European Employment Observatory

EEO Review: The Employment Dimension of Economy Greening

Sweden

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1. Introduction

Sweden has a long history of environmental and energy policies; indeed, in 1991, Sweden was the first country to introduce an explicit tax on CO2 and as such can be seen as a pioneer in this area. According to the Swedish Government, the transition towards more efficient resource use and fossil-free energy is a precondition for increased welfare and sustainable economic growth. As such, the development and use of environmental technology remains a priority area. During the period from 1990 to 2008 Swedish greenhouse gas emissions have fallen by almost 12% and Sweden's emissions per capita are also amongst the lowest in the OECD countries. This good national record can be ascribed to the use of hydropower, nuclear power and a significant amount of biofuel to produce electricity, as well as to Sweden's active climate and energy policy, in particular the gradual increase in carbon tax. At the same time, Swedish GDP has grown by an average of 3% a year. Sweden constitutes therefore a good illustration of the possibility to combine economic growth and, at the same time, improve the environment. Since 2003, the number of green companies has also increased by 10% and the number of people employed in the environmental sectors has increased by 20%.

In spite of the economic crisis, public opinion and the social partners are positive towards the development of green technologies and the measures undertaken to facilitate the transitions towards a sustainable economy[1]. It should however be stressed that, while most stakeholders seem optimistic regarding the potential positive employment effects of the development of the green sectors, empirical evidence regarding the ongoing restructuring process and its employment consequences remains scarce. To date, the Swedish debate has mainly focused on the relative efficiency of the different policy instruments aimed at improving the environment and less on the potential employment consequences of environmental and energy policies.

2. Labour market outcomes

2.1 Levels of employment and composition of employment in the Swedish 'Green Sector'

Since 2000, Statistics Sweden has developed a database consisting of companies operating in the environmental sector. Statistics Sweden uses the Eurostat definition of an environmental establishment[2].

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[1] See for instance the climate programmes of the Swedish Trade Union Confederation (*Landsorganisationen, LO*, (2009)) and the Swedish Confederation of Professional Employees (T*jänstemännens Centralorganisation*, TCO), 2009).

[2] 'The environmental goods and services industry consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air, and soil as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products and services which reduce environmental risk and minimise pollution and resource use.'

In 2007, around 14 000 companies employing around 72 000 persons (or less than 2 % of the total employment) were operational in the environmental sector. Companies in the Swedish environmental sector are growing fast both in terms of turnover, exports and the number of people employed. Since 2003, the number of companies has increased by 10% and the number of employed people has increased by 20%. Turnover has increased by 40% and the exports by 65%.

Table 1: Environmental sector in Sweden, number of companies, turnover, export and employed, 2003-2008

	2003	**2004**	**2005**	**2006**	**2007**	**2008**
Companies	12 436	12 505	13 336	13 494	13 929	13 976
Turnover (million SEK)	165 446	169 241	187 839	216 766	233 898	256 124
Export (million SEK)	25 705	28 553	32 920	37 778	42 160	42 918
Employed, total	63 218	67 133	68 784	71 616	72 400	-*
of which Women	14 464	15 412	15 959	17 430	17 444	-*
of which Men	48 754	51 721	52 825	54 186	54 956	-*

* Data on employment for 2008 is unavailable due to time lag in statistics.

Source: SCB (2009)

Sweden is particularly successful in the areas of waste management; water and sewage treatment; renewable energy; air purification; and increasing energy efficiency. As shown in table A1 in the appendix, waste management and renewable energy constitutes the largest environmental area, regarding employment. Renewable energy accounts for nearly half of turnover and almost one third of the total export of the environmental sector.

As far as the regional distribution of green companies is concerned, the counties of Västra Götaland (Göteborg) and Stockholm have the most employees within the environmental sector (around 30% of all employed individuals are employed in the environmental sector).

No information is currently available on the educational attainment of employees in the environment area as a whole. The Swedish Environmental Technology Council (Swentec), in cooperation with Statistic Sweden, provides annual statistics on the Swedish cleantech sector[3] with some statistics on educational attainment. According to

[3] The cleantech sectors comprises companies operating in the following activities: water treatment, air purification, waste management and recycling, bioenergy, wind energy, solar energy sustainable building and energy efficiency transport, soil remediation, environmental noise, consulting and educational services and R&D, (Swentech 2009a).

