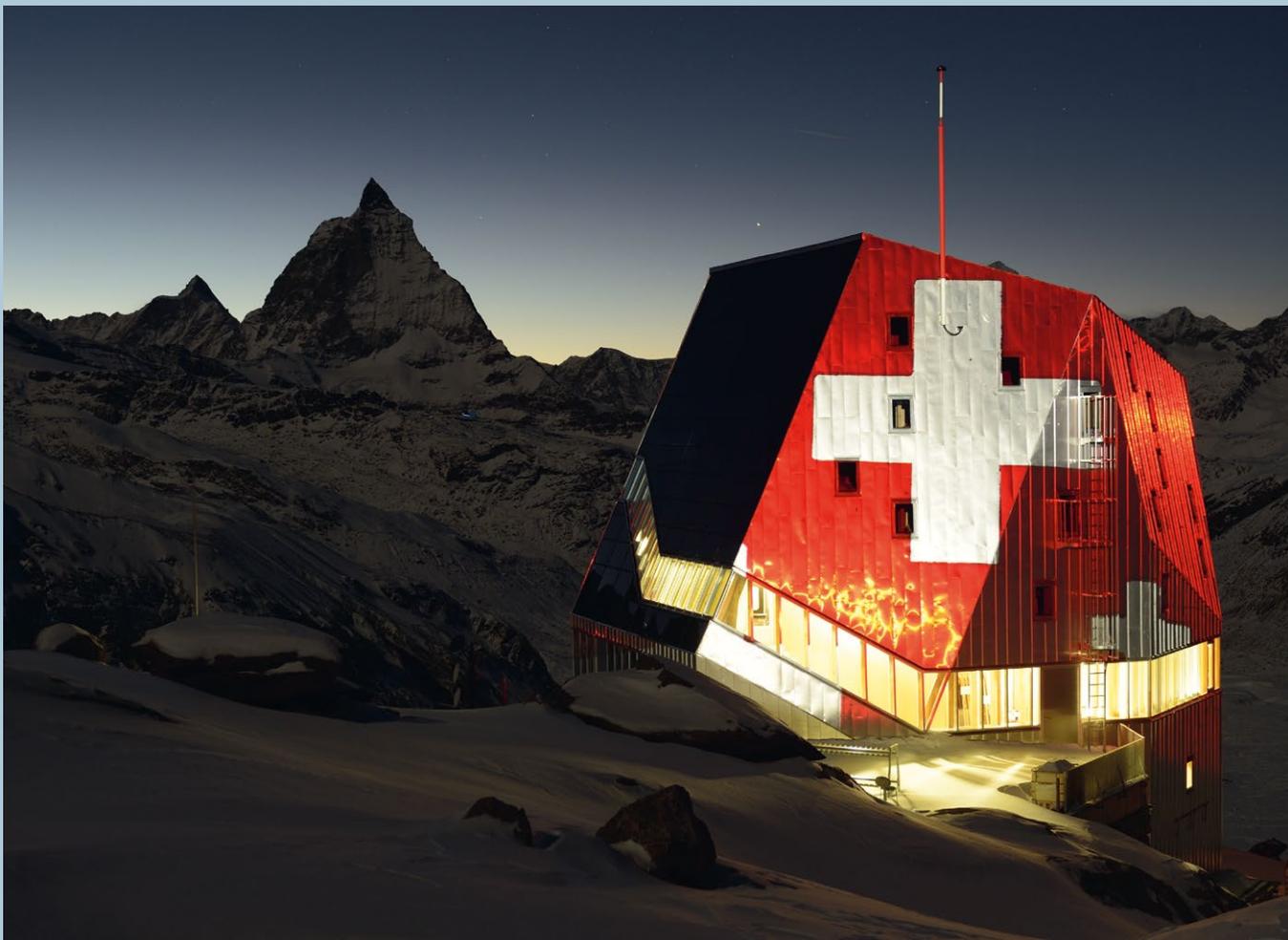


Switzerland's climate policy

Implementation of the Paris Agreement



Schweizerische Eidgenossenschaft
Confédération suisse
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Confederaziun svizra

Swiss Confederation

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The "mountain hut of the future" is a realisation of sustainable
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system, ventilation system with heat recovery, water circulation
for sanitary facilities, intelligent housing technology.
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Foreword

The Paris Agreement marked the beginning of a new era: on 12 December 2015, the international community said yes to a world that leaves behind the age of fossil fuel sources and radically reduces its greenhouse gas emissions over the next few decades. Otherwise, the stated goal of limiting global warming to less than two, better yet to a maximum of 1.5 degrees Celsius, is not achievable.

For the Agreement to succeed, developed countries must join forces with emerging countries. This needs the spirit of shared responsibility, both in terms of reducing emissions and supporting countries most affected by climate change.

With the ratification of the Paris Agreement, Switzerland has committed to halving its greenhouse gas emissions as compared with 1990 levels by 2030. In the longer term, the Federal Council aims for a further significant reduction in emissions. The potentials exist: with renewable energies, CO₂-neutral transport, less waste and more efficiency, Switzerland can reduce its greenhouse gas emissions to a fraction.

But this will not happen by itself. Both business and politics are called upon to improve their climate compatibility. Today's investments have a decisive influence on the future development of greenhouse gas emissions. How climate-compatible the Swiss financial market's investments are is thus becoming increasingly important. The Paris Agreement is also a clear signal for innovation and environment-friendly technologies. Our country has much to offer in both areas.

As an emitter of greenhouse gases, Switzerland has an obligation. As a mountainous country, which is heavily exposed to natural hazards, it is one of the major beneficiaries of a successful climate policy. As a financial and technological centre, it can contribute its expertise at the international level. Doing nothing is therefore not an option. That would be much more expensive for us than resolute action.

Christine Hofmann
Deputy Director
Federal Office for the Environment (FOEN)

The Paris Agreement – leading to a stable climate

The Paris Agreement has launched a new global climate policy. It points the way for mitigating global warming and preventing irreversible damage to humans and nature. But the implementation of the Agreement is also associated with great challenges.

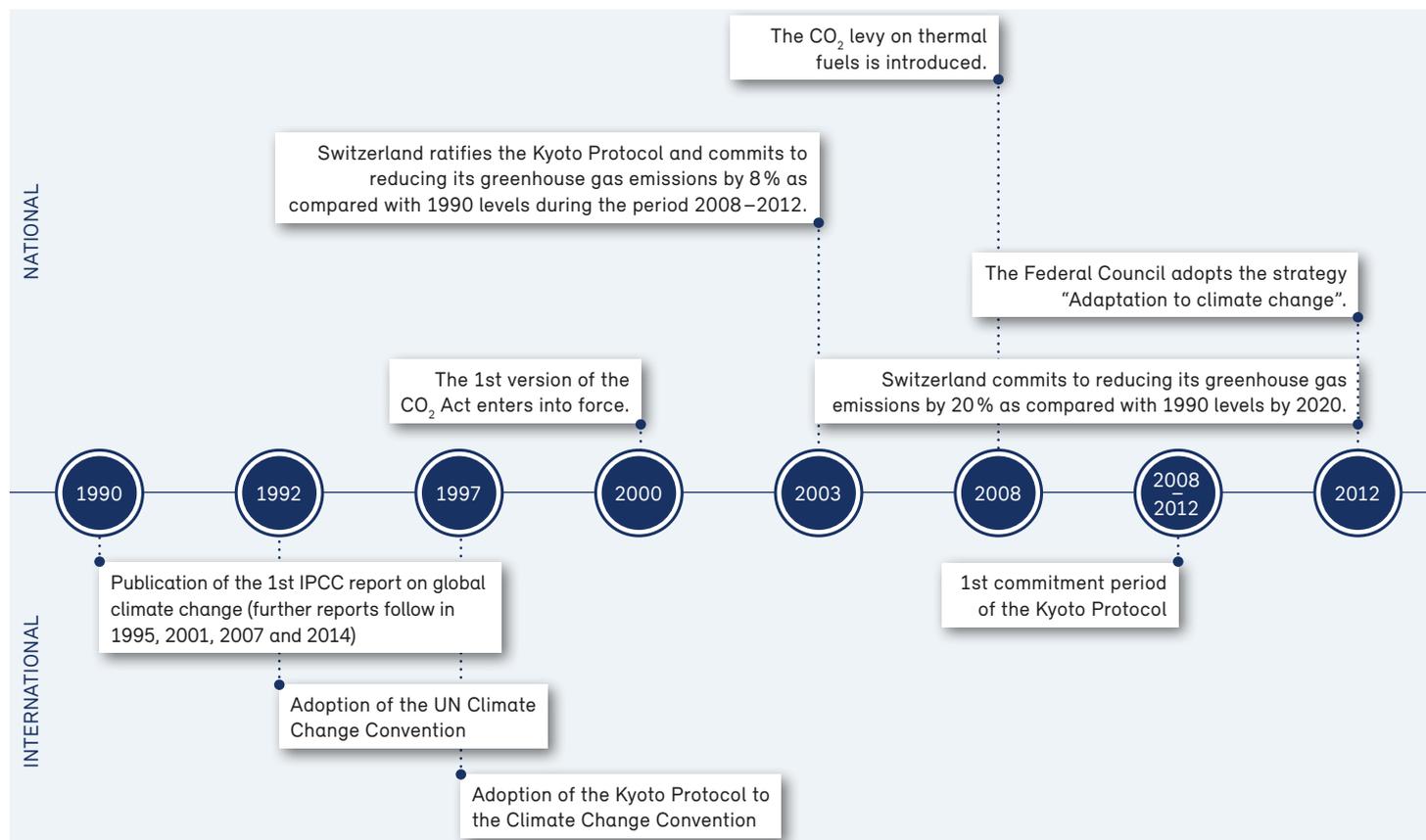
On 12 December 2015, after tough negotiations, the 196 signatories to the UN Climate Change Convention [1] unanimously adopted the Paris Agreement. Hundreds of country delegates rose and applauded spontaneously. The next day, newspapers wrote of a “monumental success for the planet” and even saw the “beginning of a new world order”. A framework for international climate policy that all countries could stand behind was found.

