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Département fédéral de l'environnement,
des transports, de l'énergie et de la communication DETEC
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Report to the Federal Council

Green Economy: Report and Action Plan

Table of Contents

Figures	4
Tables	4
Summary	5
PART I: REPORT	8
1 Background and mandate	8
1.1 Over-exploitation of natural resources.....	8
1.2 Green economy	8
1.3 The Federal Council's decision in 2010 on a green economy.....	9
2 Progress in implementing actions in the six areas	10
2.1 Cleantech Master Plan.....	10
2.2 Resource-efficient information and communication technologies (ICTs)	11
2.3 Improving information on the environmental impact of products.....	12
2.4 Greening the tax system	13
2.5 Comprehensive welfare measurement.....	14
2.6 Resource efficiency and sustainability in legislative drafts.....	15
PART II: GREEN ECONOMY ACTION PLAN	17
1 Introduction	17
2 Global pressure on natural resources	17
2.1 Global resource consumption	17
2.2 International efforts	19
3 Resource consumption in Switzerland	21
4 Strengthening the economy	24
5 The green economy approach	27
6 Sectoral policies that support the transition to a green economy	28
7 Green Economy Action Plan	30
7.1 Consumption and production	31
7.2 Wastes and raw materials.....	36
7.3 Cross-cutting instruments	38
7.4 Targets, monitoring, information, reporting.....	40

8 Costs and benefits of a green economy	42
8.1 Challenges.....	42
8.2 Impacts on companies	42
8.3 Macroeconomic costs and benefits	43
Sources	44

Figures

Figure 1: the notion of green economy.....	9
Figure 2: Global trends: GDP, population and CO2 emissions since 1990 and projection until 2050	18
Figure 3: Environmental impacts of Swiss final consumption, by area of consumption.....	23
Figure 4: Global market volume and growth projections for 2011-2025 for the various cleantech sectors	26
Figure 5: Green economy implementation approach:.....	28
Figure 6: Targets – monitoring – measures process	40

Tables

Table 1: Global consumption of important natural resources.....	19
Table 2: Consumption of important natural resources in Switzerland.....	22
Table 3: Cleantech: employment and gross value added in Switzerland, 2008	25
Table 4: Potential for additional value creation in 2050, thanks to a green economy.....	25
Table 5: Overview of the action plan: priority areas and measures	31

Summary

Background

Current lifestyles in industrialised countries are causing the over-exploitation of natural resources and are therefore not sustainable. It has become clear at the national and international levels that resource consumption must be lowered to naturally sustainable levels if the foundations of life are to be safeguarded for current and future generations.

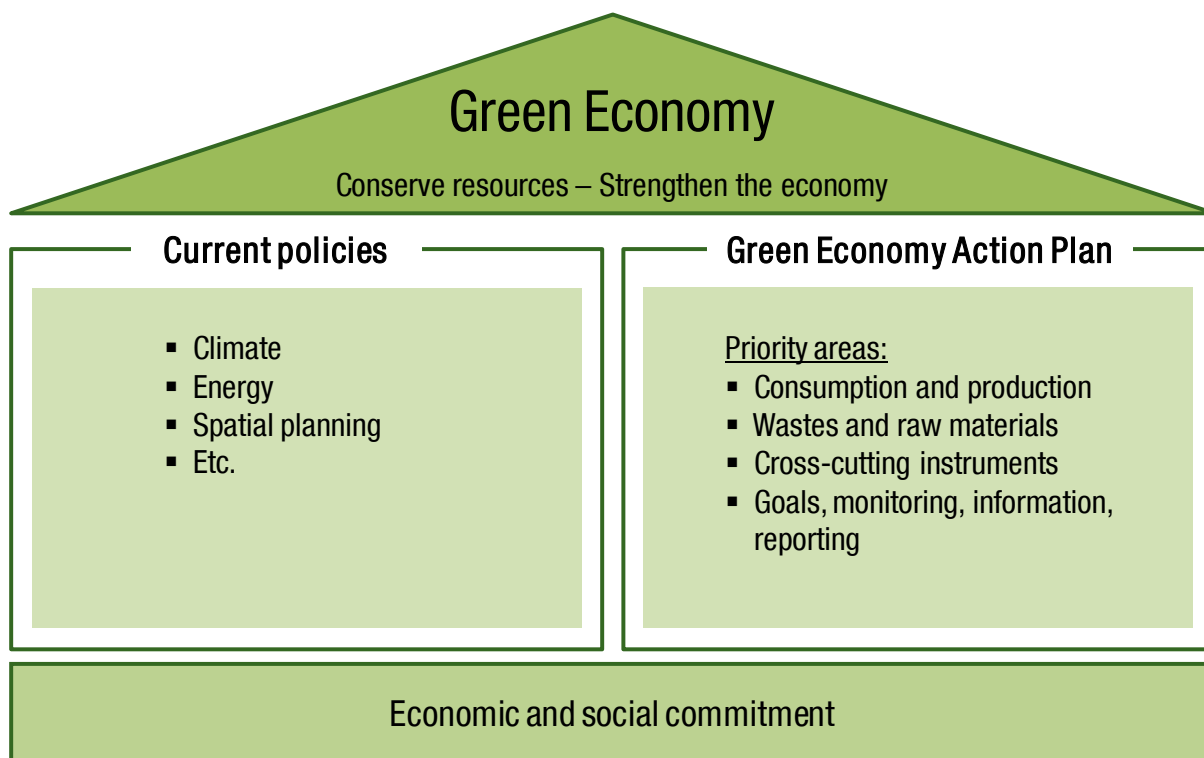
Green economy is the term used to describe an environmentally-friendly method of resource economic activity. This method takes into account the scarcity of limited resources and the regeneration capacity of renewable resources, increases resource efficiency and thus improves the performance of the economy and general welfare.

With its decision of 13 October 2010, the Federal Council signalled the move toward a green economy and mandated the Federal Administration to take action in six specific areas. The first part of this report discusses the progress of the actions taken in each of these six areas.

Approach and action plan

The second part of the report shows that pressure on natural resources is expected to rise in step with economic and demographic growth in Switzerland and around the world. According to the World Business Council for Sustainable Development (WBCSD), serious long-term consequences can be avoided if global resource consumption becomes four to ten times more efficient by 2050.

The diagram of the green economy implementation approach shows that existing policies (energy, climate, spatial planning) already contribute a great deal to reducing environmental impacts, but resource efficiency must be significantly improved, especially when it comes to the use of raw materials and consumer products. The figure below provides a diagram of this approach.



Predictable, innovation-friendly national framework conditions and a firm and voluntary commitment by the economy and society are necessary to successfully transition to a green economy.

Priority areas and measures

The suggested measures in the action plan are aimed at advancing the transition to a green economy in four priority areas:

(1) Consumption and production: current consumption patterns and production methods use large quantities of resources and cause major environmental impacts. To induce change in this area, it is necessary to improve information on the ecological aspects of products and company product ranges and increase innovation. Furthermore, cooperation with the economy is required to provide opportunities for further efficiency improvements.

(2) Wastes and raw materials: the extraction of raw materials causes major environmental impacts. More efficient use of raw materials and the closure of material cycles will need to become priorities. Fewer raw materials should be used to produce goods and less waste should be generated.

(3) Cross-cutting instruments: the Cleantech Master Plan and greening the tax system are projects that affect more than one issue. But since a large portion of our environmental impact is caused abroad, we will not reach our goals by working solely at the national level. To reduce the overall pressure exerted on natural resources from the extraction of raw materials and the production of goods, Switzerland will need to step up its international efforts to promote a green economy.

(4) Targets, monitoring, information, reporting: to know whether Switzerland is on its way to becoming a green economy, it must fully measure its progress and use these measurements as the basis for monitoring the success of its measures. Goals must also be set and progress reports prepared. In addition, dialogue with economic actors, the scientific community and

civil society is an important part of developing a green economy. Finally, awareness measures can be used to support this dialogue.

Costs and benefits of a green economy

Measures to enhance the resource efficiency of the Swiss economy will generate - at least in the short term - costs that will have to be assumed by the polluters. However, resource efficiency also makes it possible to cut costs, open new markets and create jobs. It can also help reduce the external costs caused by damage to the environment.

PART I: REPORT

1 Background and mandate

1.1 Over-exploitation of natural resources

Natural resources are a fundamental basis for the welfare of our society. If resources such as water, soil, clean air, raw materials or mineral resources such as energy raw materials and metals were no longer available in sufficient quantity or quality, our entire economic system and quality of life would be in jeopardy.

Yet, in many places, the quantity of natural resources consumed greatly exceeds their capacity to regenerate, which leads to phenomena such as climate change, biodiversity loss and increasing soil scarcity.

Current lifestyles in industrialised countries are causing the over-exploitation of natural resources and are therefore not sustainable. And it is likely that economic and demographic growth will carry on, increasing the pressure over time. For that reason, it is becoming gradually clearer at the national and international levels that natural resources need to be used more efficiently and sustainably.

1.2 Green economy

The overall strain on the environment and natural resources must be reduced in absolute terms in the long run if we hope to safeguard the livelihoods of current and future generations.

Green economy is the term used to describe this environmentally-friendly production and consumption system. The transition to a green economy is a multi-generational challenge that will shape Switzerland and the international community for decades. However, meeting this challenge is also in the interest of the Swiss economy, as it will enable Switzerland to make full use of its strong innovative capacity and bring its sustainable, resource-efficient technologies to global markets in the future.

Different aspects of the definition and understanding of a green economy are given emphasis depending on the region of the world and the international bodies and organisations concerned. While the UN uses a broader definition that includes anti-poverty measures and equitable resource distribution in developing countries, the OECD and EU do not deepen these issues in their green economy initiatives as the countries involved are more advanced economically.

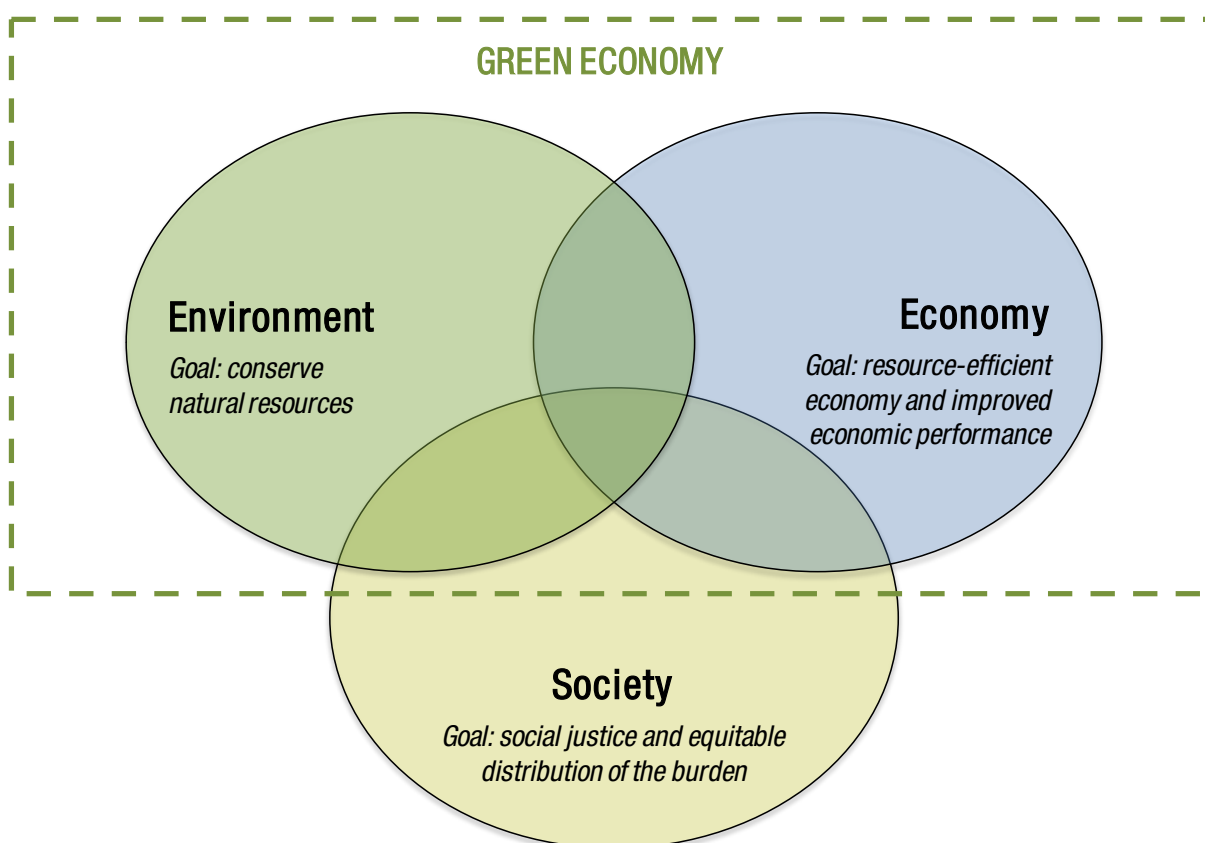
In Switzerland, the notion of green economy basically refers to a production and consumption system that takes into account the scarcity of limited resources and the regeneration capacity of renewable resources, enhances resource efficiency and thus generally improves the performance of the economy and welfare.