Swentech (2009b), the distribution of educational attainment in the clean technology sectors does not differ significantly from the Swedish economy as a whole; if anything, there is a weak overrepresentation of low educated workers (see Table A2 in the Appendix).

2.2 Shortage of skills and structural unemployment due to the greening economy

As far as the potential shortage of green professional is concerned, no specific studies or surveys have been conducted in Sweden. There are, however, a wide array of instruments engaged in the identification of potential skill needs and mismatches in the Swedish labour market, both in the short, medium and long run (see for instance Anxo 2008). These instruments could be easily adapted to assess potential skill shortages related to the expansion of green technology.

The main instrument for coping with structural unemployment and for enhancing the matching between labour market needs and skill development remains the existing set of measures available within the framework of the active labour market (see next section 3.1 for further developments). In other words, structural unemployment due to the greening economy, a skills shortage of green professionals and the structural changes implied by the orientation of past and current environment and energy policies will be principally addressed through active labour market and educational measures.

The role of social partners in the restructuring process should not be neglected, in particular the so-called bi-partite job security measure aimed at supporting employees affected by restructuring. By supplementing the role of public employment agencies, these agreements, which cover around half of the labour force, contribute to the improvement of the security of employees and to the enhancement of matching efficiency and geographical and occupational mobility in the labour market. These agreements also reinforce social legitimacy and the positive attitude of trade unions towards structural changes and productivity-enhancing restructuring.

2. 3 ***Current Instruments and Main Orientation of Swedish Environmental policy.***

Policy Objectives

In March 2009, the Government presented its energy and climate policy programme. 'A Cohesive Climate and Energy Policy' (Govt. Bill. 2008/09:162 and 2008/09:163), which was adopted by the Swedish Parliament (*Riksdag*) in summer 2009. The main objectives of the programme are to further reduce greenhouse gas emissions, enhance energy efficiency and to promote the development of the green sector and green technology. According to the Government Bill, greenhouse gas emissions will be reduced by 40% by 2020 (compared to 1990 levels)[4]. Fossil-based energy sources will

[4] The target of 40 percent lower emissions will be reached by implementing measures in sectors that are not included in the EU emissions trading scheme (transport, housing, waste facilities, agriculture, forestry, aquaculture and some parts of industry).

be phased out and half of Sweden's energy use in 2020 will come from renewable energy sources. Wind power production will be increased tenfold and housing and commercial premises will be heated without the use of fossil energy. Energy efficiency in the transport system will gradually increase and by 2020 the percentage of renewable energy consumed in the transport sector will be at least 10%. This shall be achieved by, *inter alia*, a transition to sustainable renewable fuels and a substantial rise in the number of electrically powered vehicles. A new target of 20% better energy efficiency by 2020 is also planned.

Policy and Steering instruments

The energy and carbon taxation of fossil fuels is and will remain one of the most important instruments to help reduce greenhouse gas emissions in Sweden. Furthermore, the carbon tax on fossil fuels for heating in industries not included in the emissions trading scheme will be increased. Measures to reduce greenhouse gas emissions are also combined with initiatives to promote the development and increased competitiveness of Swedish environmental enterprises.

As far research and development is concerned, special efforts are being put into research in the automotive industry. Reduced fuel consumption and fewer emissions from both light and heavy vehicles are the priorities of the current Government. Investment in knowledge improvement also covers information and communications technology (ICT), environmental technology, sustainable urban planning and strengthened support to new businesses in the field of environmental technology (incubators). To encourage and increase the pace of the move towards more environmentally friendly vehicles, new green cars will be exempt from vehicle tax for the first five years[5]. The principle aim of the initiative is to create an environmentally friendly transport sector, as well as to promote sustainable in the Swedish automotive industry.

Significant resources will be allocated to increasing energy efficiency at the regional and local level by favouring the implementation of energy efficiency agreements between local authorities and the Swedish Energy Agency. A five-year programme for energy efficiency (2010–2014) has been launched to promote the development and the use of new energy efficient technology by means of technology and green procurements aimed at increasing the range of energy-efficient products on the market. Furthermore, an "energy audit cheque" system will be launched to help SMEs that use significant amounts of energy to carry out energy audits in 2010–2014.

