

Switzerland's Report on Demonstrable Progress

in line with Decisions 22/CP.7 and 25/CP.8
of the UNFCCC

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Contents

Introduction	4
1 Domestic policies and measures	5
1.1 Policy-making in Switzerland	5
1.2 The role of climate policy in Swiss sectoral policies	6
1.3 Most important developments since 2001	7
1.4 Relevant legal frameworks	8
1.5 Cross-sectoral policies and measures	10
1.6 Climate policy	10
1.7 Energy policy	11
1.8 Transport policy	12
1.9 Industry (including HFCs, PFCs and SF ₆)	13
1.10 Agricultural policy	14
1.11 Land-use change and forestry	14
1.12 Waste management	15
1.13 Overview of measures implemented	16
1.14 Overview of measures adopted or planned	18
2 Trends in, and projections of, greenhouse gas emissions	19
2.1 Recent trends in emissions	19
2.2 Projections	22
2.3 Overview of trends and projections 1990–2020	23
3 Impact of domestic policies and measures on emission trends and projections	24
3.1 Interpretation of general trends in emissions since 1990	24
3.2 Evaluation of programmes implemented in the energy sector since 1990	25
3.3 Aggregate effects of policies and measures	26
3.4 Expected impact of additional measures in the energy sector by 2012	27
4 Activities related to Articles 10 and 11 of the Kyoto Protocol	30
4.1 Emission-reporting commitments under the Kyoto Protocol	30
4.2 Policy programmes in the energy sector	31
4.3 Activities related to the use of the flexible mechanisms	34
4.4 Measures related to the selection of sinks activities	34
4.5 International cooperation in research	34
4.6 Impacts and adaptation	36
4.7 Transfer of technology and capacity building	40
4.8 Systematic observation	44
4.9 Information, awareness raising and public participation	46
4.10 Financial assistance	48
Abbreviations	53

Introduction

This report has been prepared in response to Article 3.2 of the Kyoto Protocol and in line with Decisions 22/CP.7 and 25/CP.8 of the UN Framework Convention on Climate Change. As required by these decisions, the report provides the Conference of the Parties with the basis for reviewing progress in four domains, namely:

- policies and measures, including arrangements for domestic compliance and enforcement;
- trends in, and projections of, national greenhouse gas emissions;
- the impact of domestic policies and measures on emission trends and projections;
- activities undertaken in fulfilment of the commitments under Articles 10 and 11 of the Kyoto Protocol.

The report provides an overview of the steps taken by Switzerland to meet its Kyoto Protocol commitments since the adoption of the Protocol in 1997 and, in particular, since the adoption of the Marrakech Accords in 2001. It has been compiled on the basis of the fourth National Communication of Switzerland 2005 and is fully consistent with the content thereof.

1 Domestic policies and measures

1.1 Policy-making in Switzerland

Democratic instruments

According to the Federal Constitution, the Swiss people are sovereign and ultimately the supreme political authority. This includes all Swiss adults who are eligible to vote – some 4.8 million citizens, i.e. around 60% of the resident population. Those under the age of 18 and foreign nationals have no political rights at federal level.

Switzerland is a representative democracy, with strong formal and informal elements of direct democracy. By means of a popular initiative, citizens can seek an amendment to the Constitution (or, at the cantonal level, also an amendment to a law). Popular initiatives may comprise a general proposal or contain detailed regulations. In most cases, a proposal must be accepted by a majority of the electorate and of the cantons if it is to become part of the Constitution. This requirement for a “double” majority (population and cantons) mainly serves to protect the interests of less populous rural cantons.

The second formal instrument of direct democracy is the referendum. This allows citizens to veto decisions made by parliament. The referendum may be mandatory or optional. It is possible to have a referendum concerning regulations at the level of the Constitution, formal laws, international treaties and generally binding federal decrees that are put into effect as a matter of urgency. Both popular initiatives and referendums also exist at the cantonal level.

The petition is an informal instrument of public participation and is non-binding.

The cantons and other interested parties (e.g. business, trade unions, NGOs etc.) are included in a consultation process whenever government (the Federal Council) proposes a significant change in the Constitution, in a law or an ordinance. Although the outcome of this process is formally non-binding, it is of great importance and reflects an established principle of consensus typical of policy-making and of political culture in Switzerland.

Administrative structures

Switzerland is a confederation, with a federal government, a bicameral parliament and a Federal Supreme Court. The territory consists of 26 cantons (states), each of which has its own government, parliament and cantonal courts. Responsibilities are shared between the federal authorities and the cantons.

The federal government consists of the seven members of the Federal Council, together with the Federal Chancellor, and is elected by the United Federal Assembly for a four-year term. The federal administration comprises the Federal Chancellery and seven Federal Departments (for details, see <http://www.admin.ch/ch/e/bk/buku/buku2005/19.pdf>).

The Swiss parliament has two chambers which, when in joint session, are known as the United Federal Assembly. This is the country’s legislative authority. The National Council, through its 200 members, represents the population of the country as a whole – the individual cantons are represented in proportion to the number of their inhabitants. The Council of States represents the 26 cantons – 20 cantons are represented by two members while the six former half-cantons each send one representative to the 46-strong chamber.

Subsidiarity plays an important role in Switzerland. This is reflected in constitutional law, which states that unless legislative power is explicitly assigned to the federal level, the cantons are sovereign, i.e. entitled to legislate in an area of policy. This fundamental principle helps to protect minority interests, above all those of the French-, Italian- and Romansh-speaking parts of Switzerland. Another important aspect is fiscal federalism. Each canton has its own budget and sets its own level of direct taxation. Despite a system of financial equalization amongst cantons, substantial differences remain in the level of taxation of both households and companies.

Cooperation is an important principle, both vertically and horizontally. In matters where the federal authorities are responsible for legislation, the role of the cantons is to implement (enforce) such legislation. Very often, the cantons have substantial latitude to take local or regional conditions into account. At a lower level, similar autonomy is granted to the municipalities by the cantons.

At the same time, cantons cooperate horizontally and have, in a number of policy areas, concluded agreements that facilitate harmonized, effective implementation.

The legislative system comprises several hierarchical levels. All legislation must ultimately be based on the (written) Constitution. Laws of different kinds (federal acts and federal decrees) implement constitutional matters. Regulation at both of these levels is subject to the approval of the electorate, which is not the case for ordinances, through which the government alone implements the contents of laws.

1.2 The role of climate policy in Swiss sectoral policies

Climate policy in Switzerland is incorporated into other sectoral policies that existed well before climate change became an important issue. All policies are embedded in a general approach of sustainable development. The following areas of policy relate to the issue of climate change.

Area of policy	Aims and highlights
Sustainability	Sustainable development is embedded in the Swiss constitution and provides a baseline for all sector policies: Consistency of different sectoral policies according to general criteria considering environmental, economic and social concerns. "Sustainable Development Strategy 2002" with an action plan including measures for "refinement of energy and climate protection policy" and "sustainability assessment".
Environment	Emission reduction targets and timeframe stipulated in the CO ₂ Act adopted in 1999. Policies on air pollution and on waste based on the Federal Act on the Protection of the Environment, with a number of important ordinances, e.g. the Ordinance on Air Pollution Control, Technical Ordinance on Waste Disposal, Ordinance relating to Environmentally Hazardous Substances.
Energy	Most CO ₂ emissions are energy related. The CO ₂ Act is fully compatible with energy policy approaches such as the Energy Act and the related energy efficiency programmes ('SwissEnergy' action plan).
Transport	Serious consideration of environmental aspects (especially in the case of road transport). Modernization of the railway infrastructure. Agglomeration policy focusing on improvement of the transport infrastructure in order to prevent uncontrolled urban sprawl and traffic growth. Priority for non-motorized traffic and public transport as backbones of mobility in urban areas. Policy favouring rail for transalpine freight and passenger transport, and the internalization of external costs.
Agriculture	Incentives for environmentally friendly production methods (agricultural reform).
Forestry	Sustainable logging; ban on clearance and clear-cutting, preservation of forested area.
Foreign economic issues and international affairs	Implementation of cooperation and development commitments under the UNFCCC. Fund for global environmental projects as a cornerstone of bilateral activities.
Finance	Green tax and budget reforms.

Table 1-1: Overview of policy areas relevant to climate change

1.3 Most important developments since 2001

- Switzerland ratified the **Kyoto Protocol** in July 2003. Ratification was approved overwhelmingly by both chambers of Parliament.
- The national secretariat for the **flexible mechanisms** (Designated National Authority) has been established in 2004. An ordinance concerning the requirements for CDM/JI projects, as well as the amount of certificates from abroad which can be used for compliance (supplementarity), was adopted by the Federal Council in June 2005.
- The following table gives an overview of important milestones in **Swiss energy policy** since 2001.

January 2001	Federal Councillor Leuenberger officially launches the 'SwissEnergy' programme as a successor to the 'Energy 2000' programme.
July 2001	Signature of service agreements with the Energy Agency for the Economy and the Agency for Renewable Energies and Energy Efficiency. Publication of 'Guidelines on voluntary measures aimed at reducing energy consumption and CO ₂ emissions'.
September 2002	Rejection by the electorate in a referendum of the Electricity Market Act, aimed at opening the market in two steps.
May 2003	Rejection by the electorate of two popular initiatives opposing the use of nuclear power.

Table 1-2: Milestones in Swiss energy policy since 2001

- Following the publication of guidelines for **voluntary measures** in July 2001, the business community embarked on the process of concluding voluntary agreements under the umbrella of the privately run Energy Agency for the Economy. Despite these efforts, the need for an incentive tax in both the transport and the household/industry sector remained apparent. As a counterproject to the impending CO₂ tax, the Swiss Oil Association proposed to levy a "**climate cent**" on motor fuels to fund mitigation projects within and outside Switzerland. In March 2005, following a consultation exercise, the Federal Council decided to introduce a **CO₂ tax on process and heating fuels** and to accept the climate levy on motor fuels as a provisional measure until 2007.
- In 2002, the Federal Council adopted its **Sustainable Development Strategy 2002**, comprising an action plan with ten action areas and 22 measures. In action area 6 (Environment and natural resources), measure 9 (Refinement of energy and climate protection policy) calls for effective implementation of the national CO₂ Act in accordance with the Kyoto Protocol, and – for the period after 2010 – the development of new objectives according to the long-term "2000-watt society" scenario. Sustainability assessment (measure 22) is designed to promote the mainstreaming of sustainable development in all relevant policy fields.
- **Transport policy:** Since the last national communication, Switzerland has enhanced the coordination between spatial development and transport infrastructure and elaborated strategies for the improvement of infrastructure (all transport modes) in urban/suburban areas (agglomerations). At the same time, the range of Swiss public transport services has been extended (RAIL 2000 project). The modal shift of freight transport from road to rail, facilitated by the heavy vehicle fee, has been successfully initiated. In 2005, the HVF-rate has been increased up to 2.5 Swiss cents (average) with an increase of the weight limit up to 40 tonnes in parallel.
- An effort has been made to regulate **synthetic GHG emissions** under the generic name of "substances stable in the air". The revised Ordinance Relating to Environmentally Hazardous Substances entered into force on 1 January 2004. The regulation is based on three main lines of action: 1) to limit the use of substances stable in the air to those applications where there is no preferable alternative; 2) when such substances are used, to reduce emissions as far as

possible; and 3) to adopt voluntary binding agreements developed by the industry (SF₆ in the high-voltage equipment sector).

- As a result of the **Agriculture reform** introduced in the 1990s, recent years have seen significant improvements in the area of agricultural GHG emissions. Various indicators show that Swiss agricultural production is now considerably more market-oriented and environmentally sound. Restructuring in the direction of larger-scale farms or farms deploying resources in partnership with other enterprises is likely to continue at the same rate.
- Switzerland has elaborated a **National Forest Programme** designed to improve, in a sustainable manner, the economic, ecological and the protective functions of the forest.

1.4 Relevant legal frameworks

The principles and instruments of Swiss environmental policy are formulated in the Federal Act on the Protection of the Environment, adopted in 1985 and revised in 1995 and 2003. This modern legislative framework has been supplemented by the Act on the Reduction of CO₂ Emissions, which was adopted in 1999. These two laws provide the basis for the Swiss national policy on climate change.

Both pieces of legislation have a direct bearing on compliance with commitments under the Kyoto Protocol. The CO₂ Act covers about 75% of Switzerland's GHG emissions. The Environmental Protection Act provides for measures to mitigate emissions from waste disposal (CH₄), synthetic gases (HFC, PFC, SF₆) and GHG precursors. Fiscal incentives are recognized as an essential instrument for promoting the efficient use of resources.

The Federal Act on the Protection of the Environment

A number of regulations (ordinances) addressing climate change are associated with the Federal Act on the Protection of the Environment. The most important of these are the following:

- The **Ordinance on Air Pollution Control** (1985, revisions 1992, 1997, 1999 and 2003) contains precautionary emission limits and air quality standards designed to protect public health. Precautionary emission limits have to be tightened if air quality standards are not met either locally or regionally. Specific new measures have been introduced to reduce VOC emissions from solvents and to promote low-sulphur fuel through an incentive tax. An emission-related heavy vehicle fee has also been implemented. Policies implemented earlier have been brought into line with the EU approach of tightening air pollution limits and exhaust emission limits for all motor vehicles.
- The **National Clean Air Strategy** (1986, reviewed in 1996 and 1999) defines national targets and measures to reduce emissions of SO₂ and GHG precursors such as NO_x and NMVOCs. By 2000, compared with maximum levels between 1980 and 1985, NO_x emissions had been reduced by 45% and NMVOC emissions by 54%. However, further reductions are necessary so as to avoid excessive levels of ozone, particulate matter and nitrogen deposition in particular. The National Clean Air Strategy is **currently being reviewed** to evaluate achievements to date and identify gaps that need to be closed if protection objectives are to be met by 2020. The review report also assesses new technological developments with a view to possible revision of Swiss legislation, taking 'Best Available Techniques' into account, and further exploration of measures to abate air pollution. Consideration is to be given to the question of how air pollution control and climate protection are interrelated (e.g. in connection with the requirements for promotion of diesel-powered vehicles).
- The **Technical Ordinance on Waste Disposal** (1991, revisions 1993, 1996, 1998, 2000) defines the national framework for waste management and introduces a consistent control and monitoring system.
- The **Ordinance Relating to Environmentally Hazardous Substances** (1986, climate-related revisions 1995, 2003) provides for measures to control emissions of persistent substances with a high global warming potential (HFCs, PFCs, SF₆) in almost all sectors. Since the beginning of the 1990s, the Federal Council has been recommending the greatest restraint in the use of these

gases, in keeping with its integrated product policy. However, their use is increasing and in 2003 they represented around 1.5% of anthropogenic GHG emissions in Switzerland. Recent projections indicate a further 50% increase in synthetic GHG emissions by 2010. New provisions have been drawn up in consultation with the cantons and the industrial and commercial sectors concerned. They define a clear framework, allowing sectors to take strategic choices promptly in order to limit atmospheric emissions of synthetic GHGs.

The CO₂ Act

Adopted by Parliament in October 1999 and in force since May 2000, the CO₂ Act covering energy-related CO₂ emissions provides the principal legal basis for compliance with Switzerland's Kyoto commitments. To limit the use of fossil fuels accounting for about 75% of Switzerland's GHG emissions, the CO₂ Act stipulates reduction targets for 2010 compared to 1990 levels. Apart from an overall reduction target of 10%, emissions from heating/process fuels are to be lowered by 15% and emissions from transport fuels by 8%. In lowering fossil fuel consumption, priority is to be given to voluntary action. However, if voluntary and other CO₂-related measures do not suffice, the Federal Council is authorized to resort to an incentive tax. The tax rates depend on the shortfalls in meeting the sectoral targets and require the approval of Parliament. Net revenues are to be fully redistributed to the population on a per-capita basis and to businesses as a percentage of wages paid. The need for a CO₂ tax is determined by means of energy projection models. In assessing how far CO₂ reduction targets have been met, all relevant measures in other policy sectors are to be taken into account. The CO₂ Act allows for the use of flexible mechanisms supplemental to domestic action. The implementation of this provision is regulated in an ordinance, and the way in which the flexible mechanisms may be used with a view to meeting the Kyoto target is summarized in Section 3.4.

With the need for an incentive tax confirmed by periodically updated energy projections, the Swiss Oil Association, supported by *economiesuisse*, *auto-schweiz* and the TCS, proposed the "climate cent" as an additional voluntary measure to facilitate compliance with the CO₂ reduction targets. Importers are to levy a surcharge on transport fuels and pay the revenues into a fund for the financing of mitigation projects within Switzerland and project-based flexible mechanisms. Funds will be managed by a newly established non-governmental foundation.

In June 2004, the Federal Council decided to submit for consultation four options for compliance with the CO₂ reduction targets: 1) a CO₂ tax; 2) a CO₂ tax with revenues partly earmarked for use in the area of flexible mechanisms; 3) a CO₂ tax on process/heating fuels only, combined with a voluntary "climate cent" levied on transport fuels and 4) a "climate cent" only. A report comparing the mitigation, economic and financial impacts of these four options was open for stakeholder comments from October 2004 to January 2005. Based on the results of this consultation, the Federal Council decided in the spring of 2005 to adopt the third option.

The Federal Energy Act

The Federal Energy Act of 1998 and the associated ordinances provide the legal framework for federal energy policy. This policy calls for extensive cooperation with the private sector, reaffirms the principle of subsidiarity for state intervention and gives priority to voluntary measures. In addition, the division of responsibilities between the federal government and the cantons is regulated. The federal government can provide funds for cantons that have established programmes promoting energy efficiency and renewable forms of energy. In the context of voluntary agreements, the tasks of coordination, evaluation, monitoring and reporting are delegated to private energy agencies. This is compatible with the spirit of the CO₂ Act, which gives priority to voluntary action over a command-and-control approach. To some extent, voluntary agreements covered by the Energy Act coincide with private-sector initiatives to avoid the need for a CO₂ tax, on the one hand, and to gain exemption if such a tax is introduced, on the other.

