European Employment Observatory

EEO Review: Promoting green jobs throughout the crisis, 2013

Finland

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1. Introduction: employment in the green economy

Finland is a small country with a limited set of natural resources and contracting manpower resources. This means Finland can only take the 'high road' to secure success in global competition, i.e. investing in continuous innovation and environmental and societal sustainability. Also, one third of the deficit of the foreign trade balance was due to imported energy, amounting to EUR 7.7 billion (1 000 million), of which oil accounted for EUR 5.4 billion. Finding renewable energy solutions would thus have a major impact on the economy.

The structural challenges of EU – globalisation, climate change and an ageing population – are particularly pertinent for Finland. Finland is highly dependent on the global export market, making her vulnerable to the global crisis. Finland's first post-war global success was built around the forest and paper-industry which is very energy intensive and is now facing pressures from all sides – climate change and the competition on greening the economy, meeting changing customer values towards recycling and rising global competition from countries with huge fast-growing forest resources. Thousands of jobs have been lost in the last decade. Forests remain a major natural resource and a sustainable source of energy and materials in the future, but the forest industry needs to reinvent itself. The second success story of Finland was ICT in 1990 – 2000, epitomised by the global success of Nokia. This success was exhausted in the first decade of 2000 and now thousands of jobs have been lost and/or redirected in the ICT business. Finland is facing a clear but tough challenge: after two main global successes, some other global success must be found.

It seems that in the last few years a new level of shared understanding has been reached that the core of this new success is in good business ideas based on eco-efficiency, meaning economic produce/environmental impact. The last few years, and particularly since the 2008 economic crisis, there has been a step-up process and integration of Finland's efforts in greening her economy. Environmental and green growth issues are one of the keystones of the present national government programme and a new level of coordination of efforts has been reached in policies, programmes and practical activities.

The debate in Finland understands 'greening' of the economy and creating business and jobs as a crosscutting effort, as a challenge of eco-efficiency in any sector and activity. For this reason it is difficult to make exact estimates about the size of the green industry or jobs. It also needs to be said that the debate in Finland on the climate, green economy, jobs and environment occurs under a broader concept of 'environmentally and socially sustainable development', which makes it a dual challenge to be both environmentally and socially sustainable at the same time. The activity to develop 'smart cities' is one key example of this 'fusion'.

Understood in a more delineated and practical way, estimates about the green economy are done under the cleantech concept. Cleantech business is one of the priorities of Finnish economic and industrial policy. The aim of the National Government is to lift Finland to one of the leading cleantech countries in the world and to double the turnover of cleantech from the present EUR 20 billion to EUR 40 billion by 2018 as well as create 40 000 new jobs by 2020. Presently, there are about 2 000 cleantech companies employing 50 000 people and a growth rate of 10.6 % in 2010 – 2011. According to industry assessments, environmental business has increased by 46 % between 2008 and 2012. Efforts permeate all key sectors of the economy: energy production; waste management and recycling; construction; forestry and agriculture; and transport.

2. Selection of green employment promotion strategies and programmes with low-carbon/ environmental objectives

2.1. Activity just before the 2008 global economic crisis

Since the 2008 global economic crisis the activity in Finland has been stepped up considerably, but activity on promoting environmentally sustainable development had already been a concern of several consecutive National Governments. The attempts have been rather fragmented, however, and now Finland seems to be arriving at a new era of coordination and activity concerning 'greening' the economy and finding new growth. One harbinger of a new era was the Environmental Programme (2005–2007) Sitra (the Finnish innovation Fund), which highlighted just before the 2008 global crisis the opportunities for environmental business.[1] The consecutive government programmes have to a great extent taken on board the suggestions of this programme.