Outcome

In 2006, the Swedish Environmental Protection Agency (SEPA) and the Swedish Energy Agency (SEA) analysed virtually all the financial steering instruments in

[5] Furthermore, the vehicle tax will now be related to the vehicles' carbon emissions, energy tax on diesel will be increased and the General carbon tax will gradually be raised.

environmental policy in their joint report *Financial steering instruments in environmental policy* (SPA, 2006). A number of Swedish financial steering instruments (taxes, fees, tax relief and subsidies) have been shown to have a good environmental impact and good dynamic effects on society, for instance by promoting the development of energy saving and energy efficient technology. The agencies consider that general non-sectoral taxes, such as the carbon dioxide tax, are the steering instruments which generally are best able to bring about long term effective environmental steering in society. Energy and carbon taxes, together with legislation and voluntary programmes, have made a successful contribution to the emergence and the development of efficient and environment-friendly technology in Swedish enterprises. In the transport sector, energy and carbon taxes have helped to mitigate the rise in emissions by steering towards more efficient vehicles and promoting the greater use of renewable energy. The climate and energy policies implemented have also contributed to the development of the Swedish environmental technology sector and increased Swedish exports of environmental technology. As described in the previous section, new jobs in green companies have been created and demand for green technology has increased. While no comprehensive Swedish studies have been carried out to assess the employment impact of past and current climate and energy policies, most economists in Sweden believe that there will be a neutral net effect on employment in the long run.

2.4 Examples of recovery measures to address labour market needs and, at the same time, contribute to economy greening

In early 2009, a permanent tax reduction for repair, maintenance and improvement (the RMI tax deduction) for one-family houses and tenant owner housing was introduced in order to stimulate activity and sustain labour demand in the construction sector. This measure is expected to reduce tax revenue by SEK 360 billion (around EUR 35.5 billion). Even though the eligibility criteria do not include an environmental dimension *per se*, the RMI may contribute to more environment-friendly housing.

In addition to the measures previously described favouring the development of green technologies in the automotive industries, in December 2008 the Government launched a set of measures to address the crisis in the ***automotive sector*** and to facilitate the more rapid development of green technology. A new limited company was formed and received SEK 3 billion (EUR 29.6 billion) to conduct research and development activities in the automotive sector that promote the development of green cars and to help to restructure the industry towards a more climate friendly production.

3. Review of labour market policy developments

3.1 Relevant labour market policies that can and are supporting going green.

Apart from the short lived Green Jobs programme (*Gröna Jobb*[6], 2004-2006) targeted at the long term unemployed, Sweden does not have specific active labour market programmes that bring together employment and environmental concerns.

As mentioned in the previous section, the main instruments in Sweden for coping with structural unbalance in the labour market and the negative impact of structural changes on employment remain the existing set of measures within the active labour market policy framework, in particular labour market training, job brokerage and counselling. In Sweden, the main common feature of labour market training is a strong vocational provision, which is also provided within the regular education system and commissioned through private training companies. In addition to training measures, the Swedish Public Employment Service (PES) uses a wide range of other labour market interventions to cope with labour market mismatches and to facilitate the matching process. Some of the activities in this respect include the dissemination of information, vocational and occupational guidance services and job brokerage. Another central characteristic in the dissemination of information in Sweden is the efficient self-service tools for matching purposes via internet facilities. In particular, a new online forecast system (time horizon 10 years) gives valuable information to job seekers regarding the actual and expected demand situation (shortage balance, etc) in more than 150 occupations in the various Swedish regions, some of which are related to the green economy (*Yrkeskompassen*: http://yrkeskompassen.arbetsformedlingen.se/).

It should also be stressed that lifelong learning (LLL) is an integrated part of the Swedish educational and employment system and there are many opportunities to complete or enhance educational attainment after leaving initial education, either through the adult education system or through various training courses within the framework of the labour market policy. At the work place level, access to on-the-job training or the opportunity for an employee to further develop their skills also forms an important component of the Swedish LLL system. Many Swedish workplaces provide comprehensive in-service training for personnel at all levels of the organization and

[6] The Green Job programme was the result of a Collaboration/agreement between the Swedish Forest Agency the Labour Market Authority and the Swedish ESF council. Around 3 000 long term unemployed (with at least an unemployment spell of 18 months) took part in the scheme. The scheme implied that the participant worked in environmental activities (60% of the time) and attended training courses related to the green jobs (mainly preservation of the environment forest, parks etc). According to the Swedish Forest Agency (http://www.skogsstyrelsen.se/episerver4/templates/SNormalPage.aspx?id=18060&epslanguage=SV) around 47% of the participants found a job in the regular labour market after the completion of the programme or were enrolled in training programmes.

therefore are an important component in enhancing the matching process in the labour market (see Anxo, 2007).