Under the Energy Act, responsibility for the implementation of measures lies with the cantons, particularly with regard to energy requirements for buildings and the preparation of the cantons' own support programmes (e.g. procedures for the payment of subsidies). On 24 August 2000, the Conference of Cantonal Energy Directors (EnDC) agreed on a package of standard energy regulations to promote harmonization in energy legislation. Most cantons have revised their energy laws in recent years, and virtually all have already developed, or are in the process of preparing,

their own support programmes. In 2001, the EnDC approved an Energy Master Plan, guiding implementation of the SwissEnergy programme at the cantonal level; this cantonal Master Plan is to be updated for the second half (2006–2010) of the SwissEnergy programme.

1.5 Cross-sectoral policies and measures

In the run-up to the World Summit on Sustainable Development held in Johannesburg, the Federal Council adopted a revised sustainable development strategy in the spring of 2002.

The strategy is based on the provisions of the Federal Constitution as revised in 1998 and aims to integrate the principles of sustainable development into as many policy areas as possible. It also lays down the content and procedural framework for the Federal Council's sustainable development policy over the coming years. In addition to conceptual guidelines, the strategy also contains a total of 22 measures in ten action areas (1: Economic policy and public services, 2: Financial policy, 3: Education, research, technology, 4: Social cohesion, 5: Health, 6: Environment and natural resources, 7: Spatial and settlement development, 8: Mobility, 9: Development cooperation and the promotion of peace, 10: Methods and instruments). The lead agency for sustainability policy is the Federal Office for Spatial Development (OSD).

The strategy was reviewed in 2004. The interim status report highlights the progress of implementation. As far as the Sustainable Development Strategy 2002 is concerned, the implementation of the 22 measures is, generally speaking, proceeding according to plan. It is, however, apparent that a number of measures have been subject to certain limitations as a result of the Confederation's tight budgetary situation. Regarding the status of commitment at the subnational level, it should be added that, by the end of 2003, 13 of the country's 26 cantons had launched concrete activities to promote sustainable development. At the local level, around 100 municipalities, representing over 25% of the Swiss population, have initiated a sustainable development process in line with Local Agenda 21. At the international level, Switzerland is actively pursuing the goals of sustainable development in various areas and different bodies in response to the challenges defined by the Johannesburg Plan of Implementation (JPOI), which was adopted by the international community at the 2002 World Summit on Sustainable Development.

1.6 Climate policy

Energy and CO₂ legislation provide for business organizations to be entrusted with the task of supporting and implementing voluntary measures. For this purpose, the Energy Agency for the Economy (EAEC) was founded in 1999. The activities of the EAEC are governed by a service agreement with the Swiss Federal Office of Energy (SFOE), which in return grants financial contributions of CHF 2 million per year to cover one third of the agency's operating costs. The rest is financed out of membership fees, amounting to CHF 6,000 per year per company, with discounts granted to SMEs in proportion to their size. The agency consists of a network of more than 50 industry experts, who support companies in identifying in-house measures to reduce energy consumption and in calculating reduction targets for their energy-related CO₂ emissions. For reasons of administrative efficiency, companies submit their proposals to the federal government in groups. Reduction proposals are subject to a formal audit procedure carried out by SAEFL and SFOE with the aid of independent industry experts. EAEC aims to cover 40% of industry's CO₂ emissions.

As part of the purely voluntary measures envisaged by the CO₂ Act, a package of agreements was signed in April 2004 by 45 groups of companies (about 600 entities), accounting for 25% of industry's CO₂ emissions. Most of these companies are engaging in voluntary action with a view to being exempted from a CO₂ tax. This applies especially to energy-intensive companies operating in the following sectors: cement, ceramics, glass, pulp & paper, lime kilns, chemicals, sugar mills, food, transport, appliances, printing, textile finishing, foundries, aluminium, steel, plastics and machinery. As soon as a CO₂ tax is introduced, voluntary agreements will be transformed into legally binding commitments, and companies not complying with their reduction targets will be penalized, i.e. required to pay CO₂ tax retroactively for each tonne emitted since the introduction of

the tax. Another 400 companies are in the process of negotiating agreements under the umbrella of the EAEC (as of the summer of 2005).

To facilitate compliance with CO₂ reduction targets, companies are given access to the national and international CO₂ market. Companies signing a commitment to limit their energy-related CO₂ emissions are allocated emissions allowances according to their CO₂ target for 2008–12. As of 2008, emissions allowances equalling the amount of CO₂ emitted are to be cancelled annually. An internet-based monitoring system for the submission of energy and emissions data in a standardized format is now operational. Emissions allowances not needed for compliance can be sold or carried over to future commitment periods beyond 2012. To cover excess emissions, allowances have to be acquired on the domestic or international market. The use of flexible mechanisms is generally restricted to 8% of the total allowances allocated. For specific cases (e.g. large new emitters) it is limited to 30%. The use of flexible mechanisms by companies which have signed a binding commitment should not exceed 400,000 tonnes of CO₂ per year. Whether companies observe the restrictions on the use of CO₂ credits from flexible mechanisms is monitored in the National Registry as part of the compliance review.

On 23 March 2005, the Federal Council decided to introduce a CO₂ tax on heating/process fuels and to accept the Swiss Oil Association's proposal for a "climate cent" to be levied on transport fuels. On 22 June 2005, the Federal Council adopted the ordinances required to implement this decision. The first ordinance regulates CO₂ tax imposition, exemption and redistribution, and the second ordinance limits the use of the flexible mechanisms.

- For the **CO₂ tax** ordinance to come into force, the tax rate of CHF 35 per tonne of CO₂ needs to be approved by Parliament. The tax will therefore be levied from 1 July 2006 at the earliest. It is estimated that the tax will reduce CO₂ emissions in the residential and industry sector by 700 Gg. Revenues of CHF 600–700 million are to be fully redistributed to the population (about CHF 50 per capita) and the business community (about CHF 110 per CHF 100,000 of wages paid). Companies exempted from the tax are not entitled to receive redistributed revenues.
- Being a voluntary measure, the "**climate cent**" on transport fuels does not require Parliament's approval. Moreover, the government has no say in how revenues are to be used. In late summer of 2005, DETEC will conclude an agreement which sets milestones to be met by the "climate cent" fund. The CO₂ impact of the "climate cent" (expected to be levied as of 1 October 2005) will depend on how the revenues of about CHF 100 million per year are invested. The intention is to fund mitigation projects in Switzerland and CDM/JI projects abroad. Funds will be managed by the newly established non-governmental "Climate cent" foundation. Should the foundation fail to meet the agreed milestones by 2007, a CO₂ tax will be introduced on petrol as of 2008.

In the areas of energy and transport policy, several measures designed to support the achievement of the reduction targets stipulated in the CO₂ Act are in preparation (see Section 3.4).

1.7 Energy policy

The most important energy efficiency measures are implemented under the SwissEnergy programme (2001–2010), which followed the Energy 2000 programme (1991–2000).

SwissEnergy uses three kinds of measures that complement one another: first and foremost, in accordance with the provisions of the Energy Act and CO₂ Act, it supports voluntary measures based on service agreements awarded to non-governmental agencies, and concludes voluntary agreements on energy reduction targets with companies and sectors. Alongside voluntary measures, energy and building legislation calls for more comprehensive promotional and mandatory measures. These include regulations governing the energy consumption of motor vehicles, appliances and buildings.

Key measures that have been implemented under the SwissEnergy programme since 2001 include:

- the conclusion of a service agreement with the Energy Agency for the Economy (EAEC); the privately run EAEC helps companies to identify in-house measures for the reduction of energy consumption and CO₂ emissions,
- the introduction of an energy efficiency label for cars, enhancing transparency for consumers selecting or buying a new car,
- the introduction of an energy efficiency label for household appliances,
- the launching of a new quality assurance system to improve the certification procedure for the MINERGIE label, which is awarded to buildings that use only a third of the total energy consumed by an average existing building,
- services offered to large-scale consumers with the aim of reducing energy consumption in public buildings by at least 10%,
- further promotion of the “Energy City” label (more than 1 in 4 Swiss residents already live in an “Energy City”), a model which cities in Germany and Austria have started to work with as well,
- creation of a network involving several private agencies and competence centres for the promotion of renewable energy and energy efficiency (rational use of energy).

In February 2002, a target agreement was reached with the Association of Swiss Automobile Importers (“auto-schweiz”) to reduce the fuel consumption of new motor cars by 24% between 2000 and 2008. SwissEnergy is supporting this effort with a compulsory energy label for new motor vehicles introduced in 2003, and through a special campaign. As a result, the average fuel consumption of new cars decreased in 2004 by 6.9% compared to the year 2000 and now lies for the second year below 8 litres/100 km. However, the agreed mid-term target of 7.4 litres/100 km was not met, despite the increase in diesel vehicles and technological improvements.

For additional information on the structure, objectives, contents and achievements of the SwissEnergy programme, see Section 4.2.

1.8 Transport policy

Switzerland has developed an integrated approach to transport policy, focusing on better coordination between transport modes. This approach has been strengthened in recent years with the integration of transport policy into spatial development and the general sustainability context.

The following aspects are most important:

- Modernization of the railway infrastructure, including the four major projects: RAIL 2000 (the first phase had been completed by the end of 2004, the second phase is pending); the NRLA (New Rail Link through the Alps) network with two new base tunnels (Gotthard 57 km and Lötschberg 34 km long), supported by the Federal Decree on the Construction of Two New Transalpine Railway Lines of 4 October 1991; the connection of Eastern and Western Switzerland to the European high-speed rail network; and noise reduction measures on the railways.

In 2004, the modernization of the railway infrastructure led to a 12% increase in passenger transport service levels from one day to the next (more trains, faster connections between Swiss cities). Work is also progressing on the two new transalpine base tunnels (St Gotthard, Lötschberg). The first tunnel (Lötschberg) will open on schedule in 2008; the new St Gotthard link is expected to open by 2015. This will increase capacity and attractiveness for both transalpine freight and passenger transport from Switzerland and Northern Europe to Italy.

- Along with the modernization of the railway infrastructure goes a railway reform, providing increased flexibility for the railway companies and greater entrepreneurial freedom, making rail transport more productive and attractive.

- The Modal Shift Act of 8 October 1999 and supplementary measures: market-based measures and incentives will further improve the general framework for the railways, so that the transfer of freight from road to rail can be intensified and accelerated.

Since 2001, freight transport policy has been based on the successful implementation of the distance-related heavy vehicle fee (HVF), accompanied by an increase of the weight limit to the European average. These measures have provided a strong incentive to increase average truck load factors, to reduce traffic volumes and to shift freight from road to rail, especially for transalpine freight transport. In each of the first two years following the introduction of the HVF, traffic levels were reduced by 5%. With the second stage of the HVF as of 2005, the fee has been increased per kilometre and tonne, and the weight limit has been increased to 40 tonnes. By 2007, according to model calculations, a drop of about 6–8% is expected in CO₂ and NO_x values relative to a business-as-usual scenario.

In addition to the HVF, the policy of transferring traffic from road to rail includes the promotion of combined transport, with funding of more than CHF 1 billion for 10 years. The Modal Shift Act sets a target of a maximum of 650,000 heavy goods vehicles per year crossing the Alps by road no later than two years after the opening of the first alpine base tunnel. This means that, compared with 1999 levels, half of the heavy vehicles crossing the Alps are to be eliminated by transferring freight from road to rail. Initial experiences are positive. The recent figures show a boost in combined transport volumes (nearly 30% within the last three years), while heavy vehicle traffic volumes have decreased by around 10%.

- Coordination of spatial planning and transport infrastructure development, with a specific focus in agglomeration policy on concentrating population and transport growth in those areas where non-motorized and public transport offer comparative advantages and to overcome and avoid further urban sprawl.
- In addition, energy-related measures in the transport sector are part of the SwissEnergy programme, e.g. efforts to improve driving behaviour, promotion of car sharing and measures to reduce the specific energy and fuel consumption of new cars.

In 2003, an agreement was concluded concerning the purchase, by gas distributors, of biogas from its producers. This is to be injected into the natural gas grid and marketed as motor fuel in pure or mixed form. Under this agreement, the biogas purchased by gas distributors is to account for at least 10% of all gas sold as motor fuel.

In the domestic aviation sector, mineral oil tax is levied on kerosene, provided that there is no connecting flight to a destination abroad. For the time being, no further measures are in place addressing GHG emissions from domestic aviation. Within the ECAC and ICAO, Switzerland is lobbying for the implementation of internationally coordinated measures to limit and reduce GHG emissions from aviation.

1.9 Industry (including HFCs, PFCs and SF₆)

Fugitive fuel emissions

The CH₄ emissions in the fugitive fuel emissions sector are mainly CH₄ losses from the gas distribution network in Switzerland. Based on the revised Ordinance on Air Pollution Control, the emission standards for fuel distribution have been tightened, requiring vapour recovery units for petrol distribution. This has also had a positive impact on CH₄ emissions.

HFCs, PFCs, SF₆

In the industrial processes sector, the use of synthetic GHGs (called “substances stable in the air” and defined as halogenated VOCs with a half-life longer than two years, plus the non-VOCs SF₆ and NF₃) has been regulated in various areas through a climate-related amendment to the Ordinance relating to Environmentally Hazardous Substances of 9 June 1986. This amendment was adopted in April 2003 and entered into force in stages between July 2003 and January 2004. The regulations cover the following areas:

- Compressed gas containers
- Foams
- Solvents
- Refrigerants
- Fire protection
- SF₆ in electrical distribution equipment

Among the former applications of PFCs and SF₆ in Switzerland, use in tyres and insulating windows is no longer authorized. Other uses are authorized insofar as there is no environmentally superior alternative and when emissions are reduced to a minimum according to the best available techniques.

The Ordinance relating to Spray Cans of 26 June 1995 prohibits the use of HFCs or PFCs in most spray cans. It only allows the use of HFC-152a as a propellant in spray cans containing cosmetics and household products.

Furthermore, under Annex 2 of the Ordinance on the Movement of Toxic Waste, waste containing HFCs and PFCs counts as special waste. Thus, the movement of such waste is controlled, and it must be treated by licensed enterprises in an environmentally sound manner.

1.10 Agricultural policy

Since the beginning of the 1990s, agricultural policy has been fundamentally reformed in a three-stage process. The centrepiece of this reform is a reduction in regulated prices and the introduction of non-product-related direct payments to compensate for public-interest and environmental services (legislation adopted by Parliament in April 1998). The emphasis shifted from the security of food supplies to stewardship of the cultural landscape and preservation of natural resources.

These changes, together with increasing compliance with the required standard of ecological performance – in particular, the requirement for maintenance of an appropriate soil nutrient balance – have resulted in positive effects on agricultural GHG emissions.

Consistent application of the Water Protection Act, which sets the framework for the preservation of ground and surface water quality, has likewise had a moderating effect on livestock rearing and manure management practices and thus also reduced agricultural GHG emissions. To protect water quality, the Act defines a limit of 3 cattle manure units per hectare for the highest yielding areas. In environmentally sensitive or lower yielding areas, the cantonal authorities are required to set lower limits.

The substitution of farmyard manure for mineral fertilizers has led to a 30% reduction in the use of the latter, from 75,000 tonnes in 1990 to 53,000 tonnes in 2003. Consequently, N₂O emissions from fertilizer application decreased significantly. Over the same period, as a result of the reduction in livestock numbers, CH₄ emissions dropped as well.

1.11 Land-use change and forestry

The National Forest Programme of 2004 concluded that existing forest legislation is inadequate to deal with the current and future problems facing the forest. Therefore, the Forest Act is now under revision. The following principles with a long tradition in Switzerland's forestry will be maintained:

- Prohibition of deforestation, with strict regulations about exemptions, including the obligation to afforest an equal area or to take other measures to improve biodiversity.
- Devastated tracts and clear-cuts are legally kept as forest areas. From 2000 to 2003, subsidies of CHF 24.1 million per year were paid for reforestation of such areas in cases where natural regeneration was too weak and/or biodiversity had to be improved. 67,720 trees were planted

annually (the subsidies had been temporarily increased due to the damage caused by Hurricane Lothar in December 1999).

- Forest management has to be strictly sustainable (for nearly 100 years the felling of timber has only been permitted at a sustainable rate).

Major carbon reservoirs such as bogs and fens are fully protected by the Federal Act on the Protection of Nature and Cultural Heritage. Nature and landscape protection legislation also calls for the establishment of ecological compensation areas – such as copses, hedges and natural vegetation on lake shores and river banks – within intensively used areas. The duty to enhance the ecological value of farmland has been supported by the promotion of greener agricultural practices over the past few years. Financial support for these activities has amounted to several million Swiss francs per year.

In 2001, a 10-year wood promotion campaign was launched ('wood 21'). The objective is to increase the use of wood as an environmentally friendly and carbon-neutral construction material. After Hurricane Lothar, a temporary programme was carried out to promote the use of wood as a source of energy. This measure raised the consumption of fuelwood by about 100,000 m³ per year, reducing CO₂ emissions from fossil fuels by 60 Gg per year.

1.12 Waste management

Since 1991, under the Technical Ordinance on Waste Management, waste of all kinds has had to be treated in an environmentally sound manner. Since 2000, there has been a legal requirement that non-recycled combustible waste should be incinerated rather than disposed of at landfill sites, as the relatively low volumes of incineration residues present fewer problems. The cantons are responsible for implementation (planning capacity, installing, monitoring). By 2004, incineration capacities had reached a level at which the ban on landfilling could be fully enforced.

In recent years, CH₄ emissions from waste have been significantly reduced, and emissions from existing landfills are expected to continue to diminish in the coming years. CO₂ emissions from waste incineration are lower than accumulated long-term CH₄ emissions from waste disposal in landfill sites. In addition, as plants have to be operated in such a way that the heat produced by incineration is reused, 40% of the energy generated at waste incineration plants is now used for district heating and electricity production.