Figure 1 relates our understanding of a green economy to the broader concept of sustainable development, which seeks to reduce natural resource consumption to naturally sustainable

levels and conserve resources (green “environment” circle). A more resource-efficient economy is necessary to achieve this goal, which will improve its performance as a result (blue “economy” circle). These two circles represent the green economy and its goals. Improvements in these two areas make a decisive contribution to maintaining our welfare and quality of life. The social dimension (yellow “society” circle) should benefit from these efforts. Nevertheless, social welfare is not a priority of green economy measures in industrialised countries.

The notion of green economy does not replace the notion of sustainable development. At the Rio+20 Summit in 2012, the green economy was in fact recognised as an important tool for achieving sustainable development. In other words, the green economy contributes significantly to sustainable development. In Switzerland, this is clearly shown by the Sustainable Development Strategy 2012-2015, in which the Federal Council sets out a series of measures to meet ten key challenges. The substantial measures specifically listed in the “Economy, Production and Consumption” and “Sustainable Use of Natural Resources” key challenges contribute to a green economy.

Figure 1: the notion of green economy



Source: according to EC (2011)

1.3 The Federal Council’s decision in 2010 on a green economy

With its decision of 13 October 2010, the Federal Council signalled the move to a green economy and mandated the Federal Administration to take action in the following six areas:

- Cleantech Master Plan,

- resource-efficient information and communication technologies (ICTs),
- information on the environmental impact of products,
- greening the tax system,
- global indicator of welfare, and
- draft legislation on resource-efficiency and sustainability.

The Federal Council also mandated the DETEC to submit a report to it by the end of 2012 on the progress of actions that have been or still need to be taken to set up a green economy, as well as concrete proposals.

Part I of this report discusses progress in implementing the measures set out by the Federal Council decision of October 2010. Part II shows that further initiatives will be necessary as part of the action plan to significantly improve the resource-efficiency of the economy.

The goal of an economy based on renewable energies and judicious use of natural resources – in the meaning of a green economy – is also on the federal legislative agenda for 2011 to 2015. The concrete form and implementation of the measures are based on government policy guidelines (guideline 5, goal 20) (Federal Council 2012d).

2 Progress in implementing actions in the six areas

2.1 Cleantech Master Plan

Goal and Federal Council mandate

By using more clean technologies (cleantech), i.e. technologies that do not use a large quantity of energy or environmental resources, pressure on the environment can be reduced and new prospects for growth can be created by an attractive market. By 2020, Switzerland should head the list of economies with resource-efficient products, services and renewable energies.

In its decision of 13 October 2010, the Federal Council mandated the FDEA (now: EAER, Federal Department of Economic Affairs, Education and Research) to continue to work with the DETEC on the Cleantech Master Plan, consult interested circles and then report to the Federal Council on the results.

Progress

After consulting interested circles, the Federal Council acknowledged the Cleantech Master Plan in September 2011 and adopted the federal government strategy for resource efficiency and renewable energies.

The Cleantech Master Plan provides an analysis of the situation and an inventory of resource efficiency and renewable energy issues. As a reference tool for all stakeholders, the Cleantech Master Plan can be used by the federal government, cantons, cities and communal authorities, as well as the economic and scientific circles active in these areas, to coordinate their activities.

The departments concerned are currently working on implementing the 17 measures set out in the strategy, which often take the form of review engagements. The measures specifically concern cleantech curriculum in vocational education and potential cleantech continuing

education needs. The Federal Procurement Conference and the KBOB are also reviewing the possibilities for increasing the share of sustainable technologies, products, services and construction works procured by the federal government and the cantons. The fully revised Federal Ordinance on Public Procurement, which came into force on 1 January 2013, lays the foundations for monitoring sustainable procurement. Work has also begun on inventorying the main federal and cantonal regulations that impede innovation in the area of the environment and energy and on developing public-private partnership funding models to promote pilot and demonstration plants for environmental technologies. Resource-efficient products, processes and technologies have huge market potential, which is why the possibilities for producing statistics on their economic importance are currently being examined.

A core group composed of federal and cantonal government representatives is implementing the measures with the assistance of a cleantech advisory committee. The advisory committee met for the first time in 2012 under the leadership of Federal Councillor Johann Schneider-Ammann.

Prospects

The EAER and the DETEC will submit a report to the Federal Council by the end of 2014 on the progress that has been achieved in implementing the strategy and its future development. Targeted progress, potential problems and recommendations on the future development of the strategy will be reported every four years in a new edition of the Swiss Cleantech Master Plan (2014, 2018) and discussed with the parties concerned.

2.2 Resource-efficient information and communication technologies (ICTs)

Goal and Federal Council mandate

ICTs are now an essential driver of all social and economic activities.

Because they play a decisive role in shaping Switzerland's economy and environment, ICTs need to be used consistently in line with the notion of a green economy. To do so, ICT energy and resource efficiency (Green ICT) must be improved. In addition, ICTs can be used to help lower energy and resource consumption in other areas, such as transport and construction (Green by ICT).

In its decision of 13 October 2010, the Federal Council mandated the DETEC, in cooperation with the FDEA, to provide tangible examples of how ICT resource efficiency can be increased and develop the groundwork for implementing measures. However, the private economy will alone be responsible for developing technological innovation strategies and applying them.

Progress

The issue of sustainable development and ICTs is an integral part of both the Sustainable Development Strategy 2012-2015 (Federal Council 2012a) and the updated Strategy of the Federal Council for an Information Society in Switzerland (Federal Council 2012b). However, both of these documents take a broader approach to the notion of sustainable development than the measure described here, which basically targets resource and energy efficiency. With this in mind, they are intended as strategic guidelines for a federal policy in this area.

In its Strategy for an Information Society, the Federal Council defines priority actions in the Green ICT and Green by ICT sectors. Some of these priorities specifically involve increased energy and resource efficiency throughout the life cycle of ICTs. The federal government should therefore take these aspects specifically into account in the public procurement process and in the improvement of its internal ICT processes and systems. In dialogue with the cantons, cities, communes and private sector, it will need to continue to exploit all possibilities to reduce its energy and resource consumption. Promotional efforts need to be made for research and monitoring activities in relation to ICT energy consumption, substitutes for scarce raw materials used in production and recycling development. Finally, the federal administration can systematically look for opportunities to use ICT substitutes internally and create the legal, organisational and technical conditions required for their application and approval.

Prospects

As part of the Strategy of the Federal Council for an Information Society in Switzerland, the priority actions will be implemented in the form of projects. A monitoring system for measures and their results will be implemented by mid-2013 and an interdepartmental steering committee chaired by the DETEC will be in charge of implementing the strategy and its future development up to 2015. Finally, the ICT and sustainable development measure of the Sustainable Development Strategy 2012-2015 should be put into action starting in 2013 (lead: OFCOM).

2.3 Improving information on the environmental impact of products

Goal and Federal Council mandate

Most consumers are not aware of the environmental impacts and resource consumption involved in their purchasing decisions. For many products, no or only incomplete environmental information is provided, which makes it difficult for consumers to identify resource intensive products. The goal is therefore to improve the ecological transparency of markets by providing relevant, scientifically-based, easy-to-understand information about the environmental impacts of the most important products.

In its decision of 13 October 2010, the Federal Council mandated the DETEC, in cooperation with the FDEA and economic actors, to prepare the principles and the regulations required to improve environmental information on products.

Progress

Cooperation with other federal bodies (SECO, FOAG, FOPH and FCAB), retail businesses, and consumer and environmental protection organisations was initiated in 2011 (competent department: FOEN). The implementation options were discussed.

The FOEN commissioned studies on consumer information needs with respect to the environmental impacts of products and on ways of meeting these needs. Based on the studies, the FOEN worked with experts to develop preliminary recommendations on environmental information about products and specific rules for evaluating food products, known as product category rules. Product category rules are widely accepted as a condition for uniform and relevant environmental information about products and simplify the work involved in developing life cycle assessments. Similar efforts are underway in the EU.

A first evaluation of the most ecologically important products was commissioned. In parallel, the Swiss recommendations were compared to similar projects in the EU (Ecological Footprint of Products, Round Table Food) and France.

Furthermore, the Agricultural Policy 2014-2017 contains a new legal basis allowing the Federal Council to issue rules on voluntary labelling of agricultural products and food produced according to strict sustainable development criteria.

Prospects

To enhance the environmental transparency of the markets, legislation is required to improve the environmental information on products. This measure concerns environmental product declarations, which describe the environmental impact of products and allow comparisons between products with the same function. Labels are not concerned as they only certify that certain production requirements have been met.

Suppliers of products that contribute significantly to depleting or jeopardising natural resources should be required to inform consumers of their products' characteristics in accordance with the requirements set out by the Federal Council. Product suppliers that already make environmental product declarations should also comply with the requirements. The Federal Council will designate the products concerned.

To implement this provision, requirements for analysing and evaluating the environmental impact of products and communicating the results to consumers will need to be developed. Consistency with international standards has to be taken in account. Uniform requirements will simplify the development of environmental product information and lower the costs for suppliers. It must also be ensured that this measure is compatible with Switzerland's international trade commitments.

Experiences with energy labelling have shown that product information is an effective tool. It also allows product manufacturers and suppliers to appropriately structure their product ranges (see also Part II, Section 7.1, Measure 5: Environmental information on product lines).

This work involved will be carried out in cooperation with the federal offices concerned, retail businesses, and consumer and environmental protection organisations. The project planned by the EU in the area of consumption will also be taken into account so that the requirements for analysing and evaluating the ecological footprint of products can be applied on a uniform basis. The requirements will be gradually developed for the most important product categories starting in 2013 (competent department: FOEN).

2.4 Greening the tax system

Goal and Federal Council mandate

In accordance with the deliberations of the CESPE, the Federal Council will review the current tax system (levies, taxes, subsidies and deductions) to identify disincentives to greening the economy and society.

In its decision of October 2010, the Federal Council mandated the FDF, in cooperation with the DETEC and the FDEA, to submit a report with recommendations on greening the tax system in the meaning of the Studer motion (06.3190) referred by Parliament on 15 March

2010. This motion mandates the Federal Council to "submit a report to Parliament concerning the effectiveness of the current framework conditions for the sustainable management of natural resources and draft legislation to improve these framework conditions. The draft legislation should also contain components on greening the tax system without impacting tax revenues".

Progress

Given that the motion requires a report and draft legislation on greening the tax system, it possesses the characteristics of both a postulate and a motion. A number of preliminary studies have identified the disincentives to sustainable management of natural resources in various areas.

Prospects

At this time, there is no coherent policy package that can be used to develop separate draft legislation. This is specifically due to the decisions on the new Energy Strategy 2050, such as the green reform of the tax system, whereby all measures concerning the issue of energy were incorporated into an entirely separate policy package. For that reason, the draft legislation will probably be abandoned. The report on greening the tax system should be adopted in the first six months of 2013 (lead: FDF).

2.5 Comprehensive welfare measurement

Goal and Federal Council mandate

Gross domestic product (GDP) may in fact be the standard indicator of a national economy's activities, but it is not a sufficient indicator of welfare. The state of the environment and the social context also play a decisive role in the quality of life and welfare of a population.

In its decision of October 2010, the Federal Council mandated the FDHA, in cooperation with the DETEC and the FDEA (now: EAER), to complement GDP with suitable indicators relating to social, economic and environmental developments (e.g. quality of life and its prerequisites: quality of the environment, household income, etc.) so that it is possible to measure overall welfare.

These indicators are intended to supply policymakers and society with the information they need to make decisions based on more than just changes in GDP, but on overall welfare developments as well. Still, the GDP itself and its conceptual bases will not be upgraded or even replaced since it provides important information about developments in an economy and the material situation of households according to international standards.

The work involved in this mandate must consider not only federal statistical requirements, but also the methods prescribed by international organisations.

Progress

The first step consisted in developing a set of indicators based on existing information. The set contains a detailed representation of 27 indicators that was published on the Web site of the Swiss Statistical Office on 11 May 2012 ("Overall Assessment - Complementing the GDP", FSO 2012b). In addition to the social and economic development indicators, this preliminary indicator set also includes some environmentally relevant indicators that address the

issues of climate, soil and land, energy and material consumption, as well as the environment's contribution to quality of life.

Prospects

As part of the second phase that runs until the end of 2014, the published indicator set will be further developed, expanded and converted into a complete indicator system. However, the goal is not to replace GDP with an alternative, more comprehensive indicator. The planned information system will contain indicators, descriptive comments and an initial overview of the in-depth analyses to follow.