In other words, structural unemployment due to the greening of the economy, a skill shortage of green professional and the possible negative impact of structural changes related to the development of a green economy will be addressed through the existing channels mentioned above.

3.2 The role of ESF funding

Sweden has drawn up a frame of reference for implementing Structural Funds Programmes, the National Strategy for Regional Competitiveness, Entrepreneurship and Employment 2007–2013. The initiatives conducted within the framework for the Swedish Structural Funds Programmes therefore focus on programmes aiming at developing the skills of the employed, with, more recently, a clear focus on firms where a large number of dismissal notices have been issued. According to the Swedish ESF-councils the programme contributes to the achievement of sustainable development by focusing on the supply of skills and an increase in the labour force. Some projects and initiatives supporting the development of an environmentally friendly economy have also been taken within the framework of Structural Fund Programmes. Table A3 in the appendix below shows how the funding from the Structural Funds (European Regional Development Fund programmes ERDF) is expected to be allocated primarily among the main priority areas. As shown by the table, the programmes relating to the promotion of renewable energy and energy efficiency constitute a small share of the Swedish ESF funding. According to the programme documentation, the various programmes are expected to contribute to 33 300 new job opportunities and 12 800 new companies. Unfortunately, no information is available on the estimated number of jobs that will be created in the specific ESF-programmes supporting the development of a green economy.

3.3 Skill anticipation system and green tax shifts

Forecasts and surveys on skill needs have a long tradition in Sweden; indeed, some date back to the late 1950s. These forecasts constitute good instruments to estimate the potential imbalances between supply and demand regarding employments, skill and educational needs. Several short and medium term forecasting instruments have been developed over the past decade in order to provide the Government and labour market authorities with information on skill needs. The long term projections, based on demographic and econometric models with a 15-20 years time horizon, are essentially aimed the long term assessment of the supply and orientation of education in line with forthcoming demand of skills and occupations. As previously mentioned these instruments are flexible and can be amended and adapted in order to take into account the emergence of new skills and occupations related to the development of the green economy.

In Sweden, the issue of environmental taxes was heavily debated in the 1990s, in particular with regards to green 'tax shifts'. While environmental taxes are considered to be an important instrument for promoting sustainable growth, the green 'tax shift' is expected to produce a double dividend; notably, a reduction in damaging environmental activities and an increase in employment.

A green tax shift was implemented in Sweden between 2001 and 2006, entailing higher environmental taxes (carbon tax and energy taxes) and lower taxes on labour, mainly by raising the basic allowance in the income tax system but also through a modest reduction of payroll tax. The Swedish green tax shift was based on fiscal neutrality and the primary aim of the tax reform was to improve the environment (although employment motives were also present).

The choice of a reduction of income tax instead of a larger reduction of payroll tax was essentially motivated by distributive concerns, i.e. to limit the negative impact of the increase of environmental taxes on disposable income for low and medium income earners[7].

To the best of my knowledge no formal evaluation has been conducted in Sweden to measure the impact of the green tax shift on employment. The employment effect of the green tax shift has been based on empirical evidence from studies aimed at evaluating the employment effect of a reduction in payroll tax. These evaluation studies have shown that a reduction in payroll tax has a limited net effect on labour demand due in particular to large deadweight, windfall and displacement effect. In other words, there are strong reasons to believe that the employment effect of the Swedish Green Tax reform has been limited, due both to the weak reduction of payroll tax (0.5 %), as well as the negative side effects mentioned above.

4. Conclusion

As shown by the previous developments, Sweden has an ambitious environmental and energy policy. The employment and labour market consequences of this policy and the ongoing restructuring process related to the development of green technology have, to date, not given rise to empirical studies. It is therefore extremely difficult to assess the labour market consequences of the green measures and the transitions toward a more environmental friendly economic growth. More globally, there is no direct connection between climate/energy and employment/labour market policy. On the other hand, Sweden appears to have a set of good and flexible forecast instruments for assessing current and future skill needs, both short and long term, and for monitoring potential skill shortages. In our view these forecasting instruments could be easily adapted to take into account the transformation implied by the development of the green economy, in particular regarding the emergence of new occupations and skill requirements. As

[7] A study performed by the Swedish green party (Miljöpartiet de Gröna, 2009) shows that the distributive impact of the green tax shift has been limited, especially for low income earners.

before, structural changes in Sweden will be addressed mainly by traditional active labour market measures and educational policy. The social partners and the existing bipartite Swedish job councils will also play a crucial role in mitigating the potential negative impacts of the restructuring process related to the development of a green economy.