1.13 Overview of measures implemented

Overview of measures implemented (situation as in June 2005)

Name of policy or measure	Objective and/or activity affected	GHGs affected	Type of instrument	Status	Implementing entity or entities	Impact indicators
1 CO ₂ Act	Setting targets and timeframe for reduction of energy-related CO ₂ emissions (overall target: minus 10% by 2010 compared to 1990)	CO ₂ , precursors	Legal Voluntary, with option for economic incentive tax	In force since 1 May 2000; guidelines for voluntary action issued in July 2001, superseded by CO ₂ Ordinance adopted in June 2005	SAEFL	Fulfillment of CO ₂ requirements according to CO ₂ Act (periodic monitoring of overall emissions; progress reports by players engaged in voluntary agreements)
2 Kyoto Protocol flexible mechanisms	The flexible mechanisms are understood to be primarily an instrument for the private sector. The major buyer of certificates in Switzerland is expected to be the "Climate cent" foundation.	CO ₂	Economic	The necessary institutions have been established (legal framework, secretariat). For the time being, no budget allocated for investment in CDM/JI projects.	SAEFL and SFOE with the aid of the Energy Agency for the Economy (EAEC)	Entities with binding commitments are allowed to cover up to 8% of their reduction target with emission certificates. Other actors (e.g. "climate cent") are allowed to cover up to 1.6 million tonnes CO ₂ eq./year through the flexible mechanisms. The total admissible contribution from flexible mechanisms corresponds to approx. 50% of the difference between base year and target.
3 Energy Act	Ensure secure energy supply, contribute to rational and efficient energy use	CO ₂	Framework legislation - institutional - economic - regulatory	Implemented since 1998	SFOE, cantons	Development of overall energy consumption. Fossil fuel savings through mandatory measures in 2004: 17.6 PJ (1.2 million tonnes CO ₂)
4 "SwissEnergy" action plan (successor to "Energy 2000" programme)	10% reduction in fossil fuel consumption from 2000 to 2010	CO ₂	Voluntary agreements	Implemented since 2001 (follow-up to "Energy 2000").	SFOE, cantons and partners in the public and private sectors	Direct and indirect effects of the programmes since 1990 measured in terms of energy saved and reduction in CO ₂ emissions (2004: 23.7 PJ and 1.6 million tonnes CO ₂ respectively)
5 Cantonal and communal energy laws	Bring cantonal/communal energy legislation in line with the federal Energy Act	CO ₂	Framework legislation - institutional - economic - regulatory	Continuously implemented	Swiss cantons and local authorities	Status of cantonal/communal energy legislation
6 Energy efficiency programmes in the buildings sector, MuKE modules (model cantonal energy provisions)	Introduce/promote SIA standards, MINERGIE label etc.	CO ₂	Institutional Regulatory	Implemented since 2001 (follow-up to "Energy 2000")	SFOE, cantons and partners in the public and private sectors	Energy consumption in new and renovated buildings. Quantitative impact of activities largely corresponding to the effects of the Energy Act (see measure 3 above)

Name of policy or measure	Objective and/or activity affected	GHGs affected	Type of instrument	Status	Implementing entity or entities	Impact indicators
7 Energy efficiency programmes in the commercial and industrial sector	Voluntary agreements, models for large-scale consumers to fully exploit technological potential	CO ₂	Voluntary agreements	Implemented since 2001	SFOE, partners in the public and private sectors	Energy consumption in commercial and industrial sector. 2.7 PJ of final energy saved in the period 2001–2004
8 Energy efficiency programmes in the transport sector	Agreement on targets with Association of Swiss Automobile Importers Energy efficiency label for cars	CO ₂	Voluntary agreements	Implemented since 2001 (follow-up to "Energy 2000")	SFOE, partners in the public and private sectors	Energy consumption in transport sector 0.77 PJ of final energy saved in the period 2001–2004
9 Amendment to the Energy Act	Improved feed-in tariffs for renewable energy Guarantee of origin for electricity	CO ₂ (at the global level*)	Regulatory	Implemented since 2005	SFOE, cantons and partners in the public and the private sectors	Increased generation of renewable electricity
10 Heavy vehicle fee (HVF)	Transfer of freight traffic from road to rail, reduction in transalpine road traffic	CO ₂ , precursors	Economic	Implemented since 2001	Customs authorities, Federal Roads Authority	Load factors, change in road/rail vehicle-kilometres Expected reduction in vehicle-kilometres for HGVs in 2005: 13.6–17.2%
11 Modal shift measures in the transport sector	Transfer of freight traffic from road to rail, reduction in transalpine road traffic (supporting the HVF); expansion of railway infrastructure and services	CO ₂ , precursors	Institutional Subsidies (combined transport)	Implemented since 2000	Federal Office of Transport	Reduction in vehicle-kilometres for HGVs, increase in combined transport, transalpine truck traffic volume Expected reduction in vehicle-kilometres for HGVs in 2005 (including effects of HVF): 18–21.7%
12 Sustainability and protection of forested area	Sustainable forest management, no reduction in forested area	CO ₂	Regulatory	Implemented since 1993	SAEFL	Number of trees, and their CO ₂ absorption
13 GHG gas mitigation in agriculture	Promotion of ecological practices on farms	CH ₄ , N ₂ O	Economic Voluntary	Implemented since 1993	FOAG	Reduction in cattle population, and in the use of mineral fertilizers
14 Amendment of the Ordinance relating to Environmentally Hazardous Substances	Reduction in use and emissions of synthetic GHGs in all main sectors	HFCs, PFCs, SF ₆	Regulatory Voluntary	Implemented since 2004	SAEFL, cantons	Expected reduction of emissions growth: 100,000–500,000 tonnes CO ₂ eq. in 2010
15 NMVOC tax	Reduction in fugitive fuel emissions	Precursors	Economic	In force since 1999	SAEFL	Expected reduction: 27,000 tonnes of NMVOCs

*) Since power generation is almost carbon-free in Switzerland, renewable energy does not reduce CO₂ emissions directly in this country, but at the global level, e.g. if it is used to replace coal-based power.

Table 1-3: Most important measures implemented

1.14 Overview of measures adopted or planned

Overview of measures adopted or planned (situation as in June 2005)

Name of policy or measure	Objective and/or activity affected	GHGs affected	Type of instrument	Status	Implementing entity or entities	Impact indicators
1 CO ₂ tax	Reduction of CO ₂ emissions from heating/process fuels	CO ₂ , precursors	Economic	Adopted by Federal Council and submitted to Parliament for adoption	SAEFL	Fulfilment of CO ₂ reduction target for non-transport fuels
2 "Climate cent"	Mitigation projects within and outside Switzerland	CO ₂ , precursors	Voluntary	Agreement concluded in 2005	"Climate cent" foundation	Fulfilment of CO ₂ reduction target for transport fuels
3 Emissions trading	Scheme for companies engaged in legally binding reduction commitments	CO ₂	Economic	Ordinance adopted by Federal Council, due to enter into force after adoption of CO ₂ tax rate by Parliament	SAEFL	Trading volume monitored in national registry
4 Bonus/penalty system for cars	Reduction in fuel consumption of new cars Improvement of general environmental performance	CO ₂ , precursors	Economic	Evaluation of models	SFOE, Swiss Customs Swiss Federal Roads Authority	Fuel consumption of new cars: general environmental performance of cars
5 Programmes in the transport sector	Infrastructure expansion in agglomerations; reduction of traffic growth, new attempts to shift from road to public/non-motorized transport	CO ₂ , precursors	Infrastructure	New financing options for infrastructure financing (road, rail) in consultation	DETEC	Implementation of infrastructure programmes in agglomerations
6 Electricity Market Act	Measures supporting the liberalization of electricity markets: promotion of renewable forms of energy	CO ₂ (at the global level*)	Institutional Regulatory	Public consultation concluded; expected entry into force in 2007	SFOE	Share of renewable electricity
7 Revision of mineral oil tax legislation	Promotion of alternative fuels by tax reduction, and tax increase for petrol	CO ₂ , precursors	Economic	Public consultation concluded; expected entry into force in 2007	Swiss Customs	Share of alternative fuels
8 Decision by Parliament to account for sinks	Forest management to enhance and conserve sinks	CO ₂	Not yet defined	Decided in 2004, implementation starting in 2008	SAEFL	Maximum contribution to Kyoto reduction objective: 1.835 million tonnes of CO ₂ per year (Decision 11/CP.7, Appendix)
9 Ecological tax reform	Shifting tax burden from labour to energy use	CO ₂ , other emissions	Economic	Suspended and reconsidered for post-2012 period	Federal Department of Finance	Model calculations

*) Since power generation is almost carbon-free in Switzerland, renewable energy does not reduce CO₂ emissions directly in this country, but at the global level, e.g. if it is used to replace coal-based power.

Table 1-4: Most important measures adopted or planned

2 Trends in, and projections of, greenhouse gas emissions

2.1 Recent trends in emissions

Table 2-1 and Figure 2-1 show emission trends for all major source categories. As the largest share of emissions originated from the energy sector, Table 2-1 also shows the contributions of the energy sub-sectors.

Source and Sink Categories	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	CO ₂ equivalent (Gg)													
1 Energy	40'968	43'074	43'176	40'893	40'025	40'922	41'680	41'088	42'290	42'370	41'243	42'045	41'252	42'384
1A1 Energy Industries	1'425	1'776	1'872	1'562	1'581	1'641	1'821	1'773	2'004	1'799	1'634	1'743	1'762	1'753
1A2 Manufacturing Industries and Construction	6'191	6'109	5'891	5'708	5'786	5'882	5'668	5'624	5'867	5'903	5'897	6'034	5'937	5'936
1A3 Transport	14'382	14'901	15'213	14'153	14'350	14'036	14'064	14'686	14'909	15'523	15'811	15'505	15'406	15'604
1A4 Other Sectors	17'865	19'197	19'121	18'397	17'240	18'308	19'042	17'964	18'478	18'120	16'892	17'748	17'134	18'089
1A5 Other (Offroad)	723	719	715	711	707	703	696	687	679	671	663	666	668	670
1B Fugitive Emissions from Oil and Natural Gas	382	372	364	361	360	351	359	353	353	353	346	348	345	331
2 Industrial Processes	3'228	2'872	2'708	2'375	2'517	2'476	2'324	2'267	2'339	2'378	2'647	2'730	2'657	2'686
3 Solvent and Other Product Use	108	110	112	114	117	119	119	120	120	121	121	121	123	124
4 Agriculture	6'082	6'090	5'972	5'956	5'801	5'753	5'742	5'585	5'549	5'536	5'498	5'520	5'464	5'372
6 Waste	2'061	1'950	1'910	1'808	1'709	1'663	1'634	1'622	1'665	1'682	1'748	1'678	1'691	1'686
Total (without CO₂ from LUCF)	52'446	54'096	53'877	51'147	50'167	50'933	51'498	50'682	51'964	52'086	51'257	52'094	51'187	52'252
5 Land-Use Change and Forestry	-1'273	-1'339	-1'424	-2'388	-2'392	-2'355	-2'507	-2'674	-2'602	-2'256	149	450	305	-1'766
Total (with net CO₂ emissions/removals)	51'173	52'757	52'454	48'759	47'776	48'578	48'991	48'008	49'361	49'830	51'406	52'545	51'492	50'485

Table 2-1: Overview of Switzerland's CO₂ equivalent GHG emissions by sector, 1990–2003

The relative contributions of the various source categories are shown for selected years in Table 2-2. During the period under consideration, the share of the energy sector increased slightly (from 78% to 81%), while the other sectors' shares decreased (industrial processes from 6% to 5%; agriculture from 12% to 10%, and waste from 4% to 3%).

Source and sink categories	1990	1995	2000	2003
1 Energy	78.1%	80.3%	80.5%	81.1%
1A1 Energy Industries	2.7%	3.2%	3.2%	3.4%
1A2 Manufacturing Industries and Construction	11.8%	11.5%	11.5%	11.4%
1A3 Transport	27.4%	27.6%	30.8%	29.9%
1A4 Other Sectors	34.1%	35.9%	33.0%	34.6%
1A5 Other (Offroad)	1.4%	1.4%	1.3%	1.3%
1B Fugitive emissions from oil and natural gas	0.7%	0.7%	0.7%	0.6%
2 Industrial Processes	6.2%	4.9%	5.2%	5.1%
3 Solvent and Other Product Use	0.2%	0.2%	0.2%	0.2%
4 Agriculture (without CO ₂ from energy use)	11.6%	11.3%	10.7%	10.3%
6 Waste	3.9%	3.3%	3.4%	3.2%
Total (without CO₂ from LUCF)	100%	100%	100%	100%

Table 2-2: Relative contributions of source categories to total gross CO₂ equivalent GHG emissions for selected years

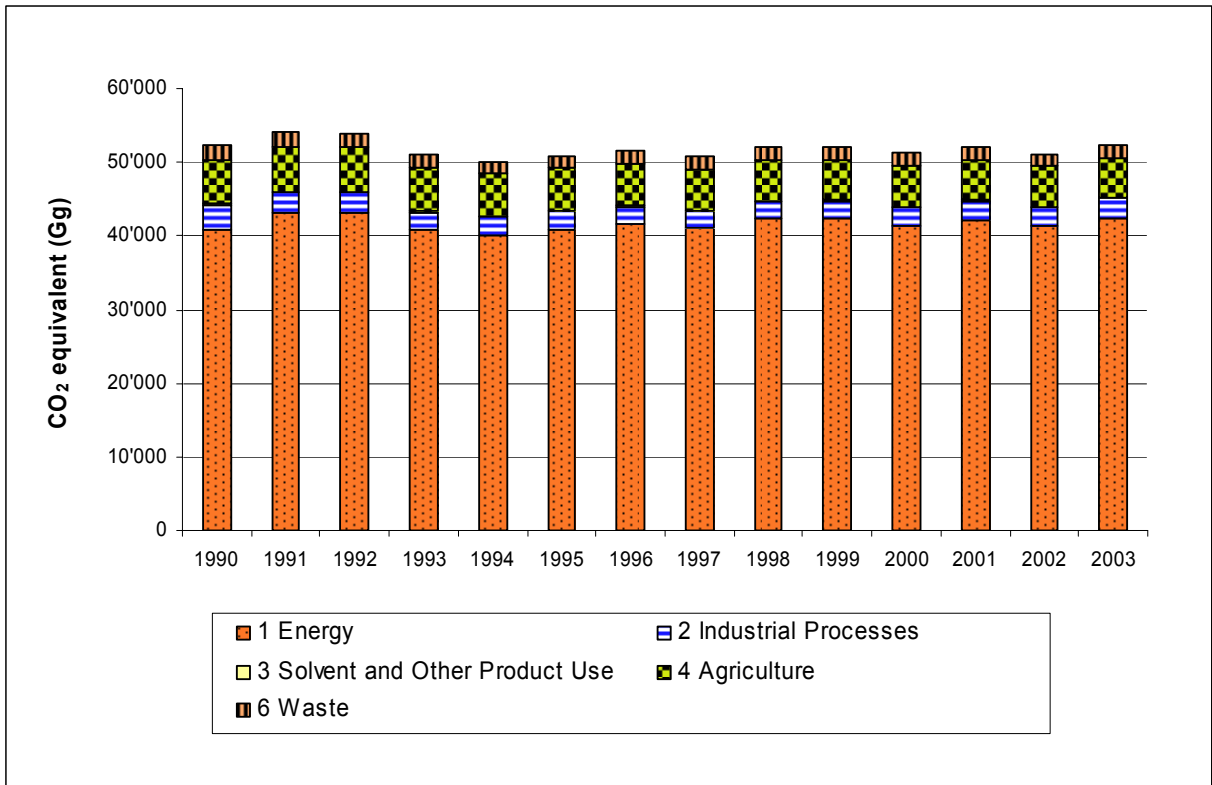


Figure 2-1: CO₂ equivalent GHG emissions by sector (without CO₂ from LUCF), 1990–2003

Figure 2-2 shows Switzerland’s net GHG removals (negative emissions) by sinks in the LUCF sector. In 1990 and 1999, two storms led to significant loss of biomass (the amount destroyed in 1999 was nearly three times higher than average annual net growth of Swiss forests). Disregarding the influence of these extreme events, GHG removals show only slight variations.