This work is closely coordinated with related projects and activities at both the national (e.g. sustainable development monitoring, MONET) and international (UN, OECD and EU) levels.

In 2013, key information content is being developed and corresponding indicators defined so that the indicator system can be created and the descriptive analyses can be carried out starting in 2014 (lead: FSO).

2.6 Resource efficiency and sustainability in legislative drafts

Goal and Federal Council mandate

To reduce the impact of legislation on natural resources, the latter should be reviewed while in draft stage to ensure its compliance with resource efficiency and sustainability. In its decision of October 2010, the Federal Council mandated the DETEC, in cooperation with the FDEA, the FDJP and the Chancellery, to examine whether a respective impact analysis should be stipulated in the Instructions for the Schemes of Dispatches and in the Regulatory Impact Analysis (RIA).

Progress

The addition of this analysis to the Instructions for the Schemes of Dispatches and the RIA was reviewed and then executed: in January 2012, the Federal Chancellery published revised Instructions that specifically include an analysis of environmental impacts within the scope of the broader sustainability assessment. Two of the five environmental criteria proposed concern impacts on resource efficiency.

Now that the various items for review have been added, it is possible to obtain more specific and complete information about the environmental impacts of federal laws. Their explicit inclusion in the revised RIA guidelines and the Instructions for the Schemes of Dispatches of the Federal Council should allow the issue of environmental impacts to be considered as early as possible in the legislation development process and provide for a better balance between the interests of the various sectors concerned.

Prospects

To improve the resource efficiency and sustainability of federal measures, the offices concerned need to be informed of the new requirements included in the RIA guidelines and the Instructions for the Schemes of Dispatches of the Federal Council starting in 2013.

To avoid as many additional administrative costs as possible, the following measures will be taken starting in 2013 in coordination with RIA procedures:

- after the adoption of the goals of the Federal Council in November, dispatches with the potential environmental impacts will be issued, and
- at the beginning of the year, the lead departments will be informed of the environmental requirements included in the RIA and the Instructions for the Schemes of Dispatches of the Federal Council and, if necessary, receive the required support and information concerning environmental impacts (lead: FOEN).

PART II: GREEN ECONOMY ACTION PLAN

1 Introduction

Despite the progress made in the six areas of action described and the existing sectoral policies that contribute significantly to the transition to a green economy (see Chapter 6), various analyses show that there is still a lot of work to be done.

Even at the international level, there is greater awareness of the additional efforts that need to be made to significantly improve the resource efficiency of the economy and successfully meet the challenges ahead. The EU adopted its Roadmap to a Resource Efficient Europe, while the OECD approved its Green Growth Strategy. The green economy in the context of sustainable development and the fight against poverty were also key topics at the United Nations Rio+20 Summit in the summer of 2012.

On 6 September 2012, the Green Party proposed its "For a Sustainable and Resource-Efficient Economy (Green Economy)" popular initiative, which aims to permanently enshrine the following goal in the Constitution: reduce Switzerland's "ecological footprint" by 2050 so that it does not exceed one earth after being extrapolated to the world's population. This initiative would require the federal government to set medium and long-term goals and report on whether the goals have been achieved at the beginning of each legislature. To set up a green economy, the federal government would also have to promote research and innovation, set product regulations and take fiscal measures. The Federal Council decided on 27 February 2013 to develop an indirect counterproposal to amend the Environmental Protection Act (EPA). The counterproposal includes, among other items, measures in the "Consumption and Production" and "Wastes and Raw Materials" priority areas of the Green Economy Action Plan (see Chapter 7) and addresses some of the concerns expressed in the initiative without amending the Constitution.

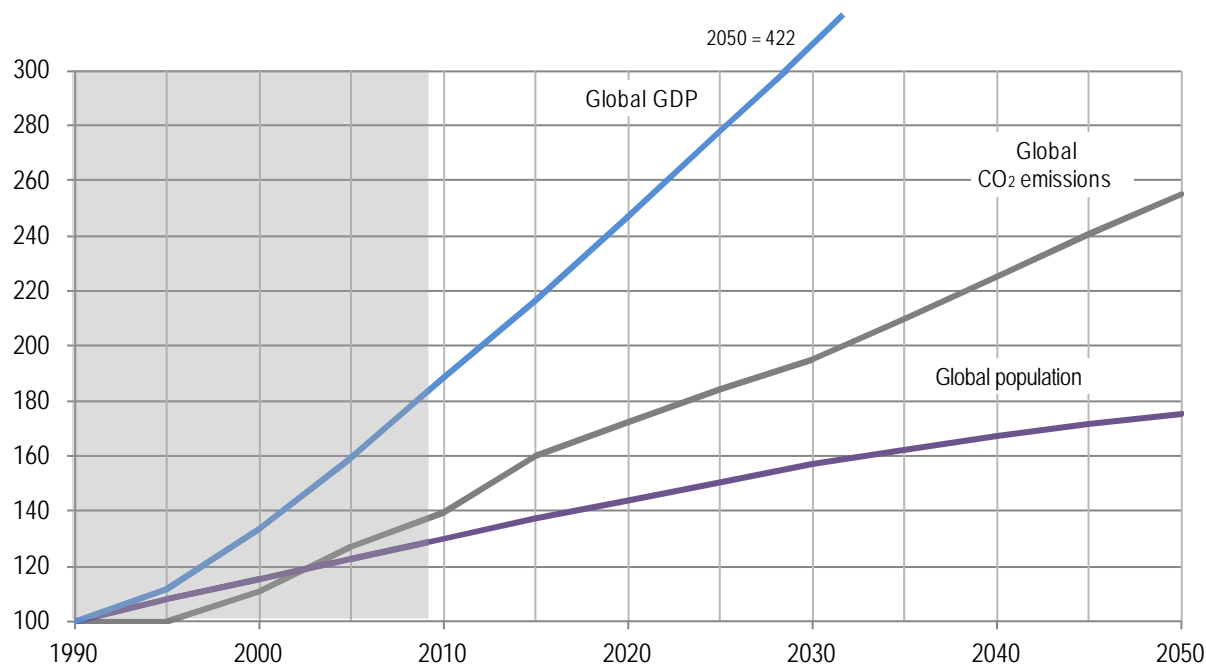
The second part of this report discusses the analysis of pressures exerted on natural resources in Switzerland and around the world, economic opportunities and required actions. This analysis served as the basis for developing an implementation approach and outlining the measures required to set up a green economy in an action plan.

2 Global pressure on natural resources

2.1 Global resource consumption

Recent decades have been marked by strong economic growth around the world. Global economic performance has almost doubled since 1990 (see Figure 2) while during the same period of time, global CO₂ emissions and raw material extractions have increased by roughly 40%. According to the economic outlook published by the OECD (2012) and the World Bank (2012), the size of global economy could quadruple by 2050, which will have a comparable impact on the demand for natural resources (see Figure 2).

Figure 2: Global trends: GDP, population and CO₂ emissions since 1990 and projection until 2050

















Sources: CO₂ emissions: OECD 2012 (baseline scenario); population growth: UN DESA (medium scenario); economic growth: World Bank 2012 and UNEP 2011c ("business as usual" scenario). Indexed to 1990=100.

Population growth is a major driver of constantly rising resource consumption: between 1990 and 2010, the world's population grew by 30%. It is projected to grow from 7 billion today to over 9 billion by 2050.

Economic and population growth put more and more pressure on natural resources. Table 1 describes the state of the most important natural resources and their likely future course if nothing is done to curb the trend. Current consumption levels already largely exceed nature's maximum carrying and regeneration capacities of our planet (Rockström et al., 2009). UNEP (2011a) predicts that if industrialised countries do not change their current consumption patterns and resource use per capita continues to rise in developing countries, global resource use will triple by 2050. The OECD (2012) estimates that this will lead to destabilising climate change, a drastic decline in biodiversity, water scarcity and serious health problems. With this in mind, the World Business Council for Sustainable Development (WBCSD, 2010) calculates that global resource use would need to become four to ten times more efficient in order to avoid serious long-term consequences. However, the required extent of efficiency improvements depends on economic and demographic developments.

The global situation is dire for all of the important resources and their anticipated future development (see Table 1). This disturbing context and the huge challenges facing the international community have motivated various international green economy initiatives and strategies in recent years (see Section 2.2).

Table 1: Global consumption of important natural resources

Current situation		Likely development	
Climate Total greenhouse gas emissions too high. The consequences of climate change are becoming perceptible (temperature, precipitation, etc. (IPCC 2007)		Greenhouse gas emissions will continue to rise around the globe (IPCC 2007).	
Biodiversity Extinction rate much higher than the natural dynamic. Extensive loss of natural habitats and genetic resources (Rockström 2009, OECD 2012).		Pressure on biodiversity continues to rise (UNEP 2012a).	
Land / soil Large-scale degradation of forest areas and arable land (UNEP 2009, FAO 2006) and desertification (UNEP 2012a).		Pressure on agricultural and forest areas is increasing due to intensive use and land-use change (OECD 2012).	
Air pollution Alarming pollution levels in cities and areas near industrial zones, especially in developing and emerging countries (Poizzer et al. 2012, OECD 2012).		Pollution will continue to worsen (Poizzer et al. 2012, OECD 2012).	
Water Serious regional water shortages and deterioration of water quality in many areas (OECD 2012).		Usable water resources will continue to become scarcer (UNEP 2012a).	
Energy High total consumption, heavily dependent on fossil energies (OECD 2012).		Energy consumption, emission levels and pressure on biomass continue to rise; shortages conceivable. (OECD 2012)	
Material consumption Considerable extraction and consumption of raw materials (e.g. metals) (UNEP 2012b).		Material use continues to grow (UNEP 2012b).	

Compilation and evaluation: FOEN

2.2 International efforts

Roadmap to a Resource Efficient Europe

In the EU, the “Roadmap to a Resource Efficient Europe” (EU 2011) sets out concrete strategies for conserving natural resources and strengthening the economy at the same time. Its vision for 2050 is one of a resource-efficient economy that respects the limits of our planet and espouses the sustainable management of natural resources (raw materials, energy, water, air, land and soil), the achievement of climate targets and the conservation of biodiversity. The roadmap is a part of the "A Resource-Efficient Europe" flagship initiative, which is intended to ensure that energy, climate, research, innovation, transport, agriculture and environmental policies result in more efficient resource management. This flagship initiative is also part of the “Europe 2020” ten-year growth strategy.

The roadmap sets a number of milestones up to 2020 and suggests measures to achieve them. The EU measures coincide with Switzerland's goals in a number of key areas, such as:

- implement appropriate price signals and clear environmental information for products and services;
- develop a common method for governments and economic actors to assess and compare the environmental impacts of products and services throughout their life cycle;
- set minimum environmental performance standards in order to remove the least resource-efficient products from the market;
- use waste as a resource (recycling and reuse).

After an in-depth consultation, tangible goals and measures will be determined in 2013.

Based on the EU roadmap, Germany (German Federal Government 2012) and Austria (Ministry of Life 2012), among other countries, have each developed a national strategy and an action plan for a green economy. Germany's "ProgRess" resource efficiency program aims to double raw material productivity from its 1994 level by 2020.

OECD Green Growth Strategy

The OECD (2011) Green Growth Strategy is designed to transform our current economic model. It describes the urgent need for action, the considerable costs of inaction and the economic opportunities. According to the strategy, growth models and stimulation measures need to take more account of natural resource consumption in production and consumption.

Its main strategic goals, which largely overlap Switzerland's goals, are the following:

- promote innovation and investment in green technologies in order to speed up the transition to a green economy;
- internalise the external effects;
- strengthen the demand for environmentally-friendly goods and services and improve information about them;
- measure progress with appropriate indicators.

The OECD's future work will primarily focus on assisting countries with the transition to a green economy, especially through the recommendations it makes on growth, investment and environmental policies in its country reviews.

United Nations Conference on Sustainable Development (Rio+20) and the green economy

The United Nations Conference on Sustainable Development (Rio+20) was held from 20 to 22 June 2012 in Rio. Its goals were to renew the Member States' commitment to sustainable development, put the green economy on the international political agenda for the first time as part of sustainable development and the fight against poverty, and strengthen international sustainability governance. Although the green economy approach is controversial among developing and emerging countries because they fear that it will lead to the introduction of new trade barriers, for example, it still gained international recognition as a way to help bring about sustainable development. The conference particularly demonstrated that states, organisations and the private sector need to take appropriate measures to set up a green economy. The conference outcome document entitled "The Future We Want" (UN 2012) states that the transition to a green economy should ensure long-term welfare, conserve

natural livelihoods and reduce poverty and inequality. Innovation, clean technologies and the internalisation of external social and environmental costs will play a decisive role in this regard.