After the diplomatic breakthrough, it was now the turn of the individual countries. By the beginning of 2018, 173 countries had ratified the Paris Agreement and thereby committed themselves to implementing it. Switzerland is among them.

The Agreement aims to respond collectively to threats posed by climate change while promoting sustainable development and the eradication of poverty. In particular, the international community strives (see also Fig. 1):

- to limit the rise in average global temperature to well below 2 degrees Celsius in order to significantly reduce the risks and impacts of climate change;

Milestones in climate policy



- to strengthen the ability of countries to adapt to the adverse impacts of climate change and to move towards a low-emission development path;
- to align worldwide cash flows so that they are consistent with the objectives mentioned above.

Important concepts and principles forming the foundation of the Paris Agreement are described below.

The two-degree upper limit

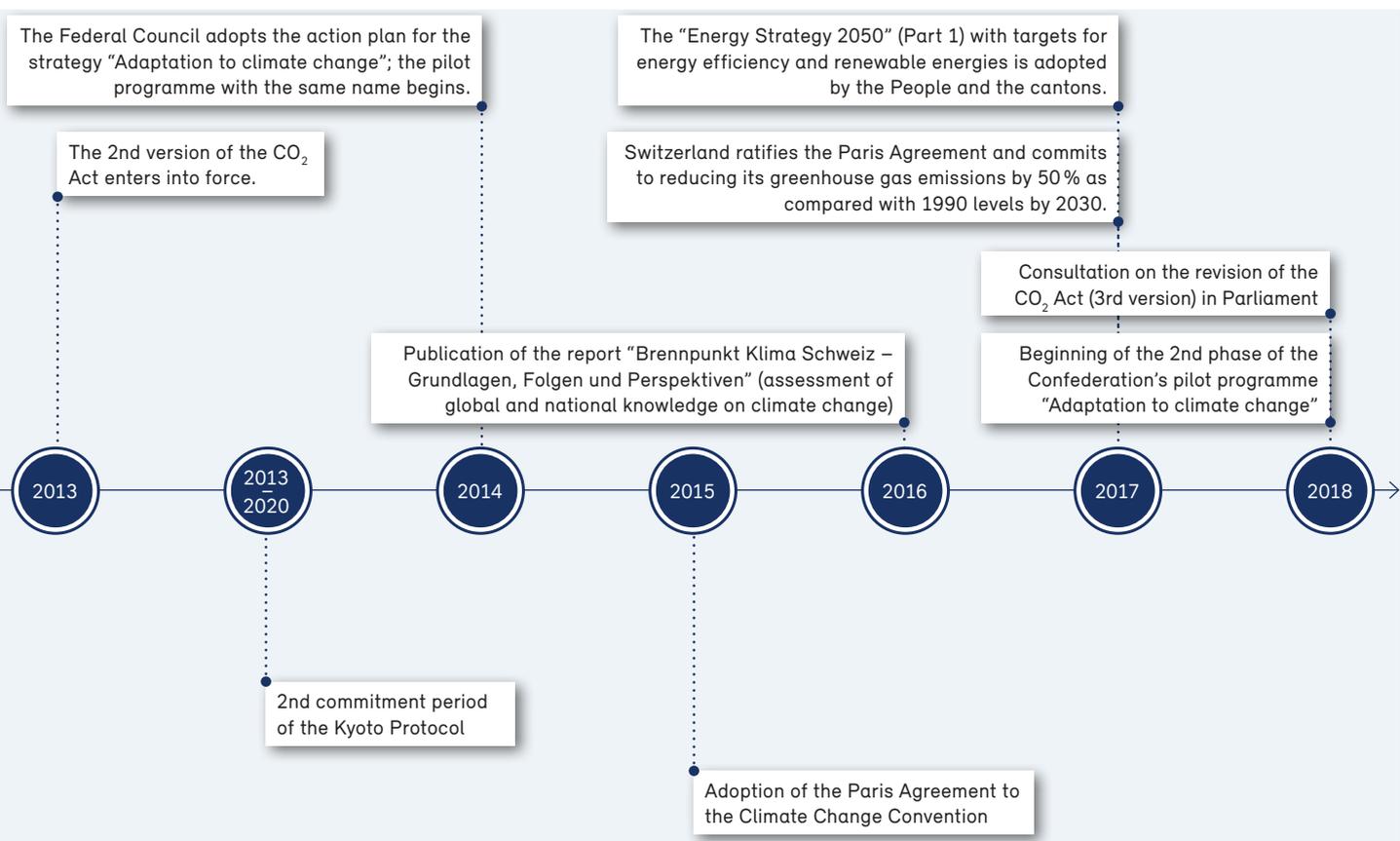
In climate research, there has long been consensus that increasing the average global temperature by more than two degrees Celsius would entail serious risks. These include more frequent extreme weather events with heat waves, periods of drought or tropical storms and a significant rise in sea levels. Some of these changes would be irreversible for centuries. The Paris Agreement therefore sets a ceiling of two degrees and uses this as a reference

to assess the need for action and whether measures and timetables for its implementation are appropriate.

The global CO₂ budget

Since the beginning of systematic, internationally comparable measurements in 1864, the average global temperature has increased by almost 0.9 degrees. Depending on the region, the increase is significantly higher. In Switzerland, the increase is already around two degrees. The main cause for the warming observed since the end of the 19th century is greenhouse gases [2] released into the atmosphere through human activities, mainly through the use of fossil fuel sources, by agriculture as well as extensive deforestation.

For the upper limit of two degrees global warming not to be exceeded, a maximum of 2,900 billion tonnes of CO₂ may be released into the atmosphere. Since the begin-



Country delegates applaud after the successful adoption of the Paris Agreement



Photo: François Guillot, AFP

ning of industrialisation in the 18th century, about 2,070 billion tonnes had already been emitted by 2016, mainly by the wealthy countries. This leaves a budget of no more than 830 billion tonnes of CO₂ if global warming is to be kept within reasonable limits.

