analysing and evaluation the policy for promotion of sustainable business development goes on and some of the most important directions of the agency's work are presented at the end of the chapter.

Growth Analysis' most important conclusions so far are the following:

- 1 It is important to have a consistent, long-term policy to promote necessary investments by trade and industry in environmentally efficient solutions and technology.
- 2 Growth and economic policies and the selective measures have an important role in the mix of policy instruments for sustainable development of trade and industry.
- 3 In order to create a focused, effective policy, better knowledge is needed of the environmental technology sector's and all trade and industry's driving forces, challenges and needs.
- 4 Greater investment in environmental technology requires investors who are financially strong and have the stamina to stay the course.
- 5 Learning from the total effectiveness of the implemented selective policy measures needs to be improved through better planning, a systems perspective, and evaluation.
- 6 There are valuable lessons to be learned from other countries' policies and selective measures to achieve sustainable growth and environment-driven business development.

More and deeper analyses are needed to design an effective policy that promotes sustainable growth. Growth Analysis is also working to increase this knowledge in all the agency's assignments and commissions. Among other things we are evaluating the government's environmental technology strategy and studying how the policy measures work both at home and abroad.

### 5.1 Conclusions for a knowledge-building and effective policy

*1. It is important to have a consistent, long-term policy to promote necessary investments by trade and industry in environmentally efficient solutions and technology.*

Growth Analysis observes that even if the green structural change largely comprises a naturally occurring transition within the Swedish economy, it differs to certain extent from previous structural changes. This is because part of the pressure to transform comes from society's need to solve the environmental and climate problems. Previous structural changes were driven to a greater extent by trade and industry's desire to economise on scarce resources such as manual labour. This gives the policy an important role in changing the market's basic conditions so that the resources are distributed in a more sustainable way.

There are still substantial obstacles to trade and industry's willingness to invest in new, environmentally efficient technology at the pace required to meet the environmental and climate challenge. Some of these obstacles relate to high investment costs and a long delay before any return is seen, at the same time as the demand for green products and services continues to be characterised by uncertainty.

In order to reduce the companies' uncertainty it is crucial to design policy that is clear and transparent and provides a long-term framework and conditions for trade and industry's environmental transition and improved efficiency. Reduced uncertainty presupposes both international agreements and collaborations and a clear and coordinated national policy to promote a green structural change and environment-driven business development.

*2. Growth and economic policies and the selective measures have an important role in the mix of policy instruments for sustainable development of trade and industry.*

The general policy instruments constitute an important first building block in a mix of policy instruments for green development of trade and industry. These have two central aims: to give a signal as to the policy's long-term focus and thereby give an indication of future costs, and to drive the implementation of existing technology.

Selective policy instruments constitute a second, complementary component in the promotion of more sustainable trade and industry. The purpose of the selective policy instruments is to achieve a broad parallel technological development of potentially important technology – to broaden the line-up of potential winners, not select winners in advance.

The insight that both selective and general policy instruments are needed leads on to the question of how they should be combined into as operative and effective a policy as possible. The interaction between the general and selective policy instruments and their total impact for technologies, industries, regions and players also need to be studied further. This is something that Growth Analysis is working on.

*3. In order to create a focused, effective policy, better knowledge is needed of the environmental technology sector's and all trade and industry's driving forces, challenges and needs.*

The green structural change of trade and industry is driven by both the development of purely environmental technology companies and the rest of trade and industry. The environmental companies constitute less than 2% of all companies but are of great importance for the development of new environmental technology products and services for both the domestic market and for export. In the rest of trade and industry it is a matter of continuing to change production so that the companies are equipped to meet the challenges that await and so that they can actively contribute to sustainable development.

A good understanding of these processes and what drives and prevents this transition is a very fundamental factor in designing an effective policy. At present, neither the qualitative understanding nor the quantitative tools in Sweden and other countries are sufficiently developed to provide a full picture of trade and industry's driving forces, challenges and future needs.

*4. Greater investment in environmental technology requires investors who are financially strong and have the stamina to stay the course.*

As we mentioned at the beginning, sustainable development presupposes substantial investment in eco-innovations to realise a sustainable energy system, sustainable transportation and sustainable production. Growth Analysis has conducted a study to analyse one type of investment: private venture capital. The main conclusion from the

study was that private venture capital only to a small extent finds its way to the environmental technology field. The reason for this is that private venture capital has relatively small financial resources and that the return on invested capital must come relatively quickly. The environmental technology strategy segment on the other hand is capital-intensive and requires long-term investments. The conclusion is that in order to bring about the substantial investments required by eco-innovations, investors are needed who have financial muscle, can take risks and have the necessary staying power.