3 Resource consumption in Switzerland











The Environment Switzerland 2011 (FOEN/FSO 2011) report shows the full extent of the over-exploitation of natural resources in Switzerland, where climate change and its consequences are clearly already being felt (cf. Federal Council, 2012c). A number of other natural resources, such as biodiversity and soil, are under great pressure. For instance, Switzerland loses nearly 1 m² of arable land per second. This is soil that can no longer be used to produce food, regulate water flows or provide habitat for biodiversity.

Yet, some progress has been made in recent years, such as in protecting water and air. Sulphur dioxide emissions have been reduced by more than 80% and lead-containing particulate matter has decreased by more than 90% compared to their 1990 levels. Concentrations of particulate matter, ozone, nitrogen oxide and ammonia still exceed the limit values set out in legislation and continue to harm the health of the population and natural ecosystems. The quantity of waste per capita continues to rise and reached 700 kilograms per year and per capita in 2010 (FOEN/FSO 2011).

Switzerland's total material requirement has increased by 14% since 1990, reaching 120 kg per day and per capita in 2010 (FSO 2012c). Metal consumption totalled 2.3 million tonnes in 2010 (FSO, 2012a). Metals are causing particularly heavy environmental impacts (Jungbluth et al. 2012).

Table 2 provides an overview of the current state of all important natural resources in Switzerland and their likely development.

Table 2: Consumption of important natural resources in Switzerland

Current situation	Likely development	Switzerland's impacts at the global level
<p>Climate</p> <p>Greenhouse gas emissions exceed 50 million t of CO²-eq. Kyoto targets attained only by purchasing carbon certificates abroad (FOEN/FSO 2011). </p>	<p>CO₂ Act revised; measures introduced to reduce greenhouse gas emissions. </p>	<p>Embodied energy imported in products release almost as much greenhouse gas abroad as direct emissions within the country (FOEN 2007).</p>
<p>Land / soil</p> <p>Soil sealing is still on the rise. Even though pollutant loads are decreasing, certain pollution problems persist (FOEN/FSO 2011). </p>	<p>No change. </p>	<p>High demand for land abroad, especially for imports of agricultural commodities (SERI 2011).</p>
<p>Biodiversity</p> <p>Biodiversity is greatly threatened and conservation is not ensured in the long term. This is reflected in the state of the ecosystem, species and genetic diversity (FOEN 2012b). </p>	<p>The pressure is constant or rising. Decrease in the quality of the ecosystems. Decline in the populations of certain species. Emergence and/or spread of invasive alien species. </p>	<p>Damage to biodiversity abroad caused by importing goods and raw materials whose extraction/production results in habitat degradation. (UNEP 2010 and SERI 2011)</p>
<p>Air</p> <p>General improvement. Some problems persisting, especially particulate matter, excessive nitrogen loads (ammonia, nitrogen oxides) and ozone (FOEN/FSO 2011) </p>	<p>Direct emissions declining. (FOEN/FSO 2011) </p>	<p>Air pollution caused while producing and transporting goods imported by Switzerland (Jungbluth et al. 2012)</p>
<p>Water</p> <p>Unproblematic consumption, high water quality. Some problems with nitrates and micropollutants (FOEN/FSO 2011). </p>	<p>Micropollutant reduction measures introduced. </p>	<p>Indirect water consumption from imported products can exacerbate water shortages in some regions (SDC 2012).</p>
<p>Energy</p> <p>Around 80% of final energy consumption comes from non-renewable sources (fossil and nuclear energy) (FOEN 2011). </p>	<p>Total final consumption on the rise (FSO 2012c). Renewable energy production is increasing (FOEN 2011). </p>	<p>Embedded energy consumed by the production and transport of imported goods in Switzerland. The extraction and transport of energy carriers cause major environmental pollution (UNEP 2010, Jungbluth et al. 2012).</p>
<p>Material consumption</p> <p>Total material requirement (including hidden flows abroad) exceeds 40 tonnes per capita and per year (FSO 2012c). </p>	<p>Total material requirements are increasing (FSO 2012c). </p>	<p>68% of the materials required by Switzerland in 2010 came from abroad (FSO 2012a).</p>

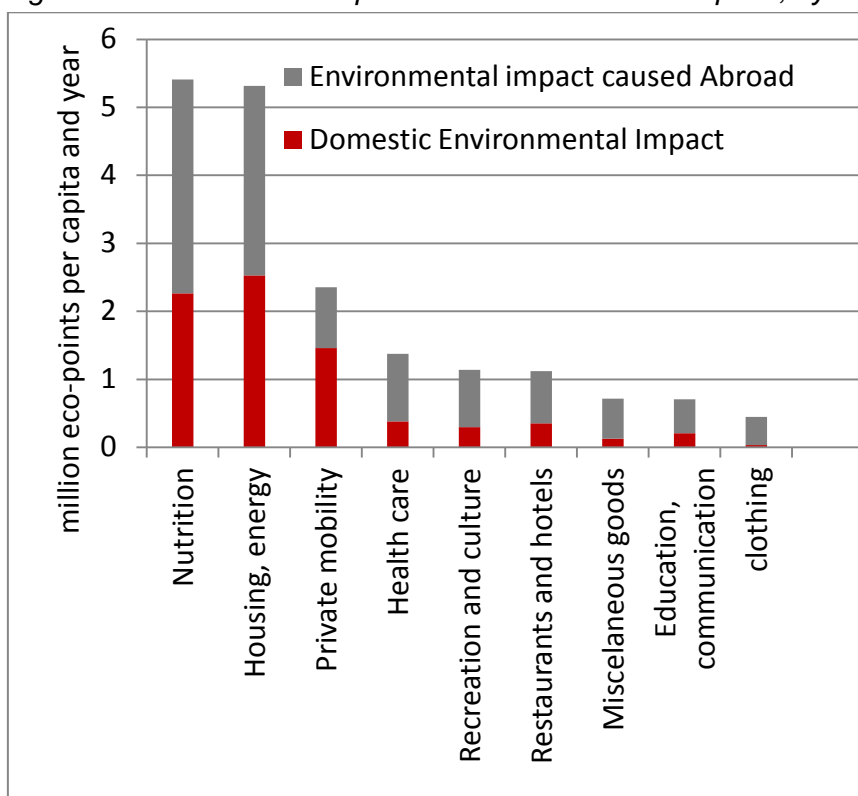
Compilation and evaluation: FOEN

Column 3 of Table 2 shows that our consumption has major impacts not only on the environment in Switzerland, but also abroad, due to the products we import. More than half of the total environmental impact of Swiss consumption occurs abroad because not all phases of product life cycles (production, transport, use, and disposal) happen in Switzerland (FOEN

2011). Other European countries also “export” a large percentage of their environmental impacts (EC-JRC 2012, SERI 2011). But Switzerland’s share is particularly high because it is a small open economy with a large service sector.

Some of the goods that have a particularly heavy environmental impact throughout their entire life cycle include not only fossil energy carriers and energy-consuming goods like electronic equipment, but also concrete, greases and oils, fertilisers, pesticides, herbicides, fungicides, forage, clothing and textiles. This becomes apparent with life cycle assessments using the ecological scarcity method. The weighting of the various environmental issues and their conversion into eco-points are based on targets set out by Swiss environmental policy. When aggregating products to areas of consumption, it becomes clear that nutrition, housing and private mobility are the areas that cause the highest environmental impact (see Figure 3). Together, they are responsible for over two-thirds of the environmental impact caused by Swiss consumption (FOEN 2011). This result is in line with the conclusions of similar studies conducted for EU countries (AEE 2010, Faber et al. 2012).

Figure 3: Environmental impacts of Swiss final consumption, by area of consumption



Source: FOEN 2011.

Nutrition is responsible for nearly 30% of the overall environmental impact. Food production requires large expanses of land. Together with the required energy use and the input of plant protection products and fertilisers it adds up to a considerable overall environmental impact.

The environmental impact caused by **housing** is primarily attributable to the use of electricity and heating, building materials and many everyday household chemical products.

The environmental impact of **mobility** is mainly caused by the greenhouse gas emissions resulting from fuel consumption, but also by air and noise pollution, and the damage to landscape from transport infrastructures.

Given its comparative lack of raw materials, Switzerland is heavily dependent upon other countries. The volume of imported materials increased by approximately 11% from 1990 to 2010 (FSO 2012c). In 2010, Switzerland imported 6.6 tonnes of materials per capita, which included around 2.4 tonnes of fossil energy carriers, 1.6 tonnes of non-metal minerals (e.g. gravel or cement), 1.1 tonnes of biomass (e.g. food and wood) and nearly 800 kg of metals (FSO 2012a). A considerable share of the imported material is used for production purposes and end up leaving Switzerland in export products. These are significant ecological trends, as the increasing demand for raw materials exacerbates the environmental impacts of the extraction, transport, treatment and disposal of materials.

About half of Switzerland's current footprint is attributable to the energy demand of industry, transport and housing (with impacts on the climate, air, etc.) as well as to soil use in Switzerland. In accordance with the Energy Strategy 2050 and climate and spatial planning policies, important measures have already been designed and introduced to reduce this share.

A share of about the same size of Switzerland's current footprint is caused by raw materials and consumer products. Additional efforts will have to be made in this area to reduce the pressure exerted on natural resources throughout the life cycle of these products.

4 Strengthening the economy

With its high innovative power, Switzerland can not only improve its resource efficiency, it can also create jobs, income and prosperity. Due to the innovative power of the economy, new markets for resource-efficient technologies and products are opening up to Switzerland. In addition, resource-efficient technologies may considerably reduce Swiss companies' costs. Material consumption accounts for nearly half of industrial production costs. A German study shows that companies can reduce their material costs by up to 20% by exploiting their efficiency potential (Kristof 2010).

The performance of the economy depends on the availability of natural resources such as metals or agricultural raw materials. So, it is in the interest of the economy to ensure their long-term availability and to reduce supply risks.

The economic importance of resource-efficient technologies (cleantech) was evaluated by Ernst Basler & Partner and Nowak (2009). According to the study, some 160,000 people were employed in Switzerland's cleantech sector in 2008. With an annual gross value added of CHF 18 to 20 billion, cleantech contributes between 3 and 3.5% of Switzerland's GDP (see Table 3).

Table 3: Cleantech: employment and gross value added in Switzerland, 2008

Jobs [absolute value]	Jobs [%]	Gross value added [absolute value]	Gross value added [% of GDP]
155,000 to 160,000	4.5%	CHF 18 to 20 billion	3.0% to 3.5%

Source: EBP and Nowak 2009.

A variety of international studies expect considerable growth potentials for cleantech. For instance, in their study "Vision 2050", the authors of the World Business Council for Sustainable Development (WBCSD, 2010) estimate the value added to increase by around USD \$4,100 billion until 2050 in sectors that are highly relevant to the environment (energy, agriculture, water, etc.) (see Table 4).

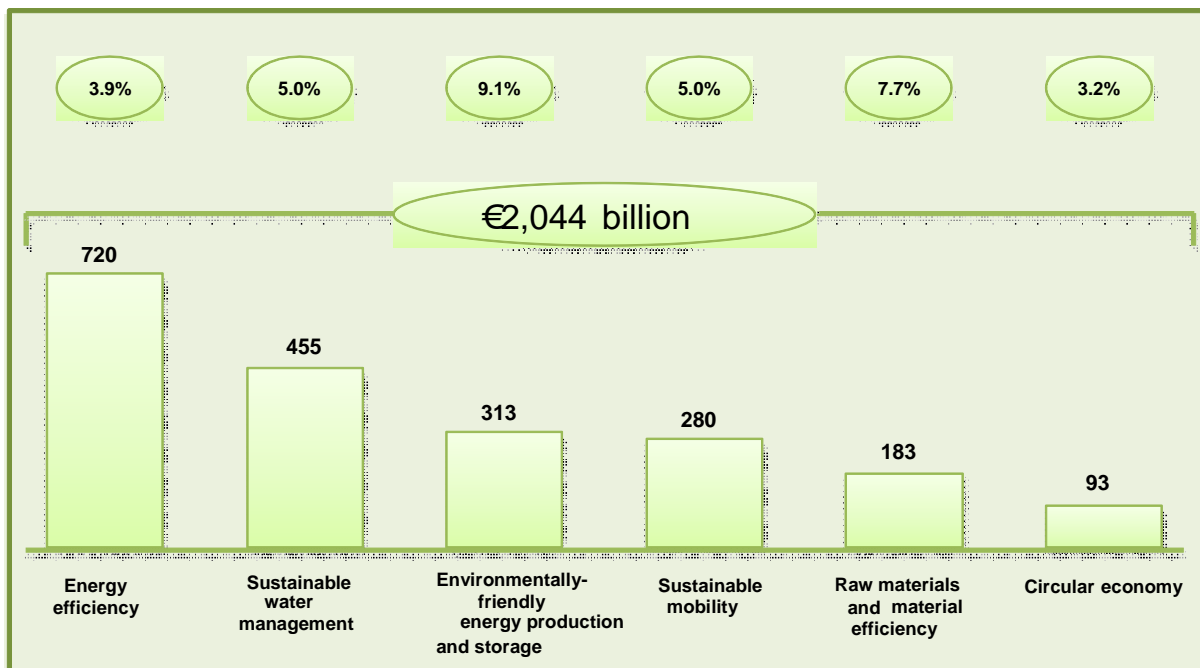
Table 4: Potential for additional value creation in 2050, thanks to a green economy

Sectors	Annual value in 2050 (in trillion of USD; basis: 2008 prices; average values, range in parentheses)
Energy	2.0 (1.0 – 3.0)
Forestry	0.2 (0.1 – 0.3)
Agriculture and food production	1.2 (0.6 – 1.8)
Water	0.2 (0.1 – 0.3)
Metals	0.5 (0.2 – 0.7)
Total natural resources	4.1 (2.0 – 6.1)
Health and education	2.1 (0.8 – 3.5)
Total	6.2 (2.8 – 9.6)

Source: WBCSD 2010, based on estimates by PwC drawing on data from IEA, OECD and the World Bank.

