

Sustainable finance

Investment and financing needed
for Switzerland to reach net zero by 2050



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Swiss Bankers Association (SBA)
and Boston Consulting Group



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“Banks can make an effective contribution towards achieving the net zero target.”

Foreword

The Federal Council sees sustainable finance as a great opportunity for the Swiss financial centre and as a relevant competitive factor in sustainable growth¹. The Swiss financial centre should be a leading global location for sustainable financial services. The Federal Council therefore intends to shape the framework conditions in such a way that the Swiss financial sector can make “an effective contribution to sustainability” in line with the UN’s 2030 Agenda. This was the path set by the Federal Council back in June 2020. The Swiss Bankers Association (SBA) fully supports the government’s objectives and is confident that the Swiss financial centre can make a significant contribution to the climate transition of the national economy as a whole.

Most of the SBA’s work in 2020 was concentrated on investment business.² This year we plan to focus more on banks’ financing activity and the contributions they make towards sustainability. Among the most pressing issues here are how the Swiss economy can achieve the net zero target set by the Federal Council³, the scale of the investments required, and how they will be financed. This is where the banks can make an effective contribution, and our study explores how they can do so.

1 https://www.sif.admin.ch/dam/sif/en/dokumente/dossier/int_finanz-waehrungsfragen/int_waehrungszusammenarbeit/bericht_sustainable_finance.pdf.download.pdf/24062020-Nachhaltigkeit%20Bericht%20Executive%20Summary-EN.pdf.

2 https://www.swissbanking.ch/_Resources/Persistent/5/9/3/b/593b75d1d479ddc70ff20a76991deffd9ca4bab/SBA_Guidelines_for_the_integration_of_ESG_considerations_into_the_advisory_process_for_private_clients_EN.pdf.
https://www.swissbanking.ch/_Resources/Persistent/3/3/e/7/33e7c9a474c72717e1cd19bc547b6f048a020b56/SBA_Sustainable_Finance_2020_EN.pdf.

3 <https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-76206.html>.

The Swiss economy will have to undergo a radical transformation if it is to reduce its GHG emissions. This transition has different consequences for the various economic sectors. Taken as a whole, however, it also presents a fantastic opportunity for the Swiss economy, by opening up new markets in which our country can become a leading player. At the same time, achieving these goals will require considerable extra investments to roll out green technologies and find substitutes for high-emission activities.

Taking the global study by BCG and GFMA⁴ as a starting point, we have explored potential measures for reducing greenhouse gas emissions in 10 Swiss sectors that together account for an estimated 87 percent of national emissions. We have also quantified the corresponding investment volume required and analysed the potential sources of funding for these investments. The types of financing studied range from mortgage lending to vehicle leasing, SME loans and the capital market as a whole. Here we consider the various initiatives already taken by Switzerland's banks to apply sustainable criteria to their financing activities.

Suitable incentives and framework conditions are also needed for climate transition – and its financing – in order to move forwards as swiftly and smoothly as possible and thus benefit our domestic economy. Appropriate incentives will encourage market forces that offer very effective support in reducing GHG emissions. Following the rejection of the CO₂ Act in June 2021, policymakers have to redefine the necessary approaches and framework conditions.

Thanks to a combination of experience, financial expertise, familiarity with technological solutions and a dynamic implementation drive, the Swiss financial centre already commands a strong position in the field of sustainable finance. Swiss banks are acutely aware of their responsibility here, and sustainable finance is accordingly a top priority for the Swiss Bankers Association. We focus particularly on the role of investment, financing and capital markets, as each one can make different, but significant, contributions towards climate change and sustainability. As the umbrella association for Swiss banks, we actively campaign for the removal of existing regulatory hurdles for sustainable financial instruments in Switzerland and for overall improvements to the framework conditions for sustainable financial flows.



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⁴ <https://www.gfma.org/policies-resources/gfma-and-bcg-report-on-climate-finance-markets-and-the-real-economy/>.

“The Swiss economy will have to undergo a radical transformation if it is to reduce its greenhouse gas emissions.”



Imprint

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About the SBA

As the umbrella association of Swiss banks, the Swiss Bankers Association (SBA) represents the Swiss financial centre's interests vis-à-vis politicians, the authorities and the general public.

We are committed to entrepreneurial freedom and open markets and work towards an environment in which an innovative and diverse banking sector can grow. We are a forward-thinking knowledge hub, setting the agenda and steering the industry towards a successful future.

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“Thanks to a combination of experience, financial expertise, familiarity with technological solutions and a dynamic implementation drive, the Swiss financial centre already commands a strong position in the field of sustainable finance.”

Executive Summary

The growing global importance of sustainability and climate protection affects Switzerland as much as any other nation: with total greenhouse gas (GHG) emissions of 46.2 megatonnes (million metric tonnes, Mt) CO₂ equivalents (CO₂e), our country is responsible for 0.1 percent of global emissions and 1 percent of all European emissions. The ten sectors with the highest emissions in Switzerland produce 40.4 Mt CO₂e, equating to around 87 percent of the Swiss economy's total emissions. Swiss industry must therefore make a considerable effort to reach its net zero target.

Annual investments of around CHF 12.9 bn up to 2050

Switzerland's transition to a low-carbon economy will require total investments of CHF 387.2 bn over the next 30 years, the bulk of which (an estimated 77 percent) will be concentrated in the 2020s and 2030s. These investments will fund the roll-out of measures needed to reduce GHG emissions to achieve the 2050 net zero target for Switzerland's ten sectors with the highest emissions. To put this in context, the required level of domestic investment amounts to approximately 0.2 percent of the global investment

“The traditional offering of Swiss banks can cover 83 percent of the investment requirement.”

volume of around USD 178 trillion. Switzerland's investment volume is therefore almost twice as high compared with its share of CO₂ emissions (0.1 percent). Around 58 percent of the CHF 12.9 bn annual investment volume is earmarked for replacing existing solutions, while around 42 percent is destined for new investments. A large part of the investments required are concentrated

on the sectors Light Road Traffic, Buildings and Heavy Road Traffic. A comparison with the average annual increase in mortgage volume of CHF 30.1 bn shows that, although the additional investment required for the banking system's transition is quite substantial, it does not threaten stability and is not beyond reach. The annual investment needed to achieve climate targets works out at around two percent of Switzerland's gross domestic product (2019: CHF 727 bn).

Swiss financial centre and government can meet almost all of the funding required

The traditional offering of Swiss banks can cover the lion's share (83 percent) of the investment requirement. On top of CHF 10.7 bn in bank loans, another CHF 1.0 bn (8 percent) could be financed by the Swiss capital market. The bank loans needed for climate transition would therefore make up 10.8 percent of the CHF 99 bn in mortgages and business loans issued every year by Swiss banks. On the one hand, this creates new business opportunities for the banks. On the other hand, the financial industry will have to address the logistical challenges presented by the considerable volume and diversity of these loans, while at the same time working within existing regulatory constraints. By contrast, the capital market financing of around CHF 1.0 bn needed for climate transition would only account for a small proportion (1.6 percent) of total annual bond issues on the Swiss exchange (2019: CHF 62 bn). Around 7 percent (CHF 0.9 bn) of investments relate to public goods such as the expansion of public transport, which is traditionally supported by state subsidies. The remaining CHF 0.3 bn (2 percent) present certain challenges because the technologies required, such as carbon sequestration and storage, are relatively immature and need special attention. Approaches such as blended finance or public-private partnerships can provide solutions for these investments.

Switzerland's financial centre has an important role to play in achieving the government's net zero target for the Swiss economy. As demonstrated by the lending programme to SMEs during the coronavirus crisis, Swiss banks' physical proximity and long-standing client relationships provide an ideal platform for delivering efficient finance solutions. The support of the whole sector – from regional banks through to cantonal and the large Swiss banks – together with their entire offering of products and services (including mortgages, SME loans, vehicle leasing and capital market transactions) are necessary to ensure optimal coverage of individual funding requirements.

Net zero target achievable through funding from the banks' own initiatives and favourable framework conditions

To perform its role effectively and to the necessary extent, the Swiss financial centre requires a combination of own initiatives by financial institutions and suitable framework conditions. Many institutions have already signed up to global initiatives such as the Principles for Responsible Banking (PRB). Many also report climate compatibility indicators, such as TCFD or testing of climate alignment goals by the Federal Office for the Environment (FOEN). Some have created dedicated offerings for financing climate-oriented investments. As far as framework conditions are concerned, additional restrictions on funding activity have been successfully avoided to date. Only a strong financial centre will be in a position to play a key role in supporting Switzerland's transition to a low-carbon economy. In addition, the regulator can create regulatory incentives for climate-oriented financing, as part of a "green supporting" approach.

Switzerland's commitment to climate transition can have a signalling effect

The goal of the Swiss government and financial centre is to make Switzerland a leading global hub for sustainable finance. Financing and achieving net zero carbon emissions by 2050 is a key component of this and will strengthen the competitiveness both of Switzerland's economy and its financial centre. By working together with the Swiss economy in this manner, banks also make an effective contribution to sustainability and to climate protection as an important public good. As an affluent and technologically advanced society, Switzerland's climate transition can provide a clear signalling effect for other countries. This study makes a fact-based contribution to this transition and suggests ways of financing it.





**“Implementing the various
CO₂ reduction measures
will require significant efforts
across all sectors.”**

1 Background and methodology

If Switzerland is to achieve its goal of becoming carbon neutral (net zero) by 2050, its economy must switch to activities with lower emissions. This will require the implementation of numerous technical and behavioural measures capable of reducing GHG emissions. The pricing of external effects (in the form of a carbon tax, for example) is very important, as climate protection then becomes not just a global and long-term public good, but also a private good. This provides a financial incentive for companies and private households to reduce their emissions. In industry especially, these reductions are associated with investments in new plant and equipment that need to be financed through own funding or external capital. Other investments focus on the development of new, greener technologies, which often tend to be long term and high risk.

1.1 Aim of the study

Implementing the various CO₂ reduction measures will require significant efforts across all sectors. On the one hand, this entails an adjustment in the use of energy and resources, which in turn changes the structure of companies' running costs. On the other hand, it involves the use of new technologies and modified processes, supported by the necessary level of investment. The Swiss financial centre plays a key role as the main source of financing for such investments. The focus of this study is therefore on

- outlining the transition pathways and the necessary measures at sector level in order to determine the investment volume needed to fund Switzerland's GHG reduction targets up to 2050 (see Chapter 2)
- discussing the possible sources of funding and their suitability for the sector-level measures identified previously (see Chapter 3)
- defining the framework conditions required for suitable funding through the Swiss financial centre (see Chapter 4)

1.2 Climate mitigation vs. climate adaptation

This study distinguishes between climate mitigation and climate adaptation. Climate mitigation refers to the active reduction of GHG emissions through suitable technical and behavioural measures, and is often referred to as “climate protection”. Climate mitigation is very distinct from adaptation, which the IPCC defined as follows in 2001: “In human or natural systems, the process of adjustment to actual or expected climate change and its effects, in order to moderate harm or exploit beneficial opportunities” (IPCC 2001). In other words, it is a response to changing climatic conditions, such as the expansion of flood defences.

When determining the measures and the relevant investment volumes needed to achieve net zero in Switzerland, this study did not include the potential costs of climate adaptation. However, it is important to note that there is a strong connection between climate mitigation and adaptation: if no action is taken in the area of climate mitigation, worsening climate conditions and extreme weather events will result in higher climate adaptation costs. Conversely, low or ineffective climate adaptation leads to higher climate-related losses, which in turn pushes up insurance costs. Higher insurance premiums would also have a direct impact on the creditworthiness of mitigation-related investments. Because of this interdependence, climate mitigation is becoming an increasingly important means of containing consequential losses.

Mitigation and adaptation also differ with regard to physical scale, however: although climate change is an international concern, the benefits of adaptation are predominantly local, while the advantages of mitigation are global. The difference also extends to the time dimension and the business sectors affected. When discussing the framework conditions for financing the transition, we therefore need to view adaptation and mitigation from a societal (and consequently political) perspective as well. In the eyes of policymakers, climate adaptation is mainly a local, private good, often with clear and immediate benefit.⁵ Climate mitigation, on the other hand, is a global, public good with far-reaching benefit. This is exactly why the very diverse forms of funding cannot be consistently placed in a local, private context. Established forms of funding are not always capable of meeting the challenges of mitigation financing. It is therefore important to check whether additional solutions and framework conditions exist to plug financing gaps.

⁵ In contrast to private goods, public goods are characterised by their non-excludability and non-rivalry in consumption.