2.2. Selection of strategies, policies and programmes

The programme of the national government for the period 2011 – 2014 has three priorities; (1) enhancing sustainable economic growth, employment and competitiveness, (2) the reduction of poverty, inequality and social exclusion and (3) consolidation of public finances. According to the programme, economic growth in Finland must be ecologically and socially sustainable. The Government strives for a Finland that is among the world's forerunners in environmentally friendly, resource and material-efficient economies and as developer of sustainable consumption and production methods.

Cleantech Programme, Cleantech Finland and Cleantech Cluster

The strategic umbrella of the present National Government (2011 – 2014) for promoting the green economy and jobs is the Strategic Programme for the Cleantech Business.[2] This can be considered to be opening up a new era in bringing together the otherwise disparate and fragmented efforts in the different fields and activities. On a practical level these efforts are supported by the Cleantech-cluster[3] which belongs to the Centre of Expertise Programme (OSKE, running 2007 – 2013)[4] and run by the Ministry of Employment and the Economy. Cleantech Finland is a brand owned by the Confederation of Finnish Industries, collecting a network of experts and companies in the global promotion of Finnish business in environmental efficiency.

A new strategy on the bioeconomy

The hopes of realising Finnish opportunities in the green economy job market are invested in the development of the bioeconomy and industries. As a part of the national government programme the preparation of a new Bioeconomy Strategy was launched in October 2012 as a joint effort of the Ministry of Employment and the Economy, the Ministry of the Environment and the Ministry of Agriculture and Forestry.[5]

[1] Internet: http://www.sitra.fi/en/environment

[2] Internet: https://www.tem.fi/index.phtml?l=en&s=4834

[3] Internet: http://www.cleantechcluster.fi/en/main_page/?id=7

[4] Internet: http://www.oske.net/en/

[5] Internet: http://www.tem.fi/?89508_m=108088&s=2468

Ecologically smart cities and smart environment

Big opportunities are apparent in developing the totality of the environment, especially urban areas, on an environmentally sustainable basis. The process is now gathered in the new focus area of the Finnish Funding Agency for Technology and Innovation (TEKES), the Intelligent Built Environment[6], and a programme in preparation called Smart City[7].

Sustainable Public Procurement

Procurement is a key factor in promoting a sustainable, green society and business. The Finnish Government recently passed a resolution that encourages all public actors to adopt sustainable procurement including the Central Government, Regional Governments and the municipal sector.[8]

2.3. Selection of Coordination of activities

The Finnish scene is characterised by a set of coordination platforms, some quite unique, which address environmental and social sustainability and promote innovation and cooperation between administrations, sectors and stakeholders.

Foresight report for Sustainable Growth and Well-Being 2030

The Government agreed in its meeting on 9 November 2012 to appoint a ministerial working group for the drawing up and implementation of a foresight report.[9] The report is to focus on the Finnish approach for sustainable growth in a changing world. The foresight report is to be submitted to the Finnish Parliament in 2013. The report will then be taken to the Committee for the Future of the Parliament.[10]

Finnish National Commission on Sustainable Development (FNCSD)

The key hub for sustainable development is the Finnish National Commission on Sustainable Development (FNCSD) which was established in 1993 and has continued to operate through several changes of government.[11] The Commission is chaired by the Prime Minister and includes a broad set of stakeholders.

Government Foresight Network

Government Foresight Network is an inter-ministerial forum for cooperation and exchange of information on issues relating to the anticipation of the future.[12]

[6] Internet: http://www.tekes.fi/fi/community/%C3%84lyk%C3%A4s_rakennettu_elinymp%C3%A4rist%C3%B6/1071/%C3%84lyk%C3%A4s_rakennettu_elinymp%C3%A4rist%C3%B6/2358

[7] Internet: http://www.tekes.fi/ohjelmat/Kaupunki

[8] Internet: http://www.ymparisto.fi/default.asp?contentid=319422&lan=EN

[9] Internet: http://vnk.fi/hankkeet/tulevaisuusselonteko358587/en.jsp

[10] Internet: http://web.eduskunta.fi/Resource.phx/parliament/committees/future.htx

[11] Internet: http://www.ymparisto.fi/default.asp?node=4412&lan=en

[12] Internet: http://valtioneuvosto.fi/tietoarkisto/ennakointiverkosto/en.jsp

National Foresight Network

The National Foresight Network is an open network which brings together Finnish foresight experts and decision-makers[13] to promote a long-term perspective in Finnish decision-making and to improve the society's ability for a controlled structural renewal.