A study by Roland Berger Strategy Consultants quoted in the Environmental Technology Atlas for Germany (BMU, 2012) came to similar conclusions. It estimates the current market volume for cleantech at a total of around €2,044 billion and projects annual growth rates of 3 to 9% in the various cleantech sectors until 2025 (see Figure 4).

Figure 4: Global market volume and growth projections for 2011-2025 for the various cleantech sectors



Source: Federal Ministry of the Environment, Protection of Nature and Nuclear Safety (BMU, 2012).

Swiss companies achieved most of their exports between 2000 and 2007 in the areas of waste management and resource efficiency (nearly 40% of all cleantech-related exports; Fraunhofer ISI 2011). As shown in the following examples, these areas still have unexploited value creation potential.

Example 1: Raw material recycling (circular economy)

Recycling creates value from waste by recovering important secondary materials for production. By recycling raw materials, many Swiss companies contribute to an increased security of supply. For instance, phosphorus is a limited resource but essential for agriculture. It can be recovered from sewage sludge, for example. Metals such as iron and zinc can be recovered from the ash of incinerated municipal solid waste and industrial waste and reused to produce, for example, steel or batteries. One tonne of municipal solid waste contains around 30 kilograms of metals such as iron, copper, zinc or gold.

Example 2: Material efficiency in the construction sector

In the construction sector, traditional building and insulation materials such as concrete and polystyrene can be replaced by more environmentally friendly and renewable raw materials. New insulation materials from natural fibres can benefit from these growing markets. As a cheap yet robust and durable construction material, local wood is enjoying renewed popularity in particular with respect to residential buildings.

The Swiss building fabric is our most abundant source of raw materials. Swiss buildings and civil engineering structures contain approximately 2.3 billion tonnes of materials such as concrete, masonry, road rubble, wood and metals. Using these materials increases material efficiency and decreases the dependence of the construction industry on primary raw materials.

As part of its German Resource Efficiency Programme (ProgRess), the German Federal Government (2012) evaluated the market potential of the circular economy. The results show that the annual growth rates of waste and recycling treatment installations are around 3%. For high-tech recycling procedures, such as rapid sorting technologies for different types of plastics, growth rates of up to 15% per year until 2020 are projected.

5 The green economy approach

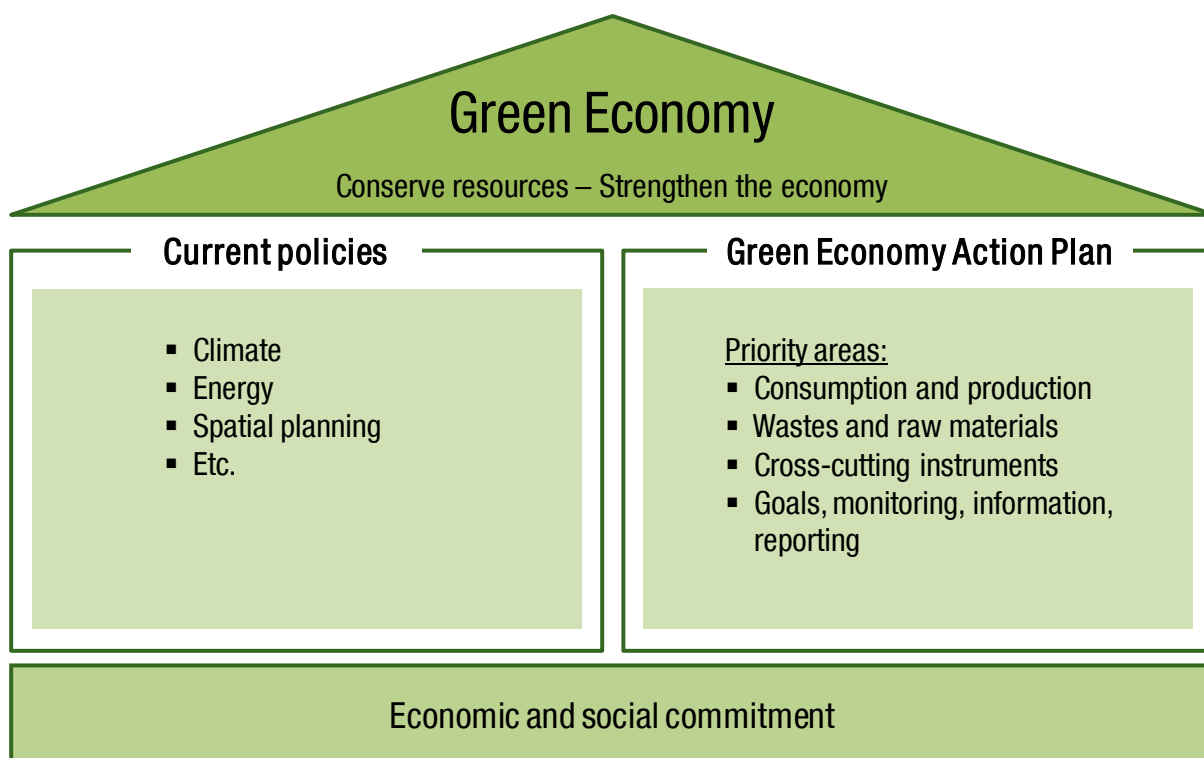
Figure 5 shows the approach to implementing a green economy. The goal is to set up a strong, resource-efficient economy that improves overall welfare. To achieve this, the contribution of current policies is needed (cf. left column of the figure) and resource efficiency in raw materials and consumer products must be increased significantly (cf. right column of the figure).

The major contribution of current policies to environmental protection and the reduction of natural resource consumption is discussed in Chapter 6. The other measures that have been designed to play a decisive role in bringing about a green economy are described in Chapter 7 on the Green Economy Action Plan.

Predictable, innovation-friendly national framework conditions are a mainstay of a successful transition to a green economy. Still, they cannot achieve it alone. The economy and society must also make a deep and voluntarily commitment. The economy plays a particularly important role in this effort. As a prime location for business, industry and organisations, Switzerland has also effectively understood where its interests lie and is therefore assuming responsibility for the transition to a green economy. In fact, a number of companies have achieved major advances in resource and energy efficiency. These efforts must be stepped up because Switzerland's attractiveness as a location for business and industry is dependent upon the quality and security of the natural resource supply.

Switzerland's highly-qualified education and research system and innovative environment maximise its economy's chances of making great strides toward a green economy and benefiting as a whole from positive growth and employment stimuli in cutting-edge industries. The key to achieving this is not only greater investment in resource-efficient technologies, processes and products, but also the development of "green" expertise in the education system and entrepreneurial skills in resource efficiency.

Figure 5: Green economy implementation approach:



Source: FOEN

6 Sectoral policies that support the transition to a green economy

Various sectoral policies already make major contributions to the reduction of environmental impacts and the development of a greener economy.

The **Growth Policy 2012 – 2015** report includes selected federal measures to promote future growth in Switzerland. The main focus of the growth policy is to increase labour productivity. For the period from 2012 to 2015, the growth policy sets out a new area of action aimed at enabling a supportable level of environmental impacts. In the interest of a green economy, it takes into account the exhaustibility of natural resources, while maintaining growth opportunities. The capacity of regeneration of the global climate and respect for the carrying capacity of the natural environment are essential to long-term economic prosperity.

The measures set out in the **Climate Policy after 2012** also make major contributions to the achievement of green economy goals. The revised CO₂ Act, which came into force on 1 January 2013, sets out climate policy goals and measures for the period from 2013 to 2020. It stipulates that Switzerland must reduce its domestic greenhouse gas emissions by at least 20% below their 1990 levels by 2020. The measures established during the 2008-2012 period will be continued and refined, thereby improving business planning security (e.g. CO₂ levy on the thermal fuels oil, gas, coal, the buildings programme, greater efforts to adapt to climate change in education, research and development). All of these measures are intended to support investments in low-emission, resource-efficient technologies that contribute significantly to the transition to a green economy.

The measures set out in the **Energy Strategy 2050** to improve energy efficiency in all sectors as well as its cross-cutting information and market-based instruments are essential to the transition to a green economy. In May 2011, the Federal Council decided to gradually phase out nuclear energy. To ensure that there is a secure energy supply after the nuclear energy phase-out, the Federal Council is focusing specifically on measures to improve energy efficiency, on developing renewable energies, and on using additional cogeneration and combined cycle gas plants as a temporary solution, where necessary. In September 2012, the Federal Council submitted its first policy package on the progressive transformation of Switzerland's energy supply for consultation. The Energy Strategy 2050 does not address the issue of indirect energy consumption caused by imported goods (production and transport abroad).

Given the major environmental impacts of transport (primarily climate, air, noise and soil) and the rapid rise in traffic volume, but given also the importance of transport accessibility for the economy and the population, the **transport policy** is a key factor in the transition to a green economy. Legislative drafts currently under discussion, such as the rail infrastructure financing project (FABI), and the related discussion on the elimination of disincentives due to transport cost deductions, transport and urban agglomeration projects, development plans for the national road network, and mobility pricing as a long-term measure can also contribute significantly to the creation of a green economy (by internalising external costs, among other things).

The **biodiversity policy** is intended to protect diversity of habitat, species and genetic resources. The Swiss Biodiversity Strategy adopted by the Federal Council in April 2012 sets ten strategic goals. Of these, the measures to promote sustainable use of natural resources (e.g. in forestry, agriculture and tourism), to review financial incentives and to measure services provided by ecosystems (as complementary indicators of welfare) contribute directly to the transition to a green economy. An action plan with concrete goals and measures should be finalised by mid-2014.

Given the environmental impact of food production in Switzerland and abroad, the agricultural policy also plays a key role. An agricultural reform, which was introduced in the mid-1990s as a result of a new constitution article on agriculture, has achieved considerable progress towards environmental goals by instating proof of ecological performance criteria and ecological direct payments. The **Agricultural Policy 2014 – 2017** improves targeting of direct payments for the provision of various services, among other items. Its goals are to increase the efficient use of raw materials and natural resources, maintain fertile soil, improve climate protection, promote biodiversity and support animal and environmentally-friendly production methods through contributions to the production system and the promotion of sustainable consumption patterns.

The federal government's **Forestry Policy 2020** is aimed at creating framework conditions to encourage sustainable, efficient and innovative forest management in the interest of a green economy. When it approved the Forestry Policy 2020 in the fall of 2011, the Federal Council sought to increase the contribution of the forest and forest management to mitigating climate change by more efficiently using a larger quantity of wood, a renewable raw material.

As its main objective is to ensure a more economical use of soil, the **spatial planning policy** also plays a key role in the transition to a green economy. The revised Spatial Planning Act, an indirect counterproposal to the landscape initiative, includes important steps toward this

goal, such as the prevention of landscape fragmentation. The implementation of the secondary residences initiative will also help to limit urban sprawl.

Finally, the Message on **Switzerland's International Cooperation 2013 – 2016** sets strategic targets for implementing sustainable development processes and the green economy. These commitments are being implemented in selected countries based on 1) projects in the areas of sustainable land use, sustainable forestry, biodiversity conservation, access to renewable energies and energy efficiency, sustainable water management, stronger market and financial mechanisms for climate protection, and sustainability in raw materials extraction and trade, 2) cooperation with multilateral development organisations (United Nations, World Bank, regional banks, global funds and networks), and 3) participation in multilateral processes (e.g. Rio+20).

7 Green Economy Action Plan

Additional concrete measures are necessary to set up a green economy. These measures were selected based on an analysis of the required actions and in consideration of current policies and the six areas of action set out in the Federal Council's decision of 13 October 2010 on a green economy.