1.3 Methodology

In December 2020, the Global Financial Market Association (GFMA) and Boston Consulting Group (BCG) published a joint study: “Climate Finance Markets and the Real Economy”. Based on the ten sectors⁶ with the highest GHG emissions globally, the discussion focused on the measures required for climate transition, leading to an estimate of the investment volume needed over the period 2020–2050 (excluding private investments). Global investments were estimated to be in the region of USD 100–150 trillion⁷, with Europe accounting for USD 21 trillion. Our study takes a similar approach when estimating the investment volume needed for the Swiss economy (supplemented by private funding), based on the GHG emissions of the same ten sectors. In this context, however, no explicit consideration was given to the potential consequences of climate mitigation for running costs. To ensure adequate validation of the study’s findings, there was full consultation with representatives from individual industry associations to make allowances for the specific characteristics of Switzerland’s economy.

For the purposes of this study, the focus was on the Swiss economy’s total greenhouse gas emissions, based on the current FOEN definition. As a result, the following emissions, which are only partially linked to Swiss climate targets or the Swiss financial centre, are not considered further:

- Emissions of companies domiciled abroad but financed by Swiss banks,
- Emissions generated by Swiss companies operating abroad,
- CO₂ emissions of imported goods (In 2018 these so-called “grey” emissions came to around 74 Mt⁸, equivalent to 1.6 times the domestic emissions of the Swiss economy. No further consideration is given to these emissions, as they are already included in the relevant country of origin’s CO₂ statistics, and Swiss banks presumably play only a minimal role in financing these companies),
- GHG balance of substitution investments, in other words, the climate impacts of disposing of decommissioned plant and equipment, the climate impacts of the production of substitution investments, and the effects of potentially reduced substitution cycles.



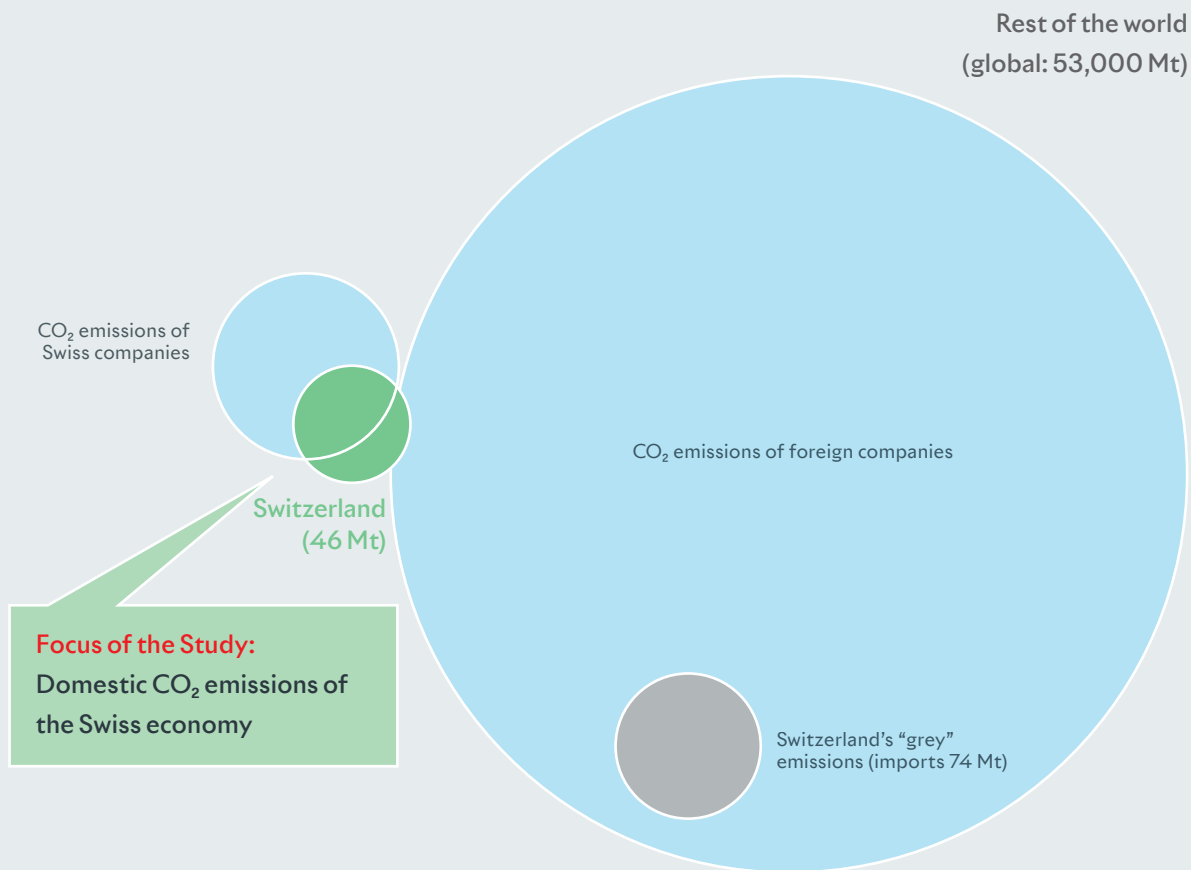
6 Here a sector refers to an area of business where undertakings, companies or private individuals share the same or a related product or service.

7 Source: GFMA/BCG study “Climate Finance Markets and the Real Economy” (December 2020).

8 Source: Federal Statistical Office – Environmental Accounts 2020 (GHG emissions based on Swiss end demand).

Figure 1

In focus: Swiss economy's greenhouse gas emissions



Potential CO₂ emissions of Swiss and foreign companies financed by Swiss banks or the Swiss capital market

Note: all scaling is indicative only
Source: own representation, Federal Office for the Environment, UNFCCC GHG Data interface

The representation of the respective climate pathways was based on the planned Swiss climate targets per sector. Where such a sector-specific climate target was unavailable, a linear annual reduction was assumed to achieve a 50 percent saving by 2030 compared with 1990 levels, and net zero carbon by 2050. In addition, GHG emissions for 2019 were taken as a basis for subsequent calculations in order to avoid potential distortions caused by the effects of the coronavirus pandemic.

2 Measures and investment volumes needed up to 2050

2.1 Emissions reduction per sector

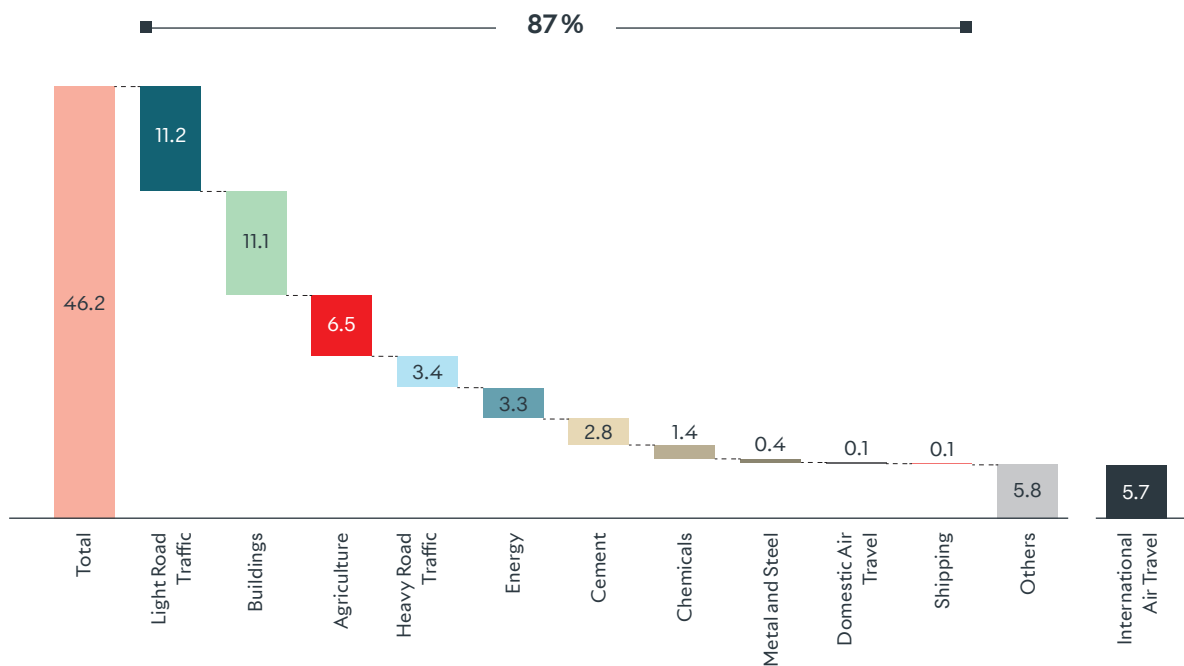
In 2019 global greenhouse gas emissions amounted to 53,000 Mt⁹ (measured in CO₂ equivalents, CO₂e), with Europe contributing 5,000 Mt. Switzerland's total output of 46.2 Mt¹⁰ makes up 0.1 percent of global emissions, or 1 percent of European emissions. The ten sectors with the highest emissions in Switzerland produced 40.4 Mt, equivalent to around 87 percent of the Swiss economy's total emissions (at the global level, the GFMA/BCG study estimated the contribution of these 10 sectors at 75 percent of total emissions worldwide). The following section therefore provides more in-depth analysis.

Figure 2

CO₂ emissions per sector

Swiss GHG emissions by sector, 2019

[Mt CO₂e]



Source: Federal Office for the Environment

⁹ Source: UNFCCC GHG Data Interface.

¹⁰ Source: Federal Office for the Environment (FOEN).

The biggest emitters in Switzerland are the sectors “Light Road Traffic” (11.2 Mt CO₂e) and “Buildings” (11.1 Mt CO₂e), with a combined share of almost 48 percent. The fraction produced by both sectors is disproportionately high by European standards. By comparison, these two sectors only account for just under 26 percent of total CO₂ emissions in Europe.

The high figure for “Light Road Traffic” can be explained by the stronger purchasing power in Switzerland and the popularity of high-performance private cars – every other new vehicle in Switzerland is an SUV¹¹ producing higher emissions than more compact models. This will require measures coupled with substantial investment in order to meet the planned climate target of a 25 percent reduction in emissions by 2030 compared with 1990 levels, equivalent to a cut from 11.2 Mt CO₂e at present to around 8.6 Mt CO₂e in 2030.

The current proportion of oil-fired heating in the Swiss building sector is the highest in Europe¹². Over two thirds¹³ of buildings in Switzerland are heated with fossil fuels and more than a million¹⁴ homes require energy efficiency improvements. The current rate of refurbishment is only around one percent¹⁵, but that rate has to be at least doubled to achieve national climate targets. The emissions reduction goal set for the building sector requires a saving of 65 percent by 2030 compared with 1990 levels. As a result, the current level of 11.1 Mt CO₂ emissions needs to be cut to around 5.8 Mt by 2030. A national building programme was launched back in 2010, and a programme of federal subsidies added in 2017. Additional steps are still needed, however, and these will be explored in more detail in the next chapter as we identify the measures required at sector level.

The agricultural sector is the third highest emitter in Switzerland, with annual greenhouse gas emissions of around 6.5 Mt CO₂e. Farming accounts for 14 percent of Switzerland’s GHG emissions (including nitrous oxide and methane), a figure roughly in line with the rest of Europe (12 percent). The sector’s worst emitter is livestock farming – especially cattle. Furthermore, the bulk of ammonia gas emitted in Switzerland originates from slurry (liquid manure), so some of the emissions produced through farming are very difficult to avoid. To allow for the specific attributes of the agricultural sector, and to ensure a secure food supply, the climate target set for the sector is therefore a reduction of only 20 percent by 2030, or a cut of one third by 2050 compared with 1990 levels. At the same time, it is important that climate protection measures do not result in production constraints or a competitive disadvantage for Swiss farming.

11 Source: Auto-Suisse “New passenger car registrations 2020”.

12 Source: Eurofuel “Energy sources for heating buildings”.

13 Source: Swiss Federal Office of Energy (FFOE).

14 Source: Federal Office for the Environment (FOEN) – “The federal and cantonal buildings programme”.

15 Source: Swiss National Science Foundation (SNSF).

In the case of “Domestic air travel”¹⁶, the GHG emissions reported nationally by the Federal Office for the Environment (FOEN) are minimal. By contrast, emissions from international air travel (not counted in the national figure¹⁷) are far more relevant, at 5.7 Mt CO₂e. Compared with neighbouring countries, the Swiss take to the air twice as often, with over 80 percent¹⁸ of Swiss passengers flying to European destinations. For the “International air travel” sector, a linear reduction in the current level of greenhouse gas emissions (5.7 Mt), with an interim target of 3.8 Mt (2030), is set as the climate goal for 2050.

The energy sector is the biggest emitter at European level, with a 26 percent share of CO₂ emissions. It also accounts for a similar percentage of CO₂ emissions on a global level. In Switzerland the figure is just 7 percent. This is due to the fact that, ever since electrification began, Switzerland has sourced energy from renewables such as hydroelectric power, benefiting from the country’s topography and plentiful rainfall. In 2019, almost 57 percent of Swiss electricity consumption came from hydroelectric plants. In addition, the country’s four nuclear power plants play a key role in providing a comparatively eco-friendly power supply, accounting for around a third¹⁹ of the electricity produced in Switzerland.²⁰ The target set for the energy sector envisages a 50 percent cut in CO₂ emissions by 2030 compared with 1990 levels, or a reduction from 3.3 Mt (2019) to 1.3 Mt in 2030.

