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UBS Sustainability and Impact Institute

# Downhill climb

The challenge and opportunity of Switzerland's journey to reduce emissions

UBS

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# Editorial

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Swiss emissions peaked decades ago, and the country has made significant strides compared to others. Its ambitious climate policies, its natural endowment of hydro power, and a population that values its pristine landscape and flourishing biodiversity, have put the country on a strong footing in its climate transition journey.

But just as hikers and climbers incur more injuries on the downslope than on the up, so Switzerland's Net Zero path contains formidable challenges, with energy security being the most pressing. The ongoing transformation in the Swiss energy mix will require renewed efforts each and every year on multiple fronts to succeed. Further, strengthening incentives to foster innovation, encouraging collaboration, and driving scalable solutions to continue its momentum is paramount. Finance will play a pivotal role in this transformation, too. At UBS, we are committed to supporting our clients in the transition to a low-carbon world, leading by example in our own operations, and sharing our lessons learned along the way. We offer holistic solutions, embedding sustainability in strategic client conversations and partnerships. Working with our corporate clients, we help to understand business drivers and obstacles to shape their net zero strategy.

The climate transition also offers many opportunities, with a swathe of new green markets, from low-carbon cement to carbon removals, in which Swiss companies are well positioned to take a leading role. UBS offers its private clients the opportunity to deploy their capital to transition investments. However, long-term success hinges on sustained ambition, collaboration among key stakeholders, bold action, and winning the hearts and minds of citizens as well as businesses, as it is their preferences that could make or break decarbonization. This report maps the progress to date, as well as opportunities and challenges ahead.

We hope you enjoy the read.

# Executive Summary

Switzerland is on track to achieve its emissions goals, but remaining so will not be easy. Electrifying its economy and transitioning to renewables, all while ensuring energy security, as well as scaling carbon capture and storage technology, are just some of the challenges that lie ahead.

## Head start…

Switzerland, like most developed economies, is targeting net zero greenhouse gas emissions by 2050. Thanks to several advantages, stemming from both previous policy decisions and luck of geography, it starts from a strong position. It has the lowest carbon intensity of any developed country and mostly zero-carbon domestic electricity generation. Versus 1990, the comparison year for official Swiss targets, emissions have fallen 24% by 2022, while the economy more than doubled in size. Aiming to continue this progress, in 2021, the Swiss government published its updated Net Zero strategy, targeting a 35% reduction by 2025, and 50% by 2030.

## … but a rocky road ahead

But challenges, both current and emerging, litter the path. The first is energy security. As Switzerland electrifies its economy, electricity demand will inevitably rise, but this comes at a time when much of its existing clean generating capacity is set to go offline. Switzerland's four remaining nuclear reactors, accounting for 32% of its gross power production, are scheduled for shutdown by 2034, while hydro generation faces risks from climate change as glaciers melt. Filling the gap will require a major build-out of renewables – mainly solar – presenting its own challenges. Seasonal demand and generation patterns are likely to become increasingly misaligned. Expanded energy storage combined with innovative efforts to reduce strains on the grid, like energy communities and water-based thermal networks, are likely to come to the fore.

## The carbon capture challenge and opportunity

The second obstacle is the need to perfect and scale new technologies. Most important among these is carbon capture. Some sectors, like agriculture and industry, are almost impossible to completely decarbonize and will require carbon capture and storage if net emissions reduction targets are to be met. Carbon capture equivalent to about a quarter of current Swiss emissions, will ultimately be required. This will be a technological, logistical, and financial challenge, but also an opportunity to lead in an area critical to global climate goals. However, carbon capture should be seen as a last resort for stubborn emissions, not an excuse to avoid reducing emissions in the first place.

## The importance of running with, not against, public opinion

Additionally, transitioning is dependent on consumer choices and public sentiment. Running against public opinion risks creating the condition for the unpicking of climate policies in the future. Beyond policy, there is a need to win the hearts and minds of consumers as their choices will play a key role in the transition.

## Show me the money

Finally there is the financial challenge. An estimated CHF 13bn per year to 2050 will be required to achieve Net Zero. Of this, 83% is expected to come from traditional bank loans with the rest from capital markets and public subsidies. While public money may make up a relatively small share of the required investments, unlocking all the needed private investment requires political buy-in and confidence in a supportive policy framework.

## Strong policy guardrails in place…

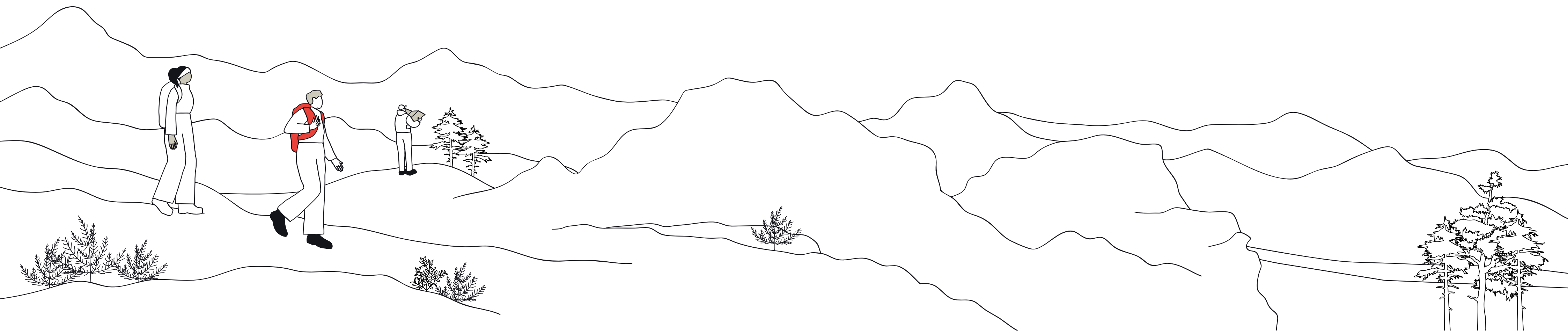
A raft of supporting policy and legislation has been passed to support the net zero journey. Some elements have been in place for many years, such as the $CO_2$ levy introduced in 2008. But much of it will become effective only in 2025. These include the Electricity Law, the $CO_2$ Act, and the Climate and Innovation Act, which are formidable legislative guardrails of Switzerland's transition to a net zero economy.

## …but success requires stakeholder cooperation

Government and the largest companies have so far led the climate transition charge, but increasingly SMEs and private citizens will be challenged to make their contributions, too. Financial institutions can guide personal and corporate clients to develop the plans and make the investments necessary to be prepared for the journey to 2050. They can also contribute by connecting investors with projects, encouraging decarbonization investments in their engagements with portfolio companies, and innovating to de-risk and enable new projects and technologies. All stakeholders will need to work together to achieve the transition, and while challenges and uncertainties remain, the current path and future intentions are providing grounds for optimism.

# A bright beginning

Switzerland is off to a promising start, with total greenhouse gas emissions peaking in the early 1990s and falling consistently since 2011. A long-term policy- and market-based framework is supporting the country's aim to achieve Net Zero by 2050. Yet, the path ahead is rocky – hurdles will need clearing, and perseverance will be necessary.



Switzerland, like most developed economies, is targeting net zero greenhouse gas (GHG) emissions by 2050. While this report will focus exclusively on emissions, energy use, and the transition within the country's domestic economy, Switzerland's pioneering role in reducing emissions beyond its own borders is noteworthy (Box 1).

Thanks to several advantages, resulting from both previous policy decisions and favorable geography, Switzerland has the lowest carbon intensity (emissions per unit of GDP) of any developed country, and the third lowest globally (Figure 1). Further, it has the lowest energy use per unit of GDP of developed countries, and second lowest globally. Third, it has mostly zero-carbon domestic electricity generation, with the majority produced by either hydro or nuclear. And lastly, its carbon pricing is one of the highest in the world, which, at CHF 120 per ton, albeit with various exemptions, lies within the 2030 range recommended by the World Bank to limit warming to 1.5°C.[1,2]

Box 1:

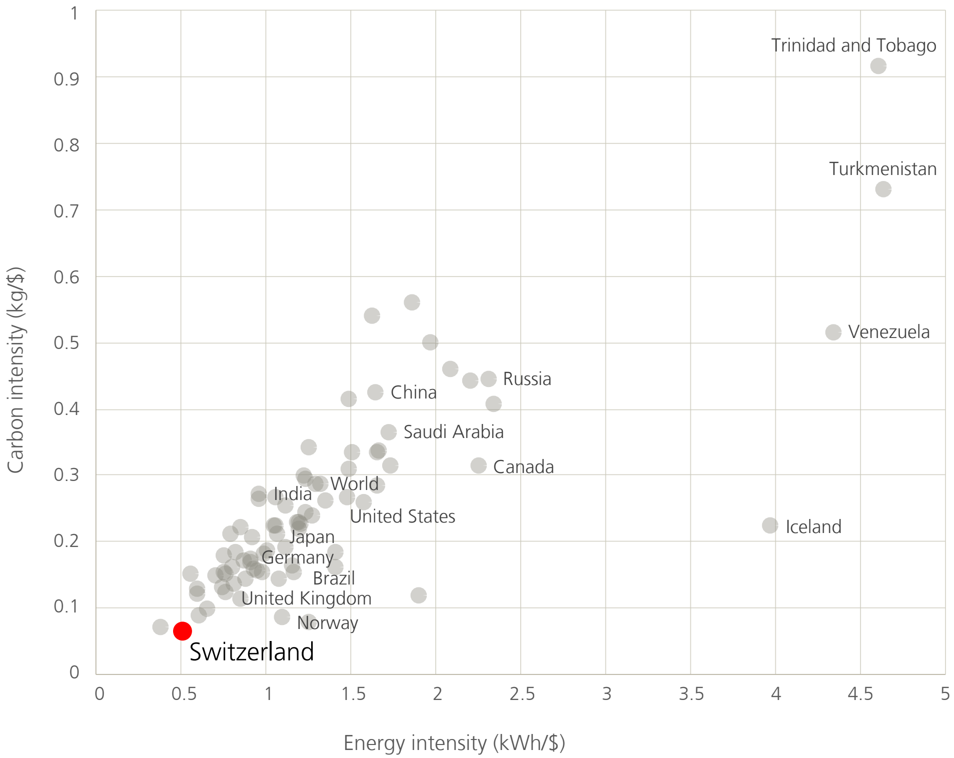
## Switzerland's role in reducing emissions outside its borders

Switzerland is playing a leading role in reducing extraterritorial emissions in two ways. First by setting high standards internally, that will apply to domestic and international companies operating in Switzerland. For example, in 2022, following the TCFD recommendations, the Federal Council mandated climate disclosures and transition planning for all public companies as well as non-public banks and insurance companies above a certain size,[3] starting with financial year 2024. The Climate and Innovation Act, passed in 2023, requires companies to achieve net zero emissions for Scopes 1 and 2 by 2050 as well as defining sector pathways. Separately, the $CO_2$ Act is a 5-year implementation plan and market-based strategy containing a mixture of carrots and sticks to support the Swiss transition. Second, Switzerland is pioneering the Paris Agreement Article 6.2 transaction framework, whereby countries will trade carbon credits with each other to connect their carbon markets and reduce emissions in the most efficient way possible. While offsetting emissions abroad can be controversial, Switzerland has signed several bilateral treaties to provide examples of how to establish a legal basis for commercial contracts between buyers and sellers of emission reductions, providing a workable model others can follow.[4]

1 OECD, (2023), *Effective Carbon Rates 2023: Pricing greenhouse gas emissions through taxes and emissions trading.*
2 World Bank, (2024), *State and trends of carbon pricing.*
3 >500 employees and at least CHF 20 million in total assets, or >CHF 40 million in turnover
4 Swiss Federal Department of Environment, Transport, Energy and Communications, (2024), *Declaration of Intent between the Ministry of Energy and the Ministry of Climate and Environment of Norway and the Swiss Federal Department of Environment, Transport, Energy and Communications on Cooperation on Carbon Capture and Storage and Carbon Dioxide Removals.*

**Figure 1:** Low intensity

*The carbon and energy intensity of Switzerland's domestic economy vs. the rest of the world*




Source: Federal Office for the Environment; UBS

## Downward slope

Switzerland's domestic GHG emissions technically peaked in 1973, though they did not enter a persistent downtrend until the mid-2000s. From 2005 to 2022 they have fallen by a quarter, to just under 42 million tons of $CO_2$ equivalent ($CO_2e$).[5] Versus 1990, the comparison year for official Swiss targets, overall emissions have fallen 24% by 2022, while the economy has more than doubled in size. These reductions have come mostly from a 44% and 29% decline in emissions from buildings and industry respectively.

In 2021, the Swiss government published its long-term strategy for reaching Net Zero by 2050.[6] It includes interim targets for domestic emission reductions: a 50% cut by 2030, and a 75% cut by 2040 (Table 1). While most of these reductions must be met within Switzerland's borders, emission reductions and certified carbon removals achieved in other countries also count toward the national targets.[7]

**Table 1:** The long-term strategy for reaching Net Zero by 2050

| | 2025 | 2030 | 2040 | 2050+ |
|---|---|---|---|---|
| **National goals** | –35% vs. 1990* | –50% vs. 1990 | –75% vs. 1990 | –100% vs. 1990 |
| **Federal government** | | | Net Zero operations (Scope 1 and 2) | |
| **Cantons[8] and firms** | | | Net Zero for cantons and public firms | Net Zero for private firms (Scope 1 and 2) |

* The 2025 35% cut is an "anticipated" figure in the Swiss Nationally Determined Contribution, rather than a legally enshrined target

Source: Our World in Data; UBS

5 Gases with warming equivalent to that amount of $CO_2$.

6 Swiss Federal Office of Energy, (2021), *Energy Perspectives 2050+*.

7 For example, in the version of the $CO_2$ Act that was rejected by voters, it was stipulated that of the 50% targeted cuts by 2030, a minimum of 37.5% was to be accounted for by measures in Switzerland, while the remaining 12.5% would potentially be accounted for by measures abroad. The new version of the Act states that the Federal Council shall determine the share according to SwissInfo, (2024), *Parliamentary resolutions on the revised $CO_2$ Act: An overview.*

8 The cantons are Swiss regional government areas which handle local administration and legislation. The country has 26 of them.

## Legislative support increasing

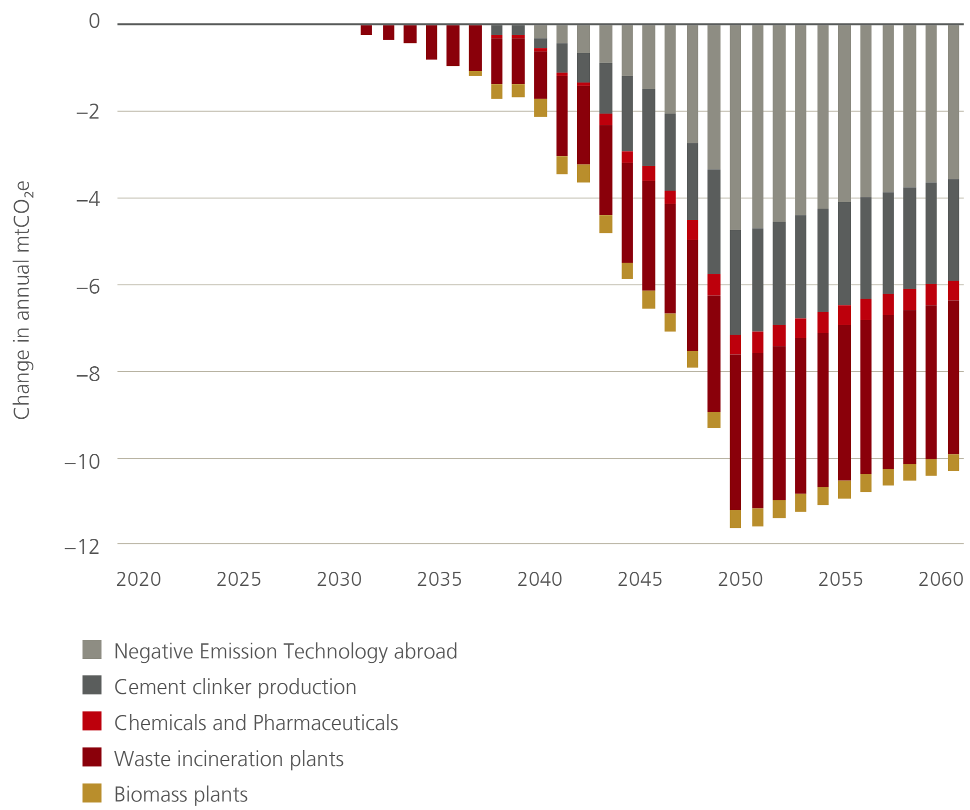
Switzerland has a raft of supporting policy and legislation to meet its climate goals (Table 2). Some have been in place for many years, such as the $CO_2$ levy, which was introduced in 2008 (Box 2). But much of it is new, becoming effective in 2025. These include the Electricity Law, the $CO_2$ Act, and the Climate and Innovation Act, which will define the legislative parameters of Switzerland's transition to a net zero economy. The economic impact of this legislation can vary by sector, company size, and geography.