The measures set out in the action plan are aimed at advancing the transition of the economy in four priority areas:

(1) Consumption and production: current product consumption and production patterns use large quantities of resources and cause serious environmental impacts at every stage of a product's life cycle, from the extraction of raw materials and production to transport, use and recovery. To bring about change in this area, it is not only necessary to improve information on the ecological aspects of products and company product lines, but to increase innovation as well. Furthermore, mandatory cooperation with the economy will provide opportunities for new efficiency improvements in consumption and production.

(2) Wastes and raw materials: as raw materials become scarcer, their extraction causes growing environmental impacts. Using raw materials more efficiently and closing material life cycles, i.e. by recovering waste from production and consumption, need to become priorities. In the future, fewer raw materials should be used to produce goods and less waste should be generated. In addition to increasing efforts to prevent waste, there is some major room for improvement in the efficiency of waste treatment plants and production facilities.

(3) Cross-cutting instruments: the Cleantech Master Plan and greening the tax system are projects that deal with more than one issue. But since a large portion of our environmental impact is caused abroad, we will not reach our goals by working solely at the national level. In order to reduce the overall pressure exerted on natural resources from the extraction of raw materials and the production of goods, international efforts to create a green economy will also need to be made. Switzerland must support and influence these efforts much more than it has done in the past.

(4) Targets, monitoring, information, reporting: to know whether Switzerland is on its way to becoming a green economy, it must measure its progress in a comprehensive way and use this information as the basis for monitoring the success of its measures. This also involves

setting targets and preparing progress reports. Furthermore, dialogue with economic actors, the scientific community and civil society is important to further develop the green economy. This dialogue needs to be accompanied by awareness measures that inform the public of the consequences of its decisions and encourage more economical behaviour.

Table 5 provides an overview of the priority areas of the action plan and the related measures. The six measures set out in the Federal Council's decision on 14 October 2010 in favour of a green economy are included in the action plan because this work is already underway. Their progress and future activities are described in Part 1, Chapter 2 of this report.

Table 5: Overview of the action plan: priority areas and measures

Priority areas	Measures (M)	Comp. dept.
Consumption and production	Resource-efficient ICTs: M 1	DETEC
	Food waste / nutrition: M 2, 3	EAER
	Information on products and product lines: M 4, 5, 6	DETEC
	Marketing: M 7	DETEC/EAER
	Coordination with the economy: M 8, 9	DETEC/EAER
	Centre of expertise, network: M 10, 11	DETEC/EAER
Wastes and raw materials	Measures 12 to 18	DETEC/DDPS
Cross-cutting instruments	International commitment: M 19, 20	FDFA/DETEC
	Cleantech Master Plan: other measures, cf. M 21	EAER/DETEC
	Greening the tax system: M 22	FDF/DETEC
Targets, monitoring, information, reporting	Measures 23 to 27	DETEC/FDHA

7.1 Consumption and production

Current product consumption patterns and production methods consume large quantities of resources and have serious environmental impacts at every stage of a product's life cycle, from the extraction of raw materials and production to transport, use and recovery. This applies, for instance, to information and communication technology (ICT) products, food and many other everyday consumer products. The current regulatory powers of the federal government as concerns products are essentially limited to energy consumption and waste recovery. Federal legislation is somewhat lacking to create measures in other areas.

Nutrition, for example, causes approximately 30% of our environmental impact (FOEN 2011). To reduce this environmental impact, food production must become more sustainable, food waste must be reduced and nutrition must become more resource efficient. Supply and demand measures are necessary to reduce the environmental impact of products. All too often, consumers are not really aware of the impact of their consumption decisions on the environ-

ment and resources. In most cases, they do not know the environmental impacts caused by the production, marketing, consumption and disposal of the various products. Therefore, they cannot take these aspects into consideration when making their decisions. Ecological market transparency is necessary, but lacking because there is only partial information about products or none at all.

When it comes to the global consumption of natural resources, products such as palm oil, biofuels, soy, textiles and wood from non-sustainable production must be given particular attention. A large portion of the environmental impact of consumption is caused abroad. Manufacturing certain products (e.g. palm oil, soybeans and tropical wood) causes major damage to the environment, such as greater soil pollution and CO₂ emissions and reduced biodiversity. Although there are virtually no minimum requirements for marketing these products, some definitely need to be issued. Current international standards on products of this type must also be promoted.

To successfully transition to a green economy, it is not only necessary to improve the framework conditions, but also to motivate companies to take voluntary measures. These measures can be supported through agreements with the government. The goal is to encourage economic actors to enter into voluntary agreements that help substantially reduce the environmental impacts caused by products over their entire life cycle. If this goal is achieved, it will not be necessary to adopt new regulations. These types of agreements also allow economic actors to become more transparent and inform the public and political authorities of their commitment to conserving natural resources and their progress in this area.

Resource-efficiency innovations and widespread use of resource-efficient technologies are key factors in moving toward a green economy. Beyond sporadic improvements to processes, synergies between the various forms of expertise in applied science and technology need to be harnessed so that entire systems can be improved.

Measure 1: Resource-efficient ICTs

See Part I: Report, Section 2.2

Measure 2: Reduce food waste

Worldwide, around one-third of food fit for human consumption is lost between harvesting and consumption (Gustavsson et al. 2011). A large portion of this waste could be avoided. The scale of food waste in Switzerland is in all likelihood comparable. In fact, a number of countries and the European Union have already begun to make efforts to reduce food waste.

Public awareness measures will be implemented until 2014. The on-going dialogue with stakeholders will end by mid-2013 and should lead to appropriate concrete measures. At the same time, the knowledge base is being expanded and the legal framework is under review (lead: FOAG).

Measure 3: Resource-efficient diet

From an environmental perspective, our eating habits could be improved enormously. This measure is intended to tap the full potential for improvement in agriculture. Synergies with a healthy diet can also be exploited. In coordination with NRP 69 "Healthy nutrition and sus-

tainable food production” and the Agriculture Policy 2014-2017, the challenges and potential are being identified, which should lead to a more resource-efficient, balanced and varied Swiss diet. The issue of sustainable agricultural land use in Switzerland is now considered a part of these efforts. In addition, dialogue with actors in the agri-food system will be initiated and measures are being developed (lead: FOAG).

Measure 4: Improve environmental information on products

See Part I: Report, Section 2.3

Measure 5: Environmental information on product ranges

To succeed in significantly reducing the ecological footprint of products, measures to improve environmental information on products need to be completed by supply measures. In other words, product ranges need to become environmentally friendlier. The responsibility for this should not be left to consumers alone; it must also be assumed by product manufacturers and suppliers.

Commercial establishments and manufacturers should be required to assess the product groups in their product ranges according to a mandatory standard in order to determine which of them contribute significantly to exerting excessive pressure on or jeopardising natural resources and report regularly on their progress. The regulations should be developed in consideration of Switzerland’s trade commitments.

Product range assessment (e.g. screening) and reporting (e.g. similar to the “Global Reporting Initiative”, GRI) methods should be set out in the regulations and comply with relevant international standards. In the medium term, these measures contribute towards making the overall assortment environmentally friendlier. The amount of work involved in assessing the product ranges is reasonable thanks to available assessment standards.

The next phase of work is to be carried out in cooperation with the federal offices concerned, retail businesses, manufacturers, and consumer and environmental protection organisations (lead: FOEN).

Measure 6: Evaluate the environmental impact of trade agreements

International trade agreements can greatly affect product consumption and related environmental impacts. That is why the product groups discussed in negotiations should be analysed on a case-by-case basis in specialised environmental feasibility studies in order to determine if existing environmental agreements and minimum requirements are being observed.

These studies have several components: a comparative legal analysis of environmental laws and commitments under multilateral environmental conventions that are binding on all trade partners; an analysis of the trade flows to detect potentially harmful products for the environment; and an estimation of the development potential of exports and cooperation in the field of resource-efficient technologies. To give concrete form to these studies, the experiences of other OECD Member States should be taken into consideration.

The responsibility for deciding whether a particular case needs to be reviewed lies with the SECO, in close coordination with the FOEN. The studies are carried out by the SECO and the FOEN according to their respective responsibilities.

Measure 7: Minimum requirements for releasing products in the market

Many products that are released in the market have problematic characteristics for the environment. When these products do not contain environmentally damaging substances or their use does not produce harmful or irritating emissions, there is generally no legal basis on which appropriate measures can be taken. To protect the climate and biodiversity in particular, the EU, for instance, adopted the timber regulation, which came into force on 3 March 2013, to ensure that all timber released in the market in the EU, whether or not it comes from within Europe, has been legally harvested (EU regulation no. 995/2010). A legal basis is required if a similar regulation is to be enforced in Switzerland. A new provision in the EPA will authorise the Federal Council to issue, where necessary, minimum environmental requirements for releasing products in the market. These types of ecological requirements for releasing products in the market must be applied with the utmost caution in consideration of trade policy. The Federal Council should only use them if the products have considerable environmental impacts, if voluntary measures or other less radical measures have not achieved the desired effect and if the requirements are compatible with international commitments. The requirements should be issued in close coordination with the EU and take into account existing international standards, whose development must also be encouraged.

The FOEN is currently reviewing the legal and regulatory framework required to issue these types of minimum requirements.

The next steps in the EPA adaptation process will be based on the on-going review of the legal and regulatory frameworks required to issue minimum environmental requirements for releasing products in the market and on the preparatory work for the potential introduction of a regulation similar to the EU regulation on the timber trade (competent departments: FOEN, SECO).

Measure 8: Voluntary agreements with the economy concerning products

Voluntary agreements should be entered into with the economy, especially concerning products that have major environmental impacts. The purpose of the agreements can be, for example, compliance with international standards or corresponding criteria, or improvements that make product ranges or specific product groups environmentally friendlier.

These agreements should set out clear and ambitious goals and corresponding timelines for improving resource efficiency, rules on controlling their effectiveness and requirements for regular progress reporting. Reporting is necessary to effectively, transparently and credibly implement the agreements.

The work involved in these agreements, which will be performed in close cooperation with the economy, will begin in 2013. The first phase consists in clarifying the scope of application, the goals and the intended parties of these voluntary agreements (competent department: FOEN).

Measure 9: Effectiveness of international product standards

Stores now have a range of resource-intensive products, even though environmentally-friendlier alternatives exist. Although product standards and regulations can promote the manufacturing of resource-efficient alternatives, current standards apply to only select products and do not always cover their entire life cycles or all of the relevant environment impacts.

Voluntary international standards that promote products manufactured using demonstrated above-standard methods are being strengthened and disseminated. The purpose of this measure is to foster demand for and the availability of environmentally-friendlier products. Furthermore, the effectiveness of the standards should be monitored to make sure that they contribute to reducing the environmental impact of products (competent department: SECO).

Measure 10: Competence centre for resource efficiency

Innovation is essential to improve resource efficiency in production processes and the use of raw materials. In Switzerland, applied scientific and technical expertise in these areas is spread over a large number of scientific and economic institutions. In most cases, this expertise now enables innovations to be made to specific components that play a key role in improving efficiency (e.g. better pumps), but not to optimise entire systems with multiple technologies, complex infrastructures and logistical chains. By combining these strengths within a competence centre, synergies can be exploited and innovations can be developed more easily for entire systems, such as in the case of recycling rare metals or recovering phosphorus from sewage sludge. A competence centre would be able to launch initiatives to set up flagship projects that demonstrate innovations in resource efficiency.

Efforts are now being made to determine how research institutions in Switzerland can help improve resource efficiency in the economy based on their current and future scientific knowledge. For that purpose, specifications are being developed on the scientific expertise required by research institutions and their cooperation with the various actors. In conjunction with the SERI, the FOEN is specifically looking into whether additional incentive measures are necessary and if they can be funded, for example, by setting up public-private partnerships and using federal funds (lead: FOEN).

Measure 11: Enterprise resource efficiency improvement network

A national network to promote resource efficiency is being set up with the goal of developing current analytical tools, ensuring broader and more systematic application in companies, especially SMEs, and launching innovative resource efficiency improvement projects. The network is intended to advise companies on how to improve resource efficiency (material efficiency), analyse their potential for improvement and propose concrete measures. An annual maximum amount of CHF 1 million should be provided to the network from funds currently allocated to the promotion of environmental technologies. The implemented measures will be monitored to verify the effectiveness of the network.

Network preparatory activities will begin in 2013 (lead: FOEN).

7.2 Wastes and raw materials

For countries without significant sources of raw materials, such as Switzerland, access to raw materials is essential to a secure supply for the economy. The growing use of secondary raw materials, i.e. materials salvaged through recycling, can substantially reduce Switzerland's dependence on imports and the environmental impacts caused by extraction and transport. Today, the Swiss waste industry is an effectively functioning and cohesive system. Material cycles are now largely closed in many areas. However, a cross-cutting resource and raw material policy based on a global vision of product life cycles is still lacking. Waste and raw material policy should be further developed in order to close the life cycles of substances that are still open, use more secondary raw materials (particularly plastics and construction waste), reduce the demand for raw materials and decrease the volume of waste produced.