Promoting practical innovation towards a greener and sustainable society

The Finnish Funding Agency for Technology and Innovation (TEKES), operating as an agency of the Ministry of Employment and Economy, is the most important publicly funded expert organisation for financing research, development and innovation in Finland and has a broad set of programmes addressing green and white sustainability issues, like the Green Growth Programme 2011 – 2015.[14]

Promoting energy efficiency

Motiva Ltd[15] is a state owned expert company promoting efficient and sustainable use of energy and materials. Its services are utilised by the public administration, businesses, communities, and consumers.

Research

The Academy of Finland[16], a key funder of scientific research (funding EUR 317 million in 2013), is actively involved in the activities of the Strategic Centres for Science, Technology and Innovation (SHOK).[17] Another key research institute is the Technical Research Centre of Finland (VTT).[18]

2.4. Social partners

Both the Confederation of Finnish Industries and the trade unions have recently been active in promoting the green economy and jobs.

3. Detailed description of practices

3.1. Strategies

3.1.1. Cleantech

The Strategic Programme for the Cleantech Business[19] can be considered as the mainstay of getting more cohesiveness and cooperation in the Finnish initiatives in greening the economy. As stated in Section 2.2, the programme is aimed at spurring Finnish companies towards sustainable growth and renewal through clean technologies with the goals of substantial job creation within the cleantech sector by 2020 and a doubling of the total turnover of cleantech businesses by 2018.

[13] Internet: http://www.foresight.fi/info-in-english/

[14] Internet: http://www.tekes.fi/programmes/Kestavatalous

[15] Internet: http://www.motiva.fi/en/areas_of_operation/

[16] Internet: http://www.aka.fi/en-GB/A/Academy-of-Finland/

[17] Internet: http://www.aka.fi/en-GB/A/Programmes-and-cooperation/Strategic-centres/

[18] Internet: http://www.vtt.fi/?lang=en

[19] Internet: https://www.tem.fi/index.phtml?l=en&s=4834

On a practical level these efforts are supported by the Cleantech-cluster[20], belonging to the Centre of Expertise Programme (OSKE).The basis of OSKE is regional specialisation, where a cluster is formed with –four to seven centres of expertise working on the same topic. The city of Lahti Science and Business Park coordinates the work of the Cleantech Cluster.[21] The Lahti Science and Business Park is now integrated to a new company, LADEC Ltd.[22] Four cities/regions belong to the cluster: Lahti (material efficiency), Kuopio (international research, environmental risks, safety and health), Oulu (water industry) and Uusimaa (energy efficiency in urban environments).

3.1.2. A new strategy on the bioeconomy

The strategy process, which includes a broad set of stakeholders and citizens, will produce a Government Decision and an Action Plan due for adoption in the spring of 2013. The aim of the strategy is to create new businesses and services based on renewable resources, including biotechnological processes, food production chains and the recreational use of nature.

3.1.3. Ecologically smart cities and smart environment

Big opportunities are seen in developing the totality of the environment, especially urban areas, on an environmentally sustainable basis. This means intelligent electric grids, traffic and households, together with other aspects of sustainable development and the growth of cities. To this end there has already been a process of developing Carbon Neutral Municipalities (HINKU).[23] The HINKU project has brought municipalities, businesses, citizens and experts together to create and carry out solutions to reduce greenhouse gas emissions. Six local authorities have pioneered this. The TEKES Programmes 'Sustainable Community' (2007 – 2012, with EUR 95 million, financing 150 company and municipality projects and 65 research projects), and 'Space' (2008 – 2012, with EUR 77 million, financing 100 company and 70 research projects) have accelerated the process in developing the change in land-use, building and construction on a sustainable basis.[24]

The process is now continued in the new focus area of TEKES, Intelligent Built Environment, and the Smart City programme, mentioned earlier. The Ministry of Employment and the Economy has also launched the possibility to apply by February 2013 to a new Innovative Cities (INKA) programme[25] for larger cities with the aim of establishing synergies in promoting innovations in sustainable land-use, housing and traffic solutions.