The government has announced that it intends to align with European Union (EU) regulations in certain key areas, for example, the Corporate Sustainability Reporting Directive.[9] Under the Swiss Federal Council's proposed revision of the Code of Obligations, approximately 3,500 Swiss companies (up from 300 currently) will need to measure and report emissions as well as other environmental, social, and governance parameters.[10] This becomes effective two years after the revised law enters into force.

Legislative effort alone may not be enough to eliminate emissions completely for sectors like agriculture and industry. Significant carbon capture and removals capacity, equivalent to roughly a quarter of current Swiss emissions is expected to be required (Figure 2). New technology will be a key part of this, while achieving scale will pose both logistical and financial challenges.

**Figure 2:** The role of carbon capture and removals in the Swiss transition

*The negative GHG emissions from carbon removals projected in the EP2050+ strategy*




Source: Federal Office for the Environment; UBS

9 Homburger (2024), homburger.ch/en/insights/swiss-corporate-sustainability-reporting.

10 As defined by the European Sustainability Reporting Standards or an equivalent as defined by the Federal Council.

**Table 2:** A raft of legislative guardrails guides the transition

| | 2025–2030 | 2035 | 2040 | 2050 |
|---|---|---|---|---|
| **Climate and Innovation Act**<br>*National and subnational climate governance and targets* | Financial assistance guaranteed to companies using novel techniques and processes to achieve Net Zero until 2030.<br>Confederation to provide advice to sectors and companies on Net Zero roadmaps by 2029. | | –75% emissions vs. 1990<br>Federal gov't: Net Zero*<br>Cantons and federally-affiliated companies: Net Zero* | –100% emissions vs. 1990<br>All Swiss businesses: Net Zero* |
| **Electricity Law**<br>*Frameworks, incentives, and targets for power* | Subsidies and permitting reform for renewables.<br>Reserve and local electricity communities introduced.<br>Surplus regional solar price harmonized.<br>Supplier energy efficiency targets.<br>Legal framework for dynamic energy tariffs. | **Generation targets vs. 2023**:<br>Renewables, +509% (35 TWh<br>Hydro, +2% (38 TWh)<br>**Per capita targets vs. 2000:**<br>Electricity, –13%<br>Energy, –43%<br>Winter electricity, –2 TWh | Hydro: +2 TWh<br>Federal government energy use vs. 2000: –53% | **Generation targets vs. 2023:**<br>Renewables, +683% (45 TWh)<br>Hydro, +5% (39.2 TWh)<br>**Per capita targets vs. 2000**:<br>Electricity, –5%<br>Energy, –53% |
| **$CO_2$ Levy (part of $CO_2$ Act)**<br>*Incentive for companies to set climate strategies* | $CO_2$ levy exemption for companies with 2040 climate target.<br>Companies that miss their own decarbonization targets must pay penalties. | | Exemptions from $CO_2$ levy end | |
| **$CO_2$ Act**<br>*Governance and climate targets* | –50% emissions vs. 1990<br>Companies to submit emissions plans within 3 years and update it every 3 years. Annual progress report. | | | |

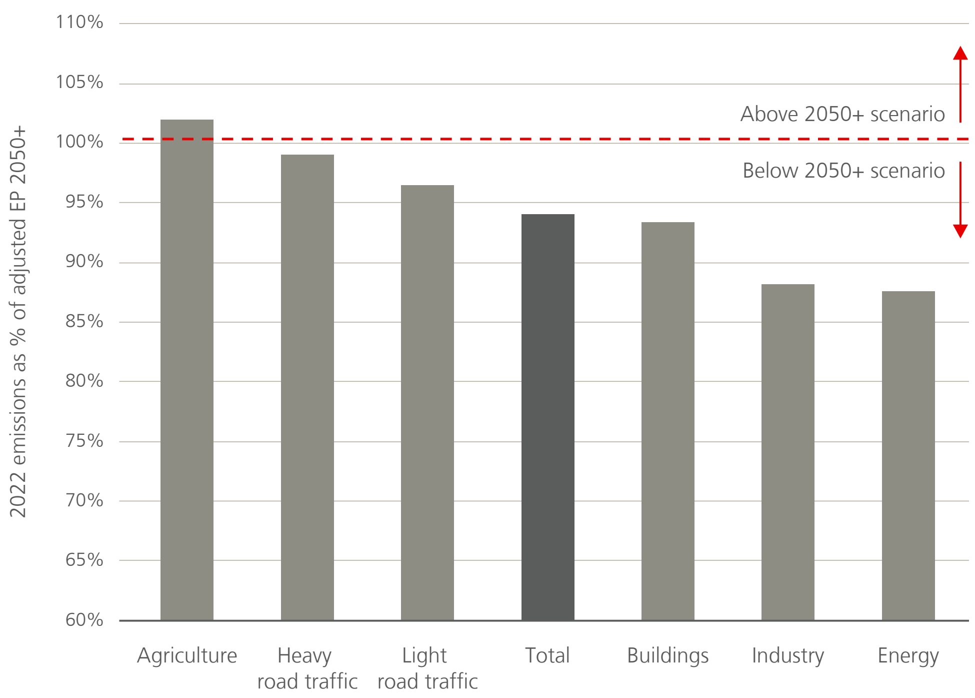
* Scope 1 and 2 emissions
Source: Federal Council; Federal Office for the Environment; UBS

Scaling carbon removals
Johannes Tiefenthaler, CEO, neustark
**Read the interview ›**

Switzerland is broadly on track to hit its emissions reduction targets. While 2021 saw a post-COVID rebound, 2022 emissions were below those of 2020 and below those envisaged by the baseline scenario of the Government's plan, known as Energy Perspectives (EP) 2050+ (Figure 3). Some sectors are performing better than others, with buildings and industry outperforming the baseline scenario.

**Figure 3:** Broadly on or below target

*Swiss emissions relative to the baseline projections laid out in the EP2050+ strategy*




Source: Federal Office for the Environment; UBS

Box 2:

## The $CO_2$ levy

**Coverage:** The levy is imposed on fossil fuels used to generate heat, light, or electricity in stationary settings and covers about 40% of Swiss emissions. Wood, biomass, and petrol are not included.

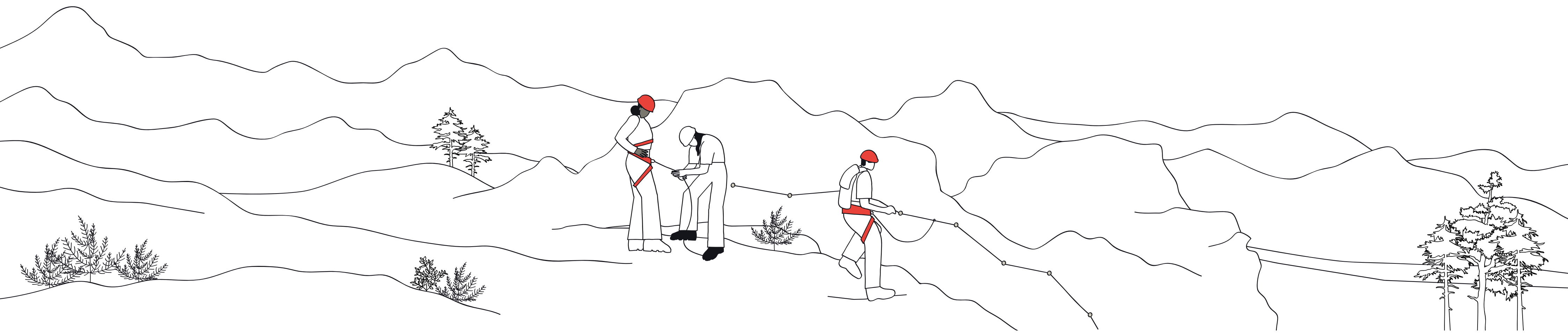
**Level:** The levy is currently CHF 120 per ton of $CO_2$ emissions.

**Reallocation:** One-third of revenues, which amounted to CHF 1.2bn in 2022, are allocated to supporting energy-efficient renovations and renewable heating energy, while the other two-thirds are redistributed to households and businesses.

**Exemptions:** There are exemptions, including for companies that commit to emissions reduction plans, or join the emissions trading scheme. Companies that miss their emissions reduction commitments must pay penalties of CHF 125 per ton in addition to submitting a national or international certificate.

# Safety first

While Switzerland is currently on target to decarbonize by 2050, challenges persist, and staying the course will be a stretch. Existing and emerging challenges include safeguarding energy security, achieving popular consent for new infrastructure, and maintaining a stable power market and grid while ramping up electrification. This requires carefully balancing environmental, economic, and political priorities.



As Switzerland electrifies its economy, the government projects electricity demand will increase by over 20% by 2050 (EP2050+ baseline scenario) compared to today, although another estimate by the Swiss Federal Institute of Technology Lausanne suggests it could almost double,[11] as the country shifts away from fossil-powered boilers and vehicles. This brings several challenges.