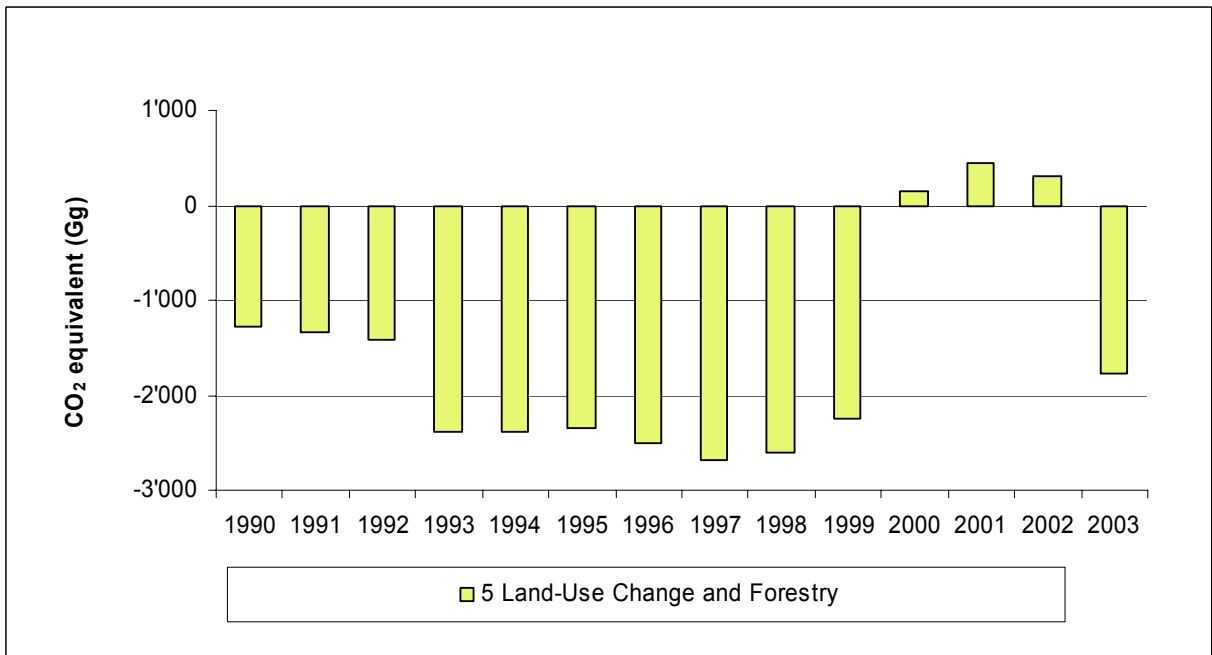


Figure 2-2: GHG removals in the LUCF sector, 1990–2003

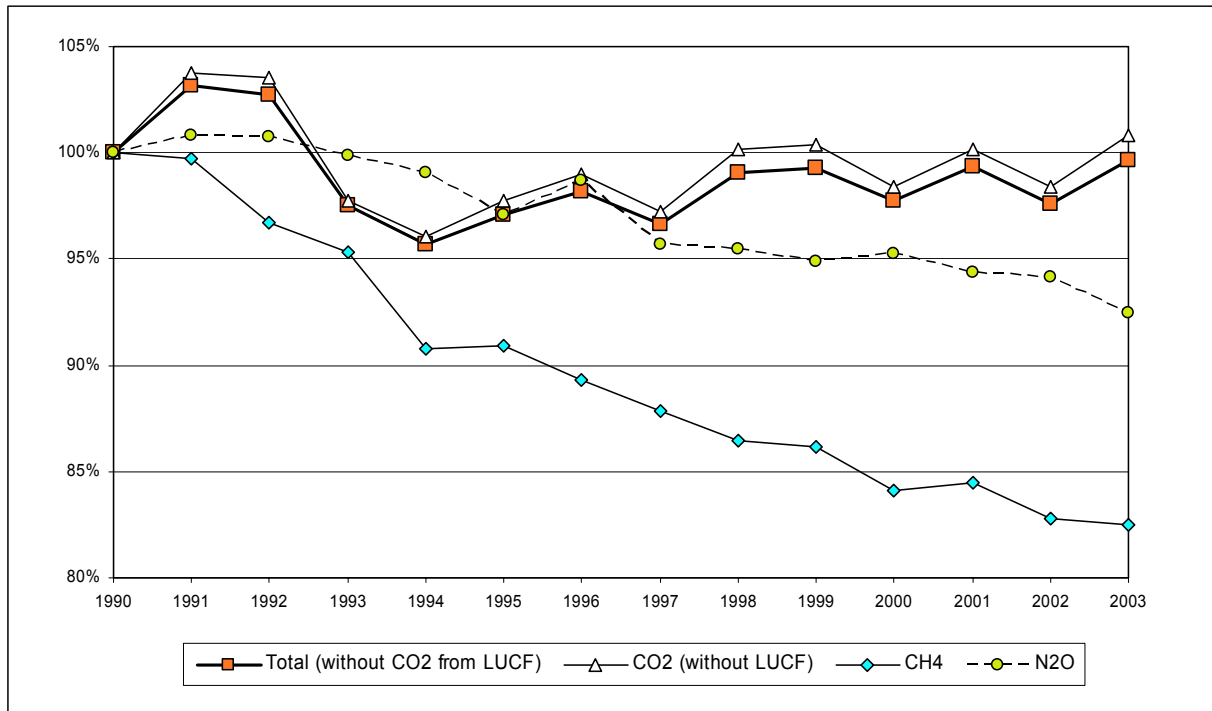


Figure 2-3: GHG emissions relative to the base year 1990 by gas, 1990–2003. The increase in synthetic gases is not shown (274% in 2003, compared to 1990).

Figure 2-3 shows emission trends for the most important greenhouse gases between 1990 and 2003. The development of the synthetic GHGs is illustrated by Figure 2-4.

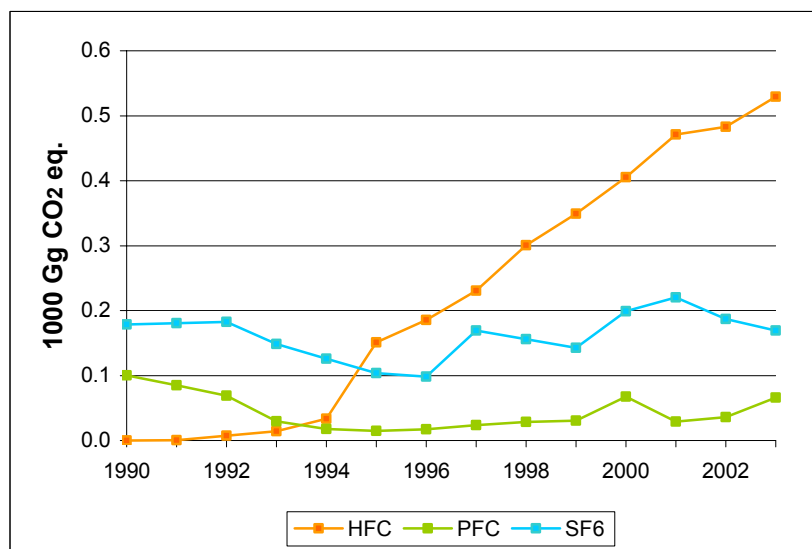


Figure 2-4: Total emissions of HFCs, PFCs and SF₆ between 1990 and 2003

2.2 Projections

Projections for CO₂, CH₄ and N₂O emissions

The projections for CO₂ emissions are based on scenarios using bottom-up model calculations. These models are applied to yield long-term energy consumption projections from 1990 to 2020. Non-energy-related CO₂ emissions are based on a published overview of the information available for all Kyoto Protocol gases for the period 1990–2010. In Switzerland's 2005 Reports under the UNFCCC, the results of this study are extended to 2020. The future development of removals by the LUCF sector (including emissions from organic soils) is highly uncertain. Table 2-3 shows overall emission trends for 2005, 2010 and 2020 "with measures implemented".

(million tonnes CO ₂ eq.)	CO ₂			CH ₄			N ₂ O		
Sector	2005	2010	2020	2005	2010	2020	2005	2010	2020
All energy	40.94	40.40	39.11	0.35	0.34	0.34	0.26	0.22	0.20
<i>Fuel combustion</i>	40.86	40.32	39.03	0.11	0.10	0.10	0.26	0.22	0.20
<i>Fugitive emissions</i>	0.08	0.08	0.08	0.25	0.24	0.24	0.00	0.00	0.00
Industrial processes	1.86	1.86	1.86	0.01	0.01	0.01	0.10	0.10	0.10
Solvent use							0.13	0.13	0.13
Agriculture				2.89	2.86	2.80	2.45	2.35	2.35
Waste	1.19	1.19	1.19	0.35	0.24	0.12	0.09	0.09	0.09
Total emissions	43.98	43.45	42.15	3.61	3.45	3.28	3.03	2.88	2.87
LUCF	(-1.60)	(-1.60)	(-1.60)						
<i>International bunkers</i>	3.68	3.82	4.13						

LUCF = Land use change and forestry; brackets indicate a high degree of uncertainty

Table 2-3: Projections for emissions of CO₂, CH₄ and N₂O in 2005, 2010 and 2020

Synthetic GHG emissions

Table 2-4 presents projections for emissions of synthetic GHGs. The results are based on a model which calculates actual emissions for all relevant UNFCCC categories and covers the period from 1990 to 2010. The trend between 2010 and 2020 is highly uncertain.

(million tonnes CO ₂ eq.)	2005	2010	2020
HFCs	0.64	0.73	(0.73) ^a
PFCs	0.10	0.10	(0.10)
SF ₆	0.16	0.16	(0.16)
Total	0.89	0.99	(0.99)

a) Brackets indicate a high degree of uncertainty.

Table 2-4: Projections for emissions of synthetic gases in 2005, 2010 and 2020

2.3 Overview of trends and projections 1990–2020

Table 2-5 shows aggregate emission trends between 1990 and 2020, based on inventory data for 1990 and 2000 and projections for the period 2005–2020.

GHG emissions (million tonnes CO ₂ equivalent)		Inventories		Projections			
IPCC	Sector	1990	2000	2005	2010	2015	2020
1	All energy	40.97	41.24	41.55	40.96	40.33	39.65
1A	Fuel combustion	40.59	40.90	41.22	40.64	40.01	39.33
	1 Energy/Transformation	1.42	1.63	1.75	1.63	1.62	1.62
	2 Industry	6.19	5.90	5.83	5.92	5.96	5.94
	3 Transport	14.38	15.81	15.50	15.37	15.09	14.90
	4 Other sectors	17.87	16.89	17.47	16.98	16.55	16.01
	5 Other (off road)	0.72	0.66	0.68	0.73	0.78	0.87
1B	Fugitive emissions	0.38	0.35	0.33	0.32	0.32	0.32
2	Industrial processes ^a	3.23	2.65	2.86	2.95	2.95	2.95
3	Solvent use	0.11	0.12	0.13	0.13	0.13	0.13
4	Agriculture	6.08	5.50	5.34	5.21	5.18	5.15
6	Waste	2.06	1.75	1.63	1.52	1.45	1.40
	Total emissions	52.45	51.26	51.51	50.77	50.04	49.29
5	Land use change/Forestry ^b	-1.27	0.15	(-1.60)	(-1.60)	(-1.60)	(-1.60)
1A3 ai	International bunkers ^c	3.23	4.77	3.68	3.82	3.99	4.13

a) Including synthetic gases; b) Brackets indicate a high degree of uncertainty; c) CO₂ emissions only

Table 2-5: GHG emissions by sector between 1990 and 2020

3 Impact of domestic policies and measures on emission trends and projections

3.1 Interpretation of general trends in emissions since 1990

CO₂

In 1990, gross CO₂ emissions were 44,370 Gg. Subsequently, emissions fluctuated around this level within a margin of $\pm 4\%$. The yearly variation can largely be attributed to changing seasonal weather conditions (number of heating degree days per year) as well as changes in the price gap between Switzerland and neighbouring countries for petrol and diesel ('fuel tourism').

The 2003 level of 44,720 Gg was very close to the 1990 value. The fact that emissions remained stable can be seen as the result of a combination of two factors: policies/measures influencing GHG emissions and weak economic development in the 1990s.

CH₄

CH₄ emissions declined from 212 Gg in 1990 to 175 Gg in 2003, an overall decrease of 17.5%. This trend primarily reflects changes in the agricultural (-10%) and waste sector (-45%), as CH₄ emissions are closely linked to the number of cattle and the amount of landfilled waste. Emissions also declined in the energy sector.

N₂O

N₂O emissions decreased slightly, from 10.8 Gg in 1990 to 10.0 Gg in 2003. This relative stability is the result of two opposing trends: while agricultural emissions declined by 13% between 1990 and 2003, N₂O emissions from the transport and waste sectors tended to increase as a result of increased use of first-generation catalytic converters in passenger cars and waste incineration plants.

Other greenhouse gases

Emissions of HFCs have increased markedly since the beginning of the 1990s, as these gases are increasingly being used as cooling agents. Emissions of SF₆ show both upward and downward trends in its main fields of application – as an insulating gas in electrical equipment and windows, respectively. Due to the patterns of production and consumption in Switzerland, PFCs are of minor importance.

3.2 Evaluation of programmes implemented in the energy sector since 1990

The legal basis for evaluation is the Energy Act, which came into effect in 1998 and obliges the Federal Council to periodically examine implemented measures, publish the results of its studies and report to Parliament.

The impacts of SwissEnergy are analysed and published annually. Thanks to two detailed analyses encompassing the entire programme, it is possible to verify the degree to which SwissEnergy's objectives are being achieved, as required by the Energy Act:

- **Ex-post analysis:** This analysis is based on annual changes in energy consumption. The report analyses how consumption is influenced by external factors such as energy prices, size of population, number of cars, buildings, appliances, climate and policy. It also assesses the impacts of mandatory measures of SwissEnergy on energy consumption, employment and investments.
- **Impact analysis:** The second analysis examines the effectiveness of the programme's activities with regard to energy consumption, employment and investments. Here the focus is on voluntary measures.

a) Ex-post analysis of mandatory measures and factors influencing energy consumption

The ex-post analysis attempts to evaluate the ongoing effects of the measures implemented in the energy sector for the period 1990–2004. The real changes in energy demand are compared with the modelled changes, considering the change in exogenous factors such as economic growth and world energy prices.

According to this long-term analysis, total energy consumption in 2004 had increased by 86 PJ (+10.9%) compared with 1990 (791.4 PJ). This increase includes marked shifts in the breakdown of energy sources: natural gas showed the greatest increase (42.5 PJ, +67.1%), with its share of total energy consumption rising by 3.7%. Also accounting for an increased proportion are electricity (+1.5%) and "others" such as municipal waste, industrial waste and the other renewables, which show significant (more than two-fold) growth, albeit from low initial amounts. Decreases were recorded for coal and heating oils.

The analysis shows that growth effects and energy price movements outweighed the energy-saving effects attributable to the measures implemented. Although the policy/technology-induced energy savings would have been 89 PJ since 1990, total energy demand increased, especially due to growth effects.

b) Evaluation of voluntary measures

From 1990 to 2004, measures implemented under the two energy programmes achieved total sustainable savings estimated at around 28 PJ (3% of Switzerland's final energy consumption). During the same period, the impact on Switzerland's CO₂ emissions rose to 1.6 million tonnes per year.

The total savings yielded by the voluntary measures implemented under Energy 2000 and SwissEnergy are increasing year by year. In 2004, in spite of the reduction in the financial resources available the SwissEnergy programme (voluntary measures) achieved the highest increase in energy savings since it was started in 2001. The additional energy savings achieved in 2004 are estimated at around 3.4 PJ.

c) Overall effects of mandatory and voluntary measures 1990-2004

Table 3-1 shows the savings achieved in 2004 as a result of the various measures implemented from 1990 to 2004 (excluding electricity-related measures). The voluntary measures include the combined long-term effects of the Energy 2000 programme in the 1990s and of SwissEnergy in 2001–2004.

By 2004, the mandatory measures produced savings of more than 17 PJ, with CO₂ emissions being reduced by around 1.2 million tonnes. The voluntary measures yielded overall savings of more than 23 PJ, with CO₂ emission reductions of about 1.6 million tonnes. The energy savings also contribute to reductions in emissions of other gases.

In absolute terms, the impacts are greatest in the residential sector, while relative to energy consumption the greatest savings are seen in the services sector. The effects in the transport sector are less marked. Together, the mandatory and voluntary measures produced savings of almost 50 PJ (including electricity-related measures), which is equivalent to almost 6% of total energy consumption in 2004. In the absence of Energy 2000 and SwissEnergy, CO₂ emissions would now be at least 7% higher.

	Fossil fuel savings (PJ)	Percentage of total consumption	CO ₂ emissions (mio. tonnes)
Total mandatory measures	17.8	3.0	1.2
Residential	6.9		
Services	3.4		
Industry	3.6		
Transport	2.6		
Total voluntary measures	23.7	4.2	1.6
Public sector and buildings	5.6		
Industry	6.3		
Transport	3.2		
Renewable energies	8.7		
Total savings (mandatory and voluntary measures)	41.5	7.4	2.8

Table 3-1: Savings due to mandatory and voluntary measures in 2004, compared with 1990

3.3 Aggregate effects of policies and measures

Table 3-2 and Figure 3-1 show the expected development of GHG emissions for the period 1990–2020, considering the aggregate effect of measures currently implemented. The projected overall reduction between 1990 and 2020 amounts to 6%. Between 1990 and 2010, the overall reduction is 3%.

(million tonnes CO ₂ eq.)	1990	2000	2005	2010	2015	2020
CO ₂	44.37	43.66	43.98	43.45	42.83	42.15
CH ₄	4.45	3.74	3.61	3.45	3.36	3.28
N ₂ O	3.34	3.19	3.03	2.88	2.87	2.87
HFCs	0.00	0.41	0.64	0.73	(0.73) ^a	(0.73)
PFCs	0.10	0.07	0.10	0.10	(0.10)	(0.10)
SF ₆	0.18	0.20	0.16	0.16	(0.16)	(0.16)
Total emissions	52.45	51.26	51.51	50.77	50.04	49.29

a) Brackets indicate a high degree of uncertainty.

Table 3-2: Aggregate effect on emissions between 1990 and 2020, by GHG

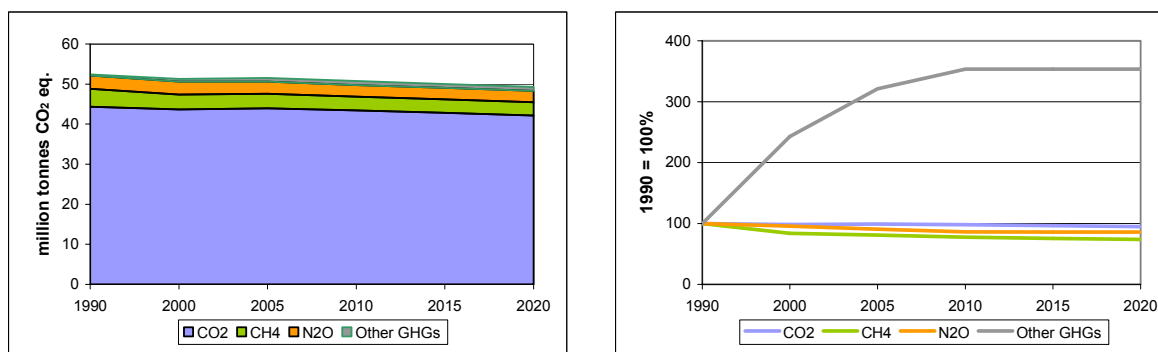


Figure 3-1: Development of CO₂ equivalent emissions from 1990 to 2020, based on energy scenario “with measures implemented” (HFC, PFC and SF₆ emissions are kept constant after 2010).

3.4 Expected impact of additional measures in the energy sector by 2012

Under the Kyoto Protocol, Switzerland’s target for average annual CO₂ equivalent GHG emissions in the first commitment period (2008–2012) is 48.25 million tonnes – a reduction of 8% below 1990 levels. However, the projections without additional measures show annual emissions of 50.8 million tonnes. The target shortfall is thus 2.5 million tonnes.

Kyoto target shortfall (million tonnes CO ₂ equivalent)	
Base year emissions (1990)	52.45
Kyoto target (average 2008–2012)	48.25
Total projected gross GHG emissions (average 2008–2012)	50.8
<i>Target shortfall</i>	2.5

Table 3-3: Kyoto target shortfall

In March 2005, the Swiss government decided to introduce additional measures in order to reach the goals of the CO₂ Act and the Kyoto Protocol.