As Finland has a very strong and autonomous local government with a very broad palette of services ranging from infrastructure to education, social and health services, and business promotion, progress in local government towards a comprehensive approach on 'greening' is both pertinent and opportune, as well as developing world class 'total solutions' for local governments.

[20] Internet: http://www.cleantechcluster.fi/en/main_page/?id=7

[21] Internet: http://www.cleantechcluster.fi/fi/fokusalueet/lahti/?id=142

[22] Internet: http://www.lahtisbp.fi/fi/ladec/ladec_in_english

[23] Internet: http://www.ymparisto.fi/default.asp?node=22737&lan=en

[24] Internet: http://www.tekes.fi/fi/community/Uutiset/404/Uutinen/1325?name=tulosseminaari

[25] Internet: http://www.tem.fi/inka

3.1.4. Sustainable Public Procurement

As already mentioned above, procurement is a key factor in promoting a sustainable and green society and business. The public sector is big in Finland and it is pioneering sustainable procurement. The value of public procurement in Finland is EUR 27 billion per year. This means that public actors have good reason to make procurements that will help to mitigate climate change, reduce the amount of waste and prevent pollution of the environment. The Government's resolution that encourages all public actors to adopt sustainable procurement should contribute to progress in this area.

3.2. Coordination of activities

3.2.1. Government Foresight 2030 - a report on sustainable growth and well-being in Finland

The National Government Programme addresses a broad set of green challenges and is due for a 'halfway-house' revision in February-March 2013. Tying in with this, the Government agreed in its informal meeting on 9 November 2012 to appoint a ministerial working group for the drawing up and implementation of a foresight report which will focus on the Finnish approach for sustainable growth in a changing world. The report will examine future developments from the viewpoint of the economy, people's well-being and the environment in their global contexts and its time-scale will cover the next 10 - 20 years. It is expected to identify likely development trends and set objectives and strategic outlines for the government work and will then be submitted to the Finnish Parliament and the Committee of the Future in 2013. The Committee for the Future deliberates parliamentary documents referred to it and, when requested to do so, makes submissions to other committees on futures-related matters which are included in their spheres of responsibility and have a bearing on development factors and development models of the future. The Committee conducts research associated with futures studies including their methodology. The Committee also functions as a parliamentary body that conducts assessments of technological development and the effects of technology on society.

3.2.2. Finnish National Commission on Sustainable Development (FNCSD)

The key hub for sustainable development, both green and white, is the FNCSD chaired by the Prime Minister. It includes a broad range of stakeholders; 44 members, six ministries, the Parliament, public administration, business, trade unions, regions, non-governmental organisations (NGOs), science, art and churches. The most important objective of the FNCSD is to make sustainable development a central part of national policies and administrative practices. Finland's approach is referred to as the 'Finnish model', in which broad-based, multi-stakeholder participation is combined with high-level political leadership. In this model, the Government, civil society and business life are engaged in an open dialogue on sustainable development policy. The leadership of the Prime Minister has also characterised the commitment to sustainable development. The term of FNCSD is five years, with the current period having begun in 2008.

3.2.3. Government Foresight Network

Government Foresight Network is an inter-ministerial forum for cooperation and exchange of information on issues relating to the anticipation of the future.[26] Anticipation of the future refers to a systematic and inclusive process involving the collection, assessment and analysis of information. It also includes outlining projections and visions for the future in the medium and long term.