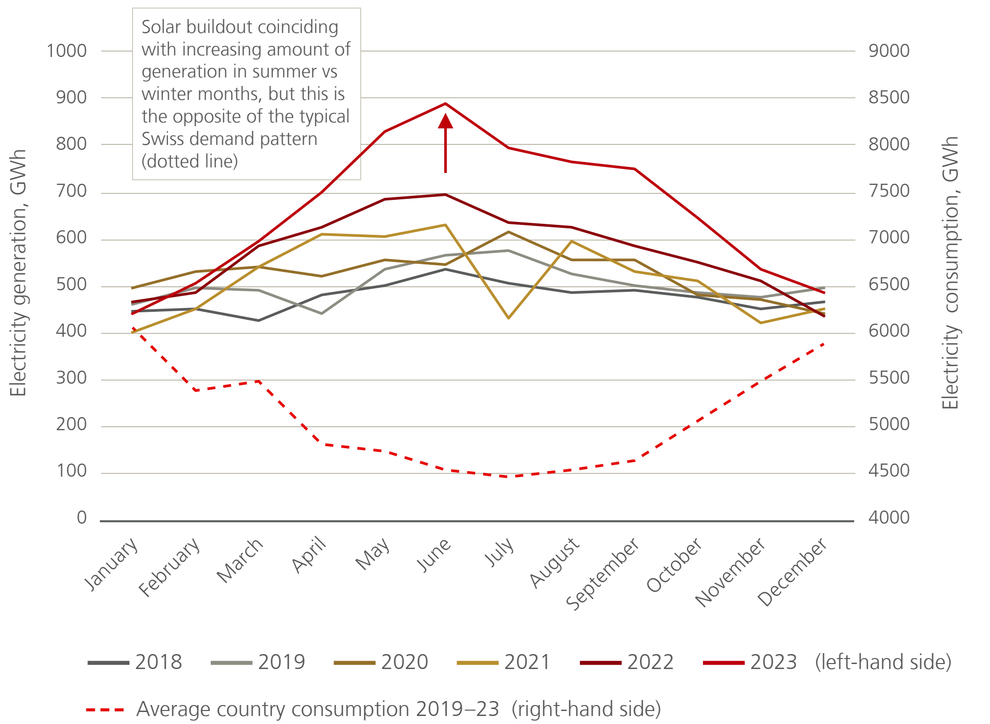
A significant proportion of current generating capacity is set to go offline. Switzerland's four remaining operational nuclear reactors, which in 2023 accounted for 32% of its gross power production, are scheduled for shutdown by 2034, although there remains a degree of uncertainty over their fate.[12] In addition, hydro generation, which currently makes up about 57% of the electricity mix, faces risks from climate change as glaciers melt.[13]

## Matching supply and demand

The greater focus on intermittent generation from renewables introduces more supply seasonality,[14] which is compounded by a seasonal pattern in demand. The problem is not just of potential deficits during the winter, which requires Switzerland to import electricity from its neighbors, but also of large surpluses during the summer (Figure 4). These surpluses can unbalance the system, risking grid instability, negative electricity prices, and temporarily curtailment of renewables power generation.

**Figure 4:** Seasonality in electricity demand and production is misaligned

*Monthly electricity generation from renewables and conventional thermal generation vs. average Swiss electricity consumption*




Source: Federal Office for the Environment; UBS

[11] SwissInfo, (2024), *Electricity law isn't enough for Switzerland to achieve climate goals.*
[12] Reuters, (2024), *Switzerland to scrap ban on building nuclear power stations.*
[13] Although projections suggest this threatens only around 1 terawatt hour of generation annually, equivalent to just over 1% of generation in 2023. Source: Schaefli, B., et al. (2019), *The role of glacier retreat for Swiss hydropower production,* Renewable Energy.
[14] E.g., solar produces electricity only in the daytime, of which there is less in winter than in summer.

The new Electricity Law requires that Switzerland's net imports between October and March do not exceed 5 terawatt hours (TWh), equivalent typically to about 15% of final consumption during those months. This has been exceeded in three of the last nine years. Simply installing more generating capacity, which is certainly required, is neither an easy nor sufficient solution.

Meeting this challenge requires the development of both long- and short-term energy storage infrastructure. These will include pumped hydro, batteries, but also other forms, like seasonal heat storage such as heating water in underground reservoirs or even heating the earth with geothermal probes. According to one estimate, such storage solutions could meet the equivalent of roughly 4 TWh of winter electricity demand by 2050, equivalent to 40% of the expected additional winter electricity demand.[15]

In addition to storing excess supply, shifting demand is also required. One option is dynamic pricing, whereby electricity prices are lower or even negative when generation is high and vice versa, which in turn incentivizes consumers and companies to shift their consumption patterns. Another is the use of smart systems that automatically adjust in response to changing market conditions, charging EVs or onsite energy storage when prices are low and releasing power to the grid when prices are high.

## More capacity but also more opposition

Swiss electricity generating capacity needs to rise from 27 gigawatts (GW) today to over 60 GW by 2050.[16] This may seem like a drastic expansion of capacity given the mere 20% demand increase that is projected, but this is a result of the shift to solar (Figure 5) and its lower utilization factor – 1 GW of nuclear power capacity is equivalent to 3–5 GW of solar. In addition, the need to reduce reliance on foreign generation further increases the capacity requirements. On average, 1.2 GW in new capacity should be added every year from now to 2050 to meet the EP2050+ baseline scenario.

The biggest hurdle to add more capacity is not the supply of finance but the supply of projects. The will to build is there, but in some cases permitting delays are holding projects back. The split in permitting jurisdiction between federal and cantonal officials has been cited as one bottleneck.[17] In 2022, "solar express" legislation sought to shift the balance in favor of giving projects a faster go-ahead, but reportedly one-third of the 50 large-scale projects presented so far have been abandoned, often due to local opposition.[18]

[15] Guidati, G., et al, (2022), *Winterstrombedarf und saisonale Wärmespeicher – mit Sommerwärme Strom im Winter sparen,* AeeSuisse.

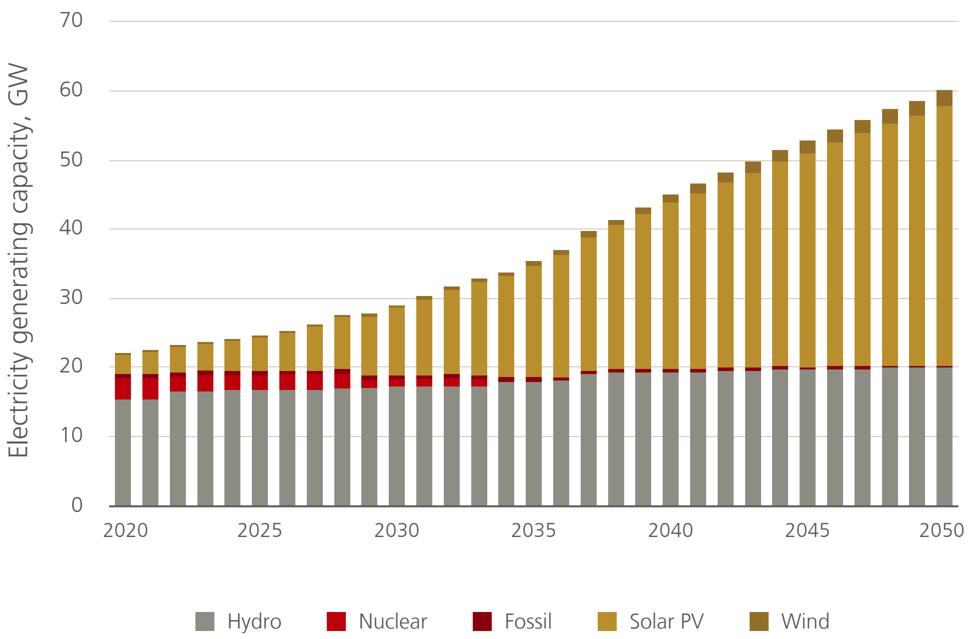
[16] Gigawatts are a measure of electricity generation capacity, i.e. how much can be generated in one second, as opposed to gigawatt hours which measure how much has been generated over a month or a year. 1 GW of solar produced much fewer GWh than 1 GW of nuclear because solar only generates electricity while the sun is shining.

[17] IEA, (2023), *Switzerland 2023 Energy Policy Review*, P70.