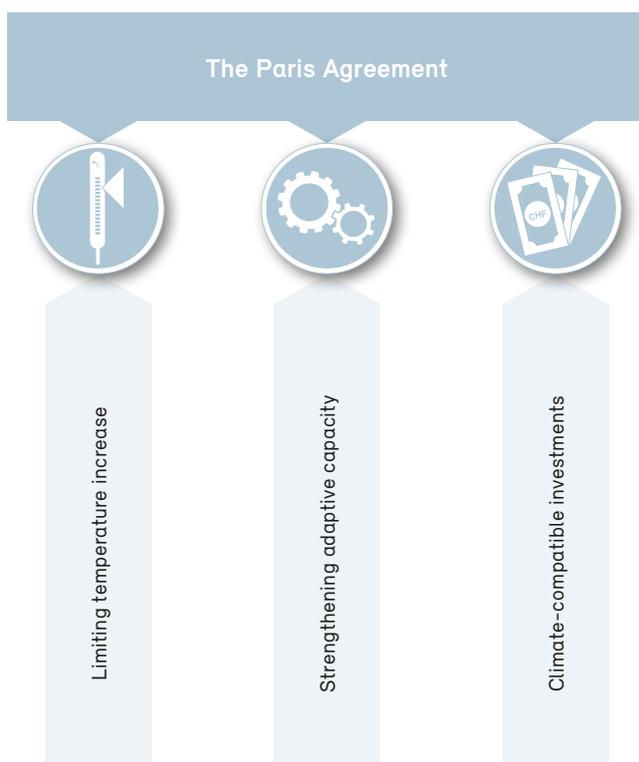
Currently, annual global emissions amount to about 36 billion tonnes of CO₂. Assuming constant emissions, the available budget would be completely exhausted by approximately 2040. Since CO₂ emissions cannot be stopped from one day to the next, the current emission trend must be broken quickly. The world needs to refrain from using much of the known reserves of coal, oil and natural gas and instead promote the widespread use of emission-free technologies. Changing societal values

about the importance of possession and consumption could effectively support this trend reversal.

Climate neutrality

The Paris Agreement recognises the great challenge of reducing worldwide greenhouse gas emissions rapidly and sharply enough for the CO₂ budget to be met. It therefore aims to find a balance by the second half of the 21st century: unavoidable emissions are to be withdrawn from the atmosphere with suitable processes. The term “climate neutrality” is used to describe this state of equilibrium (see also p. 17).

Fig. 1: The three pillars of the Paris Agreement



Periodic target tightening and success control

In order to support the necessary trend reversal in greenhouse gas emissions, both industrialised and developing countries agree to set more ambitious national climate protection targets every five years and to report on the measures taken. On the basis of individual country reports, the international community checks whether the planned activities are sufficient to meet the two-degree upper limit.

Supporting poorer countries

The industrialised countries have already previously committed to providing financial support to poorer countries to reduce their greenhouse gas emissions and adapt to the unavoidable consequences of climate change. In the future, financial assistance and investments should be channelled even more into low-emission technologies and to contribute to managing the impacts of climate change. In practice, this does not merely involve money transfers, but also improving professional and institutional conditions in recipient countries so that projects can be successfully implemented.

Transparency and commitment

The Paris Agreement trusts that the moral and political obligation to implement the mutually agreed objectives as well as the regular, systematic monitoring of success in the spotlight of the global public will make the signatories engage to the best of their abilities. Achieving the main objective of the Agreement – limiting global warming to well below two degrees – is thus supported in one way by the obligation to document and disclose goals and measures. On the other hand, it depends on mutual trust and the conviction that everyone is making a fair contribution to solving the problem.

Further information

www.bafu.admin.ch/1803-e

Switzerland and international climate policy

The Paris Agreement makes clear that global warming can only be stopped through international cooperation. Although Switzerland is a small country, its economy is strongly networked at the global level. It therefore has a vital interest in ensuring that all countries pull together to drastically reduce greenhouse gas emissions.

Switzerland has substantial financial resources and relevant expertise to deal with extreme weather events and natural disasters. Nevertheless, the economy and society are vulnerable, especially if climate change continues unabated: the water balance is likely to change significantly, the environment for key sectors such as winter tourism is to deteriorate, new health risks are to be threatened, and the heavy dependence on imported goods and global supply is expected to be felt more frequently.

Switzerland's credibility depends on its ability to live up to its responsibility as a contributor to climate change and as a prosperous nation. Due to its above-average per capita emissions (see Box p. 13), Switzerland is part of the problem. Its high level of expertise and economic performance make it easier for the country to be part of the solution. Thanks to its innovative strength, Switzerland has the opportunity to implement a new model of prosperity based on low-emission, renewable and sustainably used energies and raw materials.

Switzerland's climate-policy portfolio

With its climate policy, Switzerland aims to reduce its national greenhouse gas emissions by 20 percent as compared with 1990 levels by 2020. The Confederation, cantons and the private sector are implementing numerous measures. The most important area of activity is the reduction of emissions from fossil thermal and motor fuels.

The CO₂ Act of 2013 is the current foundation of Swiss climate policy. It provides that, by 2020, at least 20 percent of greenhouse gas emissions as compared with 1990 levels must be reduced with domestic measures. In addition, the CO₂ Act assigns the Confederation a coordinating role in adapting to climate change and requires that climate protection also be given greater consideration in vocational training and advisory services.

Instruments for reducing emissions are deployed where the reduction potential is greatest: in transport, buildings, industry and waste treatment (Fig. 2). The CO₂ Act does not provide any specific measures for agriculture as another climate-relevant sector.

Transport

Since 2012, passenger cars that have been newly registered may not exceed requirements for average CO₂ emissions. Coordinated with the EU's approach, emissions regulations are tightened periodically. Vehicle importers are responsible for compliance.

Fuel importers are in turn obliged to compensate for a steadily increasing share of transport-related CO₂ emissions. With a surcharge of no more than five cents per litre on motor fuel prices, they finance projects that reduce greenhouse gas emissions. Current legislation provides that these compensation projects be implemented domestically. For example, biomass power plants, biofuels, district heating networks or the use of commercial vehicles with hybrid and electric drive systems are supported.

About three quarters of the emissions from the transport sector stem from private passenger transport. In recent years, great progress has been made in vehicle and engine construction, and the share of more fuel-efficient vehicles has increased, also thanks to emission regulations for new vehicles. Emissions stemming from transport in 2016 were nevertheless three percent higher than in 1990, in part because kilometres driven increased by more than 30 percent. Another equally important reason is that more and heavier cars with ever more elaborate equipment are being driven in Switzerland, resulting in an increase in fuel consumption and additional emissions. Due to the wide range of compact and efficient vehicles available today, there is still vast and cost-effective untapped potential for reduction.

Buildings

Since 2008, the Confederation has imposed a CO₂ levy on fossil thermal fuels. It is designed as an incentive levy and consists of a surcharge on the price of heating oil, natural gas and coal, the majority of which is redistributed to the economy and population. It thus creates an incentive to generate heat in such a way that little or no CO₂ is produced. The CO₂ levy targets all consumers of thermal fuels, whereby the building sector plays a central role as a sector with a high demand for heating energy.

In the building sector, the CO₂ levy is supplemented by the buildings programme, jointly financed by the Confederation and the cantons. This programme supports the transition to renewable energy sources, the efficient use of energy and the renovation of old buildings with subsidies. The cantonal minimum requirements for energy efficiency and the use of renewable energy also strengthen the existing trend towards low-emission new buildings and climate-friendly renovations.

These measures have proven to be very successful. Although the heated surface area increased by 39 percent between 1990 and 2016, emissions from heating and hot water production in residential and commer-

cial buildings fell by about a quarter. But there is still considerable potential for further reductions: on the one hand, by replacing old oil and gas heating systems with heating systems that use renewable energy sources, and, on the other, by refurbishing the numerous poorly insulated old buildings.

Industry and waste

For small and medium-sized enterprises, the price pressure of the CO₂ levy on thermal fuels acts as an incentive to reduce emissions. For companies that are heavily affected by the CO₂ levy, there is the possibility of entering into a reduction commitment and being exempted from the levy.