*5. Learning from the total effectiveness of the implemented selective policy measures needs to be improved through better planning, a systems perspective and evaluation.*

The evaluations of the policy applied in environment-driven business development show several weaknesses and not a lot can usually be said about the measures' impact or effectiveness, despite Sweden being very advanced in comparison with other countries as regards this kind of evaluation. The basis is therefore at present insufficient to assess whether the policy as a whole is focused on the right measures and is implemented in the right way.

The first thing that is needed is therefore a better total picture of the selective policy's responsibility and distribution of roles and measures to promote growth and environment-driven business development at different authorities and players at both national and regional level. Second, better knowledge is needed of the policy's outcomes, impact and effectiveness. This presupposes complementary evaluations and better built-in possibilities to evaluate individual projects and areas where measures are applied.

Learning from measures carried out is thus a given key to shape a more effective policy. Another key is that strategies and measures are based on a more developed systems perspective and trade and industry's challenges together with the innovation system's supply of players and supporting tools.

*6. There are valuable lessons to be learned from other countries' policies and selective measures to achieve sustainable growth and environment-driven business development.*

Our surveys of the world around us show that sustainable growth is high on the agenda in many countries but that the scope and focus vary. There are also several good examples of policy in areas that are considered to be underexploited in Sweden, such as innovative funding solutions and stimulation of demand, that can provide inspiration for the design of Swedish policy. Examples of failures are also worth studying further to gain insight and learn lessons.

The conditions for exporting Swedish environmental technology are also touched upon. Just as when designing a national policy for green transition, designing export strategies for environmental technology requires a clear systems perspective. This includes both an understanding of the global environment technology market and knowledge of the countries' individual policies for sustainable growth and what driving forces and obstacles influence their demand for Swedish environmental engineering solutions and thus Swedish exports. Knowledge in these areas needs to be developed further in future studies.

Finally, this document shows how important it is that knowledge of other countries is built up based on what is important for Sweden. It is also crucial that the policy discussion be carried on with knowledge of each country's specific context, history and conditions. Establishment on the Swedish agenda means that the choice of policy areas and specific measures to study will contribute to the debate on Swedish policy more than previously,

while understanding of the countries' unique characteristics provides conditions for a deeper analysis of which elements may be relevant to Sweden.

## **5.2 Growth Analysis continuing contribution of knowledge**

Green structural change is one of the major challenges of our time. In the reports underlying Growth Facts 2013, Growth Analysis has begun its work to develop useful knowledge of how the transition can be made forcefully and in as effective a manner as possible.

At the same time knowledge of how this is done in more detail will be developed continuously. Like any other innovative activity, a functioning and effective policy presupposes experimentation, thinking in new ways, rethinking, and learning from successes and failures.

Despite studies that Growth Analysis and others have made in Sweden and other countries the level of knowledge is not satisfactory. More and deeper analyses are needed to be able to guide a more effective policy that promotes sustainable growth.

Growth Analysis is already today pursuing several initiatives to further improve knowledge in the area, a few of which are presented below.

- *Continued evaluation of the government's environmental technology strategy:* The assignment comprises evaluation of the implementation and short- and long-term impacts. An important element in this work is to develop methods of evaluation that can give robust answers as to the benefit of complex policy initiatives. This will give in-depth knowledge of how the conditions for sustainable growth can be promoted by means of focused measures.
- *A developed systems understanding of the green transitions toolbox:* Growth Analysis is working to develop a holistic picture of policy instruments, including indirect policy instruments and measures of importance to the companies.
- *Case studies:* During the course of 2013 Growth Analysis will conduct a series of case studies of different sectors to gain a better picture of how companies are influenced by different policy instruments, how the companies act and what room for action they have.
- *The green structural change's theory, empirics and consequences for policy:* This work includes a deeper analysis of green structural change. Questions of topical interest are for example to what extent it is a natural development, how it differs from previous structural changes and if so what implications it has for a green trade and industry policy.
- *Lessons from other countries:* The framework of Growth Analysis' work with green structural change also includes the agency's commission to gather foreign-based policy intelligence. During the course of 2012 and 2013 a number of case studies of other countries' policies will be undertaken in order to both illustrate overall trends as regards green transition and find relevant conclusions concerning the policy's possibilities and shortcomings in practice. Some examples of areas that have been or will be studied in greater depth are the transport sector, smart power grids and long-term energy strategies and geopolitical consequences of the gas revolution.