The following additional measures are planned:

- An incentive tax of CHF 35 per tonne of CO₂ on combustibles (light and heavy fuel oil, coal and natural gas). The revenues will be redistributed to the population and companies.
- “Climate cent” to be levied on transport fuels (petrol and diesel). The revenues will be used for national projects to reduce CO₂ emissions and for buying emission certificates abroad under the flexible mechanisms of the Kyoto Protocol.
- Bonus/penalty system for energy-efficient and environmentally friendly cars.
- Preferential treatment of alternative transport fuels (biogas, bioethanol, natural gas, etc.) in mineral oil tax legislation.

The potential effects of these additional measures in 2010 are shown in Table 3-4. As the additional domestic measures are not sufficient to make up the Kyoto target shortfall, part of the “climate cent” funds will have to be used to subsidize projects abroad generating emission certificates.

Additional measures	Estimated annual reduction potential by 2008–2012 (million tonnes CO ₂ equivalent)
Incentive CO ₂ tax on heating and process fuels	0.7
“Climate cent”: domestic projects	0.2
Bonus/penalty system + preferential treatment of alternative fuels	0.4
<i>Total effect of additional domestic measures</i>	1.3
“Climate cent”: international projects (certificates)	1.6
<i>Total</i>	2.9

Table 3-4: Estimated reduction potential of additional measures

Under a scenario that includes the effects of adopted and planned measures (i.e. the CO₂ tax on heating and process fuels, the “climate cent”, a bonus/penalty system for new cars and preferential treatment of alternative transport fuels), the Kyoto targets are met. The reductions due to additional measures are estimated at 2.9 million tonnes of CO₂ equivalent per year during the Kyoto commitment period.

Supplementarity of the use of the flexible mechanisms

With this combination of measures, the supplementarity condition of the Kyoto Protocol is fulfilled as follows:

Of a total reduction commitment of 4.2 million tonnes (Mt) of CO₂ equivalent per year

- 2.2 Mt (minimum) is achieved through domestic measures,
- 1.6 Mt (maximum) may be acquired abroad by the “Climate cent” foundation,
- 0.4 Mt (estimate) is available in the form of emissions certificates for compliance purposes under the CO₂ Act to companies signing a binding commitment, with the real value depending on the quantity of emissions actually covered by binding commitments.

As projections always involve uncertainties (see sensitivity analysis below), **policy options** are required for **alternative future developments**. These are as follows:

If the target shortfall is larger than expected, Switzerland has two options.

- Taking sinks into account. In Switzerland, forest management is the most important activity creating a CO₂ sink. The cap defined in the Marrakech Accords for use of this activity is 1.8 million tonnes of CO₂ per year.
- Intensified use of the flexible mechanisms (buying more emission certificates).

If the target shortfall is smaller than expected, Switzerland has several options.

- Carry-over of emission rights for use during a second commitment period.
- Buying fewer emission certificates.
- Selling emission rights.

Sensitivity analysis

A sensitivity analysis was carried out for the 2010 projection, with the following factors being varied: economic scenarios (influencing CO₂ emissions), winter temperatures (influencing the use of heating fuels), projected cattle populations (influencing methane emissions) and projected HFC emissions.

The sensitivity analysis indicates a margin of ± 2.1 million tonnes of CO₂ equivalent for 2010 ($\pm 4\%$). This means that the target shortfall may range from 0.4 to 4.6 million tonnes of CO₂ equivalent.

For CO₂, a detailed sensitivity analysis is available. The sensitivity was calculated for GDP growth, energy prices, traffic growth, building-insulation standards and a combination of these factors. GDP growth is the most sensitive parameter. A 0.5% higher GDP growth per year will lead to an emission increase of 0.8 million tonnes of CO₂ in 2010. Higher prices for fossil fuels (15% to 20% higher end-user prices for light fuel oil and natural gas, 5% higher transport fuel prices) will lead to a reduction in CO₂ emissions of 0.6 million tonnes by 2010. Although the effect of short-term fluctuations in energy prices was not estimated, it will be less than that of permanently higher energy prices.

4 Activities related to Articles 10 and 11 of the Kyoto Protocol

4.1 Emission-reporting commitments under the Kyoto Protocol

The Swiss National Inventory System (NIS) is developed and managed under the auspices of the Department of Environment, Transport, Energy and Communications (DETEC). It is hosted by a DETEC agency, the Swiss Agency for the Environment, Forests and Landscape (SAEFL), which is the national entity with overall responsibility for the GHG inventory.

Information relating to the Swiss GHG Inventory is made publicly accessible through a website (www.climatereporting.ch), where detailed contact information is also available.

As part of a comprehensive project, the SAEFL directorate mandated the agency's Economics, Research and Monitoring Division in early 2004 to design and establish the NIS in order to ensure full compliance with the reporting requirements of the UNFCCC and the Kyoto Protocol by the end of 2006. Having regard to the provisions of Art. 5.1 of the Kyoto Protocol, the project encompasses the following elements:

- Agreements with partner agencies, relating to
 - roles and responsibilities,
 - participation in the inventory development process,
 - data documentation and storage,
 - data use, communication and publication.
- Inventory Development Plan
- QA/QC system
- Official consideration and approval of data
- Upgrading and updating of the central GHG emissions database

A SAEFL Inventory Group has been formed to implement and run the NIS. The group consists of the project team at the agency, including a GHG inventory project leader, a National System coordinator, a CRF compilation specialist and database specialists. It is supported by mandated external experts contributing to the preparation of the yearly inventory submission, in particular the National Inventory Report.

The Inventory Group collaborates with several divisions within the agency as well as with several other government agencies that supply relevant data. In addition, certain data are acquired through consultants or industry associations. Regarding the land-use, land-use change and forestry sector, the third National Forest Inventory was started in 2003, with growing stock and deadwood being systematically recorded. Investigations are under way to establish how topographical maps, Swiss Area Statistics, the National Forest Inventory and satellite data can best be used to provide high-quality data on the area of the various land-use categories and land-use change according to UNFCCC reporting requirements.

Figure 4-1 gives a schematic overview of the institutional setting for the process of inventory preparation within the NIS.

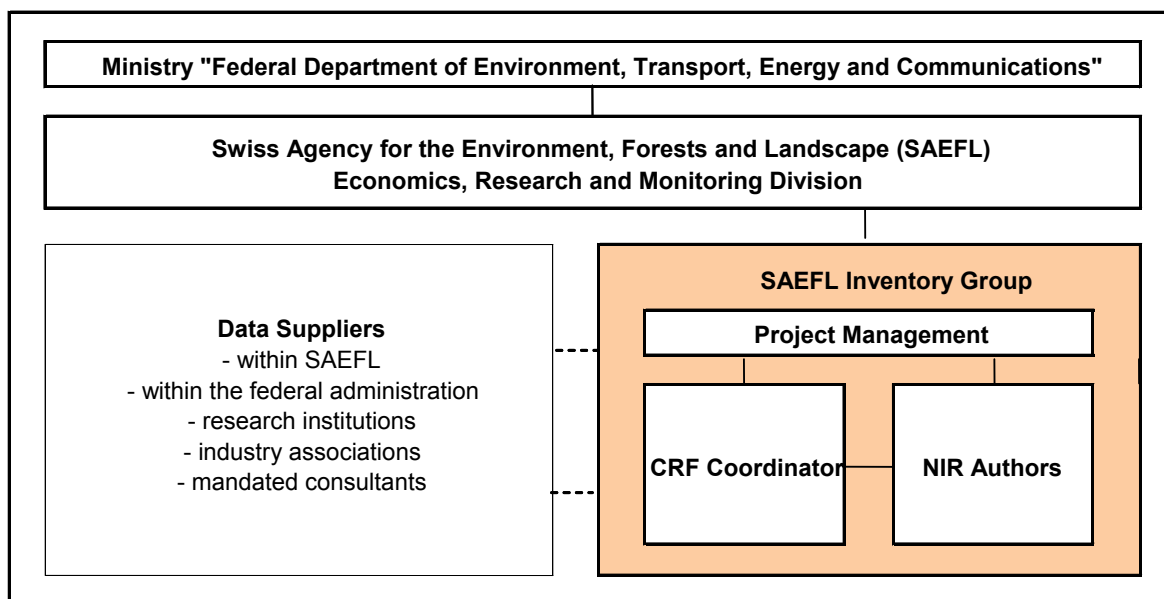


Figure 4-1: Institutional setting for the process of inventory preparation

The roles and responsibilities of the various actors in inventory-related activities are defined through:

- memoranda of understanding within SAEFL,
- agreements with the other government agencies involved,
- agreements with research institutions and industry associations,
- contracts with consultants.

Conclusion of memoranda of understanding, agreements and contracts is under way and is planned to be completed by early 2006.

Formal procedures for official consideration and approval of the inventory will be defined in the summer of 2006 by a government decision concerning the implementation of the Kyoto Protocol in Switzerland.

4.2 Policy programmes in the energy sector

The key instrument in Swiss energy policy is the **SwissEnergy programme** (2001-2010), which follows the 'Energy 2000' programme (1991-2000). SwissEnergy was adopted by the Federal Council and launched in January 2001 in collaboration with the cantons, the municipalities, industry and the environmental organizations. The programme has quantitative objectives and comprehensive strategies for energy efficiency and utilization of renewable energy in industry, buildings and transport, and is based on a broad partnership. The task of SwissEnergy is to support the fulfilment of the national energy and climate policy objectives, and to pave the way for a sustainable energy supply based on innovation and new technologies. A more detailed description of individual measures and their status of implementation can be found in Switzerland's Fourth National Communication, Sections 4.3.3 and 4.4.2 and Annex 2.

Between 1991 and 2000, CHF 560 million was spent on various sub-programmes addressing the most important economic sectors. From 2001, less funding was available for the SwissEnergy Programme: the budget was reduced from CHF 75 million in 2001 to CHF 45 million as of 2005. In 2004, the SwissEnergy budget amounted to CHF 49.1 million. These funds were increased to CHF 113 million through contributions from the cantons and third parties. They are estimated to have generated investments amounting to nearly CHF 1 billion.

Mandate and objectives: Implementation of Switzerland's energy and climate policy

SwissEnergy is pursuing a clearly defined objective in line with national commitments under the Kyoto Protocol and in accordance with the provisions of the CO₂ Act: to reduce CO₂ emissions by 10% by 2010 compared to the 1990 level. Table 4-1 provides an overview of SwissEnergy targets and achievements by 2004.

	2010 targets	2004 status	Estimated 2004 status without Energy 2000 and SwissEnergy ⁴
Efficient energy use			
Consumption of fossil energy ^{1/2}	-10%	+3.3%	+10.7%
Electricity consumption	≤+5%	+7.3%	+11.7%
CO ₂ emissions ^{1/3}	-10%	+0.7% ⁷	+7.6 to +9.0% ⁶
from combustibles ³	-15%	-4.3% ⁷	+4.9 to +7.2% ⁶
from motor fuels ^{1/3}	-8%	+8.9%	+11.9%
Renewable energies			
Hydropower production ^{2/5}	stable	+1.2%	not available
Other forms of renewable energy ²			
Electricity ²	+0.5TWh (+1%-point)	+0.15TWh	+0.10TWh ⁸
Heating ²	+0.3TWh (+3%-points)	+1.15TWh	+0.29TWh ⁸

1) excluding international flights; 2) versus 2000; 3) versus 1990; 4) estimate based on impact analysis and ex-post analysis; 5) estimated average; 6) depending on electricity mix (Switzerland or EU); 7) adjusted for heating degree days; 8) estimated 2004 status without SwissEnergy

Table 4-1: SwissEnergy targets for 2010: status as of 2004, plus estimated 2004 status without the influence of the Energy 2000 and SwissEnergy programmes.

In 2004, SwissEnergy achieved total sustainable savings estimated at around 6% (50 PJ) of Switzerland's final energy consumption (3% through voluntary measures alone). The efficiency of the programme is being continually increased by concentrating limited financial resources on measures with a high energy-saving potential.

The combined long-term impact (1990–2004) of SwissEnergy and the former Energy 2000 programme on Switzerland's CO₂ emissions rose in 2004 by around 10% to 2.8 million tonnes (including 1.6 million tonnes through voluntary measures). In the absence of these programmes, CO₂ emissions would now be at least 7% higher.

Measures: Focus on voluntary action and partnership

SwissEnergy uses three kinds of measures that complement one another: first and foremost, in accordance with the provisions of the Energy Act and CO₂ Act, it supports voluntary measures based on service agreements awarded to non-governmental agencies, and concludes voluntary agreements with companies and sectors, in which energy reduction targets are set. SwissEnergy actively promotes the implementation of voluntary measures by providing information and advice as well as training and further education. Alongside voluntary measures, the provisions of energy and building legislation call for more comprehensive promotional and mandatory measures. These include regulations governing the energy consumption of motor vehicles, appliances and buildings.

Organization: The four sectors

SwissEnergy is a federal government programme that involves the cantons and local authorities, industrial, consumer and environmental associations, and public and private-sector agencies. The structure of the programme – including the four main sectors of implementation and the various programme partners and projects – is illustrated in Figure 4-2.

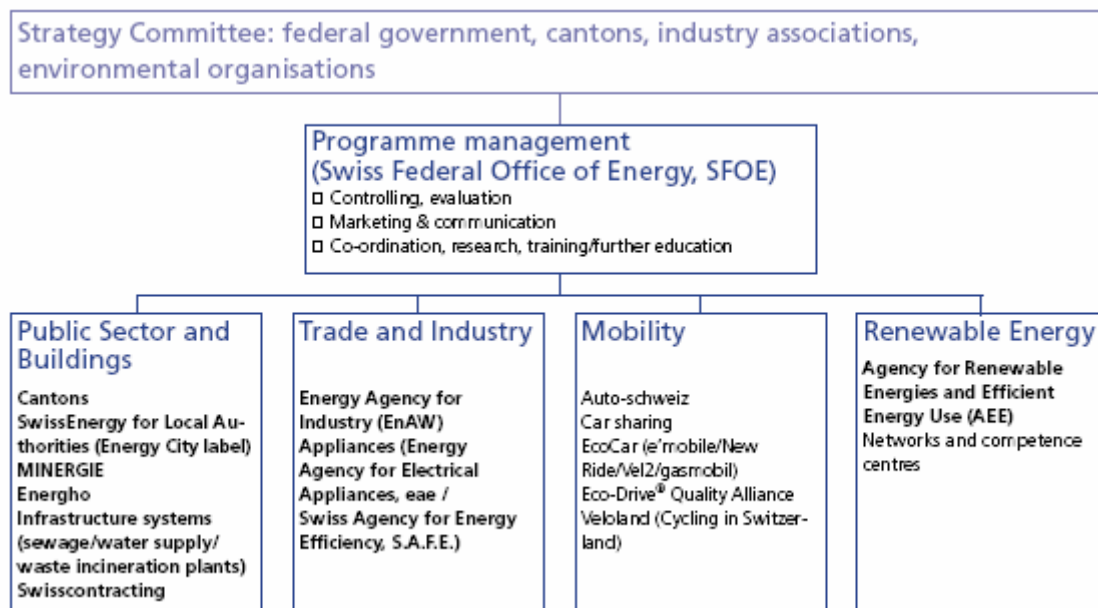


Figure 4-2: SwissEnergy organization chart

Public sector and buildings

As buildings account for approximately 45% of Switzerland's overall energy consumption, they offer a considerable potential for reducing CO₂ emissions. The cantons are SwissEnergy's most important partners: they are responsible for the buildings sector and thus have to implement the programme's objectives through building regulations, promotion programmes and voluntary measures. SwissEnergy supports the "Energy City" label, the "MINERGIE" building standard and optimization of heating and cooling systems in public buildings ("energho" Association). Energy optimization measures also apply to sewage plants, water supply systems and waste incineration plants. For these purposes SwissEnergy supports energy contracting ("Swisscontracting" Association) as a valuable tool.

Trade and industry

The Energy Agency for the Economy (EAEC, also known as Energy Agency for Industry), closely cooperating with SwissEnergy on the basis of a service agreement, helps companies to elaborate and implement agreements: with a bottom-up approach, company-specific reduction targets are developed for energy consumption and CO₂ emissions. Companies taking on ambitious caps can be exempted from the planned CO₂ tax.

The Swiss Agency for Energy Efficiency (S.A.F.E.) and the Energy Agency for Electrical Appliances (eae) both aim to stabilize electricity consumption in the area of appliances. The energy label for household appliances and lamps, mandatory since 2002, provides an important basis for their activities.

Mobility

In the transport sector, the federal government is seeking to achieve energy and climate policy goals through an optimum combination of voluntary measures, economic instruments, regulations and support for technology and innovation. In this context, the focus is on increasing energy efficiency and renewable fuels (biogas, bioethanol).

In February 2002, DETEC and "auto-schweiz" (the Association of Swiss Automobile Importers) concluded an agreement to reduce the specific fuel consumption of new motor cars by 24% between 2000 and 2008. This effort is backed by an energy label for new motor vehicles, mandatory since 2003, and by a special campaign. Another important product already launched by

the predecessor to SwissEnergy (Energy 2000) is a special course programme for economical and ecological driving behaviour (Eco-Drive®). The most important measures introduced by SwissEnergy in the areas of human-powered and combined mobility are car-sharing, promotion of walking and cycling, consulting services at local level on energy-efficient mobility, consulting on mobility management in companies, and participation in the European “In town, without my car!” campaign.

Renewable energies

A network of various players, coordinated by the Agency for Renewable Energies and Efficient Energy Use (AEE), encourages the changeover to renewable energies (green power, heat pumps, wood, biomass, solar energy, sewage gas, geothermal energy and wind power). One of the explicit objectives of SwissEnergy is to maintain the present level of electricity production from hydropower. This represents a challenge since hydropower remains relatively expensive, compared to combined-cycle gas turbines, for instance.

4.3 Activities related to the use of the flexible mechanisms

The national secretariat for the flexible mechanisms (Designated National Authority) has been established in 2004. Its activities, including the examination and approval of project proposals, are coordinated by an interdepartmental working group.

For the time being, the Swiss government does not propose to allocate a budget for the acquisition of certificates from CDM/JI projects. An ordinance concerning the requirements for CDM/JI projects, as well as the amount of certificates from abroad which can be used for compliance (supplementarity), was adopted by the Federal Council in June 2005.