The remaining CO₂ emissions are spread across the sectors “Heavy Road Traffic”, “Cement”, “Chemicals”, “Metal and Steel” and “Shipping”, all of which are expected to work towards a net zero target by 2050, with only minor deviations from the 2030 targets.



“The biggest GHG emitters in Switzerland are the sectors Light Road Traffic and Buildings, with a combined share of almost 48 percent.”

16 Including the impact of military and helicopter flights.

17 According to the guidelines of the United Nations Framework Convention on Climate Change (UNFCCC), the national total does not take into account greenhouse gas emissions from international air travel; under the UNFCCC, each country records both domestic and international flights according to the amount of aviation fuel consumed in the country – this corresponds to the amount of fuel required for all flights departing from their own country to the destination.

18 Source: Federal Statistical Office (FSO).

19 Source: Nuclear power station Kernkraftwerk Gösgen-Däniken AG (KKG).

20 The Energy Strategy 2050 adopted by the Federal Council prescribes a withdrawal from nuclear power, amongst other things. The resulting energy production gap is to be filled by renewables.

2.2 Measures and investment volumes per sector

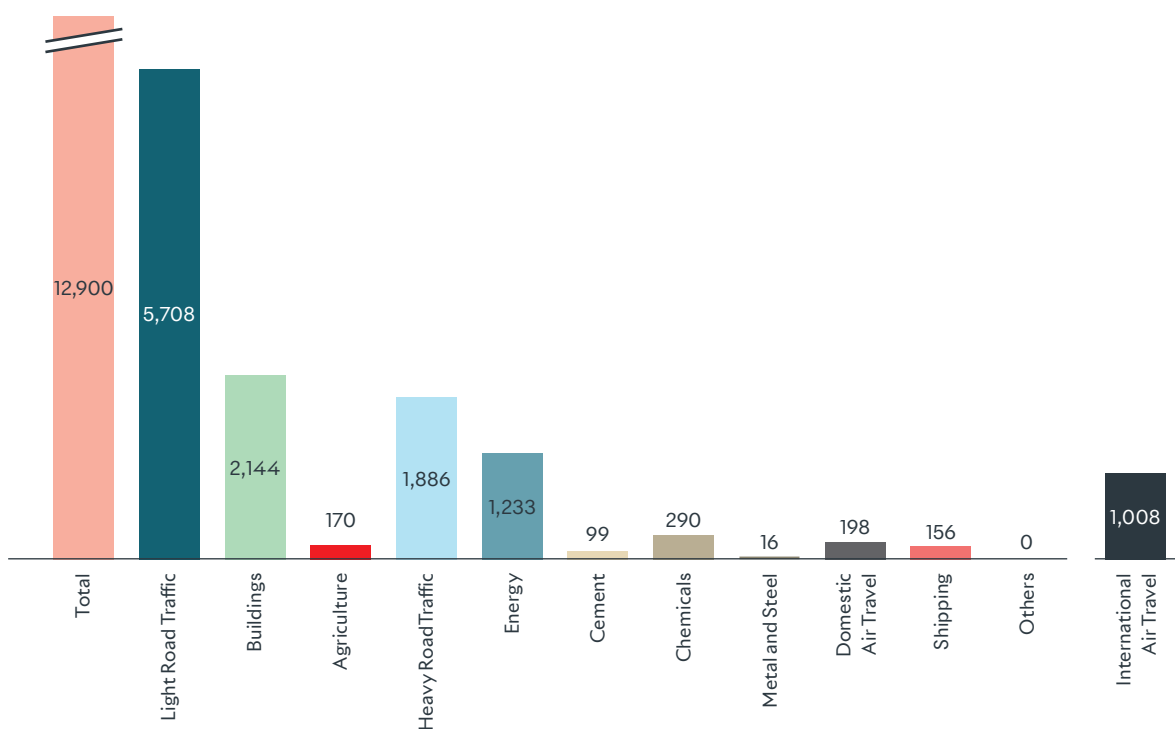
The transition to a low-carbon economy will require substantial investments over the coming years to support the roll-out of the required measures. Average annual investment to the tune of CHF 12.9 bn (including international air travel) is needed to reduce emissions, mainly concentrated on the sectors “Light Road Traffic”, “Buildings” and “Heavy Road Traffic”.²¹

Figure 3

Investments per sector

Swiss net zero investment volumes p.a., 2020–2050

[CHF m]



Note: the spread of investments over time is based on assumptions about future innovation developments and price trends for the relevant technologies (see Appendix).

Source: own estimate

To meet emission reduction targets, Switzerland will therefore need a total investment volume of CHF 387.2 bn (including international air travel).²² The level of funding will be higher both during the 2020s, when the average annual investment volume will be CHF 16.6 bn (with CHF 10.3 bn spent on substitution), and the 2030s at CHF 13.2 bn (CHF 7.2 bn substitution), which equates to 77.1 percent of

²¹ The investment required is based on a level population and unchanged economic structure. The effects of growth, changes in demand and structural change are not considered here.

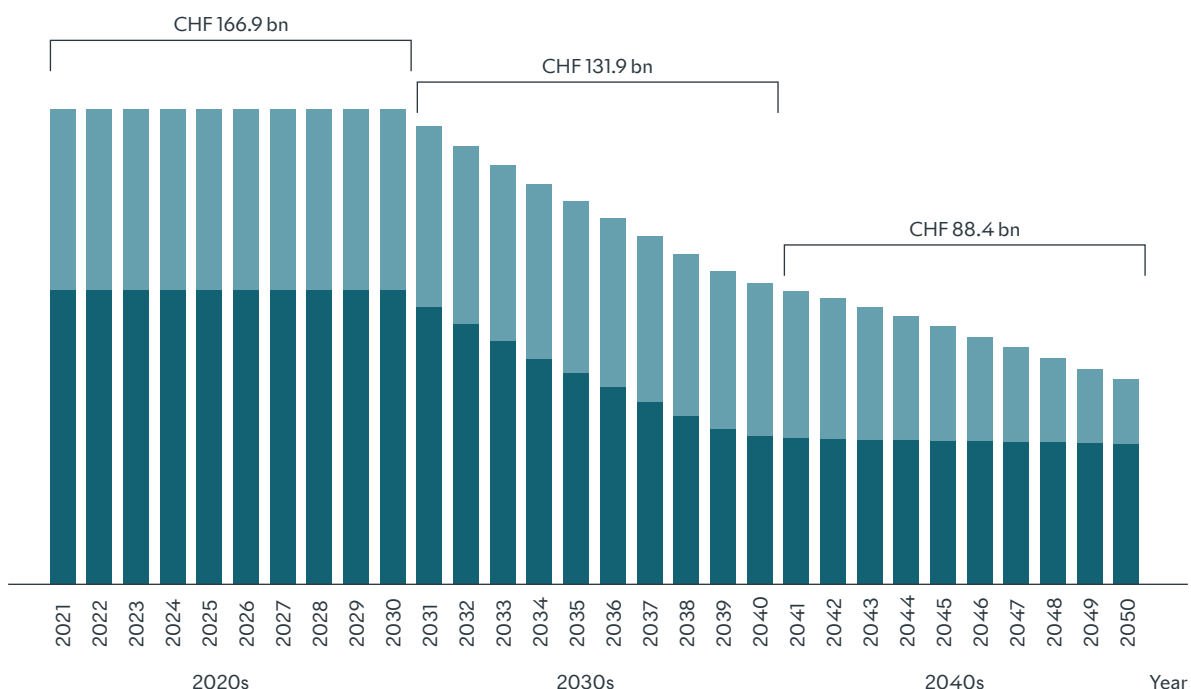
²² The spread of investments over time is based on assumptions about future innovation developments and price trends for the relevant technologies.

total investments. By contrast, the average investment volume in the 2040s will be lower, at CHF 8.8 bn (CHF 5.0 bn substitution). The variation over time is mainly due to the technical availability of selected measures. The substitution effect is expected to increase over time – in other words, investments that would have been necessary irrespective of climate transition, such as the modernisation of truck fleets – and is mainly linked to the acquisition of new commercial vehicles and aircraft. Here the substitution effect drops from around 62 percent in the 2020s to around 57 percent in the 2040s.

Figure 4

Investments over time, including substitution effect

Swiss economy’s total investment requirement over time
[CHF bn]



- New investments
- Substitution investments

Note: the spread of investments over time is based on assumptions about future innovation developments and price trends for the relevant technologies (see Appendix).
Source: own estimate

The climate transition of the “**Heavy Road Traffic**”²³ sector will require average annual investments of CHF 1.9 bn up to 2050. The focus here will be on the substitution or expansion of existing transport fleets through the purchase of electric commercial vehicles powered by battery packs or hydrogen cells. In 2020, around 41,600 trucks and 10,600 articulated lorries were registered for use in Switzerland²⁴.

²³ Vehicles weighing more than 3.5 tonnes.

²⁴ Source: Federal Statistical Office (FSO) “Fahrzeuge und Transportmittelbestände des Güterverkehrs” (Jan. 2021, German only).

Freight transport within Swiss national borders is by far the dominant segment within heavy road traffic. In 2019, domestic freight accounted for just under two thirds (65 percent) of total transport volume. Export and import traffic made up 26 percent and transit traffic just 9 percent²⁵. Essentially, inland transport is only carried out by domestic commercial vehicles, as foreign commercial vehicles are not permitted for road consignments within Switzerland due to the so-called cabotage ban.

By contrast, foreign trucks and articulated lorries dominate transit traffic, as well as imports and exports. The price of a green prototype truck is currently around three times higher than a conventional model, which costs around CHF 100,000 on average. With an average service life of about 10 years, between 4,000 and 5,000 commercial vehicles are typically replaced every year. This requires average annual investments in the region of CHF 1.5 bn, with 33 percent of this sum attributable to substitution. At the same time, around 80 percent of investments will only take place in the 2030s and 2040s, as current technology is still in its infancy. On top of that, the broader use of biofuels or synthetic fuels plays an important role. The ramp-up of hydrogen production, along with the expansion of infrastructure for hydrogen supply, will require annual investments of CHF 200 m in order to significantly increase the number of hydrogen filling stations across the whole country. These are entirely new investments that will be necessary in the 2020s and 2030s. Other initiatives to promote alternative freight transport systems, such as rail traffic, are already relatively well advanced in Switzerland (such as the system for routing goods through the NEAT tunnel).

Average annual investments of CHF 1.2 bn are needed to support climate transition in the **“Energy”** sector. As mentioned previously, Switzerland is already extremely well positioned in renewables compared with other countries. Even so, far greater use of renewables is needed in order to achieve net zero carbon emissions and the goals of the government’s Energy Strategy 2050. Around 650 hydroelectric power stations²⁶ produce enough electricity to meet a significant proportion of Switzerland’s daily electricity needs, although they produce more power in summer than in winter (as do solar plants). This creates a certain dependence on imported electricity in the winter months. Wind power can fill this gap, as around two thirds of wind farms’ annual output is generated in winter, hence the winter months are the most productive. Although there are many suitable locations for wind turbines across the country, barely one percent of Swiss electricity comes from wind farms. Switzerland lags behind the rest of Europe in the area of wind power, and further expansion should be considered.²⁷ To push ahead with the development of these and other renewables will require average annual investments of around CHF 740 m. Improving the flexibility and reliability of the national grid, especially with regard to new connections or energy storage media, is another important lever that will cost CHF 390 m per year, with 30 percent of this spent on substitution. Both measures will take place mainly in the 2020s and 2030s.

The **Buildings sector** will need an investment volume of CHF 2.1 billion over the next 30 years. The key measures to reduce heating and cooling demand in both commercial and residential buildings include

²⁵ Source: Federal Statistical Office (FSO) “Goods transport by road”.

²⁶ Source: Federal Office for Energy (FOE) “Wasserkraft Schweiz: Statistik 2018” (German only).

²⁷ Source: EnergieSchweiz “Winterstrom für die Schweiz” (German only).

improved design of the building shell and replacing conventional heating with more advanced low-carbon technology and electrification. Around 67 percent of the investments needed for these measures would involve substitution.