In addition to its specific assignments in the area of green structural change, Growth Analysis is also working with other questions that are of interest in the context. One such task is to make preliminary evaluations of the strategies for the regional structural funds. The directives issued within the EU make it clear that great emphasis is to be put on green growth. Green structural change is moreover driven to a great extent by innovations and the work that Growth Analysis carries out within the framework of the national innovation strategy is also of relevance in this context.

One of Growth Analysis' main tasks is to evaluate and analyse growth policy and assess which policy instruments function in practice. The agency's knowledge of measures for capital procurement, guidance and regional growth has therefore played a substantial role in the work of evaluating the specifically green measures. Our work with developing knowledge about how sustainable growth can be promoted will therefore continue in all the agency's assignments and commissions.

## Important concepts in Growth Facts 2013

### *Sustainable development*

Normally used in the sense of “a development that satisfies today’s needs without jeopardising future generations’ possibilities to satisfy their needs”. Three dimensions of sustainability are used to define what this means: ecological sustainability, social sustainability and economic sustainability. At the UN summit on sustainable development in Johannesburg in 2002, the concept of sustainable development was recognised as an overarching principle for the UN’s work. With sustainable development as a starting point, the countries of the UN have agreed on the Agenda 21 action plan, which describes how the work of bringing about sustainable societies is to be developed. Agenda 21 has been developed since its original publication in Rio de Janeiro in 1992, most recently in 2012 through the Rio+20 conference, which among other things resulted in the member states together with the private sector promising to allocate 513 billion dollars to promoting sustainable development.<sup>33</sup>

### *Sustainable growth*

Sustainable growth is a concept based on economic growth being able to take place in a way that satisfies the criteria for sustainable development and that economic growth is a prerequisite to be able to pay for sustainability measures in the societal and ecological areas. Sustainable growth is a central starting point and priority for the EU’s collective growth and employment strategy, Europa 2020.

### *Green growth*

Closely related to sustainable growth is green growth – a term used for example by the OECD. According to the OECD, green growth means economic growth and development at the same time as continued provision of the resources and environmental services upon which our well-being depends is ensured through management of natural resources. In the opinion of the OECD, the world must focus on green growth and that a return to “business as usual” would involve risks that can lead to human costs and limitations to economic growth, including water shortages, limitation of resources, pollution and climate change among much else. Green growth can thus be said to focus on ecological sustainable growth, but indirectly also comprises the other two aspects of sustainability.<sup>34</sup>

### *Structural change*

Structural change is the continuous change in economy and trade and industry that is a consequence of some areas growing and others shrinking. This constantly ongoing change is based on renewal and development – both small- and large-scale. A continuous redistribution of resources in the economy creates the conditions for efficient use of the resources. A green structural change is a structural change that progresses in a sustainable direction, where sustainable industries grow (green jobs) and industries that are not sustainable decline.

<sup>33</sup> UN – *The UN and sustainable development, Rio+20*. <http://www.fn.se/fn-info/vad-gor-fn/utveckling-och-fattigdomsbekampning/hallbar-utveckling/>

<sup>34</sup> OECD (2011) *Towards Green Growth*. <http://www.oecd.org/greengrowth/47984513.pdf>

*Environment-driven business development*

Environment-driven business development is defined here as a development of trade and industry driven by a growing demand and market for environment-friendly products and services. The starting point is that a sustainable environment can also be a good deal for the companies.

## Underlying documents

The government has given Growth Analysis a number of commissions concerning the policy's conditions to stimulate sustainable growth and which policy instruments function best in different situations. The material presented in Growth Facts 2013 is based on Growth Analysis' knowledge in the field. If you would like to read more or see what documents form the basis for the specific chapters, these are detailed below. All publications can be downloaded from [www.tillvaxtanalys.se](http://www.tillvaxtanalys.se).

### Chapter 1

Growth Analysis (2011) Report 2011:02, *Miljödriven näringslivsutveckling – Analys av förutsättningar nationellt och regionalt. [Environment-driven business development– Analysis of national and regional conditions]*

### Chapter 2

Growth Analysis (2012) WP/PM 2012:23, *Globala värdekedjor och internationell konkurrenskraft. [Global value chains and international competitiveness]*

Growth Analysis (2012) Report 2012:02, *Miljödriven näringslivsutveckling – Några grundläggande utgångspunkter för en verksam, effektiv och lärande politik. [Environment driven development of trade and industry – Some fundamental starting points for an operative, effective and learning policy]*

Growth Analysis (2012) Report 2012:10, *Privat riskkapital och Cleantech – Förutsättningar och hinder utifrån investerarnas perspektiv. [Private venture capital and Cleantech – Perspectives and obstacles from the investors' perspective]*