[18] SwissInfo, (2024), *Construction starts on first large-scale solar park in Swiss Alps.*

**Figure 5:** Sunlit uplands

*Electricity generating capacity by production type in the EP2050+ baseline scenario*




Source: Federal Office for the Environment; UBS

## Grid management

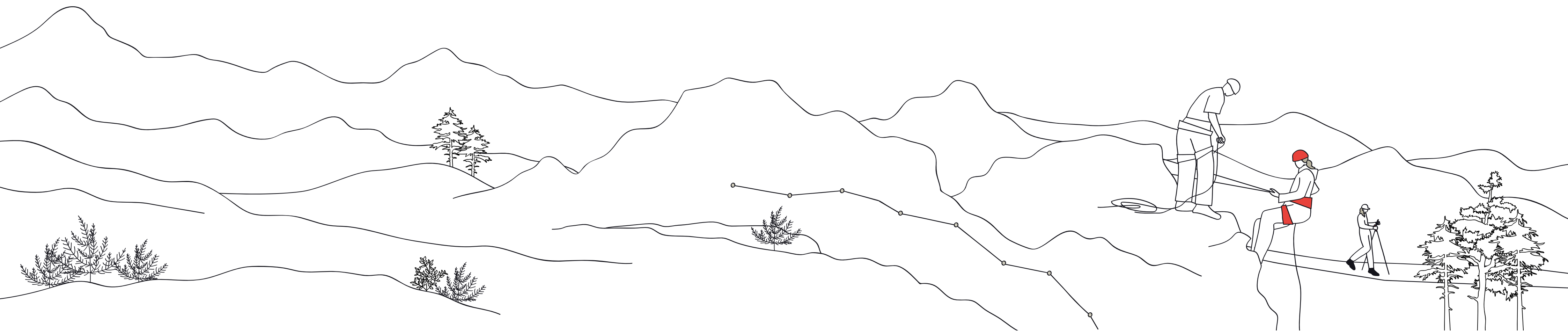
Grid infrastructure upgrades will be necessary to accommodate increased electricity consumption and seasonal variations. These will take the form of transmission and distribution line improvements, as well as the introduction of smart grid technology. More smart meters will be necessary, which as of 2022 were still only in 30% of properties.[19] Another key part of the solution is keeping supply and demand off the grid where possible, through the expansion of decentralized electricity generation like rooftop solar and microgrids. The Electricity Law includes provisions to encourage the creation of "energy communities," whereby buildings share power generated locally as needed, easing congestion on the grid.

The Swiss grid is highly interconnected with its neighbors, all of which, unlike Switzerland, are in the EU. As a result, Switzerland is not covered by the EU's introduction of rules governing cross-border grid capacities, which state that from 2025, 70% of grid capacity must be kept free for trade with EU member states. This, combined with the potential for unplanned electricity inflows (e.g., 30% of the flows between France and Germany pass through the Swiss grid), heighten the need for improved domestic Swiss generation and grid management.

[19] Swiss Federal Office of Energy, (2023), *Energiestrategies 2050 Monitoring Report.*

# Individual pace

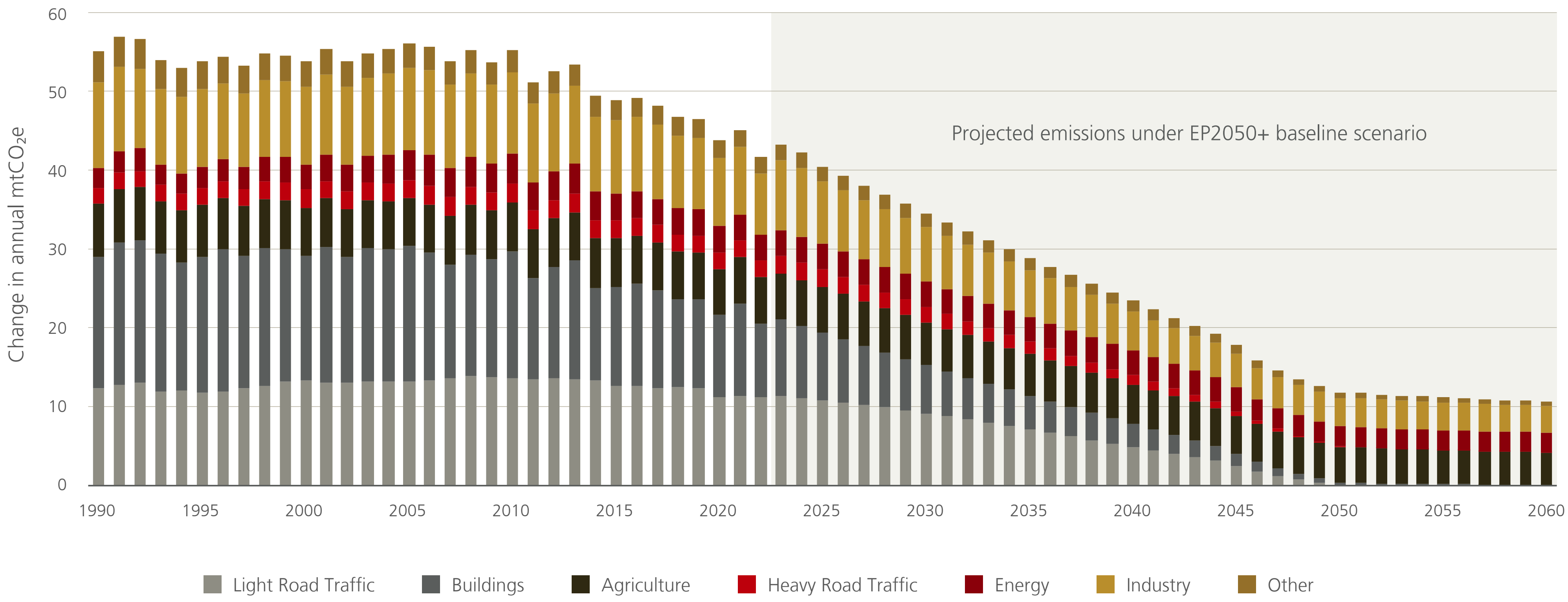
Switzerland has made strong progress on its climate goals. Maintaining long-term momentum requires a fundamental shift in how the economy produces goods and services as well as changes in consumer behavior. Sectors like power are charging ahead, and could present enticing commercial opportunities, others face more hurdles and will require deeper reforms, sustained investment, and collaboration to stay on track.



Near-term emissions reductions are concentrated in the buildings, light road traffic, and industrial sectors (Figure 6). Some sectors, like agriculture, are projected to continue producing emissions even after Net Zero has been achieved. This makes research and development (R&D) as well as the application of innovative technology, such as carbon capture, an integral part of a successful transition.

**Figure 6:** Swiss emissions have peaked

*Swiss domestic greenhouse gas emissions broken down by sector*




Source: Federal Office for the Environment; UBS

# Agriculture

### Emissions
Agriculture contributed roughly 14% of GHG emissions in 2022, primarily from livestock farming, fertilizer, and soil management. The ruminant herds are large, representing roughly 80% of the sector's emissions. Cattle and dairy activities are between 3 to 10 times and 100 to 150 times more energy-intensive than pig and poultry farming, respectively.

### Trends
Demand for meat and dairy looks set to remain high – based on current trends, livestock numbers may only decrease about 25% by 2050.[20] In addition, the proliferation of energy-intensive activities, such as heated greenhouses, means primary energy consumption is expected to drop by only 20% by 2060.

### Agriculture decarbonization timeline

| 2025 | 2030 | 2040 | 2050+ |
|---|---|---|---|
| Production of renewable fuels from crops must not worsen food security. | N/A | –30%* | –40%* |

*Targeted emissions cut from 1990 levels.
Source: FedLex; Federal Office for the Environment; Ecofact; UBS

### Opportunities
Key levers include replacing fossil fuels, improving resource efficiency, and adapting farming to the challenges of climate change. Significant R&D is needed to reduce livestock emissions if herd populations do not fall over time. A key area for farms to build skills and knowledge is in greenhouses, given the area they occupy is expected to almost double by 2050 as demand for fruit and vegetables grows, as well as changing on-farm practices, such as improving soil management.