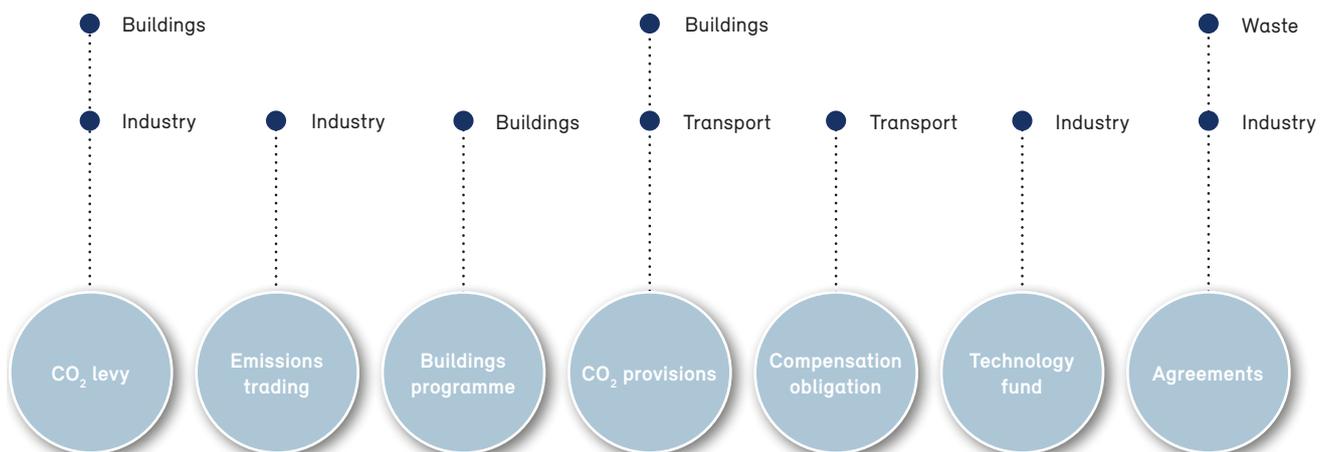
Companies that emit large volumes of CO₂ are required to participate in emissions trading. The basis of emissions trading is that each company is allocated a number of emission allowances (in tonnes of CO₂) free of charge that decreases from year to year. The emission allowances allocated correspond to the emissions that would occur if the facilities were operated in accordance with state-of-the-art technology. If the company's emission reduction exceeds the target, it can sell unclaimed emission allowances to a company that is struggling to meet its target. If the emissions exceed the allocated amount, then the company must purchase emission allowances.

For emissions from municipal waste incineration plants and large electricity substations, the Confederation has concluded agreements with the industry associations. Furthermore, a technology fund supports climate-friendly innovations.

Overall, industrial-sector emissions have declined slightly since 1990. While the emission of greenhouse gases from industrial energy consumption could be significantly reduced, the emissions from industrially manufactured, climate-affecting substances (e.g. cooling agents used in refrigeration and air conditioning systems) have increased significantly. Emissions from waste treatment rose, mainly as a result of population and consumption growth.

Figure 3 provides an overview of the development of emissions in the various sectors since 1990.

Fig. 2: Important measures to reduce greenhouse gas emissions in Switzerland and the sectors affected



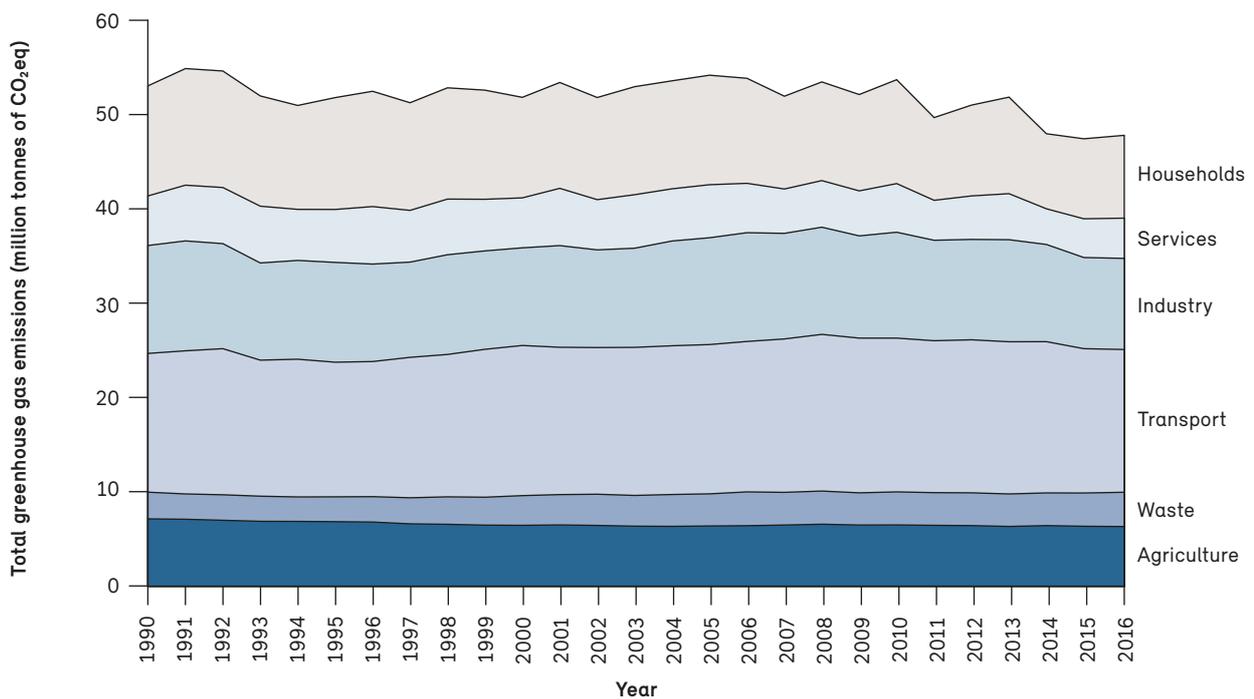
2000-watt sites operate according to the criteria of the one-tonne-CO₂ society, i.e. the sustainable use of resources, low emissions and sustainable mobility. Photo: Erlenmatt West in Basel.



Photo: vistadoc

Fig. 3: Development of greenhouse gas emissions by sector

Despite continuous population and economic growth, Switzerland's total emissions have decreased in recent years.



Source: FOEN

Switzerland's emissions trend:

one needs to look at the entire picture

In order to capture all the emissions for which a country is responsible, the so-called "greenhouse gas footprint" [3] offers a good tool. In Switzerland, the portion of the greenhouse gas footprint currently emitted domestically is just under six tonnes of CO₂ equivalent (CO₂eq) [4] per capita per year. As compared with countries such as Germany, Italy, Great Britain or Japan, this is below average. Is Switzerland thus a role model for climate protection?

A more thorough analysis clouds the positive first impression: the main reason for the comparatively low domestic greenhouse gas footprint is the lack of raw materials in Switzerland and the absence of associated industry. A large part of the raw materials and finished products consumed in Switzerland (including food and feed) are imported. Greenhouse gas emissions generated abroad in the production of these goods currently exceed domestic emissions, even if the emissions associated with Switzerland's exports are deducted. In addition, the Swiss are very fond of travel – in particular, leisure flights contribute significantly

to the greenhouse gas footprint. Overall, the portion of the greenhouse gas footprint emitted abroad is currently over eight tonnes of CO₂eq per capita per year. Switzerland's total greenhouse gas footprint is thus currently around 14 tonnes of CO₂eq per capita per year.

If Switzerland intends to comply with the two-degree upper limit, it must consistently reduce all emissions for which it is responsible. The portions of Switzerland's greenhouse gas footprint emitted both domestically and abroad have developed in opposite directions over the past decades (Fig. 4). While the domestic portion has declined, the portion abroad has increased.

The limited perspective on domestic emissions suppresses that Switzerland's very high standard of living is heavily dependent on advance services and thus associated emissions abroad. From a holistic point of view, Switzerland's production and consumption-related per capita emissions are above average compared to other industrialised nations.

Abb. 4: Change in Switzerland's per capita greenhouse gas footprint

Domestically generated per capita emissions have declined whilst those generated abroad have increased at a similar rate.



Source: FOEN

The role of cantons and communes

For Switzerland to achieve its climate protection goals, the active participation of the cantons and communes is of great importance. Various cantons support and supplement the measures of the Confederation through their own support programmes and incentives. The communes can also play an important role by participating in the projects of the SwissEnergy programme (Energierstadt, Energieregion, 2000-watt sites etc.) or by promoting climate-friendly mobility.