The **Light Road Traffic sector** will require average annual investments of CHF 5.7 bn, with the lion's share (CHF 4.6 bn) going towards funding the first private purchase of e-models. Given that the manufacture of diesel/petrol-fuelled vehicles is scheduled to end in the 2030s, it is predicted that around 80 % of registered private vehicles will be electrically powered by 2050. In addition, hardly any other country

“Demand for public charging points for electric vehicles will rise to around 100,000 by 2030.”

has such a dense and well-developed public transport system. Its share of the movement of people by road and rail has risen from 17 percent in 2000 to 21 percent in 2019²⁸. Further expansion through additional funding would be relatively easy to achieve compared with other countries. The shift in favour of local public

transport – especially the continuing expansion of the network as well as its electrification – requires an average of CHF 625 million per year. Another important lever in the “Light Road Traffic” sector is the growing shift to electric vehicles and the installation of the necessary charging infrastructure. The EU recommends a target of at least one charging point for every ten electric vehicles. Switzerland already has a relatively dense network of charging points to cater for the 29,000 electric vehicles currently registered nationwide: 18 of the biggest charging network operators in Switzerland already provide around 5,000 public charging stations.²⁹ If the electrification of Swiss passenger transport continues (estimates³⁰ forecast up to a million purely electric vehicles in 2030 against an overall total of 4.7 m registered private cars³¹), however, there is likely to be a spike in demand for public charging stations (100,000 points by 2030) and private charging stations (1,000,000 by 2030). The corresponding expansion of the public and private charging infrastructure will cost around CHF 440 m per year, with most of this investment being required during the 2020s.

The **“International Air Travel”** sector³² will need average annual investments of around CHF 1.0 bn up to 2050 for climate transition. As of May 2021, for example, the fleet of the national airline Swiss included 92 aircraft with an average age of 9.9 years³³. There is still potential for further improvements and renewals. In the wake of the global pandemic and the collapse in demand for air travel, with many airlines cutting back on the routes they serve, Swiss also plans to reduce its fleet to around 85 aircraft, with 26 deployed for international and 59 for European flights.³⁴ Swiss owns most of its fleet – only a few planes are leased. Commissioning aircraft fitted with next-generation propulsion technologies will require additional investments of some CHF 790 m per year on average. However, there is no sign of such innovative technologies being rolled-out in the foreseeable future. There is still a long way to

28 Source: Federal Statistical Office (FSO) “Public transport”.

29 Source: TCS Mobilitätsberatung “Ladeinfrastruktur: Anzahl Ladepunkte in der Schweiz” (German only).

30 Source: According to an interview in the newspaper NZZ with the president of Importeursvereinigung Auto-Schweiz.

31 Source: Federal Statistical Office (FSO) “Vehicles”
<https://www.bfs.admin.ch/bfs/en/home/statistics/mobility-transport/transport-infrastructure-vehicles/vehicles.html>.

32 In 2019 Swiss International Air Lines accounted for 54.7 percent of air traffic at Zurich airport, followed by Edelweiss Air with 6.6 percent. This makes it reasonable to assume that the emissions apportioned to Switzerland from international air travel can be allocated directly to these airlines.

33 Source: Planespotters “Swiss Fleet Details and History”.

34 Source: based on a discussion with an expert at Swiss.

go before the aviation industry is able to deploy electric or hydrogen-powered engines in large aircraft because of the low energy intensity of batteries and the technical difficulty of storing large amounts of hydrogen. These technologies are only expected to become available from 2030 onwards, at the earliest. The relevant investments are therefore likely to be deferred until the 2030s and 2040s. To provide some perspective: over the past ten years, Swiss has spent CHF 8 bn modernising its fleet.³⁵ The future investments required for the measures outlined previously will therefore go mainly towards replacements (80 percent). An additional measure involves the use of sustainable biofuels, which will cost around CHF 180 m per year on average. Lufthansa Group, the parent company of Swiss, views sustainable aviation fuel (SAF) such as biokerosene as an important lever for the energy transformation of the aviation industry. Compared with conventional fossil aviation fuels, SAF reduces CO₂ emissions by up to 80 percent. Under current safety regulations, however, no more than half of aviation fuel can come from alternative sources. The cost of sustainable fuels is currently around 10 times higher than fossil fuels. Costs therefore need to come down significantly, especially since industry experts estimate that fuel costs make up around 30 percent of airlines' total operating costs. If a higher proportion of biokerosene were to be introduced, for example, the business would no longer be profitable. On top of that, there are some measures which do not entail any investment costs but are still very effective for achieving net zero. The most obvious is to change people's flying habits. Another is to introduce measures that improve departure procedures and route management. Industry experts estimate that every European aircraft travels 250 km further than necessary on each flight, which makes optimised route planning extremely important for the aviation sector.

Achieving the climate transition in the **“Chemicals”** sector will require average annual investments of CHF 290 m up to 2050. Here the emphasis is on the use of alternative low-emission fuels and raw materials, with annual investments of CHF 160 m. The use of hydrogen in the chemicals industry promises enormous potential. Similar to other industries, such as “Metal and Steel” and “Cement”, one proposed measure is the provision of carbon capture utilisation & storage (CCUS) technology. So far, however, there have only been mostly pilot projects and there is the possibility of public opposition to the permanent storage of CO₂. In addition, there are insufficient storage capabilities in Switzerland, and no transport infrastructure to cater for potential export. The technology itself is an important tool for industrial sectors to achieve the net zero target. Annual investments of CHF 115 m would be needed in the “Chemicals” sector. Improving the process and energy efficiency of chemical production requires investments of CHF 20 m per year. One measure to improve energy efficiency, for example, would be to modernise boiler plants. BASF Schweiz AG has managed to do just this: with the support of the Energy Agency of the Swiss Private Sector (EnAW) it has cut the CO₂ emissions from its Kaisten chemicals plant by 5,000 tonnes per year.³⁶

³⁵ Source: based on a discussion with an expert at Swiss.

³⁶ Source: Energy Agency of the Swiss Private Sector (EnAW).



Reducing the GHG emissions of the **“Agriculture”** sector will require average annual investments of CHF 170 m. Although cutting the number of domestic cattle would help to reduce national emissions, this would be offset by a corresponding rise in imports if demand is constant, effectively shifting emissions abroad. A more efficient measure would therefore be to change our diet towards alternative sources of protein such as plant-based meat substitutes and cultured meat. Around a quarter of the Swiss population is now “flexitarian”³⁷ and demand is growing for plant-based meat substitutes. As the climatic requirements and labour costs are considerable, a substantial amount of these products have to be imported from abroad, as fluctuating yields make such crops a risky proposition for Swiss farmers. It is therefore questionable whether plant-based protein could be grown profitably in large quantities in Switzerland: because of higher production costs, locally grown green lentils cost more than twice as much as rival products from Canada.³⁸ Suitable state incentives therefore need to be created. This would require annual investment to the tune of CHF 114 m up to 2050. To reduce the emissions caused by slurry, the Federal Council has already incorporated two new measures in the 2020 Ordinance on Air Pollution Control (OAPC): first, slurry storage facilities must be permanently covered to prevent the release of ammonia gas; second, it is now mandatory to apply the slurry – where the topography allows (i.e. primarily in flat areas) – with drag hose spreaders rather than baffle plates, as before.³⁹ The further improvement of slurry management will require annual investments in the region of CHF 46 m. Furthermore, the adoption of regenerative agricultural practices, primarily direct sowing and a move to organic farming, plays an important role as well. “No-till farming”, or direct sowing, is a relatively new method in Switzerland and very little scientific research has been conducted into these approaches.

37 Source: Swissveg “Survey of vegetarians and vegans in Switzerland”.

38 Source: Schweizer Bauer “Pflanzenburger: Schweizer Bauern profitieren nicht” (Swiss Farmers Magazine, German only).

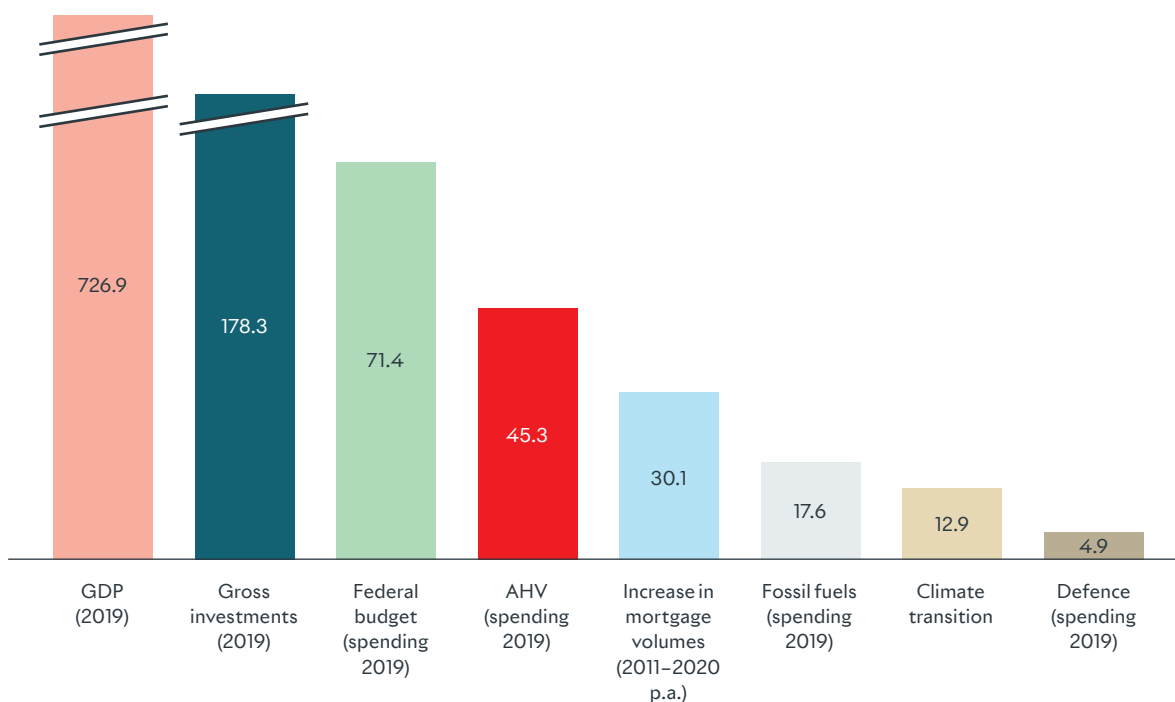
39 Source: Federal Office for the Environment “Luftreinhaltung in der Landwirtschaft” (German only).

Because of the specialist know-how required, this approach has only been taken up by a small proportion of Swiss farmers: estimates for direct sowing are just under five percent of the Switzerland’s total arable land area (275,439 hectares).⁴⁰ Improvements here will require annual investments of around CHF 10 m over the coming decades. The substitution effect of both these measures in agriculture is only modest, at around 10–20 percent.

In addition, annual investments totalling CHF 470 m are required in the sectors **“Domestic Air Travel”, “Shipping”, “Cement”** and **“Metal and Steel”** for a host of measures needed to achieve the net zero target (see Appendix for more details).

Figure 5
Comparison of required climate transition investments

Comparison of Swiss “net zero” investment volumes for climate transition
 [CHF bn p.a.]



Source: Federal Statistical Office, SNB, Federal Finance Administration, Federal Social Insurance Office

40 Source: Landwirtschaftlicher Informationsdienst (LID) “Der steinige Weg weg vom Pflug” (German only).

The total investment volume for Switzerland therefore comes to CHF 387.2 bn (including international air travel), with an average substitution effect of around 60 percent. Switzerland's share of the global investment volume cited in the GFMA study (USD 122 tn plus USD 56 tn for private investments) works out at around 0.2 percent. Switzerland's investment share is therefore almost double compared with its share of CO₂ emissions. Compared with the average annual investment of CHF 12.9 bn needed for climate transition, for example, Switzerland spent CHF 4.9 bn on the military and CHF 17.6 bn on fossil fuels⁴¹ in 2019. The investments needed to meet the net zero target would equate to around 18.1 percent of total government spending of CHF 71.4 bn, or roughly 2 percent of Switzerland's GDP (CHF 727 bn), in 2019. In comparison, the investment requirement in Germany, for example, is 1.2 – 1.8% of national GDP according to the BDI study. In what follows we therefore explore potential sources of financing for these measures.



41 Source: Federal Statistical Office "Endverbraucher-Ausgaben für Energie" (German only).

3 Assessment of potential financing sources

Cooperation between the Swiss financial centre, the private sector as a whole and the public sector is key to ensuring that the measures presented previously at sector level can be financed. The private sector applies different criteria to its financing decisions compared to state institutions. This raises questions as to which source of financing appears suitable for the measure concerned, and the best way to structure the interaction between the financial centre, the private sector and the public sector.

3.1 Presentation of basic decision logic and categorisation

In the context of this study, possible sources of external financing (financing of the necessary investments from own resources was not explicitly taken into account) based on the categories of “Banks” (mainly financing through classic banking products such as loans), “Capital markets” (financing through the capital market, e.g. bond issues), “Public sector” (measures financed via the public sector – the underlying capital raising can take place through classic bank loans, appropriate bonds or the state treasury) and “Others” (this includes financing for which no clearly definable form of financing is currently apparent). The respective measures were allocated to the different categories by selecting criteria that make financing within the category concerned appear likely.