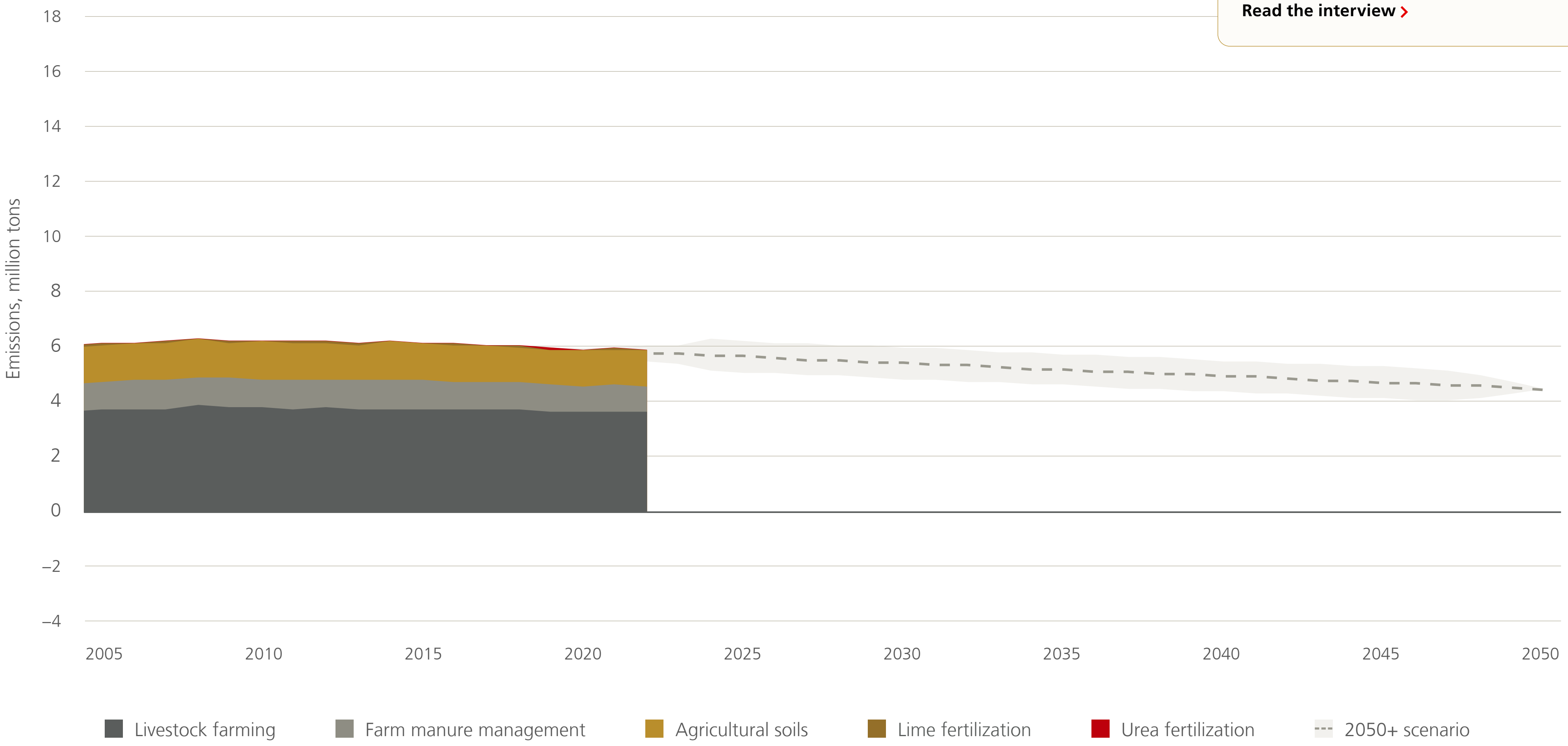
Corporates who produce key equipment and inputs for low-carbon farming are selling into expanding markets, particularly green fertilizer, as well as specialist manufacturers of resource efficiency equipment that reduce water and chemical consumption. Farmers who adopt these technologies lower their dependence on inputs, reducing costs.

### Challenges
Emissions need to be reduced across hundreds of thousands of fields and animals, rendering agricultural decarbonization a unique logistical challenge.

Making green alternatives more affordable for farmers requires additional incentives and policy support. The upfront investment for new equipment, or the additional cost of low-carbon alternatives such as green fertilizer, can be daunting for an industry with often low profits and seasonally uncertain cash flow.

[20] EP2050+ scenario, base = 2020.

**Figure 7:** Agricultural emissions vs. the 2050+ scenario




Note: EP2050+ baseline scenario aligned with 2019 emissions to reflect changes in emissions measurement. Band represents a +/– 10% range around the baseline EP2050+ scenario.
Source: Federal Office for the Environment; UBS

Sowing sustainably

Dominique Mégret, CEO, Ecorobotix

**Read the interview ›**

# Light Traffic

### Emissions

Light traffic, still mostly internal combustion engine (ICE) cars, accounts for the largest share of Swiss emissions by sector, producing over 11 million tons in 2022 or 27% of the total.

### Trends

In 2023, a net 84,000 ICE passenger cars were decommissioned, leaving 4.2 million on the road. Petrol cars were still the largest share of new vehicle registrations, at 33%, with diesel accounting for a further 9%. But hybrid (both plug-in and conventional) and all-electric passenger cars represent a growing share, at 37% and 21% of new registrations respectively in 2023, up from 33% and 18% a year earlier. And that growth is accelerating – new EV registrations in 2023 were 12,000 higher than in 2022, which were 8,000 higher than in 2021. This acceleration will need to be maintained if targets are to be met, but it remains to be seen if the removal of the 4% EV import duty exemption in 2024 will hinder this.

### Light traffic decarbonization timeline

| 2025 | 2030 | 2040 | 2050+ |
|---|---|---|---|
| Per km emissions targets for new vehicles. Vehicle importers and manufacturers pay penalty for missing targets. | –25%* | –57%* | –100%* |
| Companies must have plans to hit Net Zero by 2050. | | | |
| No exemptions from the $CO_2$ levy. | | | |

* Targeted emissions cut from 1990 levels.
Source: FedLex; Federal Office for the Environment; UBS

### Opportunities

The ElectroMobility Roadmap set ambitious targets for 2025 including raising the share of battery-powered vehicles (including plug-in hybrids and full EVs) to 50% of new registrations from 28% as of October 2024, and increasing the number of charging stations to 20,000.[21] The targets are ambitious relative to current levels and imply a supportive environment for the EV sector over the coming years.

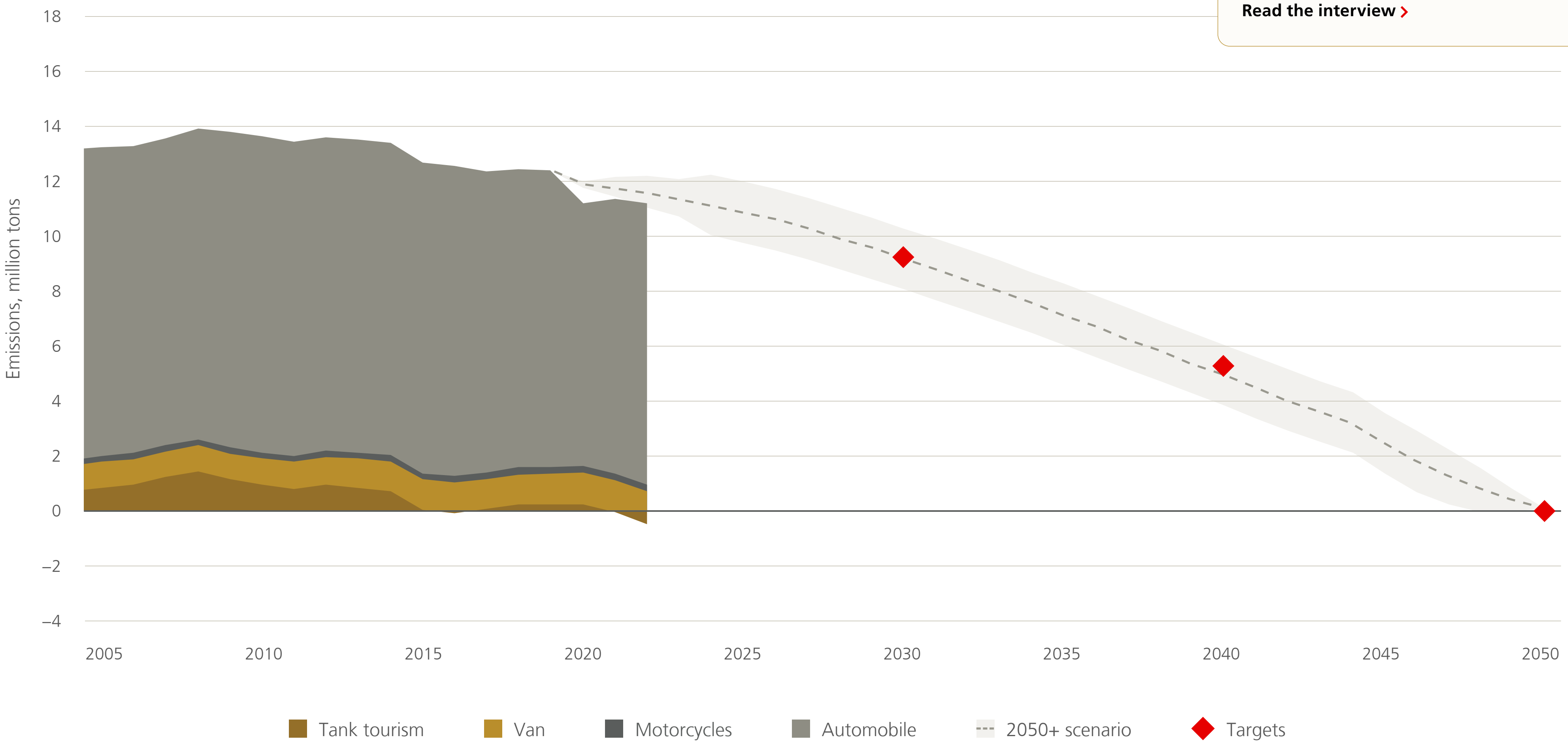
The $CO_2$ Act incentivizes development of the charging network, supported by the $CO_2$ levy. Tighter vehicle efficiency targets as part of the $CO_2$ Act will penalize manufacturers and importers whose vehicles exceed defined $CO_2$ emissions per kilometer levels. These targets will be tightened further in 2030. If planned EU regulations go ahead, from 2035 new $CO_2$-emitting cars will be banned in the EU, and de facto in Switzerland, too. Around 10% of autos are expected to use hydrogen fuel cells by 2040, while a residual of conventional and plug-in hybrid cars will require imported e-fuels, i.e., fuels produced using electricity.