Further information

www.bafu.admin.ch/1803-e

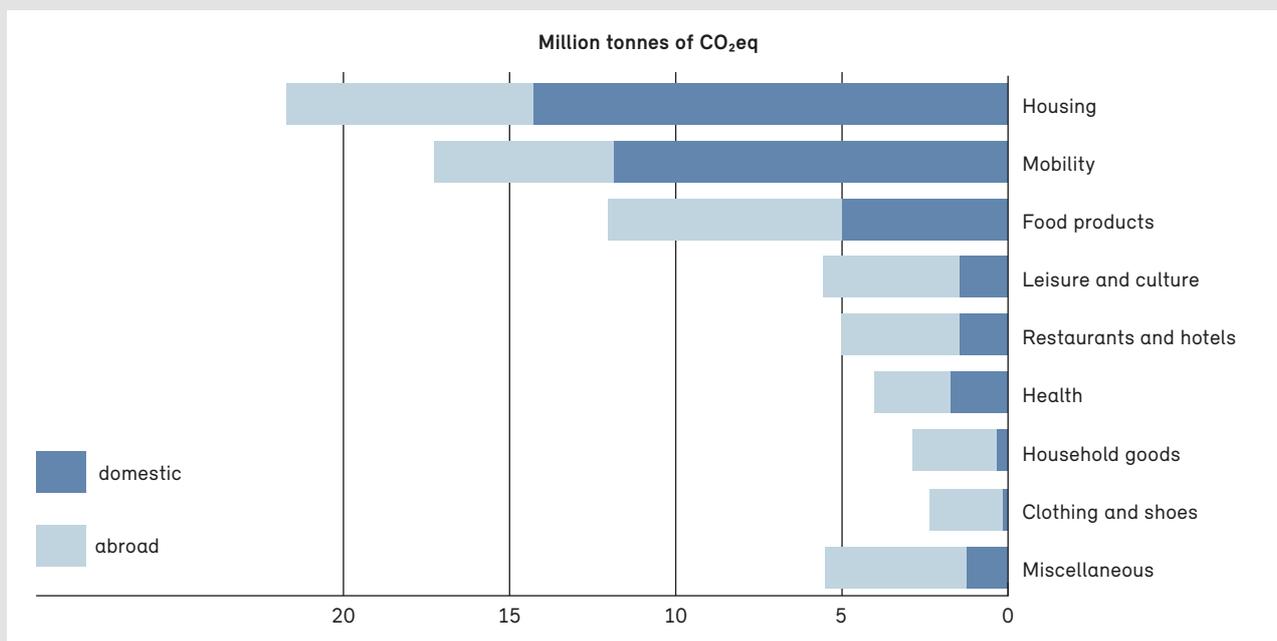
Greenhouse gas emissions in daily life:

What are the sources?

The vast majority of Switzerland's greenhouse gas emissions is attributable to the housing sector (heating, hot water, electricity consumption), mobility and nutrition (Fig. 5). For housing, around three quarters of emissions are generated domestically. Types of heat generation and living space per person have a significant influence. For mobility as well, around three quarters of greenhouse gas emissions are generated

domestically. The choice of means of transport (car, non-motorised transport, public transport, aircraft) and mobility behaviour (distances travelled) have a decisive effect on the level of emissions. More than half of the emissions from food production are emitted abroad. The main reason for this is extensive feed and food imports. The consumption of meat and dairy products has a particularly strong influence on emissions in this area.

Fig. 5: The main sources of greenhouse gas emissions



Source: Treeze/Rütter 2015

Course to climate neutrality

Switzerland has set an interim target of halving its greenhouse gas emissions by 2030. According to the Federal Council, an emissions reduction of 70 to 85 percent as compared with 1990 levels can be achieved by 2050. With this long-term goal, Switzerland has set course for climate neutrality.

For global warming to remain well below two degrees Celsius, all affluent countries will have to massively reduce their greenhouse gas emissions over the next two to three decades. In 2015, the Federal Council informed the UN Climate Change Convention of its intention to reduce Switzerland's emissions by 70 to 85 percent as compared with 1990 levels by 2050 (Fig. 6). This objective means that in Switzerland, in just over 30 years, about one tonne of CO₂ per year will be emitted per person, a situation that is also referred to as the "one-tonne-CO₂ society" (see Box on p. 17). This would be a big step towards the goal of climate neutrality.

The potential for such a development exists: fossil thermal and motor fuels can be replaced by renewable energy sources, energy-wasting old buildings can be renovated more quickly, energy and raw materials can be used much more efficiently and electrical vehicles can replace those with internal combustion engines. Well-known and proven technologies can be relied upon. Implementation, however, requires political

will, nationally and internationally, to give high priority to climate and energy policy measures, to coordinate and accelerate the implementation of existing technical solutions and to optimally exploit the potential of research and development. With the Paris Agreement, an important step in this direction has been taken at international level.

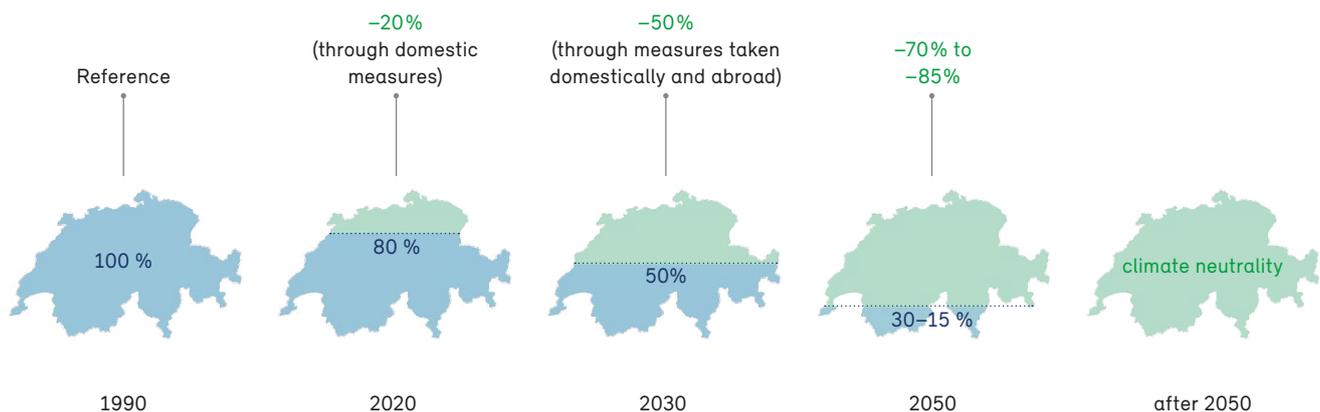
2030 intermediate target: halving emissions

Switzerland ratified the Paris Agreement in October 2017. At the same time, it set for itself the interim target of reducing its greenhouse gas emissions by 50 percent as compared with 1990 levels by 2030. The binding framework for the necessary measures is provided by the CO₂ Act, which is currently being revised and will replace the current regulation by early 2021. The Federal Council's draft to Parliament builds on the instruments of the previous legislation (see p. 10).

Revision of the CO₂ Act

The CO₂ levy on fossil thermal fuels introduced in 2008 is expected to remain a core element of Switzerland's climate policy beyond 2020. The revised CO₂ Act provides scope for adjusting the amount of the levy if emissions do not decrease as planned.

Fig. 6: Reduction path towards climate neutrality



The Confederation's funds for the buildings programme will be increased and the programme will run until 2025. The Federal Council can subsequently set CO₂ threshold values for heating systems in new buildings and for replacing heating systems in old buildings. The threshold values, however, should only be applied if the emissions of the building sector have not halved by 2026/27 as compared with 1990 levels.

The provisions for average CO₂ emissions from newly registered vehicles will be adjusted. From 2020, the stricter target of no more than 95 g CO₂/km for passenger cars and no more than 147 g CO₂/km for delivery vans or light semitrailers will apply. The average standard consumption of passenger cars thus drops to 3.6 litres diesel or to 4.1 litres petrol per 100 kilometres respectively. In line with the EU, the target values will be further reduced after 2024 in order to make better use of the existing potential for emission reductions in the transport sector.

As in the past, motor fuel importers will be obliged to compensate for part of the CO₂ emissions from transport in the future. The Federal Council can increase this

Climate protection thanks to compensation abroad?

The Paris Agreement envisages that countries can compensate for their own emissions by financing projects in other countries and allowing the greenhouse gas savings achieved to be credited to their national emission reduction target. For Switzerland, compensation projects are one way of reducing the extensive emissions abroad for which it shares responsibility (see Box p. 13).