Bibliography

Anxo, D (2007), 'Lifelong learning and skills development: a review of trends and policies with a particular focus on gender and age in Sweden, EEO Autumn Review, December 2007.

Anxo, D (2008), 'Improving the capacity to anticipate EU-wide labour market and skills requirements, EEO Autumn Review, December 2008.

Environmental Objective Council (2009), Sweden's Environmental Objectives in Brief, Stockholm.

LO (2009), LO Klimatprogram, Stockholm

Miljöpartiet de Gröna (2009), Utvärdering av den Gröna Skatteväxlingen 2001-2006, (*Evaluation of the Green Tax Shift*, 2001-2006), Stockholm

SCB (2009), System of Environmental and Economic Accounts, http://www.pubkat.scb.se/Pages/Product____38175.aspx?Produktkod=MI1301&displaypublications=true

Swentech (2009a), Swedish Strategies and Initiatives for Promotion of Environmental Technologies, Stockholm.

Swentech (2009b), Svensk Miljöteknik i Siffror (Statistics abour Swedish Cleantech), Göteborg.

Swedish Environmental Protection Agency (SEPA), (2006), Ekonomiska Styrmedel i miljöpolitik", www.energimyndigheten.se

Swedish Government (2009), An eco-efficient future - an overview of Swedish climate and energy policy, http://www.sweden.gov.se/sb/d/574/a/129935

Swedish Government (2009a), A Cohesive Climate and Energy Policy Government Bill. 2008/09:162 and Government Bill 2008/09:163.

Swedish Government (2009b), The Swedish Reform Programme for Growth and Jobs-Annual Progress Report 2009, http://www.sweden.gov.se/sb/d/574/a/135188

TCO (2009), TCO Klimatprogram, Stockholm.

APPENDIX

Table A1: Number of employed men and women by environmental area, 2003-2007

Environmental area	**Employed women**	**Employed men**	**Total employed**
Air pollution control	315	831	1 147
Wastewater management	1 195	5 474	6 669
Waste management	2 684	13 401	16 085
Soil and groundwater	268	631	899
Noise and vibration	50	178	228
Environmental consultants	3 405	4 850	8 254
Education, research and monitoring	2 323	2 017	4 340
Recycled materials	1 611	8 194	9 805
Renewable energy, *of which*	3 170	11 232	14 402
Electricity/heat from renewable biofuels	*1 415*	*4 862*	*6 277*
Wind power	*348*	*1 289*	*1 637*
Solar	*227*	*515*	*742*
Hydropower	*411*	*955*	*1 366*
Manufacturing of biofuels	*209*	*1 032*	*1 241*
Renewable transport fuels	*117*	*394*	*511*
Geothermal heat and others	*443*	*2 185*	*2 628*
Heat/energy saving	1 102	5 007	6 109
Sustainable. agriculture./fishery	652	1 921	2 573
Sustainable forestry	146	664	810
Other resource management. (eco-tourism included)	524	556	1 080
TOTAL	***17 444***	***54 956***	***72 400***

Source: Swedish Government (2009b), page 87. http://www.sweden.gov.se/sb/d/574/a/135188

Table A2: Distribution of employment by educational attainment in the cleartech sector and the Swedish economy as a whole, 2007

	Compulsory education or less	Upper secondary education	Tertiary education less than three years	Tertiary education less than three years
Cleartech industries	18 %	52%	12%	18%
Economy as a whole	13%	50%	15%	22%

Source: Swentec (2009b).

Table A3: Funding Allocation by Priority Areas.

Priority area	**Indicative allocation of funding from the Structural Funds (SEK, millions)**	**Allocation of structural funds decided up to and incl. 2008 (SEK, millions)**	**Allocation of national public funds decided up to and incl. 2008 (SEK, millions)**
Innovation and renewal, of which	**6 400**	**2 343**	**4 304**
Research and development for an innovative business sector	5 400	2 094	4 038
Renewable energy and energy efficiency	500	53	65
Tourism, culture and metropolitan areas	500	156	201
Accessibility, of which	**1 500**	**515**	**608**
Information Society	900	217	245
Transport	600	298	363
Total	7 900	2 858	4 912

Source: Swedish ESF Council (2009), http://www.esf.se/