3.2.4. National Foresight Network

This network brings together Finnish foresight experts and decision-makers[27] to discuss the challenges that Finland faces and subject these to closer examination, promoting innovation activities that provide the necessary answers to the challenges. The goal of the cooperation is to promote a long-term perspective in Finnish decision-making and to improve Finnish society's ability for a controlled structural renewal.

3.2.5. TEKES: Promoting Practical Innovation towards a Greener and Sustainable Society

The on-going TEKES Programmes related to the green economy and jobs[28]:

Green growth – Towards a Sustainable Future 2011 – 2015. The aim of the Green Growth programme[29] is to identify potential new growth areas for sustainable economy businesses, which are essentially based on lower energy consumption and the sustainable use of natural resources. The programme aims at a leap forward in energy and material efficiency of production and service chains over the entire life span of products. The programme is aimed at companies seeking to grow or renew their business in the face of changes in energy and raw material prices and impacts of laws and regulations. The programme will support the generation of new innovations especially on boundaries between sectors, as future sustainable economy solutions will not be defined by traditional sectorial divisions. Research organisations will play an important role in generating new anticipatory information and skills.

BioRefine – New Biomass products 2007 – 2012. The BioRefine programme will generate new and unique expertise in the processing of biomass and apply it to the creation of processes, products and services related to biorefineries.

Groove – Growth from Renewables. The main objective of the Groove programme is to enhance the business capabilities of Finnish small and medium-sized companies working with renewable energy by improving their international competitiveness and developing networks with the financier network.

Green Mining 2011 – 2016. The main objective of the Green Mining programme is to make Finland a global leader of sustainable mineral industry by 2020. This has become a hot topic with the considerable recent growth of mining in Finland and some environmental near-catastrophes.

[26] Internet: http://valtioneuvosto.fi/tietoarkisto/ennakointiverkosto/en.jsp

[27] Internet: http://www.foresight.fi/info-in-english/

[28] Internet: http://www.tekes.fi/en/community/Ongoing_programmes/554/Ongoing_programmes/1425

[29] Internet: http://www.tekes.fi/programmes/Kestavatalous

Built Environment 2009 – 2014. The programme focuses on renovation and refurbishment, construction for well-being concepts and infrastructure construction.

Eve – Electrical Vehicle Systems 2011 – 2015. The aim of the Electric Vehicle Systems programme is to create a community of electric vehicle and support system developers in order to develop new technology, business and service competence.

Functional Materials 2007 – 2014. The Functional Materials programme aims to develop new applications for Finnish industrial sectors. The properties of functional materials are designed to serve a specific purpose in a controlled way for special or challenging environmental conditions.

SymBio – Industrial Biotechnology 2006 – 2011. SymBio renews industrial processes and environmental conservation using biotechnology and boosts the application of biotechnology across industry sectors.

Water 2008 – 2012. The objective of the programme is to contribute to technology transfer, new applications development, business competence development and overall competitiveness of the Finnish water sector in the international market.

There are also several ICT-related programmes which have an environmental impact dimension through making solutions intelligent, like Ubicom – Embedded ICT 2007 – 2013, developing embedded systems and processors designed to make everyday life easy by functioning inconspicuously in the background. In the programme, technologies are developed and piloted for selected applications.

3.2.6. Promise on promoting green growth - campaign

The Ministry of Employment and the Economy, together with TEKES[30], and in connection with the Cleantech Strategic Programme, launched a campaign, 'Promise on Promoting Green Growth' in the autumn of 2012[31]. For those public, private and third sector actors who sign up, there is a concrete promise on their role and goals in promoting green growth in the services they provide over the Internet. So far over 50 institutions have given a 'promise'.[32]

3.2.7. Promoting energy efficiency

Motiva Ltd, outlined above, provides services in marketing Energy Efficiency Agreements, support and monitoring of implementation, development of energy audits and analysis activity, increasing the use of renewable energy, promoting material efficiency, publicising energy and material efficiency, influencing attitudes and consumer habits, monitoring and impact assessment.