The EPA needs to be revised so that measures can be implemented in the area of waste and raw materials. The explanatory report will provide a detailed description of the measures and review their impacts on the environment and the economy.

Measure 12: Increase efficiency of waste treatment plants and production facilities

The EPA currently has no legal basis on which to require waste treatment plants (except for landfills) to obtain authorisation. For this reason, municipal solid waste (MSW) incineration plants are slow to adapt to the latest technical advances and improve their energy efficiency and effectiveness in treating substances. This is why it is important to introduce regulations governing these aspects of waste treatment plants, and especially MSW incineration plants.

MSW incineration plants should also be required to expand their primary focus of incinerating waste to include recovering materials, such as by increasing the number of separate municipal solid waste collection and sorting systems. The new regulations governing waste incineration should be aimed at increasing heat and electricity production and recovering raw materials from incineration ash (e.g. phosphorus when sewage sludge is incinerated). One tonne of municipal solid waste contains roughly the same quantity of energy as 300 litres of heating oil and around 30 kg of metals such as aluminium, iron, copper and gold.

The need and possibilities for measures and regulations to reduce raw material use in favour of secondary raw materials should first be examined in production facilities. Products should have the longest possible service life and be recyclable so that the secondary raw materials can be reintegrated in the raw materials cycle (lead: FOEN).

Measure 13: Supply of non-energy mineral raw materials

Non-energy mineral raw materials are of critical importance in our daily lives. Many of our needs are met by products made from mineral raw materials. These include the raw materials used in construction (e.g. gravel, sand, lime and clay), other metals, salt and gypsum. Some of these minerals are extracted in Switzerland, while others have to be imported. Exhaustive data is lacking on non-energy mineral sources in Switzerland, Swiss demand for these materials, and domestic and transnational material flows. On behalf of the Swiss Geological Survey, the Swiss Geotechnical Commission has compiled an inventory of raw materials over the years and continues to develop it in order to ensure continuous monitoring of raw materials for Switzerland.

The measures required to improve Switzerland's long-term supply of non-energy mineral raw materials should be reviewed in cooperation with all federal departments concerned so that resource use can be enhanced as much as possible. Both primary mineral raw materials and material flows from recycling (keyword: secondary minerals or urban mining) should be considered in the review (lead: swisstopo).

Measure 14: Mandatory take back of consumer product packaging

Neighbouring countries have detailed regulations on product marketing aimed at reducing packaging and thus waste. However, experience shows that these regulations are difficult to apply. Switzerland does not have any similar regulations. Periodic analyses of municipal solid waste composition reveal that packaging materials make up a large portion of this waste and therefore have great recycling potential. Instead of adopting an ordinance on packaging, which would be time-consuming and difficult to implement, Switzerland should merely require retail businesses to take back their consumer product packaging, without regulating the design of the packaging or the arrangements that need to be made in order to take it back. This would be a simple way to create incentives for designing packaging that uses fewer materials and reduce waste without excessive regulations. Producers and retailers could freely decide where and how the measures should be implemented. Today, retail businesses are already choosing to become involved, in varying degrees, in taking back packaging materials, such as boxes, plastic film, beverage packaging and plastic hollow bodies (lead: FOEN).

Measure 15: Use secondary gravel from excavated material

Construction waste is the largest waste category in Switzerland: it accounts for over 65 million tonnes of waste per year, of which 50 million tonnes come from excavated material that are primarily used to fill in gravel pits. Yet, Switzerland's total gravel consumption has been lower than its volume of excavated material for a few years now. This means that gravel pits are being filled faster than they are being excavated. As there is not a great deal of space for landfills in Switzerland, some regions are beginning to lack places where the excavated materials can be stored. A regulation requiring greater use of secondary gravel from excavated material would help resolve the shortage of places to store excavated materials and conserve primary gravel sources, which are a limited resource.

Furthermore, the extensive transport services required to dispose of the excavated material pollute the environment. In fact, nearly one out of every three trucks that travel on Swiss roads carry excavated material. A regulation encouraging the creation of decentralised storage sites for excavated materials would be one solution to the transport problem and would help increase the recovery rate of excavated materials (competent department: FOEN).

Measure 16: Requirements for construction materials and methods

Current construction methods and materials produce large quantities of non-reusable mixed rubble (mixture of brick, tile, concrete and gravel) when structures are demolished. Composite materials with mineral and organic components, such as expanded polystyrene concrete or wood-cement composites, are particularly difficult to recycle. Standards that take account of the entire life cycle of construction materials need to be planned and applied to new mate-

rials and construction methods. These standards should ensure the sustainable management of the life cycle of construction waste by requiring environmental construction methods and the highest possible recycling rate when structures are demolished (competent department: FOEN).

Measure 17: Increase recycling of rare technical metals

The rapid development of electric and electronic applications in practically every area of life has caused the demand for rare technical metals to explode in recent years. As nuclear energy is abandoned and renewable energies are promoted, this huge demand will continue to rise because it is not yet possible to produce and operate efficient wind power or photovoltaic installations or exploit other new energy sources without the state-of-the-art technology that requires rare technical metals.

Therefore, better recycling methods for rare technical metals are being investigated, and the potential necessity of regulations is in the process of being determined. The crucial question is what are the options for recovering rare metals from electronic waste? When studying the life cycles of metals, the interaction between available primary metal reserves and the life cycles of metals used as secondary materials must be analysed. Analyses are also required to determine whether dissipated rare technical metals have biological and eco-toxic effects. The knowledge acquired from these studies and projects will be used as a basis for potential regulations (competent department: FOEN).

Measure 18: Increase the environmental responsibility of the raw materials sector

Switzerland's commitment to creating a social and environmentally-friendly raw materials sector is important. As far as the green economy is concerned, this measure is limited to increasing the environmental responsibility of the raw materials sector.

Within the framework of existing international cooperation bodies, Switzerland advocates international guidelines for the environmentally-safe extraction of raw materials and participates in international dialogue on this topic. Furthermore, the possibility of negotiating and adopting international guidelines, ideally in the form of a convention on raw materials that not only takes their specific environmental impacts into account, but also requires sustainability reporting by companies and a certification system, will be reviewed by the end of 2013 (lead FOEN/FDFA/SECO).

7.3 Cross-cutting instruments

To increase resource efficiency, it is not only important to take action in the "Consumption and Production" and "Wastes and Raw Materials" priority sectors, but it is also necessary to implement instruments that help improve resource efficiency in all sectors. The work being done as part of the Cleantech Master Plan, greening the tax system, and increasing Switzerland's international commitment are contributing significantly to achieving this goal.

However, because a large portion of Switzerland's footprint is made abroad, the national lever offered by these instruments is not enough to achieve the goals. The overall pressure exerted on natural resources from extracting raw materials and producing goods also needs to be reduced through continuous international efforts to promote a green economy.

Switzerland should do its part in building a global green economy by increasing its international cooperation in order to contribute to the efficient and rational use of the world's natural resources. In the longer term, Switzerland has the potential to position itself as a country with a green economy because it already carries out a multitude of activities and has recognised expertise in this area. However, it is important to ensure that all countries and the poorest population segments benefit from the transition to a green economy and that national and international policies affect the development opportunities of poorer countries in a positive and not a negative way (cohesive development policies).

Now that resource efficiency is attracting many investors from around the world and the green economy has been added to the political agendas of many countries since Rio+20, Switzerland would benefit its export economy, tourism and status as a location for business, industry and organisations by becoming more involved at the international level.

Measure 19: Increase Switzerland's international commitment

Because more than half of the total environmental impacts of Switzerland's consumption and production are caused abroad, the international scope of the measures it takes to reduce the environmental impact are of critical importance. This is why national efforts to improve resource efficiency must translate into greater involvement by Switzerland in international organisations (UNEP, OECD, WTO, FAO, international financial institutions, etc.) and international environmental conventions, especially on chemicals, waste and raw materials. In these international bodies, Switzerland is working to develop international rules and standards on resource efficiency (e.g. by setting goals, establishing guidelines and best practices, measuring progress and instituting reporting requirements), support countries in their transition to a green economy, close knowledge gaps and highlight the funding aspect of a green economy, such as in the context of OECD environmental reviews, for instance. This commitment to establishing international rules and standards will be strengthened. Moreover, an international network should be developed in order to facilitate and encourage dialogue on resource efficiency, particularly between political circles, economic organisations, financial organisations, NGOs, universities and universities of applied sciences. The FOEN is working closely with the Federal Department of Foreign Affairs and the SECO on Switzerland's international commitment (lead FOEN/FDFA/SECO).

Measure 20: Switzerland's international visibility

Switzerland's achievements, activities and expertise as concerns the green economy should increasingly be promoted abroad. These activities will strengthen Switzerland's image abroad as a pioneer of the green economy. Other measures that can be taken for this purpose include communication abroad, support for conferences and other international events, partnerships with selected countries and even high-level dialogue and discussions. In addition, the actors concerned in the federal administration should be involved and the external policy instruments of the FDFA (diplomatic visits, activities by selected representative agencies abroad, Presence Switzerland) and the SECO (economic commissions, Cleaner Production Center) should be utilised. At the same time, the private sector should also become more involved.

In this way, Switzerland's reputation as a location for international processes and institutions in the area of the green economy will be promoted to a greater extent. Likewise, Geneva will

be actively promoted as an excellent location for international institutions (Geneva International).

Other measures (e.g. communication initiatives to inform others of the quality of Swiss environmental technologies, active participation in international debates, organisation of conferences and exhibitions) and channels of communication are being studied on a continuous basis, while existing measures are being more closely coordinated and implemented in order to improve Switzerland's image abroad in the area of the green economy (lead FDFA).

Measure 21: Cleantech Master Plan

See Part I: Report, Section 2.1

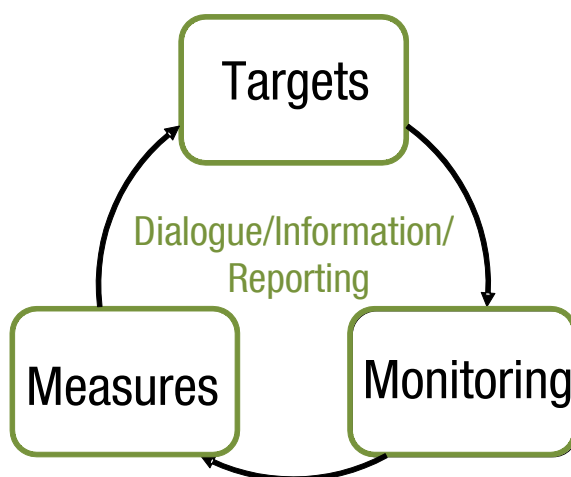
Measure 22: Green the tax system

See Part I: Report, Section 2.4

7.4 Targets, monitoring, information, reporting

The transition to a sustainable and resource-efficient economy is an on-going, long-term process that should take shape through dialogue with economic actors, the scientific community and civil society. Moreover, information must be provided and public awareness must be raised (cf. Figure 6).

Figure 6: Targets – monitoring – measures process



Source: FOEN

Efforts must be guided by clear targets. Progress must be correctly measured and the achievement of targets must be verified so that new measures can be suggested, where necessary. Appropriate indicators are crucial so that policy-makers can quickly get a general overview of progress in accomplishing the targets. These indicators must be as consistent as possible with international indicators and standards of public statistics.

In this way, it is possible to propose adaptations to measures, where necessary. For that purpose, a report is submitted to the Federal Council at each legislature in consideration of other relevant policies and strategies. Reporting activities within the administration are coor-

minated directly by the departments concerned. The content and timeline for these activities are harmonised with those of the Sustainable Development Strategy.

Measure 23: Setting targets and reporting on progress

The goal is to improve resource efficiency and reduce resource consumption to naturally sustainable levels over the long term. This goal must be enshrined in the EPA so that it is binding.

To achieve this long-term goal, specific milestones should be set at regular intervals (e.g. every eight years). The milestones will be accompanied by appropriate measures so that they can be achieved. The goals should be scientifically sound and harmonised with international goals (e.g. the sustainable development goals and the UN's Post-2015 Development Agenda).

For the purposes of monitoring, the achievement of the goal and thus the progress made in transitioning to a green economy will need to be regularly measured and evaluated. The evaluation will be based on indicators such as soil and water pollution or material consumption and on further indicators of the comprehensive welfare measurement (cf. Measure 24).

If monitoring of results indicates that additional action is required, new measures will be proposed and their environmental and economic impacts will be specified.

At the end of each legislature (2015, 2019, etc.), a report will be submitted to the Federal Council to inform it of progress in the Green Economy Action Plan and on the path toward the green economy. The report will take the form of a general assessment and an assessment of the specific milestones (competent department: FOEN).