### Challenges

Remaining on track with the course laid out in the EP2050+ baseline scenario will need an acceleration in light traffic emissions reductions from 200,000 tons a year in the previous eight years to 250,000 tons a year to 2030. In addition to shifting more people from cars onto public transport where possible, the substitution of ICE cars by EVs or more fuel-efficient vehicles needs to accelerate. An acceleration in the number of chargers is also likely to become increasingly important. The EU recommends there should be one public charging point for every 10 EVs on the road. But in 2023, for each new charging point roughly 12 new EVs were registered. If these trends continue, a shortage of charging points will become increasingly likely, which in turn may adversely affect demand for EVs slowing decarbonization.

[21] In August 2024 there were just 14,224, up from around 13,000 at the end of 2023, source: Swiss Federal Office of Energy, *Key figures about the publicly accessible charging infrastructure for electrical vehicles.*

**Figure 8:** Light traffic emissions vs. the 2050+ scenario




Turbo charging the transition

Olivier Kofler, CEO, Carvolution

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Note: EP2050+ baseline scenario aligned with 2019 emissions to reflect changes in emissions measurement. Band represents a +/– 10% range around the baseline EP2050+ scenario.
Source: Federal Office for the Environment; UBS

# Buildings

## Emissions

Buildings directly accounted for just over 9 million tons of emissions in 2022, 23% of Switzerland's total. This makes them the second-largest contributor.

## Trends

Significant progress has been made, with emissions falling from over 17 million tons and 30% of the total in 2005. Switzerland's buildings sector is currently on track to hit the projection in the EP2050+ baseline scenario. A successful subsidy program has seen over CHF 3 bn paid out under the Buildings Program between 2010–2022, with about half of that allocated to improvements in thermal insulation, the rest mostly helping to finance upgrades in buildings' systems and heating solutions. 21 of the 26 cantons have introduced regulations requiring at least 10% of heat generated in residential buildings to be from renewable sources or saved through efficiency measures.[22]

### Buildings decarbonization timeline

| 2025 | 2030 | 2040 | 2050+ |
|---|---|---|---|
| New buildings (>300m²) must install rooftop solar, relaxed permitting for existing buildings. | –50%* | –82%* | –100%* |
| Increased funding (CHF 200mn) for replacing heating systems, funded by the $CO_2$ levy. | | | |
| Companies must have a plan to hit Net Zero by 2050. | | | |

* Targeted emissions cut from 1990 levels.
Source: FedLex; Federal Office for the Environment; UBS

## Opportunities

The major routes to decarbonizing existing buildings – switching to non-fossil heating sources like heat pumps as well as reducing a building's overall energy demand – need to be expanded. Here, subsidies and incentive programs can make a difference: The government estimates the Building Program alone has enabled upgrades leading to almost one million tons in annual emissions reductions that would not otherwise have happened, equivalent to over 2% of Swiss emissions in 2022.[23]

## Challenges

New buildings are generally built in-line with emissions reduction principles, but 80% of buildings were built prior to 2000. The International Energy Agency (IEA) estimates retrofitting rates must rise to about 2% a year, from less than 1% a year as of 2020 to hit Net Zero by 2050.[24] At current rates, the last thermally inefficient pitched roofs and facades would not be replaced until the end of the century. Over half of residential buildings still use fossil fuels for heating, with inefficient direct electric water heating also accounting for 8%. Just 21% use heat pumps and 4% district heating.[25] Retrofitting is complex and expensive. Not all buildings are suitable for certain solutions; for example, a poorly insulated building would require such a large heat pump as to be prohibitively expensive. Similarly performing a deep retrofit outside a building's natural renovation cycle (which typically lasts about 40 years), can be economically unjustifiable. Additionally, reducing waste in the construction and operation of buildings through a more circular economy approach is required.

Building towards Net Zero

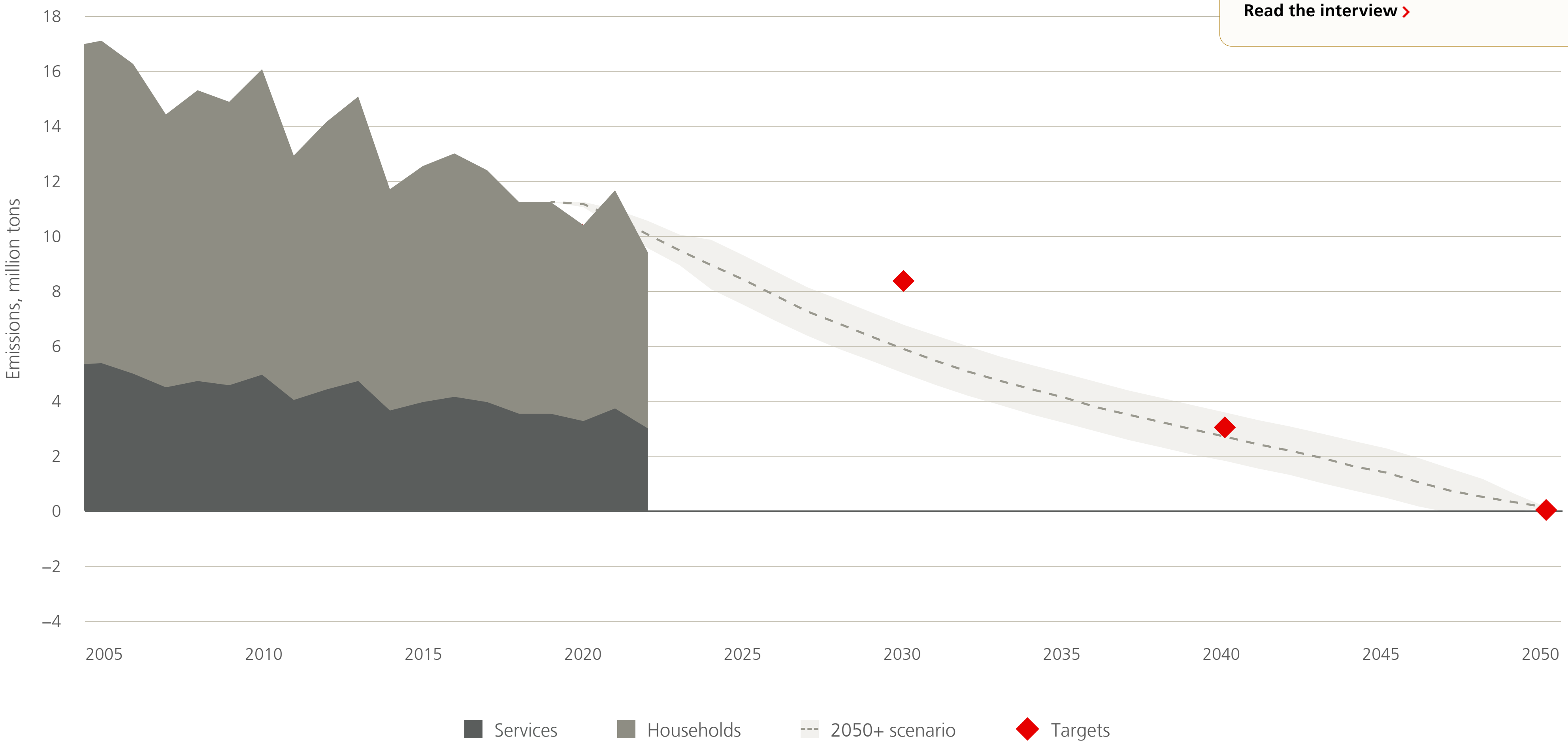
Patrik Stillhart, CEO, Zug Estates

**Read the interview ›**

[22] PACTA, (2024), *Climate Test 2024 Switzerland.*
[23] Federal Office for the Environment, *Energy efficiency of buildings*, accessed November 6, 2024.
[24] IEA, (2023), *Switzerland 2023 Energy Policy Review.*
[25] Federal Statistical Office, *Residential buildings by main heating energy source and canton,* accessed November 6, 2024.