3.2.8. Compilation of best practices in Finland in green sustainability

On the Ministry of Environment web pages there is a compilation of best practices in Finland on addressing the green challenge.[33]

[30] Internet: http://www.tekes.fi/en/community/Tekes/339/Tekes/1279

[31] Internet: http://www.tem.fi/index.phtml?s=4860

[32] Internet: http://www.tem.fi/index.phtml?s=4978

[33] Internet: http://www.ymparisto.fi/default.asp?contentid=79126&lan=en

3.2.9. Science and research

At the Strategic Centres for Science, Technology and Innovation (SHOK), researchers and research teams from universities and research institutes work closely together with companies with a view to generating new and innovative results or products. The knowledge produced by this research provides a vital impetus for new technologies, innovations and other applications. The Technical Research Centre of Finland (VTT) is a globally networked multitechnological applied research organisation active in a myriad of environmental and sustainable development projects, [34]as are also other research institutes in Finland.

3.2.10. Social partners

Confederation of Finnish Industries

The Confederation of Finnish Industries has been active in the 'green issue' and is the owner of the Cleantech Finland brand, [35] through which Finnish companies are promoted globally. Cleantech Finland is a network of top cleantech experts in different companies finding cleantech solutions. The Confederation also runs an Environmental Forum,[36] a platform and information channel for companies in the environmental business and organisations promoting environmental business.

Trade unions

The trade unions have also been active on environmental and green issues. For the first time a new joint industrial growth programme, Responsible Competitiveness, [37]was published on 8 January 2013 by the Confederation of Labour Unions (SAK) and The Finnish Confederation of Professionals (STTK)[38].

3.2.11. Structural Funds and the green economy

The Ministry of Employment and the Economy is the managing authority of the European Regional Development Fund (ERDF) programme. It has been agreed in Finland that 80 % of ERDF funding should go to support the Centre of Expertise programme. In the South Finland ERDF programme[39] Priority 5 is energy efficiency, co-production and energy management. One of the major projects in this field has been K-Easy (biggest single ERDF investment in a project). K-Easy is a multi-centred urban area/regional project which was launched via a negotiated selection process with ERDF, the local authority (city) and private funding. The project is addressing various aspects of the main objective – sustainable housing and construction – encompassing the capital city area and cities in the South-Eastern part of Finland. The K-Easy coordinator, Lahti Science and Business Park, is a Centre of Expertise in the Cleantech Expertise Cluster,[40] which is an Environment Technology Cluster, and a part of the Govern-

[34] Internet: http://www.vtt.fi/uutta/2007/talotekniikka-roadmap2007.jsp?lang=fi

[35] Internet: http://www.cleantechfinland.com/

[36] Internet: http://www.ek.fi/ymparistofoorumi/fi/toiminta/index.php

[37] Internet: http://www.sak.fi/aineistot/julkaisut/esitteet-ja-julkaisusarja/kilpailukykya-vastuullisesti-2013-01-08

[38] Internet: http://www.sttk.fi/fi-FI/uutiset/uutinen/uutiset-2013/sttk-ja-sak-osaamisesta-ja-tuottavuudesta-lisaa-kilpailukykya-suomelle

[39] ERDF Southern Finland CCI 2007 FI 16 2 PO 004.

[40] Internet: http://www.cleantechcluster.fi/en/main_page/?id=7

ment Centre of Expertise Programme. All regions and local authorities in Finland have strategies and development plans for sustainable development, construction, housing and energy efficiency. The total budget for K-Easy was EUR 2 276 121, of which 70 % was ERDF-funding.

4. Conclusion

Finland ranks fourth in the WWF: Cleantech Group Cleantech Global Innovation Index[41] after Denmark, Israel and Sweden. However, Finland was not in the global vanguard of taking the initiative on greening the economy, but rather a 'second mover' that is now aiming to be top of the class.