Measure 24: Comprehensive welfare measurement

See Part I: Report, Section 2.5

Measure 25: Dialogue with economic actors, the scientific community and civil society

The scientific community, economic actors and civil society all need to be involved in the process of setting up and developing a green economy. In order to increase the involvement of various actors from these circles, the green economy should be developed through dialogue. Emphasis should be placed on the goals, measures, contributions by various actors and discussions of theoretical and practical knowledge.

One of the building blocks of this dialogue is an Internet platform that provides an overview of the work that has been done by the federal government and the efforts that have been made to create a green economy. This platform also makes it possible to establish connections between the various activities and the existing forums and share success stories from the business world (competent department: FOEN).

Measure 26: Ensure resource efficiency and sustainability is included in legislative drafts

See Part I: Report, Section 2.6

Measure 27: Increase awareness measures

To raise awareness of efficient use and reduced consumption of natural resources, the federal government is increasing its communication, education, continuing education and advisory activities. These activities address all issues concerning the green economy, but especially waste reduction and resource efficiency in consumption and products, two areas that require special attention. Awareness measures can be used to reach specific target audiences. In this way, they contribute to changing behaviours and reducing the pressure exerted on the environment.

The federal government is reviewing the communication, education, continuing education and advisory measures and preparing specific instruments to better raise public awareness (competent department: FOEN).

8 Costs and benefits of a green economy

8.1 Challenges

The measures set out in the action plan improve the resource efficiency of the Swiss economy and reduce its environmental impact. This substantial benefit offers many opportunities to the economy and society but also generates costs, at least in the short term. The economy and society must assume these costs in accordance with the polluter pays principle.

Decision-makers and the public need to know the costs and benefits that accrue from the transition to a green economy for companies, households and the government, as well as the impacts on the environment, on growth and on employment rates in Switzerland and abroad. This information is crucial to assessing the feasibility of and designing and optimising the mix of measures.

However, to evaluate the costs and benefits, goals need to be set as clearly as possible (which impacts need to be reduced to what extent and in how much time), measures have to be formulated as concretely as possible and their effects must be estimated. The costs and benefits also depend upon technological and socio-demographic developments, which are difficult to project.

In response to postulate 10.3373 Bourgeois of 3 June 2010, the green economy report of 31 January 2013 outlines the government's role in the efficient use of natural resources.

8.2 Impacts on companies

Due to market failures and distorted price signals that do not take account of external costs, natural resources are over-exploited. Governments can implement measures to internalise these external costs.

Measures to improve resource efficiency need to be borne by those who use the resources. These measures are often costly and compete with other investment opportunities, even though they are profitable in the long term. Furthermore, companies face international competition that is not always subject to the same rules.

A green economy offers the following major benefits, particularly in the long term:

- Greater raw materials efficiency and better resource management throughout the product value chain will result in lower production costs and improve planning security for companies facing higher raw material prices.
- Resource-efficient products, processes and technologies are markets with future potential. The development and marketing of these items will open up new business segments to companies and stimulate their competitiveness.
- Companies with resource-efficient production processes can improve their reputation and image as the population's awareness increases; this may result in increased demand for their products.

8.3 Macroeconomic costs and benefits

Parallel to the specification of the measures, an in-depth evaluation of the macroeconomic effects must be performed in order to improve the decision-making bases and design measures as effectively as possible. The results of existing models show that the costs of policy measures are low if they are appropriately designed.

A variety of national and international studies have analysed the economic effects of scenarios for a green economy or at least scenarios with ambitious goals in sector policies such as climate, biodiversity and energy (e.g. IPCC 2007; UNEP 2011c; FOEN 2010; Ecoplan 2010; SFOE/Ecoplan 2012). These studies show that employment is positively affected in certain cases. They also show that GDP growth may slow down in the short term. However, in the medium and long term the effect on the GDP will be at most marginally negative or even positive (see e.g. UNEP 2011c). The benefit-cost ratio is even better when the avoided external costs are taken into account.

The most recent and detailed study conducted for Switzerland was developed in the context of the Energy Strategy 2050 (SFOE/Ecoplan, 2012). Besides energy, this study does not take other resources into account. It shows that a new energy policy focusing on energy efficiency and renewable energies and targeting a major reduction in CO₂ emissions by 2050 has slightly negative effects. However, the avoided external costs offset some of them. Although it is possible to design measures without significant distributional effects, there will be transfers between the various economic sectors.

The economic costs of "business as usual" scenarios have also been studied. A comprehensive study conducted by FOEN (2010) has shown that a 3°C increase in the average global temperature by 2100 will cause around CHF 1 billion of annual damage in Switzerland by 2050. If global climate measures can lead the rise in the global temperature to be limited to 2°C, the amount of the damage will be cut by about half.

Sources

- AEE (2010): The European Environment, State and Outlook 2010: Consumption and the environment, Copenhagen <http://www.eea.europa.eu/soer/europe/consumption-and-environment/>.
- DEZA (2012): The Swiss Water Footprint Report. Bern 2012
http://www.deza.admin.ch/en/Home/News/Close_up?itemID=209619.
- European Commission (2011): Roadmap for a Resource-Efficient Europe, COM/2011/0571 final, Brussels.
- EC-JRC (2012): Life cycle indicators for resources, products and waste. Resources, Resource-Efficiency, Decoupling. European Commission, Joint Research Centre, Institute for Environment and Sustainability, JRC, Ispra.
- Ecoplan (2010): "COPI Schweiz" - Grobschätzung der Kosten des Nichthandelns im Bereich der Biodiversität bis 2050, Bern.
- Ecoplan (2012): Volkswirtschaftliche Auswirkungen einer ökologischen Steuerreform, Analyse mit einem berechenbaren Gleichgewichtsmodell für die Schweiz, Schlussbericht, study commissioned by the Swiss Federal Office of Energy, Federal Tax Administration and Federal Finance Administration, Bern.
- Ernst Basler & Partner, NET Nowak Energie & Technologie AG (2009): Cleantech Schweiz. Studie zur Situation von Cleantech-Unternehmen in der Schweiz (summary in English: Study on the situation of cleantech businesses in Switzerland). Commissioned by the State Secretariat for Education, Research and Innovation (SERI).
- Faber J., et al. (2012): Behavioural Climate Change Mitigation Options and Their Appropriate Inclusion in Quantitative Longer Term Policy Scenarios. Commissioned by the European Commission, DG Climate Action
http://ec.europa.eu/clima/policies/roadmap/docs/main_report_en.pdf
- FAO (2006): Global Forest Assessment 2005: Progress towards sustainable forest management. Rome 2006, <http://www.fao.org/forestry/fra/fra2005/en/>.
- Federal Council (2012a): Sustainable Development Strategy 2012-2015, Bern.
- Federal Council (2012b): Strategy of the Federal Council for an Information Society in Switzerland, Bern.
- Federal Council (2012c): Adaptation to Climate Change in Switzerland – Goals, challenges and fields of action. First part of the Federal Council's strategy. Adopted on 2 March 2012, Report no. UD-1055-D, Bern.
- Federal Council (2012d): Botschaft für die Legislaturplanung 2011-2015,
<http://www.admin.ch/ch/d/ff/2012/481.pdf>.

- FOEN (2007): Graue Treibhausgas-Emissionen der Schweiz 1990-2004. Erweiterte und aktualisierte Bilanz, Bern. www.bafu.admin.ch/uw-0711-d. Summary in English: Embodied greenhouse gas emissions in Switzerland 1990-2004, UW-0711-E.
- FOEN (2010): Synthesebericht zur Volkswirtschaftlichen Beurteilung der Schweizer Klimapolitik nach 2012 (VOBU), <http://www.bafu.admin.ch/wirtschaft/00517/03734/index.html?lang=en>.
- FOEN (2011): Environmental Impacts of Swiss Consumption and Production, A combination of input-output analysis with life cycle assessment, Environmental studies no. 1111, Bern.
- FOEN (2012a): FOEN Indicators, Bern. <http://www.bafu.admin.ch/umwelt/indikatoren/index.html?lang=en>.
- FOEN (2012b): Swiss Biodiversity Strategy, Bern. <http://www.bafu.admin.ch/publikationen/publikation/01660/index.html?lang=en>
- FOEN/FSO (2011): Environment Switzerland 2011, Bern and Neuchâtel.
- Fraunhofer ISI (2011): Optimierung der Wertschöpfungskette Forschung-Innovation-Markt im Cleantech-Bereich, Karlsruhe.
- FSO (2012a): Materialflusskonten, <http://www.bfs.admin.ch/bfs/portal/de/index/themen/02/05/blank/dos/03.html> (date consulted: 12.04.2012).
- FSO (2012b): Overall Assessment Complementing the GDP, Complementing the GDP do-d-00-ebip-01, <http://www.bfs.admin.ch/bfs/portal/en/index/themen/00/09.html>.
- FSO (2012c): Sustainable development – Indicator set MONET, Neuchâtel. <http://www.bfs.admin.ch/bfs/portal/de/index/themen/21/02/ind32.approach.3201.html> (date consulted: 26.11.2012).
- German Federal Government (2012): German Resource Efficiency Programme (ProgRes), program for the sustainable use and protection of natural resources, Berlin.
- German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU, 2012): GreenTech made in Germany 3.0. Environmental Technology Atlas for Germany. Berlin
- Gustavsson J. et al. (2011): Global Food Losses and Food Waste: Extent, Causes and Prevention, Food and Agriculture Organization of the United Nations FAO, Rome.
- IPCC (2007): Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)), IPCC, Geneva.
- Jungbluth et al. (2012): Umweltbelastungen des privaten Konsums und Reduktionspotenziale. <http://www.esu-services.ch/fileadmin/download/jungbluth-2012-Reduktionspotenziale-BAFU.pdf>
- Kristof, K. et al. (2010): Materialeffizienz und Ressourcenschonung „MaRes“ – Endbericht

- des Projekts, Wuppertal.
- Lebensministerium (2012): Ressourceneffizienter Aktionsplan (REAP), Wegweiser zur Schonung natürlicher Ressourcen, Vienna.
- OECD (2011): Towards green growth: A summary for policy makers, Paris.
- OECD (2012): OECD Environmental Outlook to 2050: The Consequences of Inaction, OECD Publishing, <http://dx.doi.org/10.1787/9789264122246-en>.
- Pozzer, A. et al. (2012): Effects of business-as-usual anthropogenic emissions on air quality. Atmos. Chem. Phys., 12, 6915-6937.
- Rockström J. et al. (2009): Planetary Boundaries: Exploring the Safe Operating Space for Humanity, Ecology and Society 14(2): 32.
- SERI (2011): Europe's Global Land Demand. A study on the actual land embodied in European imports and exports of agricultural and forestry products. Sustainable Europe Research Institute, Vienna.
- SFOE (2011): Schweizerische Statistik der erneuerbaren Energien. Ausgabe 2011. Vorabzug. June 2011, Bern.
- SFOE (2012a): Schweizerische Gesamtenergiestatistik 2011, Bern.
- SFOE (2012b): Massnahmenanalyse zur Energiestrategie 2050 – Teil I
http://www.bfe.admin.ch/php/modules/publikationen/stream.php?extlang=de&name=de_416992799.pdf&endung=Volkswirtschaftliche
- SFOE/Ecoplan (2012): Volkswirtschaftliche Auswirkungen einer ökologischen Steuerreform. Analyse mit einem berechenbaren Gleichgewichtsmodell für die Schweiz.
- UN (2012): The Future We Want. Outcome document of Rio+20:
<http://www.uncsd2012.org/content/documents/727The%20Future%20We%20Want%2019%20June%201230pm.pdf>
- UN-ESA (2010): World Population Prospects. The 2010 Revision.
<http://esa.un.org/unpd/wpp/index.htm>
- UNEP (2009): The environmental food crisis – The environment's role in averting future food crises. www.unep.org/pdf/foodcrisis_lores.pdf.
- UNEP (2010): Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials.
http://www.unep.fr/shared/publications/pdf/DTIx1262xPA-PriorityProductsAndMaterials_Report.pdf.
- UNEP (2011a): Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel,
<http://www.unep.org/resourcepanel/Publications/Decoupling/tabid/56048/Default.aspx/>.
- UNEP (2011b): Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, A Synthesis for Policy Makers,
<http://www.unep.org/greeneconomy>.

UNEP (2011c): Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, chapter entitled "Modelling global green investment scenarios", www.unep.org/greeneconomy.

UNEP (2012a): GEO 5: Global Environmental Outlook. Environment for the future we want. <http://www.unep.org/resourcepanel/>

UNEP (2012b): Responsible Resource Management for a Sustainable World: Findings from the International Resource Panel. <http://www.unep.org/resourcepanel/>

WBCSD World Business Council for Sustainable Development (2010): Vision 2050, The new agenda for business, <http://www.wbcsd.org/web/vision2050.htm>.

World Bank (2012): World Bank DataBank, data from 1990 to 2010, <http://databank.worldbank.org> (date retrieved: 14.06.2012).