The National Registry is expected to be implemented and operational by mid-2006, or in conjunction with the independent transaction log (ITL).

4.4 Measures related to the selection of sinks activities

In 2004, on the basis of a parliamentary motion, the Swiss Parliament decided to elect forest management as an activity under Article 3.4 of the Kyoto Protocol. Case studies on several areas were initiated in various regions of the country. These should provide the basis for national rules for assessing and accounting for removals by sinks and emissions by sources in the forest management sector.

4.5 International cooperation in research

National Centres of Competence in Research

Two National Centres of Competence in Research (NCCR) are concerned with climate change issues – the NCCR Climate and the NCCR North-South.

NCCR Climate

The NCCR Climate (www.nccr-climate.unibe.ch) was created by a government decision in April 2001 with an intended duration of 12 years. The second 4-year period began in April 2005, albeit with some cutbacks (about 20%) in financial resources. The NCCR Climate brings together experts from a wide range of universities. It will address broader issues of natural climate variability and predictability by combining the contributors from relevant disciplines into an integrated network of competence. This network includes expertise from the physical, chemical, biological, economic and sociological disciplines. It is active on several research fronts and its functions are as follows.

- First, disciplinary work in the individual research groups to ensure continuous cutting-edge progress and to facilitate access to and sharing of latest results and methods through international cooperation (e.g. EU projects).
- Second, research within the various modules to provide thematic co-ordination of research and the integration of results.
- Third, a university-based, long-term Swiss centre of competence on basic issues of natural climate variability, extreme events, climate projections and processes, and the attendant ecological and economic processes relevant for improved predictive capability and risk assessment.

The overall goals of the NCCR Climate are to:

- Acquire a better understanding of climate system processes, variability and predictability and the complex inter-relationships between climate, economic and societal driving factors.
- Adapt and refine scientific tools and knowledge acquired for Switzerland, considering specific characteristics in physical, chemical, biological, geographical, economic and societal factors.
- Transfer and apply the knowledge to assess the future cost and risks of expected climate change, and to provide a basis for adaptation strategies.
- Educate young scientists of all disciplines with an emphasis on interdisciplinarity, in order to prepare a young generation of decision-makers for the future. The management will establish a regular series of thematic summer schools and forms of participatory teaching.
- Investigate new financial and economic tools to hedge against the increased probability of extreme events.

NCCR North-South

The NCCR North-South (www.nccr-north-south.unibe.ch) focuses on international research cooperation and promotes high-quality disciplinary, interdisciplinary and transdisciplinary research with the aim of contributing to an improved understanding of the status of different syndromes of global change, of the pressures these syndromes and their causes exert on different resources (human, natural, economic), and of the responses of different social groups and society as a whole.

By identifying the potential of social systems to mitigate syndromes, by considering their dynamics, and by adopting existing innovative solutions, the NCCR North-South primarily aims to help design ways to mitigate syndromes. The NCCR North-South enables Swiss research institutions to enhance partnerships with institutions in developing and transition countries, thereby building the competence and capacity of research on both sides to develop socially robust knowledge for mitigation action.

Individual projects are focused on one of the following themes:

- IP1: Conceptual Framework and Methodologies
- IP2: Natural Resources and Ecology
- IP3: Environmental Sanitation
- IP4: Health and Well-being
- IP5: Social practices and empowerment in urban societies
- IP6: Institutional Change and Livelihood Strategies
- IP7: Conflict Transformation
- IP8: Governance, Human Development and Environment

Research in EU projects

On 16 January 2003 Switzerland and the EU signed a research agreement, giving Switzerland the status of an “associate country” in the 6th EU research framework programme from 1 January 2004. Rather than participating in EU research on a research “project by project” basis, Switzerland now contributes to the overall EU research budget. Thus, Swiss projects are financed directly by

the EU research institutions. At the same time, Swiss researchers can now take on a leading role in any EU project. All the former restrictions on project activities have been suspended.

In the period 2002–2004, more than 100 projects in the field of climate and global change were pursued in the framework of EU research. The funding volume for projects carried out during (part of) this period was about CHF 30 million. The main general topics of EU-related Swiss projects are

- Biodiversity (13 projects)
- Atmospheric chemistry/aerosols (12 projects)
- Natural hazards (10 projects)
- Paleoclimate/climate variability (8 projects)
- Ecosystems/landscape (7 projects)
- GHG emissions, carbon cycle (7 projects)

Activities in world research programmes

Switzerland makes a major contribution to the World Climate Research Programme (WCRP) through individual research projects, research conducted at federal institutes and within co-ordinated programmes (NCCRs) and the operation of monitoring stations and networks, as well as calibration and data centres. It also plays a leading role in several regional climate research programmes.

Switzerland also contributes significantly to the International Geosphere-Biosphere Programme (IGBP), both directly and through relevant research activities. The Core Project Office for the IGBP Past Global Changes (PAGES) project is located in Berne and is jointly financed by Switzerland and the US. Swiss scientists are engaged in the PAGES and Global Change and Terrestrial Ecosystems (GCTE) projects, and also participate in most other Core Projects. Swiss participation is also significant in the DIVERSITAS programme.

Switzerland has also contributed significantly to the International Human Dimensions Programme (IHDP) on Global Environmental Change. Swiss researchers are active in fields relevant to the IHDP and have also made important contributions to the United Nations University over the years.

Of the projects funded by the National Science Foundation, about 80 were from the field of IGBP, about 40 from that of WCRP, about 25 from IHDP and about 10 from DIVERSITAS.

4.6 Impacts and adaptation

Overview of most relevant impacts

Recent research indicates a warming trend of about 1.4°C over most parts of Switzerland (1.0°C in the southernmost part) during the 20th century. Since 1970, decadal warming has been about three times higher than the global average. In the course of the 20th century, precipitation increased during the winter in northern and western regions by 20–30%, while it decreased by the same amount during the autumn in the southern part of the country. Over the same period, the frequency of intense daily precipitation events (average return period of 30 days) increased by between 20% and 80% at most of the stations north of the Alps.

Impacts of this warming trend can mainly be seen in the melting of perennial surface and subsurface ice in the Alps, which has continued in recent years, with a clear tendency towards acceleration. Roughly 25% of the glacier volume in the Alps has been lost since the mid-1970s. The extremely hot and dry summer of 2003 eliminated an additional 5–10% of Alpine glacier volume within the space of one year. Many rockfall events from steep rock walls with warm permafrost were also observed in 2003.

The warming trend and changing precipitation patterns are also expected to have significant effects on ecosystems and hydrological cycles. The possibly increased intensity of storms and reduced snowfall and snow cover duration are particularly important for alpine areas, tourism and forestry. Public health is also affected by a warmer climate: the heatwave of the summer of 2003, for instance, led to an increase in mortality of around 7% in Switzerland. Two thirds of all communes

have experienced flooding in the last 30 years, with total losses during this period amounting to CHF 8 billion.

The insurance sector (an important service sector in Switzerland) is affected by increased payments due to extreme weather events. Claims due to natural disasters have risen constantly over the past decades, although quantitative attribution to climate change has not been possible. Higher losses are primarily due to increases in infrastructure and economic assets in vulnerable areas. A potential shift in the intensity and frequency of extreme weather events may also have an impact.

National strategy on protection against natural hazards

The legal regulations for adaptation measures are still based on a sector-oriented approach, reflecting traditional hazards such as flooding, rockfalls, landslides and avalanches, which are closely linked to life in a mountainous area. In recent years, vigorous efforts have been made to apply the same strategy and similar approaches for dealing with all types of natural hazards. The most important legal provisions relate to flood protection and forest management. With a view to achieving an integrated approach to disaster reduction, a new flood protection strategy has been developed and is currently being implemented by the cantonal authorities.

Responsibility for protection against natural hazards still rests primarily with the cantons. The emphasis is increasingly being placed on preventive measures rather than disaster management. Therefore, hazard and risk assessment, the definition of protection targets, integrated planning of measures (mapping, technical measures and warning systems) and the limitation of residual risk are of central importance.

In 1997, the Swiss government established the National Platform for Natural Hazards (PLANAT) in order to fill gaps in legislation and to ensure that preventive efforts are not duplicated in the area of natural hazards and that synergies are exploited. PLANAT is organized as an extra-parliamentary commission, bringing together representatives of federal government, the cantons, the research community, professional associations, business and the insurance sector. In 2003, PLANAT presented to the Federal Council an overarching, interlinked strategy to improve protection against natural hazards, corresponding to the Federal Council's sustainability policy. The work plan established for implementation of the strategy takes various aspects of climate change-related risks into account.

Climate change, water and water management

Since the beginnings of concern over the possible consequences of global warming, it has been widely recognized that changes in the cycling of water between land, sea and air could potentially have very significant impacts across many sectors of the economy, society and the environment.

Under the leadership of the Federal Office for Water and Geology (FOWG), Switzerland has defined its position on water resource management in the context of climate change as follows:

- The expected hydrological changes are so large that they should be considered explicitly in long-term integrated river basin management. This includes policy fields such as spatial planning, environment and agriculture.
- The appropriate management response is to adopt the “no-regret and flexibility” principle. Long-term plans should be flexible and adaptable. Anticipatory measures, which serve different goals, should be undertaken in combination with already on-going activities, like reservation of sufficient room for the rivers in combination with ecological rehabilitation. “Wait and verify” is not an appropriate strategy for sustainable river basin management.
- Some of the derived impacts cannot be sufficiently quantified at present. Therefore future research should focus at integrated approaches, especially links between climate, hydrological and ecosystem models. Research should also aim at the evaluation of strategies to sustain and improve development of the river and its basin in a changing environment.
- The river basin is the unit to address impacts and policy options in view of water resources management. In such an approach, international cooperation including free and unrestricted access to data and information is a pre-requisite.

- In view of these recommendations, all decision makers are called upon to actively define, support and participate in activities, which address high priority water-related topics in transboundary river basins.

Flood Protection Strategy

In view of the integrated approach to disaster reduction, an integrated flood protection strategy has been developed. The cornerstones of this strategy are:

- **Analysis and documentation of the existing danger**
Hazard maps serve as a basis for prevention measures.
- **Safeguard of the required space for flowing water**
Sufficient space for extreme quantities of runoff water simultaneously guarantees space for the ecological function of watercourses.
- **Integral action planning**
It is imperative that the principles of sustainability be taken into account for planning and organisational measures as well as for technical safety constructions.
- **Minimisation of damage**
Maintenance of watercourses (= maintaining the existing safety conditions) as well as measures for spatial planning (= preventing a rise in the potential for damage by keeping space free or restricting the use of space) are of paramount importance.
- **Emergency planning**
Good preparation (forecasting, alerting and mobile measures etc.) can minimise the ever present residual risks. In addition, insurances can help make damages bearable.
- **Flood protection as a federal task**
Interdisciplinary cooperation among experts from all areas and inclusion at a sufficiently early stage of the political authorities as well as the concerned population are a precondition for sustainable protection policies.

The new strategy is currently being implemented by the cantonal authorities. Based on the legal framework, a handbook, guidelines and various examples of good practice have been published. Additionally, training courses for civil engineers have been organized on topics such as debris flow modelling, flood protection design and quality assurance in flood management design.

Hydropower

Although there is some concern about climate change on the part of the hydropower industry, a response strategy has yet to be developed. According to a workshop held in 2003, fluctuations in the energy market and the coming changes in the energy market in Europe (liberalization, increasing importance of wind power) are considered to have a much stronger influence on the management of hydropower production than the relatively slow changes in climate.

Agriculture

Adaptation measures to cope with increasing temperature and decreasing precipitation, and the associated risk of droughts, could include the selection of alternative crops, the selection of cultivars with a higher temperature requirement, or, more simply, shifts in the sowing dates. An obvious adaptation to reduce the impact of droughts on Swiss agriculture would be the extension of irrigation over larger areas. However, the feasibility of this measure will largely depend on the competition for water among different economic sectors, and on the prices of this resource and of irrigation equipment.

The choice of specific adaptation measures for the different regions of Switzerland will require careful consideration of local agricultural production conditions (evaluation of orographic and soil characteristics, local climate and cultivation techniques). Due to continuous improvements in the available climate scenarios, periodic reconsideration of the adaptation measures will also be essential. However, adaptation options will also be influenced by political developments, especially the WTO regulations (e.g. open markets), and/or the importance of multifunctional aspects of agriculture, such as landscape management.

Forests and forestry

Historical development and models of changes in vegetation with time suggest that forests will be affected by climate change, though the mode of transition is uncertain. Impacts will vary between different regions. Damage must be expected from storms, drought, atmospheric pollution, and (according to the level of warming) new or more prevalent pests and diseases. During the 20th century, increasing forest damage due to extreme climatic events was reported. Only limited adaptation measures exist to prevent such effects, but appropriate legal provisions allow for public assistance, where necessary, to counteract damage to forests and their protective functions. In addition, a number of measures are in place to serve the objective of damage prevention.

To maintain the vitality of forests, average annual subsidies of CHF 69.65 million were provided between 2000 and 2003 (CHF 51.5 million from 1996 to 1999) for the following measures:

- Measures to prevent and combat pests and parasites.
- Repairing damage where forest conservation might be threatened.

Special emphasis has been placed on re-establishing well-adapted stands in the forested areas destroyed by the Hurricane Lothar. For this purpose, a decision-making guide has been prepared for storm-damaged areas.

Tourism

Global warming will lead to more winters with limited snow, rendering low-lying ski resorts particularly vulnerable. The most common adaptive responses are to install snow-making equipment, to move ski stations to higher altitudes or glaciers, or to diversify the type and seasonal focus of the activities offered. It is not clear to what extent the lack of snow can be counteracted by artificial snow. It is, first of all, not possible to produce artificial snow if temperatures are too high. Secondly, artificial snow production requires substantial water, energy and thus financial resources. Moreover, the Swiss experience shows that skiers tend to discount the possibility of skiing if there is no snow in lowland areas. In general, there is a tendency to create facilities for alternative activities; but as yet there is no long-term strategy for adapting to climate change.

Areas with better prospects will be those with transport facilities providing access to altitudes higher than 2000–3000 m above sea level. As long as rough weather conditions do not impede the operation of facilities, the regions at higher altitudes may experience greater demand, prompting further expansion, and the pressure on ecologically sensitive high-mountain regions will increase.

Since climate change is a relatively long-term development in comparison to other trends in tourism, tourism managers and tourists will have every opportunity to adjust to the different constraints and adopt the corresponding strategies and measures. Tourism operators will not ignore the threats posed by climate change. They are already reacting to the deteriorating snow conditions and changes in demand.

One of the most important questions will be how young people can start skiing/snowboarding if there is a lack of snow in big towns, and if the small, cheap ski lifts suitable for families at nearby resorts are dismantled due to climate change. Although indoor skiing is a growing industry in European towns, whether small ski resorts for beginners in the foothills can be replaced by snow domes remains uncertain.

Insurance business

Insurers will attempt to manage the increased risks associated with a changing climate by applying the precautionary principle and the best scientific information available about the expected damages. New developments in weather and climate research promise to help refine specific components of risk models. New climate data may allow for improved forecasts of how future storm or flood activity might differ from the long-term average. Improved short-term forecasts will influence the trading of catastrophe bonds and other capital market products.

The insurance industry can also conduct business in such a way as to provide incentives for behavioural changes, e.g. by deploying risk-adequate rates and insurance conditions to encourage loss prevention. It can lobby for regulatory changes necessary to reduce risks; for example, the insurance industry was responsible for the first building and fire codes in the US. Or it can help to

create new markets with respect to CO₂ emission trading, e.g. by providing insurance and financial products.

Weather hazard alerts

Several online systems, including by the Swiss national weather service (MeteoSwiss), have been launched in recent years offering information and warnings concerning weather hazards, e.g. storms, heavy rain or heat waves. Alerts are distributed by e-mail, fax or text message.

International cooperation

Since 2001, Switzerland has provided financial support for the National Communication Support Programme (NCSP), which was established in 1999 by UNDP and UNEP, in cooperation with the UNFCCC Secretariat and the GEF. For the period 2001–2007, a total financial contribution of USD 968,000 has been committed under three trust fund agreements to NCSP. A large part of this funding was utilized to develop the Adaptation Policy Framework, which is designed to help to improve the vulnerability and adaptation assessments in non-Annex I National Communications.

For further information on activities related to adaptation in the context of bilateral assistance through Swiss development cooperation, see Section 4.10.

4.7 Transfer of technology and capacity building

Switzerland's understanding of "technology transfer" includes, in addition to incentives and activities directed at the provision of technical equipment in the industrial and infrastructure sector, capacity building, technology transfer in the health sector and development of administrative institutions. Therefore, Switzerland provides incentives in numerous sectors and is actively engaged in the field of training and research activities contributing to sustainable development.

Switzerland also supports programmes in the field of energy efficiency which are aimed at mitigating CO₂ emissions globally and controlling air pollution locally. These projects are related to the traffic and transportation sector and to small and medium size industries (e.g. foundry, glass and brick industries). The main objective is to strengthen local partners (capacity building) and to pool international expertise in order to develop locally adequate solutions (technology packages). These pilot programmes are then evaluated, documented and disseminated at the national level.

In the framework of economic cooperation, Switzerland seeks to strengthen the international rules by supporting developing and transition countries in their efforts to negotiate and to comply with and/or benefit from trade relevant rules in the Rio conventions. The main goal of these activities is to strengthen sustainable growth in these countries by helping them to benefit from integrating into the world trade system. Therefore, special emphasis is given to supporting the efforts of the partner countries to define their own policies and strategies in order to improve acceptance and foster implementation of international environmental agreements. Another priority is the promotion of the transfer of environmentally sound technologies. Switzerland's economic cooperation covers the following relevant fields:

Strengthening of environmental information systems and legislation

- Locating and disseminating general information on environmental technologies available in industrialized countries/Switzerland and advising on specific applications
- Consulting services for government agencies on the drafting of environmental policy guidelines and the application of laws
- Intermediary and liaison services for the arrangement of business opportunities between companies in developing countries and in industrialized countries

Technical assistance and training

- Conducting demonstration projects in selected industrial sectors
- Introducing environmental management systems (using ISO 14000 series)
- Conducting life cycle analyses (product and operations analysis)
- Introducing eco-efficient production methods and minimizing generation of waste
- General risk analysis for the prevention of chemical and physical industrial accidents
- “On the job” training in demonstration projects
- Conducting specific seminars and workshops on environmental pollution in companies

Financial facilities and infrastructure project financing

- Support in formulation of (private) environmental investment projects and in the search for sources of financing
- Co-financing public environmental infrastructure projects, and supporting sector reforms, in important sectors such as hydropower, district heating, water treatment
- Support in structuring and implementing public-private partnerships
- Provision of venture capital funds, and specialized facilities for SMEs, including for environmental investments.