When assessing bank eligibility, the criteria of creditworthiness, potential collateral, technological maturity and duration were considered in detail. Creditworthiness refers to the borrower’s ability to repay the loan, which depends, among other things, on the size and profitability of the enterprise. The availability of loan collateral in the form of tangible and, where applicable, intangible assets to secure loans can improve a below-average credit rating. Furthermore, project-related factors such as the maturity of the underlying technology and the expected payback period of the investment also play a role.

To assess capital market eligibility, the borrower’s access to the capital market was evaluated based on the size of its business and the volume of finance looked for. On the whole, financing volumes in the form of bond issues from private issuers of at least CHF 20 m are required⁴². Government-backed capital market financing is another possibility.

⁴² According to the SIX Swiss Exchange’s Bond Listing Guide, the nominal amount of a bond issue must be at least CHF 20 m, with at least CHF 100 m being required for inclusion in the Swiss Bond Index (SBI).

Public mandates, in the sense of the general public, are characterised in that the financing of the measure is guaranteed by government funds and financing from the private sector is likely to be unprofitable. A public good can also be financed by the state or canton itself with the help of the capital market. Hence, the financial centre may play a supporting role in the financing of a public mandate. There are also mixed forms of financing such as public-private partnerships or blended finance (see Chapter 4).

A financing gap exists if financing is neither bank eligible nor capital market eligible and the project is not a public mandate in the form of a public good. Further incentive structures are therefore needed to ensure a suitable allocation to one of the other categories (for example through the guarantee of government securities).

When assessing the measures presented above at sector level with regard to fulfilment of the criteria, the sectors and their specific features were considered individually. When assessing borrowers, the national key players of the sector concerned and the market concentration were taken into consideration, in order to obtain a rating for the average borrower in the sector. It was expressly decided to assess only the measures for the top ten sectors.

3.2 Suitability of possible funding sources for necessary measures

Based on the underlying measures, it is expected that annual investments of CHF 10.7 bn can be financed through classic bank loans. An example in the commercial building sector would be the reduction of heating/cooling demand with advanced building envelope design, where annual investments totalling around CHF 680 m could be financed by banks. Another example is the improvement of grid flexibility and reliability (new connections, energy storage) in the energy sector. On the one hand, the electricity producers and grid operators are established energy companies with adequate collateral and, on the other hand, this is a measure with a very high degree of technological maturity. Here, annual investments of CHF 393 m could be financed through traditional bank loans. In the case of plant upgrades with higher-quality, more energy-efficient equipment in the cement sector, for example, loans are equally bank-eligible in view of the existing industrial structure involving well-established international groups. Here, annual investments of CHF 22 m could be financed by banks. A specific example in the “Metal and Steel” sector is the modernisation of existing electric arc furnaces in Swiss steelworks. Switzerland has two steelworks (Stahl Gerlafingen and Swiss Steel Emmenbrücke) with electric arc furnaces. The two plants, built in 1996 and 1999, were last modernised in 2007 and 2013 respectively. Over the next 30 years, renovation work is likely to be carried out at both sites with a total investment volume of 0.4 bn.⁴³ These companies are well established in the market and entirely bank-eligible given their good credit rating.

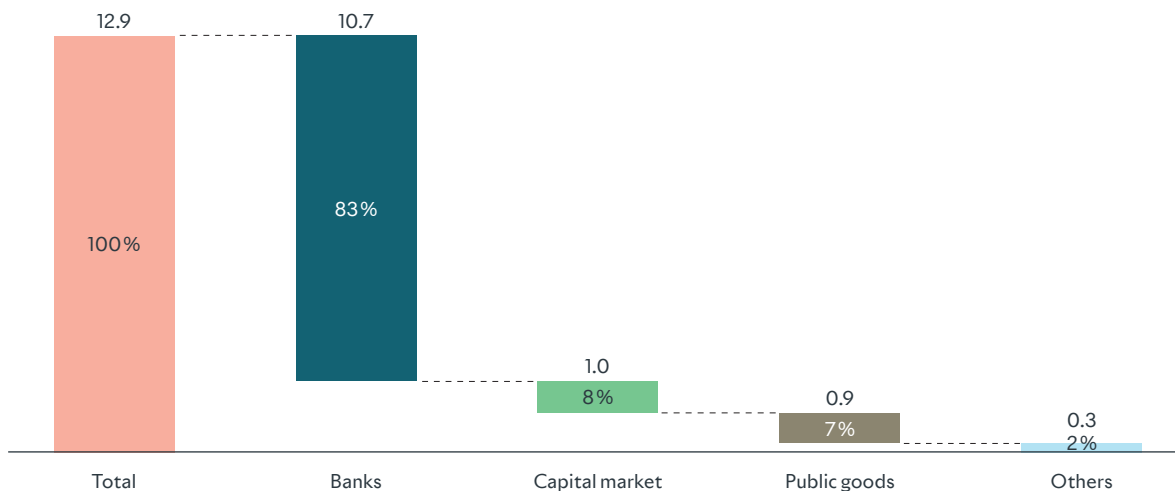
⁴³ Source: According to expert discussions.

Figure 6

Overview of financing sources

Financing sources for net zero investments, 2020–2050

[CHF bn p.a.]



Source: own estimate

Around CHF 1.0 bn could be financed through the capital market in the form of bonds or capital increases. The measures here primarily concern air travel – Swiss, for example, is an established company with access to the capital market. Improving the fleet efficiency of aircraft and using planes with next-generation propulsion technologies can thus be financed through the capital market in the long term. This would mean that around 91 percent of the total investment needed would be privately financed (bank eligible or capital market eligible).

The measures described as “public goods” would be financed mainly by the state at an annual cost of CHF 0.9 bn. One example would be the further expansion of local public transport at an annual investment cost of CHF 624 m. Investments in public transport are generally the direct or indirect responsibility of the state and can potentially also be financed directly via the capital market through government bonds.

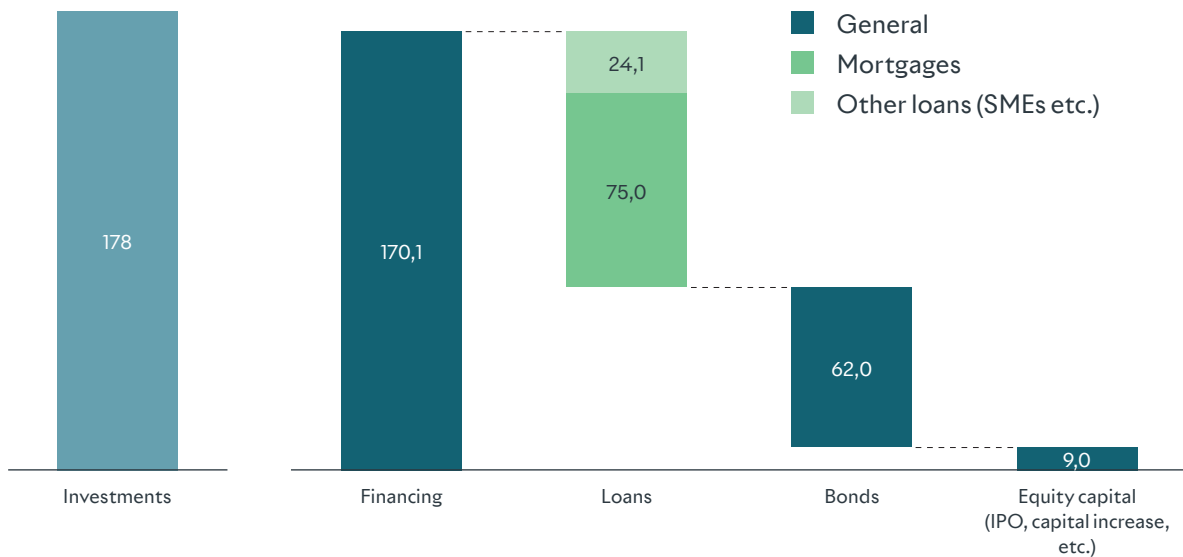
For the remaining measures, we currently anticipate certain challenges when using the funding sources outlined above. This is due in particular to the amount of investment required, but also the level of technological maturity. The development of CCUS technologies and the construction of associated infrastructures such as pipeline systems are particularly worth mentioning in this respect. A total of two percent of the annual investment volume (corresponding to an annual amount of CHF 0.3 bn) can be allocated to this category. To ensure appropriate financing, certain government support services are needed (see relevant explanations in Chapter 4).

To put these financing sums into perspective, it is worth comparing them with the annual volumes of investment and financing in Switzerland. Annual gross investments of the Swiss economy amounted to around CHF 178 bn in 2019.⁴⁴ The annual domestic new lending business⁴⁵ of all Swiss banks for 2019 was estimated at CHF 99 bn. According to SNB figures, mortgage financing accounted for a large share of this, at around CHF 75 bn. As for the remaining loans, annual new business is in the region of CHF 24 bn. In order to reduce emissions, this study – as previously explained – estimated an annual investment volume for Switzerland of CHF 12.9 bn, of which CHF 10.7 bn can in principle be financed by traditional bank loans. Consequently, this would account for around 10.8 percent (calculation: CHF 10.7 bn / CHF 99 bn) of total current annual Swiss new lending business.

Figure 7

Overview of financing sources – comparison

Switzerland – Annual investment and financing volume in CHF bn, comparative volumes:



Note: Investments correspond to the figure for gross domestic capital investment reported in the National Accounts. These are financed from various sources, such as equity capital, external capital and others. The amount of domestic financing studied here includes bank loans, bonds and exchange-listed equity capital that can be deployed in Switzerland or abroad, and in future years. The values of the investments and financing cannot therefore be directly compared.

Source: SNB, SIX, FSO

⁴⁴ Source: Federal Statistical Office (FSO) "National accounts: gross domestic product".

⁴⁵ To estimate the annual new domestic loans business of all Swiss banks, a comparison was made of the domestic credit volume of Swiss banks, including terms to maturity (source: SNB) over a 5-year horizon between 2014 and 2019.

When it comes to financing through the capital market, on the other hand, the situation looks very different. Swiss franc denominated bonds to the value of CHF 62 bn were issued in 2019 (excluding federal government and cantons). Of these, domestic issuers accounted for CHF 42.6 bn.⁴⁶ In addition, the Swiss stock exchange recorded capital increases of CHF 6 bn (2020)⁴⁷ and an IPO volume of CHF 3 bn (2019)⁴⁸. Here, the CHF 1.0 bn needed annually for capital market eligible measures would be less significant.

⁴⁶ Source: Swiss Infrastructure and Exchange (SIX) "Primary Debt Capital Market Information Q4 2020 – Report".

⁴⁷ Source: Swiss Infrastructure and Exchange (SIX) "Annual Report 2020".

⁴⁸ Source: Swiss Infrastructure and Exchange (SIX) "Trading Key Figures: 2019".

“It is expected that annual investments of CHF 10.7 bn can be financed through classic bank loans.”

4 Framework conditions for the Swiss financial centre

Financing the Sustainable Development Goals and meeting the Paris climate targets cannot be secured with public funds alone: the mobilisation of private funds is imperative. It is therefore becoming increasingly important to align the financial system with these goals – something which is also recognised as a critical factor by international financial bodies. For Switzerland to become an international hub for sustainable finance and thus contribute to the financing of sustainability, proper attention must be devoted to the framework conditions for mobilising private funds.

According to the subsidiarity principle, government units should only assume those tasks that private actors (especially the financial centre) are not capable of performing. This results in the following funding hierarchy:

1. Around 91 percent of ‘net zero’ investments can be covered with accompanying measures via existing financial centre structures, with further optimisation of the framework conditions.
2. For the financing of public goods (around 7 percent of the total volume), further private funds can be mobilised with the involvement of public funds and public-private partnerships. The focus here is on concepts such as microfinance enhancement (see p. 41) and blended finance (see p. 45).
3. According to our estimate, this leaves around 2 percent of financing that can hardly be covered with the above-mentioned approaches. To this end, we have examined the method practised elsewhere of using a state investment bank. Given the comparatively low volume of around CHF 300 m per annum, such a plan is unnecessary in Switzerland and would risk creating market distortions.

Existing forms of financing and approaches for closing remaining gaps

In the first two chapters, we showed the volume of financing likely to be needed to mitigate climate change in the Swiss economy, particularly the emissions-intensive sectors. In order to actually achieve the climate targets, the necessary funding must therefore be available for this. A goal-oriented policy requires patient, long-term, focused financing.

The Swiss financial centre has a wide range of financing methods at its disposal. As well as mortgages and SME loans, they also include other offerings such as leasing, factoring and the capital market, plus investments financed by the public sector. These private-sector providers are called upon to make the necessary volumes available, which will be possible since they remain capable of action. At the same time, they need ideal framework conditions and can also be incentivised to finance investments for climate change mitigation.

Through appropriate framework conditions, the remaining investment projects can be made eligible for investment via the financial markets or financed by the state. Another possibility is to create new forms of financing that are specifically geared towards these investments. The following chart is intended to show which approaches (framework conditions and measures) could be used to close these financing gaps.