High-quality compensation projects can provide impetus for climate-friendly, sustainable development and contribute to avoiding investments in obsolete, CO₂-intensive technologies. The goal of the Paris Agreement, however, can only be achieved if all emitters worldwide reduce their greenhouse gas emissions within their own sphere of influence to the unavoidable minimum. Compensation abroad therefore does not release business, private individuals and the public sector from resolute action at home.

share to up to 90 percent until 2030. It is envisaged that at least 15 percent of fuel-related CO₂ emissions will be compensated domestically.

Emissions trading between companies that emit large volumes of CO₂ is made more attractive by linking the Swiss and European emissions trading schemes. From 2020, air traffic and any new fossil-fuel thermal power plants will also be integrated into the emissions trading scheme.

The Federal Council's draft act envisages that halving emissions by 2030 will be achieved mainly through domestic measures. Part of the reduction target can be achieved by offsetting projects abroad – a possibility on which the transport sector in particular is dependent.

Contributions from other policy areas

The objective of the CO₂ Act also takes into account measures implemented in other policy areas. Of particular importance is the Confederation's 2050 Energy Strategy, the first stage of which was approved in the May 2017 referendum. It is intended to reduce energy consumption, increase energy efficiency and promote renewable energies. It thus also contributes to the reduction of greenhouse gas emissions. In addition, the 2050 Energy Strategy will adapt the transmission grid and electricity storage to the needs of an electricity supply that relies more heavily on the use of wind and solar energy.

Forest legislation promotes the sustainable use of wood, a CO₂-neutral resource, as a building material and as an energy source. Further contributions to emission reductions are expected from the agricultural sector, which already adopted its own climate strategy in 2011.

In addition to reduction measures, the Confederation is committed to the climate-friendly development of Switzerland as a business location, by strengthening climate competence in vocational education and training and climate consulting in the communes and cities with the "Climate Programme Education and Communication".

The challenge of climate neutrality

The halving of greenhouse gas emissions and subsequent realisation of the one-tonne-CO₂ society are necessary and – given the political will – feasible steps on the way to the mitigation of climate change. However, these measures alone are not enough to achieve the goal of climate neutrality, which is ultimately to be pursued jointly by all countries to ensure compliance with the two-degree upper limit.

Global society can be described as climate-neutral if, after the middle of the 21st century, remaining global greenhouse gas emissions are completely offset by measures that remove CO₂ from the atmosphere. Already today, various options are being researched to capture CO₂ from the atmosphere and store it permanently.

The introduction of CO₂ into exploited oil and gas deposits has already been tested. Appropriate tests have shown that, in principle, long-term underground storage is possible. Theoretically, there is also enough storage space on Earth. In practice, however, the question arises as to how large quantities of CO₂ can be captured from the air. The filtering of CO₂ directly from the air is technically possible, but in turn requires a large amount of energy. Alternatively, plants could be grown on a large scale and burned as an energy source in large-scale installations where the CO₂ can be easily separated from the exhaust gases and subsequently stored. This idea, however, has narrow limits because it would need a huge space for the cultivation of energy crops, which conflicts with food production and the protection of natural forest ecosystems.

While one can already imagine what life might look like in a one-tonne-CO₂ society (see box on the right), how climate neutrality could be achieved in the second half of the 21st century is still largely unclear. In view of this uncertainty, it is all the more important that greenhouse gas emissions be reduced as quickly and comprehensively as possible.

Further information:

www.bafu.admin.ch/1803-e

How is life in a one-tonne-CO₂ society?

Is life with a fraction of current CO₂ emissions a utopia? Not necessarily. Climate compatibility and a high quality of life can already be interconnected today:

- So-called “plus-energy buildings” supply their residents with heat and electricity and, in addition, also feed energy back to the grid.
- With e-bikes, trains and electric cars there are more and more opportunities to get around without petrol or diesel consumption.
- A healthy and tasty diet has a low impact on the climate with reduced consumption of meat and dairy products.
- The lifespan of many consumer goods could easily be extended many times over.

2000-watt sites, the energy consumption of which is geared towards the one-tonne-CO₂ society, show that a modern lifestyle and low greenhouse gas emissions can well go hand in hand. This has already been realised – or is close to being realised – in about twenty Swiss cities and communes.

Exceeding two degrees becomes dangerous

The impacts of climate change are becoming increasingly felt worldwide. In Switzerland, the risks and opportunities for the various parts of the country were examined and evaluated as part of a comprehensive analysis.

Global impacts

The main objective of the UN Climate Change Convention adopted in 1992 is to prevent dangerous interference with the climate system. Scientists agree that if the temperature rises by more than two degrees Celsius, all regions of the world must expect great risks and sharply rising damage and adaptation costs. Even before reaching the two-degree upper limit, sensitive ecosystems and habitats (e.g. polar regions and coral reefs) are endangered, and the damage caused by extreme weather events increases. Two degrees is also a critical threshold for global food production and water availability – one of the reasons why the Paris Agreement sets the goal of limiting global warming to well below two degrees by 2100.

The risks also predominate in Switzerland

Switzerland is already facing the consequences of climate change today. In particular, there are challenges in the increase in heat waves, droughts, floods and unstable slopes, in the alteration of natural habitats and in the spread of harmful organisms and pathogens.

From 2011, eight cantonal case studies were carried out to estimate in greater detail the risks and opportunities associated with climate change in the Jura, Mittelland, Alpine foothills, Alps, southern Switzerland and large agglomerations. In 2017, the results were merged into a synthesis report. It serves as a basis for the Federal Council to set priorities in the further development and implementation of its adaptation strategy.

Climate change increases the risk of landslides, such as that which occurred in 2017 in the Bergell, Grisons, causing severe damage to the village of Bondo.



Photo: Pascal Mora, Keystone

Figure 7 gives an overview of the priority climate-related risks and opportunities identified in recent years. In the agricultural and energy sectors, in tourism and for biodiversity, both risks and opportunities are emerging. The bottom line, however, is that the risks clearly predominate, especially if climate change continues unabated.

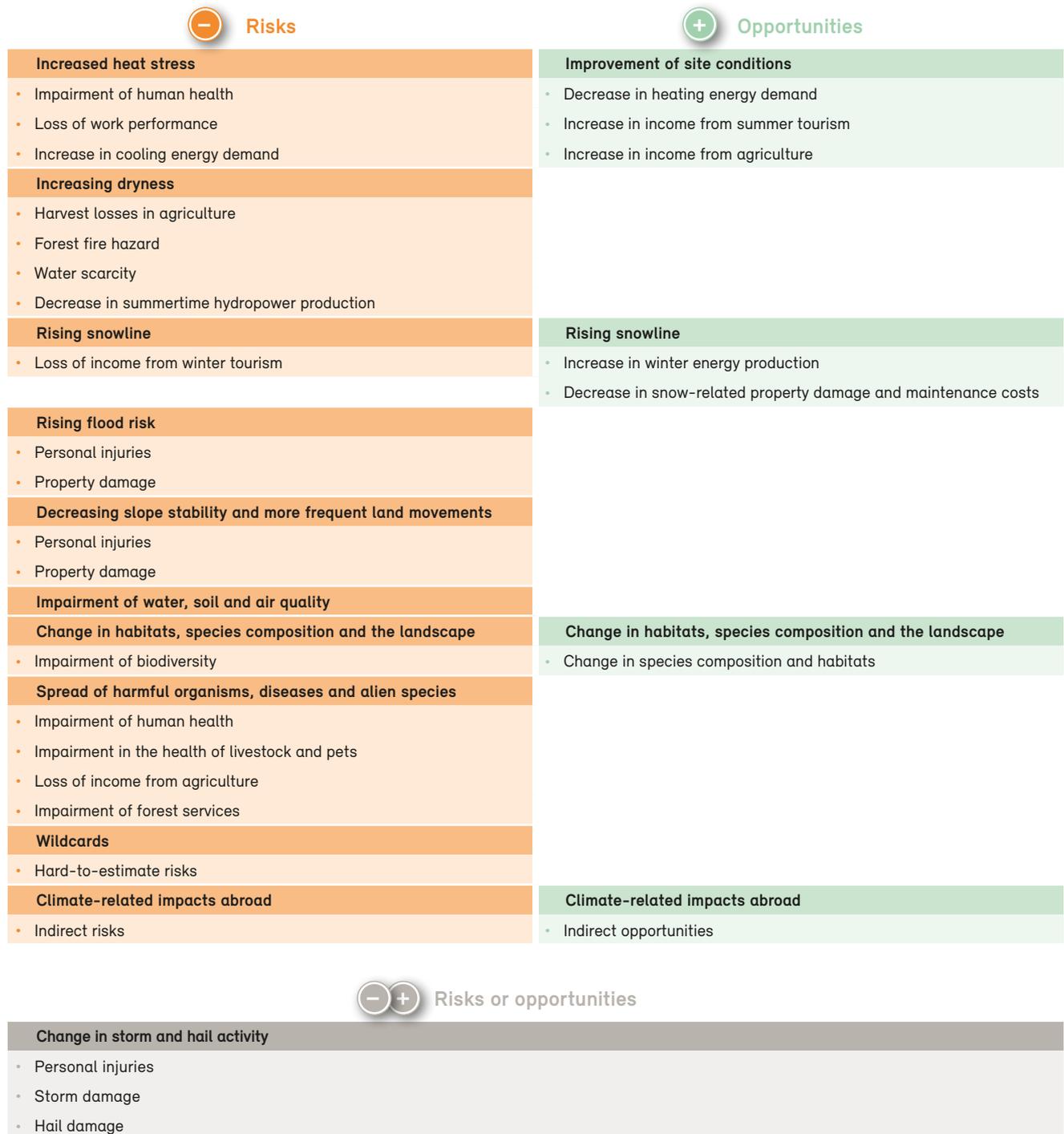
The impacts of climate change in other regions of the world must also receive increased attention in the future. Globalisation has improved flexibility in the procurement of raw materials and finished products. But Switzerland's strong dependence on imported goods and global supply chains also increases the risk of supply bottlenecks and interruptions when natural hazard events become more frequent worldwide.