Particular mention should be made of the following programmes in this context:

- In recent years, Switzerland concentrated much effort on promoting the transfer of environmentally sound technologies. A comprehensive programme for the establishment of so-called **Cleaner Production Centres** was set up. The aim of the centres is to offer private companies and the public sector a wide range of services including general information, in-plant assessments, workshops, demonstration projects, capacity building and support for the preparation of bankable projects. The Centres provide these services with the support of Swiss and other developed country WTO members’ technical institutes, universities and industries. Switzerland supports Cleaner Production Centres in Costa Rica, El Salvador, Guatemala, Bolivia, Colombia, Peru, Brazil, Morocco, South Africa, Jordan, Romania, China, India, Vietnam, Laos and Cambodia (see Table 4-2).
- The **Green Credit Lines** (Peru, Colombia) work as a special financing facility for environmental investments in SMEs.
- The **Swiss Organisation for Facilitating Investments (SOFI)** is a specialized institution to mobilize Swiss investments in countries with developing and transition economies (www.sofi.ch).
- **OSEC Business Network Switzerland** promotes Swiss exports, including environmental technologies.
- **The Swiss Thermal Energy Project (STEP)** – a district heating project based on co-generation – was Switzerland’s first AIJ/JI project with **Romania** (CHF 6.5 million), now followed by the Bucharest district heating JI project (CHF 11.5 million).
- With the aid of a Swiss mixed credit, from 2003 to 2004 **Colombia** purchased and installed **meteorological and hydrological equipment** for about CHF 12 million, allowing digital registration and satellite transmission of weather and climate data.
- Promotion of domestic and commercial **hydrocarbon refrigerators** in **India**.
- Furthermore, Switzerland is one of the main sponsors of the **International Tropical Timber Organisation (ITTO)**. Switzerland has financed the first sink project in the framework of the ITTO in Colombia, with other projects ongoing in Brazil and Peru.

For additional information, please refer to: www.seco-cooperation.ch.

Disbursements	2002	2003	2004
CPCs in general for Corporate Social Responsibility (via ILO)	2,100,000		
CPC South Africa	875,000		540,000
CPC Eastern China	1,460,000	522,106	1,400,159
CPC Jordan			465,977
CPC Laos			810,000
CPC Cambodia		450,000	405,000
CPC Colombia	203,009		410,000
CPC Central America	865,156	1,800,000	1,822,500
CPC Brazil	297,539	678,450	437,793
CPC Peru	603,750	594,542	317,511
CPC Vietnam	1,018,768		1,620,000
CPC Morocco	729,653		364,500
Green Credit Line Colombia		7,500,000	
Green Credit Line Peru			6,750,000
Total	8,152,875	11,545,098	15,343,440

Table 4-2: Disbursements by seco to Cleaner Production Centres (CPC) in CHF, 2002-2004

Guiding principles in technology transfer for Swiss development cooperation

The Swiss Agency for Development and Co-operation (SDC) has developed a policy framework for 'Addressing Energy Issues in SDC'. Technology transfer is recognized as an important means to provide adequate energy for economic development and poverty alleviation in the South without creating adverse environmental effects. Energy is seen as a change agent and a driving force to achieve sustainability in a broader context. Energy sector interventions are intended to improve living and working conditions of the people and – as a win-win effect – contribute to global environmental benefits. Guiding principles emphasize a learning process with primacy of the local level, action research and a multi-partnership approach.

Swiss development cooperation considers the following principles relevant when transferring environmentally sound technologies from (mostly) industrialized to developing countries, especially when aiming at an increase of private sector participation:

Building up knowledge-based skills and capacities

- Technical, engineering, and managerial capabilities, which are expected to help in technology absorption and diffusion on a continuous basis by the participating partners in developing countries, have to be strengthened and institutionalized.
- This also applies for adequate, appropriate indigenous research, and R&D capabilities.

Facilitate making informed decisions and choices

Enhance the capabilities of participating partners in developing countries to effectively exploit the diversity of available technological options and services by:

- The dissemination of information and the exchange of experience through seminars and workshops, technical visits, papers, and reports.
- International networking with qualified, committed research institutions and suppliers of state-of-the-art technology.
- Creation of infrastructure for adaptive research and pilot testing.

Support technology adaptation and ownership

- The need for technology adaptation according to local circumstances is crucial. This can be facilitated by providing blueprints and assuring intellectual property rights when technology transfer is completed.
- Collaborating governments have an important role to play in e.g. facilitating project agreements and exempting the equipment and materials from customs duties, taxes, port and other charges.

Build partnerships based on trust and confidence

- Strong but voluntary partnerships based on trust and confidence between collaborating governments, industries and research partners are a key factor for successful technology transfer.

REPIC (Renewable Energy Promotion in International Cooperation)

With REPIC, an interdepartmental platform has been established, bringing together the efforts of the four federal agencies SAEFL, SDC, seco and SFOE. This body strengthens and coordinates federal activities for the promotion of renewable energy in international cooperation at a strategic level. It further promotes new partnerships with private enterprises and Swiss civil society in order to contribute to the deployment of renewable energy systems in developing and transition countries through financial support for the realization of projects using Swiss technology and know-how.

Global Atmosphere Watch

In the framework of the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO), the Swiss Federal Office of Meteorology and Climatology (MeteoSwiss) is supporting and maintaining the Mount Kenya GAW station. The goal of the GAW programme is to monitor, on a long-term basis, the changing composition of the atmosphere. The GAW network consists of stations which, being remote from pollution sources and sinks, can provide background data. The Mount Kenya station is situated in the Mt Kenya national park at an elevation of 3697 m above sea level. It is the only such station on the equator. The ozone balloon soundings which are part of the measurement programme of the Mount Kenya station are performed at the radiosonde station of Nairobi.

MeteoSwiss is providing support worth CHF 60,000 per year for the ozone balloon soundings, in the form of consumables and capacity building. For 2002 to 2005, total funding was CHF 240,000.

The MeteoSwiss experts who visit the station each year provide expendables and staff training, with instrument upgrading and instrument intercomparisons.

National Strategy Study (NSS) programme

Switzerland and the World Bank jointly launched the National Strategy Study (NSS) programme in September 1997. The aim of the programme was to assist non-Annex I countries in defining their negotiation positions and to develop national strategies regarding emerging international market incentive instruments which will facilitate technology transfer to developing and transition countries. Since 1997, Switzerland supported the NSS programme of the World Bank with USD 4 million. This Swiss financing covered 13 national CDM/JI strategies in Latin America (Colombia, Bolivia, Peru), Africa (South Africa, Zimbabwe, Egypt), Asia (China, India, Uzbekistan) and Eastern Europe (Slovakia, Czech Republic, Russia, Ukraine). Thus, it helped to build up institutional capacities for CDM/JI in these countries and to structure the project pipeline.

Swiss AIJ Pilot Programme (SWAPP)

The Swiss AIJ Pilot Programme was officially launched in April 1997, when the SWAPP Secretariat took up its work. The SWAPP was established to allow Switzerland to participate in the pilot phase for AIJ (“activities implemented jointly”), which was initiated in March 1995 under the UNFCCC, to gain experience with the joint implementation (JI) of climate protection projects across national borders. In December 2001, it was decided to extend SWAPP by a maximum of 4 years.

In order to take full advantage of the AIJ pilot phase, the SWAPP undertakes a broad range of activities:

- **Government financing of AIJ projects:** Switzerland's first AIJ/JI project with Romania has been implemented. In the so-called Swiss Thermal Energy Project (STEP), district heating systems were renovated in two cities (Buzau and Pascani). The project involved the installation of combined heat and power generation units and the renovation of residential buildings to increase energy efficiency and to gain efficiency from individual metering and thermal insulation. In addition, the rehabilitation of a district heating network in Bucharest is currently being implemented as a Joint Implementation (JI) project.
- **Designing incentives for private sector investment:** One of the main objectives of the SWAPP is to encourage private sector investment in the AIJ component of GHG reduction projects (e.g. in the form of co-financing), even though the most obvious incentive (crediting) is explicitly excluded during the pilot phase. Initiating discussions with players in the private sector to develop the necessary incentives is a priority.
- **Contribution to methodological progress:** In parallel with the implementation of AIJ investment projects under the Swiss programme, and in cooperation with partner (host) countries, an effort is made to find operational solutions to the various methodological challenges associated with the AIJ/JI/CDM instruments. Actions include studies by consultants or NGOs, support for methodological workshops, reviews of experience with AIJ, and case studies of existing projects ("simulation studies").
- **Capacity-building activities, networking and information:** The AIJ pilot phase, by its nature, is a learning experience for all participants, and capacity-building activities are an integral component of the SWAPP. The targeted dissemination – to the private sector and NGOs – of information concerning the AIJ pilot phase, the flexible instruments and the Swiss AIJ pilot programme, both domestically and in conjunction with potential host countries, is a high initial priority.
- **CDM Executive Board:** The programme manager of SWAPP contributed very actively for three years (2002–2004) to the CDM as an alternate Member and in 2005 as a full Member of the UNFCCC CDM Executive Board. The CDM Executive Board administers and supervises the operation of the CDM subject to the authority and guidance of the COP/MOP.

4.8 Systematic observation

Many agencies in Switzerland engage in the systematic observation of elements of the climate system. The Federal Office of Meteorology and Climatology (MeteoSwiss) is the lead agency for most meteorological and atmospheric observations, with significant contributions from other agencies.

Switzerland has a comprehensive observational coverage of its territory. It also contributes to shared international programmes. It has a long instrumental temperature record, as well as the longest glacier monitoring records.

Swiss climate observation in the atmosphere and the related terrestrial systems forms part of general environmental monitoring. Federal agencies and research institutes contribute to world-wide and national monitoring efforts.

The core components of Switzerland's long-term climate observation efforts are shown in Table 4-3.

Type of station	Number of stations	Remarks
GCOS surface network (GSN)	12 reference stations with long time series (since 1864)	
GCOS upper air network (GUAN)	1 sounding station in Payerne	
Atmospheric constituents (GAW)	2 ozone stations (Arosa, Payerne) 1 aerosol station (Jungfrauoch)	
Radiation (GAW, BSRN, ASRB)	4 Swiss Atmospheric Radiation Monitoring (CHARM) stations 1 Baseline Surface Radiation Network (BSRN) station (Payerne) 11 ASRB stations	Central BSRN archive is held by the Swiss Federal Institute of Technology Alpine Surface Radiation Budget (ASRB) network will be integrated into the Meteo-Swiss networks

Table 4-3: Details of the GCOS, GAW and radiation monitoring networks

GAW Station Information System (GAWSIS) is an initiative by the Quality Assurance Science Activity Centre (QA/SAC) Switzerland in collaboration with the WMO Secretariat, the GAW World Data Centers and other GAW representatives to improve the management of information about the GAW network of ground-based stations. QA/SAC Switzerland is hosted by the Swiss Federal Laboratories for Materials Testing and Research (EMPA). GAWSIS was also linked to GOSIC (Global Observing Systems Information Center) during 2004 (www.gosic.org).

Switzerland's intention to support a Global GAW station at Jungfrauoch was confirmed by the WMO in February 2005. The existing regional station Jungfrauoch was therefore upgraded to a global station. This announcement by Switzerland adds the twenty-third station to the planned minimum of 30 global GAW stations worldwide.

The transition of the Alpine Surface Radiation Budget (ASRB) research project into a fully operational MeteoSwiss network is under way. To this effect, new funds were made available by the Swiss government following the ratification of the Kyoto Protocol. This commitment should guarantee the high quality and impact of this network as a long-term undertaking.

Terrestrial observations

Terrestrial and ecological observations cover a broad range of activities. The Federal Office for Water and Geology (FOWG) is responsible for hydrological monitoring. The Swiss Federal Institute for Snow and Avalanche Research (SLF) runs a network of stations for avalanche forecasting and climatological investigations. The Swiss Glacier Monitoring Network is run by the Swiss Federal Institute of Technology, and the PERMOS network by the Swiss Academy of Sciences. Ecological observations are carried out by the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL).

National GCOS structure

Until 2004, MeteoSwiss acted as the national focal point for the Global Climate Observing System (GCOS) due to its role as the national permanent WMO representative. In 2005, the national focal point was upgraded to a Swiss GCOS Office with a permanent new position for this task. This new Office is designed to enhance the coordination of the various climatological observation activities of federal agencies, universities and research institutes. For this purpose, a national GCOS round table was established, with the first meeting held in the autumn of 2004. An action plan for the coming years has been developed.

The responsibilities of the new Swiss GCOS Office included participation at the GCOS regional workshop for Central and Eastern Europe in Leipzig/Germany, with MeteoSwiss acting as a sponsor of this meeting in support of members from countries in transition.

MeteoSwiss has also actively supported and reviewed the implementation plan for the Global Observing System for Climate in support of the UNFCCC (GCOS-92). Additionally, since the first Earth Observation Summit in Washington D.C., Switzerland has taken part in all the activities of the Group on Earth Observations (GEO) and financially supported the implementation of the Global Earth Observation System of Systems (GEOSS) secretariat at the WMO in Geneva.

4.9 Information, awareness raising and public participation

Generally speaking, there is a high level of public awareness of the issue of climate change in Switzerland. This may be partly due to the fact that Switzerland has traditionally played an active and sometimes even a pioneering role in developing measures to protect the environment. In addition, natural hazards are a familiar phenomenon and in many parts of the country people have been affected at one time or another by extreme events such as flooding or major landslides. Furthermore, the Swiss political system with its many elements of direct democratic participation promotes widespread debate on matters of general interest, with referendums being held several times a year.

Information and awareness do not automatically imply a change in behaviour. There are many competing issues on the public and private agenda that influence people's decisions as consumers, citizens, employers or employees. In Switzerland, in recent years, concerns about job security, rapidly rising healthcare costs and financing of the old-age pension scheme have gained in importance. Thus, it does not come as a surprise that some important votes on climate policy issues were affected by shorter-term priorities highlighted in pre-referendum debates. Nevertheless, by providing well-targeted information activities and opportunities for personal involvement, several government agencies, scientific and educational institutions, and a wide range of NGOs continually contribute to public understanding of the climate issue and the need to take action.

Important reports by the IPCC are presented to the public in collaboration with specialized institutions such as ProClim- and the OcCC and Swiss scientists involved in the IPCC process. By supporting the translation of IPCC summaries into German, Switzerland contributes to the wider dissemination of IPCC results.

Selected government and government-sponsored activities

- Information platforms have been developed by the Swiss Agency for the Environment, Forests and Landscape (SAEFL), the Federal Office of Meteorology and Climate (MeteoSwiss) and the Federal Office for Water and Geology (FOWG, hosting the National Platform for Natural Hazards PLANAT).
- Another important source of information and training is the SwissEnergy programme. Through the network of players active in the fields of renewable energy and energy efficiency the programme offers various training and further education activities.
- In the early summer of 2005, based on an in-depth analysis of the detrimental health effects of the 2003 heat wave, the Swiss Federal Office of Public Health (SFOPH) and SAEFL launched an information campaign to raise awareness about the dangerous effects heat can have. Material containing recommendations for those with a personal or professional responsibility for caring for people most at risk was widely distributed through the appropriate channels and made available online (www.canicule.ch; www.hitzewelle.ch).

Further important activities with governmental support include

- **ProClim-: Swiss Academy of Sciences' Forum for Climate and Global Change**
ProClim- was established by the Swiss Academy of Sciences to provide professional support and co-ordination to the scientific community and to facilitate the exchange of views with policy makers. To be able to reach out to hundreds of scientists, ProClim- runs a web-based information system (www.proclim.ch). The website provides not only information on experts

(including details of publications, research programmes and projects) and a calendar of events, but also a wide range of background information and publications on topical climate issues. ProClim- products include two databases on climate change and its impacts (www.climate-change.ch and www.proclim.ch/Facts.html), which are also of great value for educational purposes.

With a broad network of experts, ProClim- also serves as the voice of the Swiss global change research community, organizes workshops and public forums, and encourages the participation of scientists in the political decision-making process. ProClim- serves as the secretariat of the parliamentary group on “Climate Change” and of the OcCC.

- **OcCC – Swiss Advisory Body on Climate Change**

The Swiss Advisory Body on Climate Change (OcCC) was installed by the Federal Department of Home Affairs and formed under the auspices of the Swiss Academy of Sciences in 1996. It is funded by SAEFL. It operates independently of the federal administration and thus guarantees a non-governmental view. The OcCC issues assessment reports and position papers on specific climate change topics. The latest report “Extreme Events and Climate Change” provides a summary of current knowledge of the influence of climate change on the magnitude and frequency of extreme events in Switzerland (www.occc.ch/reports_e.html).

The latest OcCC project is concerned with the impacts of climate change in Switzerland in 2050. A probabilistic climate scenario will be used to assess the effects of climatic conditions on various vulnerable sectors, e.g. ecology, agriculture, human health, and energy. Initial results are expected in 2006.

Education and training

The SAEFL, the SFOE and MeteoSwiss make their expertise available by preparing educational materials for various institutions and a wide range of target audiences. The SDC supports the Foundation Education and Development, which focuses, amongst other topics, on education for sustainability (see www.globaleducation.ch).

Through its network of players active in the fields of renewable energy and energy efficiency the SwissEnergy programme offers various training and further education activities. A special programme is directed to construction specialists and instructors at all levels. The programme encompasses around 15 to 20 courses, and focuses on supporting new courses and teaching aids. A CD-ROM on the topic of energy in vocational education was completed in the middle of 2003. 36 courses were held within the scope of the Penta Project, a further education programme produced by industry associations and trade organisations on the topic of renewable forms of energy.