Financing the transition – schematic overview

1. General location factors: <ul style="list-style-type: none"> • Sustainable finance as a location advantage • Education and access to talent • Legal certainty and reliability 			<ul style="list-style-type: none"> • Market access • Attractive investment environment
2. Already funded via the financial centre	3. Currently underfunded via the financial centre	4. Large-scale financing and overarching aspects	
Goal: continue to expand current offering <ul style="list-style-type: none"> • Raise awareness of the role of financial flows in the transition • Expand the fundamentals; disclosure (NFRD, TCFD, etc.) and taxonomy • Measures in combination with public-private partnerships and microfinance approaches • Joint initiatives with the public sector, industry associations and local financial service providers 	Goal: use targeted measures to make financing possible <ul style="list-style-type: none"> • Creditworthiness through adjusted evaluation models (e.g. SME rating) • Establish relationship with the financial centre for traditionally self-financed sectors • Formulate an investor-appropriate risk profile • Remove obstacles to investment • Help the market achieve critical mass 	Goal: encourage and provide solutions for extended financing needs <ul style="list-style-type: none"> • Improve capital market appeal (e.g. for green bonds, infrastructure funds, etc.) • Mobilise private investments through de-risking and leveraging public-sector investments • Create financial incentives to foster innovation (both for new technologies, achieving market maturity and also broader scaling effect) 	
Support via public-private partnership solutions	Create sustainable perspectives	Support via public-private partnership solutions	
5. General approaches and support measures: <ul style="list-style-type: none"> • Integrate into international initiatives • Public/private sector collaboration • Consistent disclosure of climate risks • Sharing best practice 			<ul style="list-style-type: none"> • Promote signalling effect • Integrate climate factors in engagement and stewardship

Source: SwissBanking

4.1 General location factors

Switzerland is an attractive location for financial service providers. However, this is not to be taken for granted and must also be ensured in the future. Furthermore, the framework conditions must be such that the financial centre remains innovative, capable of change and fully able to fulfil its important economic role. This is especially true in light of the upcoming transition of the Swiss economy and the climate targets.

For the financial services industry to remain attractive for investors, customers and talents, Switzerland must maintain business-friendly framework conditions in areas such as tax law, regulation, employment law and immigration.

The following initiatives would either support the existing business-friendly conditions or drive change to improve the competitiveness of the Swiss financial industry and domestic service providers in particular:

- On 24 June 2020, the Federal Council adopted a report and guidelines on sustainability in the financial sector. The Swiss financial centre should further strengthen its position as a leading location for sustainable financial services. The framework conditions must be designed in such a way that the competitiveness of the Swiss financial centre is continuously improved and the financial sector can make an effective contribution to sustainability.
- It is important to ensure access to skilled workers through further development of training opportunities and the maintenance of liberal immigration laws.
- Incentives for innovation must be created by defining a regulatory framework geared to these goals.
- Stamp duty should be abolished and withholding tax in Switzerland reformed to make the capital market more attractive as a financing option for climate-oriented investments.
- Competitiveness must be increased and the export of financial services must be promoted by ensuring that Swiss financial service providers have unrestricted access to international customers.



4.2 Financing needs that the financial centre is already able to meet

The inclusion of environmental, social and governance (ESG) criteria in lending is already a fact of life at a growing number of banks. At the same time, numerous banks have announced strategies on how to deal with existing financing with harmful climate impacts. In this way, banks' loan books are becoming more sustainable and climate-friendly. Several international initiatives have emerged for this purpose, which we will discuss later on. There is also a greater focus on identifying and disclosing the climate impact of banking activities. The majority of the industry has participated in the Federal Office of the Environment's (FOEN) climate goal alignment tests, and a growing number of banks are committed to the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

In order to support the transition of the Swiss economy with regard to climate targets and be able to meet the relevant financing needs, banks can pursue additional approaches that are tailored to the respective financial instruments and product groups. In the following, we consider which approaches can help finance the transition in the different product categories.

Mortgage financing

There is a direct link between CO₂ emissions and the financing of buildings. According to the Federal Office of the Environment, buildings make a significant contribution to CO₂ emissions in Switzerland, accounting for around 24 percent. Only transport has an even larger share, at 32 percent. It is therefore obvious in policy terms to look for solutions via mortgages or corporate loans. The focus here is on the building stock and thus the mortgage portfolio.

The following four approaches to mortgage lending are traditionally available and already used by various banks today:

- Taking environmental criteria into consideration when setting interest rates
- Including sustainability when considering affordability and other financing criteria
- Making the mortgage term and repayment dependent on environmental criteria
- Promoting awareness of environmental criteria among banks and customers

Furthermore, banks have an important role to play in home-owners' financial planning. For example, they can provide information on the full costs of a building (maintenance, energy costs, CO₂ levies, etc.) as well as applicable local climate-related rules (e.g. cantonal ban on oil heating, tax effects of renovations). The financial advantages of climate-efficient construction methods or renovations can be impressed upon customers in this way.

Banks can also define standards that the energy consumption of buildings must meet in order for the mortgage to be considered energy-efficient. A corresponding approach is being pursued by a consortium of European banks under the Energy-efficient Mortgages Action Plan (EeMAP) initiative.⁴⁹

⁴⁹ <https://eemap.energyefficientmortgages.eu/>.

Approaches such as these, which take sustainability criteria into account when granting loans, are pursued voluntarily by banks and can affect the margins achieved on the business in question. It may be possible for legislators and regulators to contribute directly to Switzerland's climate goals by according special treatment to the financing of energy- and climate-efficient buildings in their regulatory frameworks. The benefits and potential risks of a "green-supporting" approach could be examined for such mortgages. For example: less stringent equity requirements, risk weightings, capital buffers, valuation and loan-to-value criteria, etc. However, it is still important to ensure that the capital requirements are formulated in a risk-based manner.

The transition of the building sector towards improved climate and energy efficiency also faces socio-political, fiscal and structural obstacles that can be addressed by policy. Before considering the question of financing, it is often necessary to look at other framework conditions which are frequently critical in terms of the decision to renovate. These include, for example, the tax framework (deductibility of value-preserving versus value-enhancing investments), building regulations and structural hurdles (site redevelopment, condominium ownership, dealing with existing tenancies during refurbishment, etc.).

Climate-relevant financing is an important aspect, especially for the renovation of building envelopes (but also photovoltaics, heat pumps, etc.). The focus should not only be on the renovation budget or the increase in the mortgage, but also on maintaining the value of the property as a whole. The guiding principle should be to look for the better risk. A renovated property is less of a risk and should therefore be considered as a whole. This approach creates a greater incentive for owners who are willing to renovate and is more consistent with the assessment factors in mortgage lending.

Loan financing for SMEs

Small and medium-sized enterprises (SMEs) are a very important part of the Swiss economy. At the same time, SMEs are also very heterogeneous and have strong local roots, which also affects their banking relationships. Their credit needs and the bank's assessment of the credit risk depend on the activity, size, profitability and other criteria of the individual enterprise. Secured loans, where collateral may be pledged, and leases for vehicles and equipment are common in Switzerland. Traditionally, however, financing out of the company's own resources also plays a major role.

On the other hand, particularly in the case of relatively large investments in connection with climate mitigation, financing out of the company's own resources is difficult, as these are one-off, large sums for investments over the longer term. From a macroeconomic perspective, however, such investments are not only desirable but necessary. Failure to invest leads not only to an increasingly poor environmental performance over time, but also to a loss of competitiveness.

It is in the banks' interest to support these companies in the transition and to promote the transformation through incentives. Especially in the case of the cantonal banks, this is often done in compliance with their mandate.

More specifically, the regulator can create incentives in this way or, for example, help to close financing gaps with conditional guarantees. However, this is naturally very activity-specific (e.g. garage businesses and conversion to electric mobility).

This topic also has international relevance. This was the reason for creating the Principles for Responsible Banking⁵⁰. Swiss banks were actively involved in defining these principles and have committed themselves to observing them⁵¹.

Swiss members of the Principles for Responsible Banking, as of May 2021

Bank	Date of signing
Bank Julius Bär & Co. AG	September 2019
Credit Suisse	September 2019
Globalance Bank AG	September 2019
J. Safra Sarasin	September 2019
Lombard Odier	November 2020
Raiffeisen Switzerland	December 2020
Pictet-Gruppe	October 2019
UBS AG	September 2019

Source: UNEP FI

The six principles of the PRB were developed by the United Nations Environment Programme Finance Initiative (UNEP FI) in cooperation with 30 banks and are intended to serve as a framework to achieve the UN Sustainable Development Goals and the objectives of the Paris Climate Agreement. Under the Principles for Responsible Banking, participating banks acknowledge their responsibility to support companies in their transformation towards more sustainable business practices.

The signatories of the Principles for Responsible Banking undertake to formulate and publish targets for all major business areas. The principles cover both the strategic and the operational level. The participating banks strive to give equal consideration to the interests of customers, employees, legislators and investors.

⁵⁰ <https://www.uneofi.org/banking/bankingprinciples/>.

⁵¹ <https://www.uneofi.org/banking/bankingprinciples/sigs/>.

The UNEP FI's Net-Zero Banking Alliance⁵² goes one step further. Participating institutions commit to reducing their CO₂ emissions as much as possible. The goal is to reduce the carbon footprint of the bank's entire loan and investment portfolio to net zero by 2050 at the latest. The voluntary net zero commitment emphasises the determination to actively shape the sustainable transformation of the economy and society. The net zero commitment requires specific measures whereby the banks demonstrably support their customers in reducing greenhouse gas emissions. Initially the focus is on carbon-intensive sectors. Progress must be reported regularly according to UNEP FI guidelines. Portfolios are to be managed based on the approach defined by the "Science-based Targets" initiative. The major Swiss banks are members of the Net-Zero Banking Alliance.

52 <https://www.unepfi.org/net-zero-banking/>.

“Financing the Sustainable Development Goals and meeting the Paris climate targets is only possible with the mobilisation of private funds.”



4.3 Financing needs not adequately met by the financial centre today

Not all investments can be financed by the financial centre. This is the case, for example, when it comes to particularly long-term or high-risk projects. In the case of unsecured loans, the creditworthiness of the borrower is also very important for the creditor's decision – i.e. the borrower's ability to settle outstanding accounts and other payment obligations reliably and in accordance with the contract. Banks, for example, need to exercise restraint and foresight when lending to small, young companies with unclear profitability, otherwise they increase the risks for their own commitments.

Creditworthiness or credit rating is determined on the basis of various financial markers by credit agencies, rating agencies or the bank itself. The main approaches to enabling climate-oriented investments by non-creditworthy companies are as follows.

SME sustainability ratings

Achieving the transition of the entire Swiss economy requires not only large corporations but also small and medium-sized enterprises (SMEs) to make climate-oriented investments. Currently, around 80 per cent of all bank loans are granted to SMEs. However, based on our estimates of mitigation financing needs, the demand is likely to increase. At the moment, sustainability criteria, i.e. the non-financial performance of SMEs, play hardly any role in the lending process. One reason for this is the lack of sustaina-

“ESG criteria could soon play a major role in lending practices.”

bility-oriented assessment tools that are meaningful, suitable and practicable for SMEs. Furthermore, there are currently limited incentives for SMEs to have their activities certified with regard to sustainability.

In the context of Switzerland and the SME landscape, it is important to consider how the needs of the financial sector and the real economy can be suitably reconciled with one another so as to achieve climate and sustainability goals together, in a way that benefits both sides and does not create additional bureaucracy.

In the international context, various standardisation efforts are under way for ESG ratings/criteria (ISO, WEF, Value Balancing Alliance, etc.). However, concrete results for standardised ESG factors or standardised ESG ratings for SMEs are taking time to materialise. Stakeholders in Switzerland's real economy and financial sector therefore have it in their power to set their own standard for SMEs, with a signalling effect beyond the country's borders.

“State support is essential for long-term and high-risk projects.”



Financing of micro-enterprises

Bank and capital market financing are common financing methods for larger companies. They are not well established among smaller businesses, but here too there is a need to expand the range of financing for climate-oriented investments. In international parlance, the term ‘microfinance enhancement’ is used. The aim is to support enterprise development and prosperity by providing short- and medium-term financing through financial institutions. Microfinance and micro-enterprises are supported through a dedicated fund.

The aim of such a fund is to support enterprise development and prosperity by providing short- and medium-term financing through financial institutions. The financial institutions support small and micro enterprises that have difficulty securing financing. In pursuing this development goal, the fund should observe the principles of sustainability and combine a development-oriented with a market-oriented approach.

The aim of such a fund is to ensure that microfinance stimulates growth, creates jobs and, in particular, contributes to the transition in this market segment.

By positioning itself as an efficient microfinance credit fund, such financing has an important signal effect in the market and helps to stabilise and strengthen the provision of responsible financial services. A link with a fund fed from other sources is certainly an attractive possibility.