Growth Analysis (2012) Statistics 2012:02, *Statistik om miljösektorn – Kompletterande rapport om antalet sysselsatta år 2010 samt produktions- och förädlingsvärden år 2003–2010. [Statistics on the environmental sector – Supplementary report on the number of people in employment in 2010 and production and value added 2003–2010]*

Growth Analysis (2012) Report 2012:07, *Statistik och indikatorer om näringslivets gröna omställning – Ett förslag till en Miljöteknikstatistikportfölj. [Statistics and indicators of the trade and industry's green transition – A proposed environmental technology portfolio]*

Growth Analysis (2011) Statistics 2011:08, *Statistik om Miljösektorn 2003–2010. [Statistics on the environmental sector, 2003–2010]*

### Chapter 3

Growth Analysis (2012) Report 2012:02, *Miljödriven näringslivsutveckling – Några grundläggande utgångspunkter för en verksam, effektiv och lärande politik. [Environment driven development of trade and industry – Some fundamental starting points for an operative, effective and learning policy]*

Growth Analysis (2012) WP/PM 2012:20, *Utvärdering av regeringens miljöteknikstrategi – Delrapport 1: Utvärderingsansats och tidiga reflektioner. [Evaluation of the government's environmental technology strategy – Interim report 1: Approach and early reflections]*

#### *Chapter 4*

Growth Analysis (2012) Report 2012:02, *Miljödriven näringslivsutveckling – Några grundläggande utgångspunkter för en verksam, effektiv och lärande politik. [Environment driven development of trade and industry – Some fundamental starting points for an operative, effective and learning policy]*

Growth Analysis (2012) WP/PM 2012:13, *Innovationspolitik för hållbar utveckling i Nordamerikas regioner. [Innovation policy for sustainable development in North America's regions]*

Growth Analysis (2012) WP/PM 2012:12, *El- och hybridbilar i Kina – Planer, aktörer och policy. [Electric and hybrid cars in China – Plans, players and policy]*

Growth Analysis (2012) WP/PM 2012:04, *Klimatpolitikens nya skepnad – En global utblick om klimatåtgärder som Sydkorea, Japan, USA och Kina gör vid sidan av klimatförhandlingarna. [The new shape of climate policy – A global view of the climate measures being applied by South Korea, Japan, the USA and China alongside climate negotiations]*

Growth Analysis (2011) WP/PM 2011:34, *Svensk miljöteknik i en värld av handelshinder och nationellt främjande – En global utblick från Kina, Japan, Sydkorea, USA, Danmark och Brasilien. [Swedish environmental technology in a world of trade barriers and national promotion – a global view from China, Japan, South Korea, the USA, Denmark and Brazil]*

Growth Analysis (2011) WP/PM 2011:02, *Hur används styrmedel för hållbar stadsutveckling? – Exempel från Kina, USA, Japan, Frankrike och Indien. [How are policy instruments used for sustainable development? Examples from China, the USA, Japan, France and India]*

Growth Analysis (2010) WP/PM 2010:07, *Japans och Sydkoreas nationella strategier för tillväxt – en kort uppdatering hösten 2010. [Japan's and South Korea's national strategies for growth – a brief update in autumn 2010]*

Growth Analysis (2009) Svar Direkt 2009:02, *Politik för en ekoeffektiv politik. [Policy for an eco-efficient policy]*



**The Swedish Agency for Growth Policy Analysis (Growth Analysis) is a cross-border organisation with 60 employees. The main office is located in Östersund, Sweden, but activities are also conducted in Stockholm, Brasilia, New Delhi, Beijing, Tokyo and Washington, D.C.**

**Growth Analysis is responsible for growth policy evaluations and analyses and thereby contributes to:**

- stronger Swedish competitiveness and the establishment of conditions for job creation in more and growing companies
- development capacity throughout Sweden with stronger local and regional competitiveness, sustainable growth and sustainable regional development.

**The premise is to form a policy where growth and sustainable development go hand in hand. The primary mission is specified in the Government directives and appropriations documents. These state that the Agency shall:**

- work with market awareness and policy intelligence and spread knowledge regarding trends and growth policy
- conduct analyses and evaluations that contribute to removing barriers to growth
- conduct system evaluations that facilitate prioritisation and efficiency enhancement of the emphasis and design of growth policy
- be responsible for the production, development and distribution of official statistics, facts from databases and accessibility analyses.

**Our series:**

Report series – Growth Analysis' main channels for publications.

Statistics series – continuous statistical production.

Working paper/Memorandum series - some examples of publications in the series are method reasoning, interim reports and evidential reports.

Svar Direkt [Direct Response] – assignments that are to be presented on short notice.