A variety of material closely linked to the climate issue was recently prepared by the research programme NCCR Climate:

- Educational package “Klimaforschung und 4 fürs Klima” (in German).
- Teaching material on climate and anthropogenically-induced climatic change and its impacts on extreme events and hazards related directly or indirectly to hydrological systems (including an English learning unit at www.nccr-climate.unibe.ch).

At www.nunu.ch, the Nationwide University Network for Undergraduates, a database in German and French offers information on climate change-related education and training opportunities in Switzerland. The website was established by the NCCR Climate.

The exhibition “Achtung Klimawandel!” on the causes and impacts of climate change in Switzerland and ways to deal with this challenge was developed in collaboration with the University of Berne and supported by numerous governmental and non-governmental institutions. Following its very successful presentation at a museum in Berne in 2003, the exhibition was displayed at several other locations in Switzerland.

Public participation

In June 2005, 22 stakeholder organizations – NGOs, semi-private and private organizations and associations from business, scientific and environmental circles – were invited to comment on a draft version of Switzerland's Fourth National Communication under the UNFCCC. Nine organizations provided feedback in their own name, while 7 organizations coordinated their position within an NGO representing 48 Swiss environmental, religious, consumer, union and development aid organizations from civil society.

Many valuable comments were received concerning the structure and content of the report, and additional text elements were provided highlighting the activities of individual organizations of relevance to climate policy. The stakeholder review contributed significantly to the completeness and accuracy of the report and the balanced presentation of information.

4.10 Financial assistance

Multilateral activities

Since the establishment of the Global Environment Facility (GEF) – now the financial mechanism of the Convention – Switzerland has consistently contributed to its replenishment. In 1991, the Swiss Parliament granted a five-year credit facility of CHF 300 million to finance environmental programmes and projects of global importance in the developing countries (Federal Decree of 13 March 1991). This enabled Switzerland to play a major role in the GEF and to set up a programme of bilateral cooperation in the global environment field. Between 1991 and 2002, Switzerland contributed CHF 203 million to the GEF. For the period 2003–2006, CHF 99 million has been committed to the GEF.

From 1997 to 2004, Switzerland supported the National Strategy Study (NSS) programme of the World Bank with USD 4 million, with the aim being to assist non-Annex I countries in defining their negotiation positions and to develop national strategies regarding emerging international market incentive instruments which will facilitate technology transfer to developing and transition countries. Contributions covered 13 national CDM/JI strategies in Latin America, Africa, Asia and Eastern Europe.

The Climate Investment Partnership (www.climateinvestors.com), a non-profit association of public and private financial organizations, has been supported by seco in 2003/04 with start-up funding. The partnership seeks to provide upfront financing for climate-friendly projects. It operates as a matchmaking programme that establishes a market place for high-quality GHG projects and investments and that reduces processing costs and risks. The programme offers a way for project developers from developing countries to participate in the carbon market and to obtain access to investment funds.

Switzerland's total multilateral assistance from 2001 to 2004 amounted to approximately CHF 1.25 billion (see Table 4-4).

Contributions to dedicated funds under the UNFCCC

At COP 6bis, Switzerland signed a political declaration issued jointly with the EU, Iceland, Norway, New Zealand and Canada, committing itself to payments to the Special Climate Change Fund (SCCF) on the basis of an emissions-based burden-sharing formula originally proposed by the President of COP 6bis. The Swiss share of 1990 Annex I emissions is 0.3%. The base amount committed jointly by Switzerland and the other countries is USD 410 million, payable as of 2005, resulting in a Swiss share of USD 1.23 million per year. Switzerland made a statement at COP 7, announcing the Swiss payment modality. This payment modality was subsequently approved by the Parliament. Switzerland has already contributed CHF 400'000 in 2003 for the Least Developed Countries Fund and CHF 600'000 in 2004 for the Special Climate Change Fund.

	Multilateral contributions (million CHF)			
	2001	2002	2003	2004
Global Environment Facility	16.25	16.25	24.75	24.75
Multilateral institutions:				
International Bank for Reconstruction and Development (IBRD)	3.4	2.4	2.0	0.1
International Development Association (IDA)	140.0	-	176.9	176.9
African Development Bank (BAD)	1.9	1.8	1.8	1.7
African Development Fund (FAD)	46.0	46.0	71.6	35.8
Asian Development Fund (ADF)	13.9	13.9	13.9	13.9
European Bank for Reconstruction and Development (EBRD)	9.0	9.9	9.6	9.3
Inter-American Development Bank (IADB)	1.6	1.5	1.3	1.1
United Nations Development Programme (UNDP)	52.0	52.0	52.0	52.0
World Bank (NSS Programme)	3.4			
UNFCCC	0.5	0.5	0.5	0.6
Multilateral scientific programmes:				
Consultative Group on International Agricultural Research (CGIAR)	11.0	10.9	10.8	11.5
International Fund for Agricultural Development (IFAD)	17.7	-	-	7.1
International Union for the Conservation of Nature (IUCN)	1.2	1.8	0.7	0.8
WMO Programmes	0.8	0.8	0.9	0.8
European Cooperation in the Field of Scientific and Technical Research (COST)	7.7	8.0	8.1	9.0
OECD Climate Change	0.05	0.05	0.05	0.05
IPCC		0.1	0.1	0.1
Multilateral technology programmes:				
UNIDO	1.8	1.9	1.8	1.9
Ozone Fund UNEP	3.1	3.0	4.0	3.9
UNEP	3.7	3.7	3.5	3.5
World Bank Climate Funds			0.4	0.6
Multilateral training programmes:				
UNITAR (climate, law and environment)	0.6	0.6	0.6	0.6
Total	335.6	175.1	385.3	356.0

Table 4-4: Financial contributions to the operating entity of the financial mechanism, to regional and to other multilateral institutions and programmes (2001-2004)

Bilateral assistance

From 2000 to 2003, Switzerland's official development aid for developing and transition countries amounted to about CHF 6.4 billion. Most of this has been provided through bilateral assistance projects involving the SDC and seco. As a fundamental principle, Switzerland's bilateral assistance is committed to – environmental, social and economic – sustainability and poverty reduction, as further outlined in the MDGs. Moreover, Swiss bilateral assistance includes many programmes aimed directly at environmental and climate protection.

Switzerland's grant financing to support basic infrastructure projects can be taken as an example: priority fields of Swiss infrastructure financing in Eastern Europe and Central Asia are the environment and energy sector, e.g. construction of sewage treatment facilities, refurbishment of hydropower plants, support for public transport systems, etc. A particularly important and relevant sector in this region is the rehabilitation of district heating systems, which traditionally suffered poor maintenance and high losses. Pre-insulated pipes, co-generation and building insulation, together with tariff reforms, have contributed considerably to climate protection. These projects include the transfer of technology to partner countries.

Other areas of Swiss expertise and assistance are emission reduction programmes for the transport sector (e.g. Central America, Peru, Indonesia), soil protection, forest and watershed management, and cleaner production.

New priority issues in Swiss development cooperation

In development cooperation, climate change is of increasing relevance. SDC is further defining its role and future action in addressing climate change through mitigation and adaptation measures. In doing so, it takes into account the scientific background on climate change, the current state of international negotiations within the UNFCCC, needs and options for coordination with other government agencies, and the objectives of the Global Environmental Programme. The results of the latest review are summarized in the report 'Addressing Climate Change through Development Cooperation – An Orientation on Climate Change Issues in the field of Natural Resource Management, Livelihoods and Food Security', SDC 2005 (http://www.deza.admin.ch/ressources/deza_product_en_1434.pdf).

According to SDC's general mandate, activities addressing change through development cooperation are oriented towards poverty alleviation, participation and empowerment, as well as democratization of society. Within the scope of its Strategy 2010, SDC supports programmes and projects in the field of food security, natural resource management and local livelihoods. These should integrate measures that address one or several of the following objectives:

- ***Adaptation***: Understand and reduce vulnerability to climate change in poor livelihoods with special consideration of extreme events, natural disasters, resource availability, biodiversity loss and reduction of carrying capacity for food production;
- ***Mitigation***: Promote equitable participation of the rural poor, including gender issues and small scale farmers, in opportunities emerging from the implementation of the mitigation strategy, with special regard of their need to increase capacity to participate in the flexible mechanisms;
- ***Sustainable development***: Ensure that the implementation of mitigation and adaptation projects promotes sustainable development in poor rural areas.

In the field of adaptation, SDC has started an analysis of the impacts of climate change on selected operational work: 'Understanding the effects of programs and projects on vulnerability and adaptation to Climate Change and Climate Variability in India.' A report is already available: "Livelihoods and Climate Change – combining disaster risk reduction, natural resource management and climate change adaptation in a new approach to the reduction of vulnerability and poverty" (<http://www.eldis.org/static/DOC15217.htm>).

SDC also promotes collaboration among Swiss NGOs and research centres with a focus on '*Coping Strategies and Adaptation*'. Synergies between science, policymaking and fieldwork expertise create an appropriate framework to address climate change in the field of natural resource management, livelihoods and food security.

Bilateral assistance to developing country parties

• The Global Environmental Programme

In 1992, Switzerland launched a bilateral Global Environmental Programme (GEP), the objective of which is to support the efforts of developing countries in the implementation of multilateral environmental agreements. The GEP has three focal areas: climate change/energy, biodiversity and sustainable management of natural resources. More information is available at: www.sdc.admin.ch. In the focal area of climate change, the priority themes are as follows:

- Elaboration of policies and action plans;
- Human and institutional development;
- Policy dialogue nationally, regionally and internationally;
- Promotion of renewable energy and energy efficiency;
- Cross-cutting issues (climate/forestry/land management, positive interactions between agreements).

The main goal of all these activities is primarily the promotion of local socio-economic development, with the global environmental benefits considered as added value, and not the other way around.

During the period 2001–2004, 25 projects (see Table 4-5) received a total of CHF 26.3 million mainly in the sectors of energy, transport and industry.

• SDC programmes and climate change

In addition to the GEP, other SDC projects contribute significantly to climate change mitigation and adaptation. However, their impacts in this regard cannot be explicitly documented, since the relations between activities and effects are indirect and not monitored. As well as complying with the general requirement for all projects to diminish environmental degradation and pollution, many projects are aimed at sustainable resource management, which automatically implies a positive contribution to climate change mitigation and adaptation.

Bilateral assistance for Central and Eastern Europe and the CIS

The countries of Central and Eastern Europe require enormous financial resources to meet the costs of adapting, renewing and rebuilding their industries and infrastructure. Swiss bilateral cooperation with Central and Eastern Europe is based on three framework credits approved by the federal parliament in 1990, 1992 and 1999, and an extension of the third credit in 2004. Of the total amount of CHF 2.95 billion, CHF 1.9 billion was allocated for financial cooperation. Over the last ten years, the emphasis of the cooperation has shifted from Central and Eastern Europe to South Eastern Europe and the CIS. Bilateral financial cooperation with Switzerland is primarily based on two instruments: grants and credit guarantees.

• Grants

Switzerland uses grant financing to support priority projects that cannot be financed commercially, because their earning power is insufficient, if the Swiss economy can provide equipment and services for their implementation on competitive terms. The priority field of application is basic infrastructure, particularly in the environment and energy sectors. The partner country is expected to bear local cost components of the projects as far as possible.

• Credit guarantees

Credit guarantees are used to finance the export of Swiss goods and services to manufacturing companies or for infrastructure projects, the profitability of which allows commercial financing. Such guarantees are used in countries where the Swiss export risk guarantee (ERG) does not apply, or applies only in part. The environmental dimension is taken into account at the application stage. These mechanisms have sometimes promoted the importation of goods which have a direct impact on air quality.

Recipient	Funded project/programme	Sector	Software (S) Hardware (H)	Disbursements (in CHF)			
				2001	2002	2003	2004
Bolivia	Clean air	Transport	(S)(H)	0	0	240'000	660'000
Central America	Clean air	Transport	(S)	1'217'325	446'623	163'679	28'006
Chile	Clean air	Transport	(S)	256'867	157'572	321'061	527'167
Chile	Air quality monitoring in 4 cities	Transport	(S)	577'500	0	0	0
China	City of Kunming Masterplan public transport	Transport	(S)	220'180	228'359	292'061	400'716
Cuba	Efficient lighting (RECIC)	Energy	(S)(H)	76'868	73'000	1'111'673	550'000
Ecuador	Clean air	Transport	(S)	290'801	339'888	696'000	270'008
Global	Renewable Energy Platform (REPIC)	Energy	(S)	0	0	0	150'000
Global	UNDP/GEF: National Communication Support	Adaptation	(S)	420'715	526'684	304'030	119'245
India/Cuba	Sustainable Building Practice	Energy	(S)	0	0	54'371	116'494
India	Promotion of solar photovoltaics (PV)	Energy	(S)	128'536	84'288	52'203	78'061
India	Ecological refrigeration ECOFRIG	Industry	(S)(H)	378'967	395'777	216'341	0
India	Hybrid rickshaws	Industry	(S)(H)	141'242	0	9'204	0
India	Energy efficiency in industry clusters	Industry	(S)(H)	344'120	702'540	694'726	685'366
India	Adaptation in semi-arid areas	Adaptation	(S)	51'444	101'939	30'252	52'186
Indonesia	Clean air	Transport	(S)	1'590'440	1'519'338	1'448'707	850'000
Mali	Rural energy promotion	Energy	(S)(H)	39'794	25'432	0	167'287
Maroc	Rural electrification (hydro and PV)	Energy	(S)(H)	0	151'233	261'613	445'787
Nepal	Energy efficiency in brick industry (VSBK)	Industry	(S)(H)	0	124'196	954'683	996'516
Nicaragua	UNDP/GEF Small hydro promotion	Energy	(S)(H)	0	0	0	1'610'000
Peru	Clean air	Transport	(H)	0	72'269	364'250	1'088'391
Vietnam	Energy efficiency in brick industry	Industry	(S)(H)	3'312	561'820	500'000	654'770
Vietnam	Clean air	Energy	(S)	0	0	0	285'000
Vietnam	Atmospheric Brown Cloud Asia	Energy	(S)	0	0	0	130'000
West Africa	Bush fire control	Forestry	(S)	21'559	123'671	51'600	29'596
Total				4'542'345	5'188'006	7'362'775	9'206'590

Table 4-5 Overview of GEP projects and programmes supported between 2001 and 2004

Abbreviations

BSRN	Baseline Surface Radiation Network
CFCs	chlorofluorocarbons
CHARM	Swiss Atmospheric Radiation Network
CH ₄	methane
CHF	Swiss francs
CIS	Commonwealth of Independent States
CO	carbon monoxide
CO ₂	carbon dioxide
COP	Conference of the Parties
CORE	Federal Energy Research Commission
COST	European Cooperation in the Area of Scientific and Technical Research
DETEC	Federal Department of Environment, Transport, Energy and Communications
eae	Energy Agency for Electrical Appliances
EAEc	Energy Agency for the Economy
ECAC	European Civil Aviation Conference
EMPA	Swiss Federal Laboratories for Materials Testing and Research
EnDC	Conference of Cantonal Energy Directors
ETH/ETHZ	Swiss Federal Institute of Technology Zurich
EUREKA	European Research Coordination Agency
FAL	Swiss Federal Research Station for Agroecology and Agriculture
FOAG	Swiss Federal Office for Agriculture
FOSD	Swiss Federal Office for Spatial Development
FOT	Swiss Federal Office of Transport
FOWG	Swiss Federal Office for Water and Geology
GATT	General Agreement on Tariffs and Trade
GAW	Global Atmosphere Watch
GCOS	Global Climate Observing System
GDP	gross domestic product
GEF	Global Environment Facility
GEP	Global Environmental Programme (of SDC)
Gg	gigagram (1,000 tonnes)
GHG	greenhouse gas
GNP	Gross National Product
GOOS	Global Ocean Observing System
GSN	GCOS Surface Network
GTN-G	Global Terrestrial Network - Glaciers
GTN-P	Global Terrestrial Network - Permafrost
GTOS	Global Terrestrial Observing System
GUAN	GCOS Upper Air Network
GWP	Global Warming Potential
HFCs	hydrofluorocarbons

HGV	heavy goods vehicle
HVF	Heavy Vehicle Fee
IEA	International Energy Agency
ICAO	International Civil Aviation Organization
IPCC	Intergovernmental Panel on Climate Change
JPOI	Johannesburg Plan of Implementation
MDGs	UN Millennium Development Goals
MeteoSwiss	Federal Office of Meteorology and Climatology
Mt	million tonnes
NC3	Switzerland's third National Communication
NC4	Switzerland's fourth National Communication
NCCR	National Competence Centre of Research
NDSC	Network for the Detection of Stratospheric Change
NGO	non-governmental organization
NMVOC	non-methane volatile organic compound
NO _x	oxides of nitrogen
N ₂ O	nitrous oxide
OcCC	Swiss Advisory Body on Climate Change
OECD	Organization for Economic Cooperation and Development
p.a.	per annum
PACE	Permafrost and Climate in Europe
PFCs	perfluorocarbons
PJ	Petajoule (1 PJ = 277.8 Gigawatt-hours)
PLANAT	National Platform for Natural Hazards
PMOD/WRC	Physikal.-meteorolog. Observatorium Davos / World Radiation Centre
ProClim-	Swiss Forum for Climate and Global Change
PSI	Paul Scherrer Institute
SAEFL	Swiss Agency for the Environment, Forests and Landscape
SDC	Swiss Agency for Development and Cooperation
seco	State Secretariat for Economic Affairs
SF ₆	sulphur hexafluoride
SFOE	Swiss Federal Office of Energy
SFOS	Swiss Federal Office of Statistics
SFOPH	Swiss Federal Office of Public Health
SFRA	Swiss Federal Roads Authority
SIA	Swiss Society of Engineers and Architects
SINGADS	Synthesis of Integrated Global Aerosol Data Sets
SLF	Swiss Federal Institute for Snow and Avalanche Research
SMEs	small and medium enterprises
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation
WDCA	World Data Centre for Aerosol (GAW, Italy)
WDCGG	World Data Centre for Greenhouse Gases (GAW, Japan)
WGMS	World Glacier Monitoring Service (GTN-G)
WMO	World Meteorological Organisation
WSL	Swiss Federal Institute for Forests, Snow and Landscape Research