There are many angles to the success factors, good practices and the flipside – weaknesses and barriers - to promoting the green and greening of the economy and jobs in Finland.

An overall conclusion is that Finland has arrived at a new era in terms of political will, cohesiveness and coordination of green economy initiatives and has a rich policy palette already established and in the pipeline. The efforts have been stepped up since the global crisis 2008. A clear example of this is the establishment of the Cleantech strategic programme, backed up by a Cleantech Finland brand and Cleantech Clusters which all serve to add cohesiveness to the otherwise complex and often confusing topic and efforts.

But the level of coordination and investment leaves room for improvement. There is still fragmentation of the efforts between the ministries, despite quite impressive coordination bodies and activities like the Future Committee of the Parliament, a unique establishment, and the Finnish National Commission on Sustainable Development and the Government Foresight Network. There are positive attitudes in private companies and the public sector, but there remains a need to actually start doing things.

The challenges in restructuring the Finnish economy are so serious that success with the 'high road' strategy, aiming to be at the top of the global class of the green economy is a necessary, yet a precarious one - 'Good workplaces and need for investment stem from good business ideas', to quote one of the leading Finnish professors in this area.[42]

The challenge is to permeate the whole economy and society with a new level of understanding that our success lies in the ability to produce high-end, globally needed products with reasonable investment and high eco-efficiency. This is a very complex task and calls for a real realisation of the potential of eco-efficiency. Greening is still often understood as something 'extra' which can be afforded 'after we survive the crisis'.

In terms of political will and stakeholder cooperation, Finland has a history of pragmatic and consensual policy making, and greening the economy is no exception; to the contrary, agreement between social partners in this area has been easier than in the traditional wage-agreement areas.

[41] Internet: http://wwf.panda.org/who_we_are/wwf_offices/germany/?203662/Denmark-tops-the-first-of-its-kind-Global-Cleantech-Innovation-Index

[42] Professor Matti Pohjola, Aalto University, Helsinki. In Helsingin sanomat 30.12.2012 and professor Raimo Lovio, Aalto University, interview 25.1.2013.

In terms of scientific research, development and innovation (R&D&I) investment, Finland has been at the top of the list of global investors for a long time and the research in the green topics has been clearly stepped up recently.

In education, sustainable development and greening is a crosscutting subject which has attracted more attention recently. Overall, green skills and jobs are treated as integrated topics depending on the subject and topic at hand.

In natural resources Finland's tradition has been based on extensive and well-maintained forests, and despite the on-going restructuring, forest and paper industries, through a painful process of 'creative destruction', remain one of the mainstays of the Finnish economy. Imported oil surpassed the use of wood as the number one source of energy in 1964 but last year wood reclaimed its number one position for the first time since, and is a harbinger of a new era. Finland puts a lot of hope in bio-energy in the global division of labour and competition and has succeeded in bio-fuels and gassing of waste for energy use.

Some technical areas relevant for the green theme have already turned to global success. The Wärtsilä company[43] is a world market leader in diesel and natural gas engines, propulsion systems, power plant solutions and all related services and original spare parts. Also, ground source heat pumps in heating detached houses have been a major success. Every alternate new detached house is now heated by it. The elevator company Kone[44] is a global success in selling, manufacturing, installing, maintaining and modernising elevators and escalators, and automatic building doors, and has tripled its energy efficiency in the last few years.

The restructuring in the ICT industry, epitomised by the difficulties of Nokia, contains creative destruction and opportunities, as well. Finland is a high investor in engineer training and major engineering and technical resources are now 'on the move', and connecting to the greening of the economy.

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- The Internet sources in the footnotes have been used 28.1.2013.

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[43] Internet: http://www.wartsila.com/en/Home

[44] Internet: http://www.kone.com/corporate/en/Pages/default.aspx