Further information:

www.bafu.admin.ch/1803-e

Fig. 7: Priority climate-related risks and opportunities for Switzerland

Challenges posed by climate change, ordered by risks (orange) and opportunities (green). Some of the challenges present both risks and opportunities. At the current time, it is not known what the impacts of climate change will be on storm and hail activity (grey). Priority risks (orange bullet points), opportunities (green bullet points) and unknown cases (grey bullet points) are allocated to the respective challenges.



First steps in adaptation practice

Switzerland has gained first experiences in how it can adapt to the impacts of climate change. The adaptation strategies of the Federal Council and several cantons as well as numerous pilot projects that have been implemented in recent years were contributing factors.

Given the increasing impact of climate change, the Federal Council adopted its strategy for adaptation to climate change in 2012. An action plan was adopted in 2014, defining the first measures for the period from 2014 to 2019. These measures focus on water management, natural hazard management, agriculture and forestry, energy, tourism, biodiversity management, human and animal health as well as spatial development. In addition to coping with known and foreseeable risks, the goal is to exploit the opportunities of climate change and increase Switzerland's adaptability – even to unexpected and surprising developments.

Not only the Confederation, but also cantons, regions, communes and companies are required. They must take into account future climatic conditions in longer-term planning and investment. The Confederation has therefore intensified its collaboration with the cantons in procuring fundamentals, such as regional climate scenarios. In addition, it supports pilot projects that exemplify what adaptation means in practice. Three of these pilot projects are briefly presented below.

High quality of life instead of heat island

Sion (Valais) is one of the places in Switzerland with the highest number of very hot days per year – and the trend is rising. The city therefore decided to pay more attention to shading, landscaping and de-paving the ground when it redesigns streets, squares and recreational areas. The quality of life is thus maintained even with rising tempera-

Opportunities of climate change for Switzerland: the conditions for viticulture are improving



Photo: Karen Desjardin, Moment Open/Getty Images

tures. Even private builders have received support in projects involving rooftop gardens and environment design. The overall experience gained is incorporated in regional planning instruments (neighbourhood plans, zoning plans), the guidelines for the design and management of public space and in the city's building code.

Climate-adapted regional development

Large sludge and scree avalanches have repeatedly interrupted the main traffic route in Haslital (Grimselpass) over the past decade and have threatened parts of settlements. At the initiative of the regional conference Oberland-Ost, representatives of the population, authorities, agriculture, the energy industry and tourism worked together to develop a regional development strategy that takes climate change into account. Finally, all stakeholders signed a memorandum of understanding. A steering group was created to implement the measures agreed to (e.g. active marketing of the natural landscape with its dynamic processes, more targeted risk communication to tourists, and consideration of climate change in traffic development projects).

Protection for farmers in time of drought

The use of grassland for the production of animal feed plays an important role in Swiss agriculture. Exceptional drought can cause high costs for the farms affected. To protect farmers against losses, a new, cost-effective insurance has been developed. The basis for this is a drought index which determines when a policyholder can claim a payout. If the yield from feed production is at least 25 percent lower than normal due to insufficient rainfall, the resulting loss is partially offset. Yield losses can be attenuated in this manner.

Further information:

www.bafu.admin.ch/1803-e

Why should the consequences of climate change concern me?

- Do you live along a watercourse where flooding has already occurred?
- As a member of the public administration, do you have anything to do with planning?
- Are you active in health care or childcare?
- Do you regularly go to the mountains?
- Are you fulfilling the dream of owning a home in the near future?
- Do you enjoy winter sports in the snow?
- Are you open to new ideas and see opportunities where others only perceive risks?

If you answer yes to one of these questions, you belong to the large group of people who should keep an eye on the evolution of climate. Rising temperatures and more frequent heat waves, longer periods of drought, increased heavy precipitation, even hurricanes abroad are factors that can affect employment, leisure, safety and well-being where you live and in your own home.

Investing in a stable climate

The objective of the Paris Agreement can only be achieved if large portions of the known oil, gas and coal reserves remain in the ground. That is why it is crucial that investments no longer flow into fossil fuels and instead be invested in renewable energies and raw materials.

The World Bank estimates that developing a climate-resilient society will require several trillion US dollars of investment in low-CO₂ and energy-efficient technologies as well as adaptive infrastructures. The State, society, economy and financial market players have a significant influence on future greenhouse gas emissions if they rely on renewable energies or climate-friendly mobility. The Paris Agreement therefore also sets the goal of

Investing savings in a climate-friendly way – is that possible?

Many who care about climate protection do not know if the money they invest with their bank, pension fund or life insurance “works” for or against a stable climate. Analyses show that the investments made by Swiss pension funds alone provide the same amount of greenhouse gas emissions as is generated by domestic heating, mobility and industry.

Some pension funds have already withdrawn from coal investments, and environmentally conscious investors are investing directly in alternative, climate-friendly technologies such as solar or electric mobility. Even those who do not manage their savings on their own can be proactive. Ask your bank at the next consultation:

- Do you pay attention to the climate impact of your financial products?
- Which investment products can you recommend to me if I want to invest in a climate-friendly economy?
- Do I have any guarantee that the money in my savings account will not flow into the production of coal, oil or other CO₂-intensive sectors?

aligning financial flows so that they are consistent with low-greenhouse gas and climate-resilient development.

Risks of CO₂-intensive facilities

Climate policies that increase or restrict the use of fossil thermal and motor fuels can devalue securities holdings in which the coal and oil industries as well as other emission-intensive industries such as mining and petrochemicals have a high priority. CO₂-intensive forms of electricity generation (coal and gas power plants) and mobility (production of fossil-fuelled cars and airplanes) are also potentially affected. On the other hand, climate change can also have a direct impact on the financial markets: more frequent floods and hurricanes endanger production sites and supply chains, which can lead to losses for investors.

Transparency for climate-friendly investments

Investing in emission-intensive sectors is often the result of lack of information. With the aim of creating more transparency, the Federal Council invited Swiss pension funds and insurers to have their portfolios tested for climate compatibility. Portfolios which together comprise two-thirds of the assets of all Swiss pension funds and insurance companies could then be analysed.

The results show that the investments made on average support a warming of the global climate by four to six degrees Celsius. This finding largely coincides with average investment behaviour in global markets. There are big differences among the participants, however. Numerous studies show that there is room for manoeuvre in the case of cash investments: normal market returns can absolutely be achieved with climate-friendly investment strategies.