Role of the capital market in medium-sized companies

When it comes to raising enterprise capital, compared to other countries, Switzerland's capital market continues to play a subordinate role relative to the credit market. Especially small and medium-sized enterprises (SMEs) with an issuance volume of less than CHF 50 to 100 m make only occasional appearances in the capital market. On the one hand, it is a matter of supply and demand. On the other hand, it can also be explained by unfavourable tax rules and regulatory conditions in the Swiss capital market. Greater use of the capital market is required in order to meet climate-related financing needs.

As well as improving framework conditions, private-sector approaches can also improve the role of the capital market as a source of financing for the transition:

- Green, social and sustainable bonds (ESG bonds) are demonstrably geared towards climate- or sustainability-related investments. Green bonds in particular are already established on the Swiss capital market. Today, 46 such bonds are traded in Switzerland. ESG bonds benefit from the fact that they can be included in sustainability-oriented investment instruments.
- The standardisation and pooling of bond issuance means that economies of scale can be generated, which may translate into lower fees and therefore smaller tranche sizes. One tried-and-tested example of this is the covered bond or 'Pfandbrief', whereby the financing requirements of cantons and municipalities are pooled and then issued in the form of Pfandbriefe. Such pooling could also be offered by associations or other industry organisations, for example. Suitable industry standards and self-regulation can contribute to standardisation.
- Blended finance approaches (see Chapter 4.4).



4.4 Public initiatives and major projects

Some of the measures related to the net zero target require large, long-term investments which are partly financed by the private sector and partly with the involvement of the public sector. To ensure progress in the transition, the various stakeholders must cooperate closely with one another, and their different roles must match their respective strengths.

Education, research and innovation

Switzerland in the 21st century operates in a highly globalised and competitive environment. Strong performance in education, research and innovation is necessary and vital in order to compete internationally. Success factors for Swiss research and innovation include the country's innovative private sector, a sophisticated education system, efficient research and innovation funding by the public sector, as well as a generally favourable political framework.

While education and basic research in Switzerland are largely funded from government sources, applied research and development is the domain of the private sector. An innovative location requires interaction and mutual exchange between these two areas. Basic research is mainly conducted by universities, which have also been focusing on climate protection for some time. Climate-related product innovations in companies and start-ups, on the other hand, require venture capital, which is usually provided in the form of equity. The volume and focus of investments have expanded compared to the first wave of investments in areas such as renewable energies and batteries. Today's climate-tech venture capitalists are also focused on agriculture, alternative food production and environment-friendly transport, while many start-ups are aimed at mitigating greenhouse gas emissions. Here it is important to bear in mind that the combination of long time horizons and unproven technology unsettles many venture capitalists, who typically invest over a horizon of five to seven years. Banks and the capital market then take over their role later on in the life cycle of innovative companies: once these businesses have moved from the innovation phase into a growth or maturity phase, they can benefit from the forms of financing available from banks and the capital market.

The role of public-private partnerships for long-term, capital-intensive initiatives

The capital market is part of the financial market and used by companies and governments to raise medium and long-term capital for investments. Companies finance their investments by issuing securities (equities, bonds) on the primary market. The securities are traded on the secondary market. In this way, companies are permanently valued by the market.

Utilities are the main businesses of interest in relation to climate-oriented investments. Climate-relevant utilities include, in particular, companies (both private and state-owned) that offer infrastructure and services related to electricity, heat, water, waste disposal, lighting or telecommunications. There are also other sectors with business activities associated with high CO₂ emissions, such as cement production, heavy road traffic and air traffic.

Standardised green bonds play a marginal role in financing in Switzerland. Their share is also low compared to other countries, although they could be an important instrument, particularly in the context of mitigation financing.



While infrastructure projects abroad are often financed through public-private partnerships (PPPs), the importance of PPPs in Switzerland is low. Thanks to excellent financing conditions, the public sector is often not dependent on private-sector partners. However, in view of the large expected financing volumes and higher debt ratios of the federal government and cantons as a result of the pandemic, such cooperative ventures could become more important in Switzerland too. Public-private partnerships are likely to be used increasingly, especially against the background of the rejection of the CO₂ Act and consequent rejection of the climate fund.

The role of investment taxation

Generally speaking, taxes do not have a direct capital (re)allocation effect and are therefore not capital flows in the sense of the Paris Agreement (or other efforts to steer capital flows toward sustainable investment). Indirectly, however, they do have an influence on allocation behaviour and thus on allocation activity. Two areas of taxation stand out in this respect.

- Incentive taxes, which target the correct pricing of externalities (such as CO₂ emissions). This is an indirect positive allocation incentive, in which the pricing is only approximate and therefore needs to be formulated with due care.
- Transaction taxes such as stamp duty or withholding tax also play a role. These have a negative incentive character for investments and lead to investments not being made or being made elsewhere. Transaction taxes behave like incentive taxes on investments. As a rule, investments have the character of a risk, because the returns follow only after a delay from the time of investment. Taxing investments therefore creates disincentives, as risks later create wealth, which in turn generates tax revenues.

Thus, the incentive purpose is not just a possible, but the only meaningful area of application for taxes. At the same time, the incentive purpose must not proliferate and augment other taxes, because this would amount to misappropriation with uncontrolled side effects. Taxes and sustainability therefore intersect. Transaction taxes in particular can play an important role in the mobilisation of private funds to finance the transition and prevent necessary investments.

The role of blended finance

Blended finance brings together actors with different mandates and interests. This cooperation can lead to fundamental tensions and potential investment conflicts. Private investors are sometimes wary of public bureaucracy and lengthy government processes. Public investors may be reluctant to work with commercially oriented private companies. The aim of successful blended finance vehicles is to overcome these problems.

Blended finance is focused on transformation. To change markets and maximise climate impact, blended finance measures must be tailored to local needs. Especially with climate finance projects, scaling-up is often difficult, as investors frequently engage in one-off projects and there is no further project pipeline.

As well as structuring the instruments, innovative approaches to solving the pipeline challenge are therefore also necessary. At the same time, blended finance must follow a systemic approach and seek to support the economy's phase-out of fossil fuels.

At the initiative of impact asset managers, various investor groups are being attracted to new investment themes. Their motivation typically lies somewhere between two extremes:

- **Concessionary:** Climate protection is the priority. Investors have greater risk tolerance and/or lower return expectations. These are often public investors with a development finance mandate or foundations with a specific endowment purpose.
- **Commercial:** What counts here above all is the attractive risk-return profile of the investment. Mostly institutional investors look for attractive investments in new growth markets that simultaneously deliver impact.

In order to attract as much commercial capital as possible for new impact investment themes, the blended finance investment product is set up in tranches (junior, mezzanine and senior) with different risk-return profiles. Concessionary investors typically use their venture capital to participate in the junior tranche, bear any defaults first and thus address the main concern of institutional investors. Blended finance initiatives allow institutional investors to make an active commitment while benefiting from a safety net.

In Switzerland, blended finance investments have mainly been of interest to family offices, which usually choose the mezzanine tranche with a higher risk-return profile. However, given the possibility of opening up new sustainable investment themes with the support of concessionary investors, it is likely that institutional investors will also increasingly rely on blended finance solutions in the future.

The subsidiary role of a state investment bank (SIB)

The concern that investments for large-scale distribution of renewable energies and other climate protection measures will not come about quickly enough through purely private-sector financing is understandable. However, according to this study's reckonings, after exhausting all market-based instruments, there is no significant "financing gap" standing in the way of reducing CO₂ emissions to the target level.

This contrasts with other economies where public funds are also limited, but much more new private finance is needed given the scale of investment required. To address this challenge, some governments have set up state investment banks (SIBs) to close the financing gap and support the greening of their economies. While there are major differences in the formulation of objectives and the design, these also have certain things in common:

- The core function of an SIB is to use the limited public funds to tap into private-sector funding. A symbiosis between public and private investment must be aimed for.
- A successful role and the functioning of an SIB are market-specific and part of the overall policy mix of a transition strategy. An SIB can be seen as a systemic instrument that effectively contributes to this policy mix.

- Policymakers need to consider the balance between public and private investment. Distortions of competition by state actors must be avoided.
- A particular challenge for a financial centre and all its stakeholders arises from the nature of climate risks. Climate risks are complex and difficult to diversify. A macro-prudential assessment of the risks, including that of any SIB, is therefore imperative.

Given the magnitude of the financing gap and the functioning supply of credit from the private sector, in Switzerland this work can be done through public-private partnerships and blended finance initiatives. The creation of a state investment bank is not necessary for the financing of climate mitigation and would entail a significant risk of market distortions.

“To ensure the transition progresses smoothly, all the various players must work closely together.”



4.5 General approaches and accompanying measures

When preparing the study, it became apparent that the necessary measures are industry- or sector-specific. It follows from this that the financing is also correspondingly specific and that partnerships with companies, groups of companies and associations are necessary. In this way, the risks and opportunities of climate change can be addressed, suitable financing solutions mobilised and cross-sectoral initiatives promoted more readily and faster.

The goal should be to accelerate the development and scaling-up of a wide range of products and instruments that are already emerging in investment business. This concerns all public and private markets that meet the financing, investment, hedging, market-liquidity and funding needs of a broad mix of market participants who are actively pushing the transition.

The risks must be assessed on the basis of a consistent disclosure of climate-related information of the companies and projects being financed. This should be based on the TCFD recommendations. Switzerland pledged its official support to the Task Force on Climate-related Financial Disclosures (TCFD) on 12 January 2021. Thus, a first step has already been taken in this direction.

Switzerland is very competitive in the research and innovation sector and is one of the highest spenders on research and development (R&D) relative to gross domestic product. Fostering an innovation mentality in the scaling-up of climate finance must be a high priority, as many measures depend on it. Switzerland must strive for thematic leadership in financial innovation, standardisation of legal contract language and industry data models. This also applies to innovations in scenario analysis and risk modelling, as well as tools and platforms to promote awareness and competence in climate finance.

Sustainability must be given the right priority within companies. Sharing best practices on climate risk management and increasing the transparency of integration of climate risks into corporate governance, strategic planning, resource allocation and risk-adjusted performance management of companies will become increasingly important in financing issues.

Switzerland is very small as a CO₂ emitter, but enjoys an excellent international reputation as a financial centre and as a highly developed economy. International cooperation with standardisation bodies, the private sector, policymakers and financial regulators is therefore important. Switzerland can make a valuable contribution to achieving a common global use of language and a set of principles for climate finance and translating these into sector- and region-specific taxonomies. Swiss institutions are already actively represented in key bodies such as the Network for Greening the Financial System (NGFS), the International Platform for Sustainable Finance (IPSF), the Coalition of Finance Ministers for Climate Action and the Financial Stability Board (FSB).

Due to its prominent role in cross-border asset management business, Switzerland is in an exposed position in this regard. This makes it particularly important to accelerate the integration of climate factors into its investment processes, including greater integration of climate-related risk factors into risk models. To make this possible, the associated scientific basis must also be strengthened.

The regulator should support new climate financing products and solutions. Current regulatory hurdles that prevent this process must be identified and revised accordingly. However, it is important to avoid market fragmentation using appropriate means that are aligned with the general transformation of the economy.

“Partnerships are needed to mobilise suitable financing solutions and promote cross-sector initiatives.”



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Appendix



Energy

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	15,800.0 Mt	30 %
Europe	1,300.3 Mt	26 %
Switzerland	3.3 Mt	7 %

Measure	Increase the use of renewables							
Special features	Thanks to abundant rainfall and favourable topography, 57% of electricity consumed in Switzerland in 2019 came from hydroelectric power stations; but there is still room for expansion in other renewables such as wind power							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
736.8	50 %	50 %	0 %	0 %	4	3	2	1

Measure	Improve network flexibility and reliability (new connections, energy storage facilities)							
Special features	Construct a grid infrastructure that allows temporary storage of energy for consumption later							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
393.2	50 %	50 %	0 %	30 %	5	4	3	1

Measure	Invest in large-scale development of CCUS infrastructures							
Special features	Pilot projects; potential public opposition to permanent storage of CO ₂ and lack of storage options in Switzerland – inadequate transport infrastructure for potential export of CO ₂							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
102.9	20 %	40 %	40 %	0 %	2	1	4	5

Metal and Steel

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	2,900.0 Mt	6 %
Europe	252.5 Mt	5 %
Switzerland	0.4 Mt	1 %

Measure	Increase the use of recycled scrap metal							
Special features	Existence of two steel plants (Stahl Gerlafingen and Swiss Steel Emmenbrücke) with electric arc furnaces, constructed in 1996 and 1999 respectively, subsequently modernised in 2007 and 2013; both sites are expected to renew their furnaces over the next 30 years with investments in the region of USD 0.4 bn							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
12.4	50 %	50 %	0 %	100 %	4	2	1	1

Measure	Replace natural gas in the downstream process (heating steel in the rolling mill) with alternative biomass							
Special features	Only retrofitting required; five steel rolling mills in Switzerland (2x Swiss Steel, 3x Beltram)							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
3.1	50 %	50 %	0 %	0 %	4	2	1	1

Cement

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	2,300.0 Mt	4%
Europe	188.7 Mt	4%
Switzerland	2.8 Mt	6%

Measure	Invest in and expand CCUS facilities							
Special features	Pilot projects; potential public opposition to permanent storage of CO ₂ and lack of storage options in Switzerland – inadequate transport infrastructure for potential export of CO ₂							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
71.6	20%	40%	40%	0%	2	1	4	5

Measure	Upgrade existing plants with higher-quality, energy-efficient equipment							
Special features	Switzerland has six cement plants covering around 85% of domestic demand (rest is imported); ongoing discussion about the extension of quarrying licences in four cement plants – import quota may have to be increased from 2030 onwards							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
22.4	33%	33%	33%	50%	4	3	1	1

Measure	Increase the use of alternative fuels for producing heating energy and greater use of alternative binding agents to reduce the amount of clinker							
Special features	<p>The percentage of alternative fuels currently used in cement plants is already high (> 50%); the savings potential may therefore be minimal (CO₂ emissions from burning fuel have already been cut by more than two thirds since 1990); however, stricter legal restrictions on pollutants could be an investment driver</p> <p>Numerous research initiatives are under way (e.g. Swiss Federal Laboratories for Materials Science and Technology, Oxara) to explore cement variants with a lower percentage of clinker (target: reduction from current level of 74% to 60% by 2050); specific industry initiatives have also been launched</p>							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
5.4	33%	33%	33%	20%	3	2	3	1

Chemicals

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	2,200.0 Mt	4%
Europe	157.9 Mt	3%
Switzerland	1.4 Mt	3%

Measure	Improve process and energy efficiency in chemical manufacturing							
Special features	One way of improving energy efficiency is to modernise boiler plants – by doing so BASF Schweiz AG, with the support of EnAW, the Energy Agency for the Swiss Private sector, has managed to cut annual CO ₂ emissions at its Kaisten chemical plant by 5,000 tonnes							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
19.1	33%	33%	33%	80%	4	3	1	1

Measure	Use alternative fuels and raw materials with a smaller carbon footprint							
Special features	Potential use of hydrogen in the chemical industry; the expansion of hydrogen production plants in Switzerland has only been very slow to date, as regulatory hurdles have restricted plants to a fixed number of locations; on top of that, the actors in question only have limited experience of the technology							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
156.9	33%	33%	33%	50%	4	3	1	1

Measure	Expand CCUS technology							
Special features	Pilot projects; potential public opposition to permanent storage of CO ₂ and lack of storage options in Switzerland – inadequate transport infrastructure for potential export of CO ₂							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
114.1	20%	40%	40%	0%	2	1	4	5

Light Road Traffic

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	3,900.0 Mt	7%
Europe	630.0 Mt	13%
Switzerland	11.2 Mt	24%

Measure	Expand the public and private infrastructure for charging electric vehicles							
Special features	As a rough guide, the EU recommends a minimum of one charging point per ten electric vehicles; the 18 network operators studied currently provide around 5,000 charging points in total across Switzerland; with some 29,000 purely electric vehicles on our national roads, this equates to 1.7 charging points for every 10 vehicles, or 5.8 vehicles per charging point; many more charging points are required to cope with the growing number of electric vehicles							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
436.7	60%	20%	20%	0%	3	2	3	1

Measure	Encourage the switch to public transport							
Special features	Switzerland already has a very dense and extensive public transport system – the proportion of people using motorised rail and road transport rose from 17% in 2000 to 21% in 2019 – further expansion would be possible given additional funding; the aim should be to improve capacity utilisation even further							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
624.1	60%	20%	20%	40%	1	1	4	1

Measure	Purchase private e-vehicles							
Special features	Some 4.6 million private cars were electric models in 2020, or around 1% of all registered vehicles. This is set to rise to around 80% by 2050.							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
4,647.6	60%	30%	10%	90%	4	1	2	1

Heavy Road Traffic

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	2,200.0 Mt	4%
Europe	375.6 Mt	8%
Switzerland	3.3 Mt	7%

Measure	Develop and manufacture electric (battery-powered) trucks and vans							
Special features	Most vehicles are imported from abroad, although there are some domestic manufacturers (e. g. Designwerk)							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
104.3	33%	33%	33%	40%	3	1	2	1

Measure	Purchase electric vans and trucks to replace/expand fleets							
Special features	According to the Federal Statistical Office, some 41,600 trucks and 10,600 HGVs were registered for use on Switzerland's roads; with an average service life of around ten years, about 4,000 to 5,000 commercial vehicles are replaced every year in Switzerland							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
876.7	20%	40%	40%	33%	3	1	2	1

Measure	Develop and manufacture hydrogen cells for electric trucks and vans							
Special features	Around 100 commercial vehicles powered by hydrogen fuel cells are currently in service in Switzerland; the technology is still in its infancy							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
72.3	33%	33%	33%	40%	3	1	2	1

Measure	Purchase trucks and vans powered by hydrogen fuel cells to replace or expand the existing fleet							
Special features	According to the Federal Statistical Office, some 41,600 trucks and 10,600 HGVs were registered for use on Switzerland's roads; with an average service life of around ten years, about 4,000 to 5,000 commercial vehicles are replaced every year in Switzerland; hydrogen cell technology is not as mature as battery power							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
607.8	20%	40%	40%	33%	2	1	2	1

Measure	Expand hydrogen production and the infrastructure for hydrogen supply							
Special features	Switzerland has very few public hydrogen filling stations to date: seven in total as at April 2021							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
214.7	60%	40%	0%	0%	2	2	3	1

Measure	Use more biofuels and synthetic fuels							
Special features	The fraction of biofuels in commercial fuels was just 0.17% in 2010, but by 2019 this had risen to 6.7% in diesel and 2.6% in petrol; until 2012 domestic biofuel producers sold their fuel mainly to operators of truck fleets and construction machinery							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
10.4	0%	50%	50%	0%	3	1	2	1

Air Travel (domestic and international)

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	900.0 Mt	2 %
Europe	19.1 Mt	0 %
Switzerland (domestic)	0.1 Mt	0 %
Switzerland (international)	5.7 Mt	

Measure	Improve fleet efficiency							
Special features	Potential for further improvements and upgrades							
Investment volume [CHF m.p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
9.4 (39.5)	33 %	33 %	33 %	80 %	4	4	1	1

Measure	Use sustainable aviation fuels							
Special features	Sustainable aviation fuel (SAF), or biokerosene, is essential for energy transition in the aviation industry; compared with conventional fossil fuels, modern SAF reduces CO ₂ emissions by up to 80 percent; under current safety regulations, however, no more than half of aviation fuel can come from alternative sources; but there is still a long way to go before the aviation industry is able to deploy electric or hydrogen-powered engines in large aircraft because of the low energy intensity of batteries and the technical difficulty of storing large amounts of hydrogen							
Investment volume [CHF m.p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
33.4 (177.8)	40 %	40 %	20 %	0 %	3	2	3	1

Measure	Use aircraft with next-generation propulsion technologies							
Special features	Next-generation propulsion technologies are not expected to be used in aircraft in the foreseeable future (only expected to become mature/available from 2030 onwards); electric alternatives are required for domestic flights							
Investment volume [CHF m.p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
155.6 (790.3)	0 %	50 %	50 %	80 %	3	3	1	1



Shipping

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	900.0 Mt	2%
Europe	26.4 Mt	1%
Switzerland	0.1 Mt	0%

Measure	Improve the efficiency of vessels							
Special features	Switzerland has a modern fleet; the emission of air pollutants from shipping is minimal due to the small number of ships and the relatively few hours in operation. Most commercial shipping uses diesel, while leisure craft tend to use petrol. Steamers rely on heating oil; the overall number of ships and boats has been stable since 1980							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
59.4	33%	33%	33%	80%	3	1	3	1

Measure	Improve operating efficiency							
Special features	Operating efficiency can be improved by implementing digital solutions to optimise traffic routing, speed, engine capacity, energy systems and hull performance; at the moment the technologies are relatively new and still being tested							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
8.3	33%	33%	33%	80%	3	1	3	1

Measure	Develop and use alternative fuels							
Special features	Ongoing research (ETH etc.) in this field; potential especially in electric propulsion, as well as hydrogen- and ammonia-based fuels; in the case of hydrogen, no liquefaction or transport capacities have been available to date – above all, pilot projects are needed to test carbon-neutral vessels and clarify outstanding issues							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
87.9	20%	40%	40%	0%	2	1	3	1

Agriculture

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	5,400.0 Mt	10 %
Europe	607.2 Mt	12 %
Switzerland	6.5 Mt	14 %

Measure	Switch diet to alternative protein sources (plant-based meat and cultured meat)							
Special features	Rising demand for plant-based substitute meat products (25% of the Swiss population are “flexitarians”); a large portion of this has to be imported from abroad (e.g. grain legumes: more demanding climatic requirements, major effort and risk for Swiss farmers due to inconsistent crop yields); it is questionable whether plant proteins can be profitably cultivated in large quantities in Switzerland – for example: Swiss green lentils cost twice as much as the rival product from Canada due to higher domestic production costs							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m.p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
114.2	33%	33%	33%	10%	3	1	3	1

Measure	Improve the management of slurry							
Special features	The bulk of Switzerland’s ammonia gas emissions come from liquid manure, or slurry; in an attempt to reduce these, the Federal Council already incorporated two measures in the Ordinance on Air Pollution Control (OAPC) in 2020: first, slurry storage facilities must be permanently covered to prevent the release of ammonia gas; second, it is now mandatory to apply the slurry – where the topography allows – with drag hose spreaders rather than baffle plates, as before							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m.p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
45.5	33%	33%	33%	20%	3	1	3	1

Measure	Adopt regenerative agricultural practices, especially direct sowing and switch to organic farming							
Special features	Little scientific research has been conducted; direct sowing is a relatively new method in Switzerland – because of the specialist know-how required, this approach has only been taken up by a small proportion of Swiss farmers; barely 5% of the total arable land in Switzerland (275,439 hectares) is sown directly							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m.p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
					Banks	Capital market	Public sector	Others
10.1	33%	33%	33%	20%	3	1	3	1

Buildings

Region	CO ₂ e emissions (2019)	Percentage of total emissions (2019)
Global	3,900.0 Mt	7%
Europe	624.8 Mt	13%
Switzerland	11.1 Mt	24%

Measure	Improve the efficiency of electrical equipment							
Special features	In 2019 there were 46.81 million large domestic appliances in Switzerland, as well IT, office equipment and consumer electronic devices (11.7% of electricity consumption); advances in technology have increased the energy efficiency of IT, office equipment and consumer electronic devices by 54% since the year 2000, almost double that recorded for white goods							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
	Banks	Capital market	Public sector	Others				
157.9	33%	33%	33%	40%	4	1	1	1

Measure	Reduce demand for cooling/heating through advanced building shell design							
Special features	Over a million homes in Switzerland require energy efficiency improvements; the current rate of refurbishment is only around one percent (needs to be double that to achieve national climate targets); a national building programme was launched in 2010 and a programme of federal subsidies added in 2017; building measures include heat insulation in the fabric of the building and energy upgrades							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
	Banks	Capital market	Public sector	Others				
679.8	33%	33%	33%	50%	3	1	3	1

Measure	Replace conventional heating with advanced low-carbon technology and electrification							
Special features	Around two thirds of buildings in Switzerland are heated with fossil fuels – the use of oil for heating buildings is the highest in Europe and is still permitted in new builds; state subsidies to replace fossil fuels or direct electrical heating systems by connecting to a heating system/network powered by renewables exist in the form of incentive programmes run by the cantons; because market-ready alternatives are available, properties heated by fossil fuels could be penalised with higher mortgage interest rates							
Investment volume	Investment time frame			Substitution percentage	Financing sources score:			
[CHF m p.a.]	2020s	2030s	2040s		1 (not relevant) – 5 (very relevant)			
	Banks	Capital market	Public sector	Others				
339.5	33%	33%	33%	50%	3	1	3	1

Measure	Develop district heating/cooling at the system level							
Special features	Swiss subsidy programme for district heating/cooling: heating networks can be supported in a simple way within the framework of the “heating networks” programme; conclusion of a support contract with the Foundation for Climate Protection and Carbon Offset KliK (CHF 100 per tonne of CO ₂ saved up to 2030)							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
37.4	33%	33%	33%	50%	3	1	3	1

Measure	Upgrade energy systems in residential buildings							
Special features	Around 1 million of the 1.8 million homes in Switzerland currently need energy modernisation. The upgrade percentage is expected to be around 1–3 % over the period 2021–2050.							
Investment volume [CHF m p.a.]	Investment time frame			Substitution percentage	Financing sources score: 1 (not relevant) – 5 (very relevant)			
	2020s	2030s	2040s		Banks	Capital market	Public sector	Others
929.1	25%	35%	40%	90%	4	1	2	1



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