Exposed financial centre

Switzerland is a globally important site for asset management. As of the end of 2016, assets of over 6,500 billion Swiss francs in the form of savings, insurance capital or employee benefit plans were managed in this country. That is why Switzerland has a special responsibility to contribute to a climate-friendly development via the financial market as well.

The Federal Council expects financial market players in Switzerland to focus more on the objectives of the Paris Agreement on a voluntary basis. Other countries, such as France and Sweden, have already adopted commitments

or recommendations for the disclosure of climate-related financial risks in order to promote adjustment of investment behaviour.

Further information:

www.bafu.admin.ch/1803-e

Climate-friendly technologies as a market of the future: final inspection of inverters for solar power systems



Photo: Uwe Zucchi, dpa/Keystone

Support for those most affected

Public and private investment is intended to enable economically weak and particularly affected countries to reduce their greenhouse gas emissions and adapt to the unavoidable consequences of climate change. As one of the wealthiest countries, Switzerland is called upon to assume its shared responsibility.

increasing heat, drought, sea level rise, storms and other natural hazards on settlements, infrastructure, agriculture and health. Financial support is also an indispensable prerequisite for training, assistance in establishing appropriate structures in administration and business or in projects for testing climate-adapted technologies.

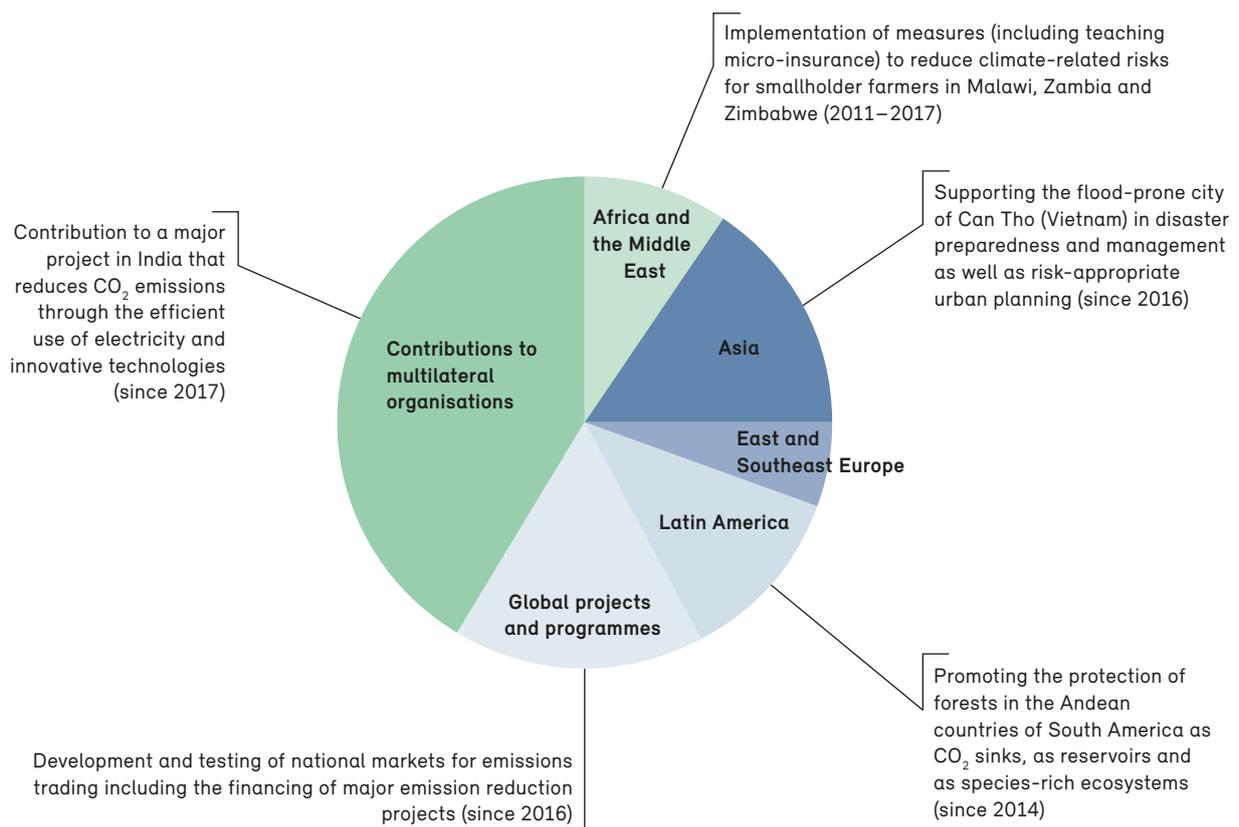
Financial resources that increasingly flow into low-emission technologies and contribute to the mitigation of the impacts of climate change are one of the three main pillars of the Paris Agreement. Poorer countries are most likely unable to implement the necessary measures to reduce their greenhouse gas emissions and the negative impacts of climate change. Large-scale investments are needed to achieve a breakthrough into low-CO₂ technologies even in these countries and to cope with the impacts of

Switzerland: part of the global burden sharing

Already in 2010, the signatories to the Climate Change Convention decided to significantly increase the financial resources needed for projects in developing countries. The wealthy countries pledged to provide at least US\$100 billion a year from 2020 onwards for this purpose. In 2014, transfers to developing countries amounted to approximately US\$62 billion.

Fig. 8: The regional distribution of Switzerland's contribution to climate projects in developing countries (2016; total US\$330 million).

The short descriptions provide examples of current projects with Swiss participation.



At the international level, there are no guidelines on how each country should determine its contribution. Switzerland makes its calculation of its fair share on the basis of its economic performance and the territorial principle. Switzerland's share of global gross domestic product is just under one percent, and the share of greenhouse gases emitted within its own borders is around 0.3 percent of total emissions of industrialised countries. Depending on the weighting of these two criteria, this results in a contribution of about US\$450 to 600 million per year, which corresponds to about one percent of federal revenues.

In 2016, Switzerland provided US\$330 million in public funds for financial assistance. A large portion of this amount came from development cooperation funds and contributions to multilateral institutions (e.g. World Bank, specialised funds) that support climate protection measures in developing countries (Fig. 8).

Further information:

www.bafu.admin.ch/1803-e

Managing climate risks in agriculture: workshop on micro-insurance for smallholder farmers (Malawi)



Photo: Mathieu Dubreuil/WFP

Glossary

[1] Climate Change Convention

In 1992, the Climate Change Convention was adopted at the United Nations Conference on Environment and Development in Rio. Since then, it has formed the framework of internationally coordinated climate policy. In 1997, the Kyoto Protocol specified the obligations of industrialised countries. For the first time, the Paris Agreement of 2015 has made it obligatory for all countries to participate in emission reductions.

[2] Greenhouse gases

Greenhouse gases are trace gases in the atmosphere that affect the Earth's heat balance. Since industrialisation, greenhouse gas emissions caused by human activities are primarily responsible for the observed warming of global climate. They are mainly emitted where fossil fuel sources (thermal and motor fuels from coal, oil and natural gas) are combusted. Other important causes include tropical deforestation, agriculture, cement manufacturing as well as industrially manufactured, climate-affecting gases (e.g. cooling agents). The most important long-lived greenhouse gas is carbon dioxide (CO₂), followed by methane (CH₄) and nitrous oxide (N₂O).

[3] Greenhouse gas footprint

A national greenhouse gas inventory covers only emissions occurring within the country's borders. The greenhouse gas footprint is used to determine all emissions for which a country is responsible by its end-user demand. It includes emissions that are generated abroad in the manufacture and transport of imported goods, as well as emissions caused by nationals abroad (e.g. through business and leisure travel). At the same time, domestic emissions from foreign nationals (e.g. tourists) as well domestic emissions associated with exported goods are deducted.

[4] CO₂ equivalents

Various greenhouse gases contribute differently to global warming. The sum of the effect of all gases is expressed in CO₂ equivalents (abbreviated: CO₂eq). CO₂ thus is used as a basis for comparison. The other greenhouse gases are converted into CO₂eq according to their contribution to global warming. Example: one tonne of CH₄ (methane) corresponds to 25 tonnes of CO₂eq.