It's not so complicated!
Marcel Kucher, CFO, Swiss Prime Site
**Read the interview ›**

**Figure 9:** Buildings emissions vs. the 2050+ scenario




Note: EP2050+ baseline scenario aligned with 2019 emissions to reflect changes in emissions measurement. Band represents a +/– 10% range around the baseline EP2050+ scenario.
Source: Federal Office for the Environment; UBS

# Industry

## Emissions

Switzerland's industrial sector contributes about 20% of national GHG emissions, and it has done so since the 1990s.[26] Today, industry is almost 15% ahead of the trajectory in the government's EP2050+ baseline scenario, due to ongoing efficiency improvements and electrification of industrial processes.

## Trends

Emissions from manufacturing and industrial processes have fallen about 20% since 1990, but due to structural shifts in the economy, their share of Swiss emissions has also remained stable, at about 20%. The difficulty of decarbonizing processes like cement production means they will continue emitting sizeable amounts of $CO_2$ while the broader economy decarbonizes, with the industrial share of emissions in the base scenario rising to 30% by 2050. Long-term decarbonization of industrial activities is especially dependent on the commercialization of carbon capture and storage (CCS) technology.

## Industry decarbonization timeline

| 2025 | 2030 | 2040 | 2050+ |
|---|---|---|---|
| More funding for low-carbon tech through the $CO_2$ levy.<br>Companies must have a plan to reach Net Zero by 2050.<br>From 2026, free Emissions Trading Scheme (ETS) permits are reduced annually. | –35%* | –50%* | –90%* |

* Targeted emissions cut from 1990 levels.
Source: FedLex; Federal Office for the Environment; UBS

## Opportunities

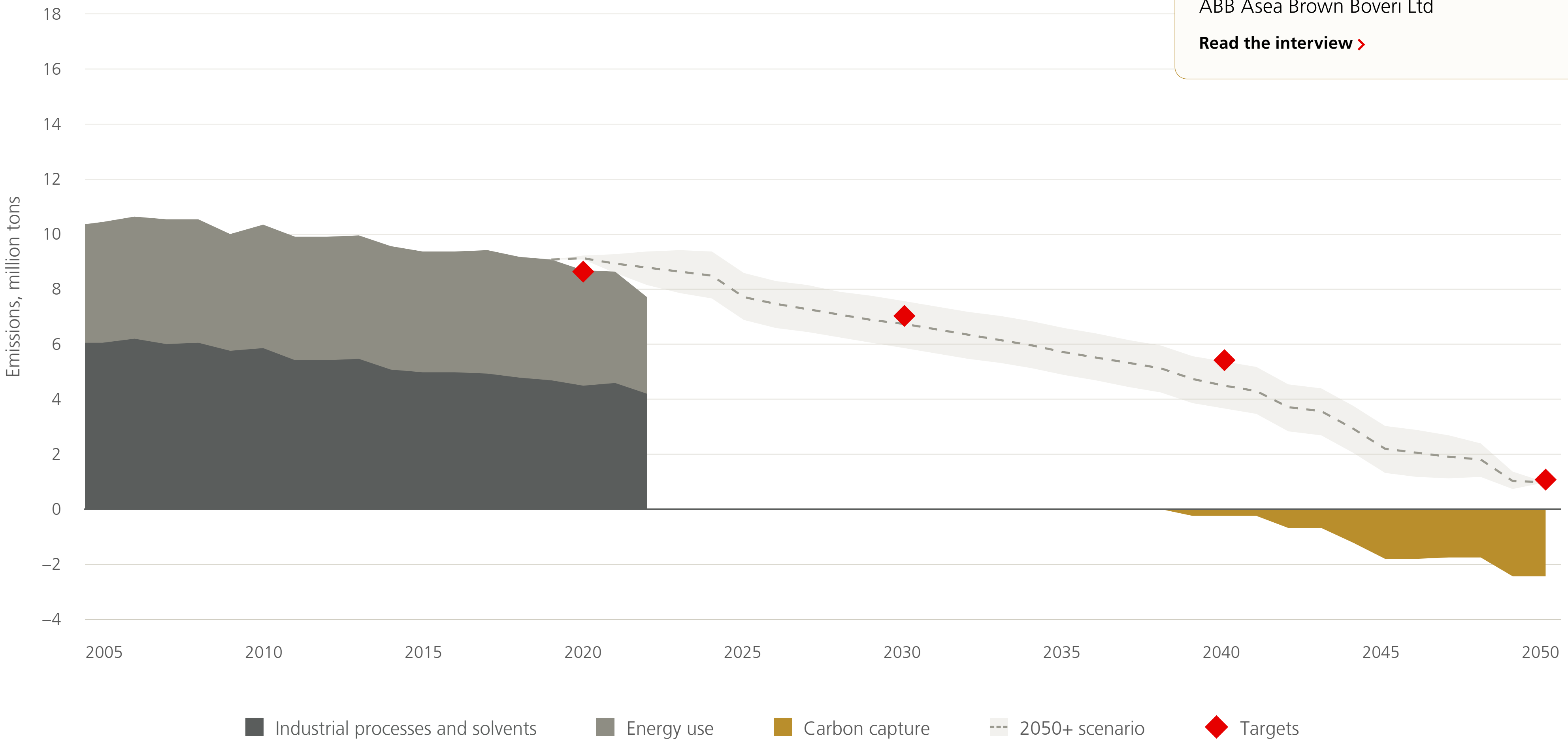
CCS today mostly exists as nascent demonstration projects. Improving its prospects presents a long-term commercial opportunity for corporates, both to develop, provide, and sell CCS technology, as well as transport and store the captured $CO_2$. The baseline Net Zero EP2050+ scenario envisages a pipeline network for transporting $CO_2$ and national storage sites emerging over time; initially it is likely $CO_2$ will be transported by train or truck to storage in Northern Europe.

## Challenges

Several other technologies are expected to grow as industry decarbonizes. Heat pumps (HPs) are the main solution for electrifying low-heat-processes (up to 160°C), like delivering hot air, water, or steam, and when drying materials. However, activities that require higher temperatures than HPs can deliver, such as cement production (roughly 1500°C), will instead rely mostly on renewable biogas to provide heat, or electrification through other technologies. Key levers include carbon pricing, encouraging better efficiency and ideally the electrification of industrial processes, and innovation to increase the feasibility of CCS deployment.

[26] Federal Office of the Environment data, covering Industry energy-related emissions and emissions from industrial processes and solvents.

**Figure 10:** Industry emissions vs. the 2050+ scenario




It's electrifying

Anke Hampel, Group Head of Sustainability, ABB Asea Brown Boveri Ltd

**Read the interview ›**

Note: EP2050+ baseline scenario aligned with 2019 emissions to reflect changes in emissions measurement. Band represents a +/– 10% range around the baseline EP2050+ scenario.
Source: Federal Office for the Environment; UBS

# Energy

### Emissions

Switzerland gets 97% of its domestically-generated power from zero-carbon sources – two-thirds from renewables, mostly hydro, and one-third from nuclear – leaving it with the lowest carbon-intensity power generation among OECD members.

### Trends

Nuclear power plants are currently planned to gradually retire – although the exact timing remains uncertain – and be replaced by a mix of renewables, energy storage, energy imports from neighboring countries, and back-up generation from gas-fired power. Despite the Swiss economy electrifying, overall electricity consumption in 2050 is expected to be similar to 2000 levels, due to much higher efficiency across use cases. Hydro will grow but only by a small amount, about 10% from 2019 levels by 2050, mostly in the form of pumped storage that adds vital grid flexibility.

### Energy decarbonization timeline

| 2025 | 2030 | 2040 | 2050+ |
|---|---|---|---|
| Annual efficiency targets for suppliers + obligation to improve customer efficiency.<br>Minimum renewable electricity share + obligation to purchase renewable electricity and gas offered at a minimum price. | Efficiency targets to be reappraised every five years | N/A | Per capita consumption vs. 2000:<br>Electricity: –5%<br>Energy: –53% |

Source: FedLex; Federal Office for the Environment; UBS

### Opportunities

The buildout of renewables is expected to be driven mostly by solar due to its tumbling costs, both as centralized plants but also lots of distributed panels on top of buildings. Most will be accompanied with dedicated battery storage in 2050, helping to smooth variable supply. The energy communities envisaged in the new Electricity Law will enable buildings to trade any energy they generate, lessening the strains on the grid.

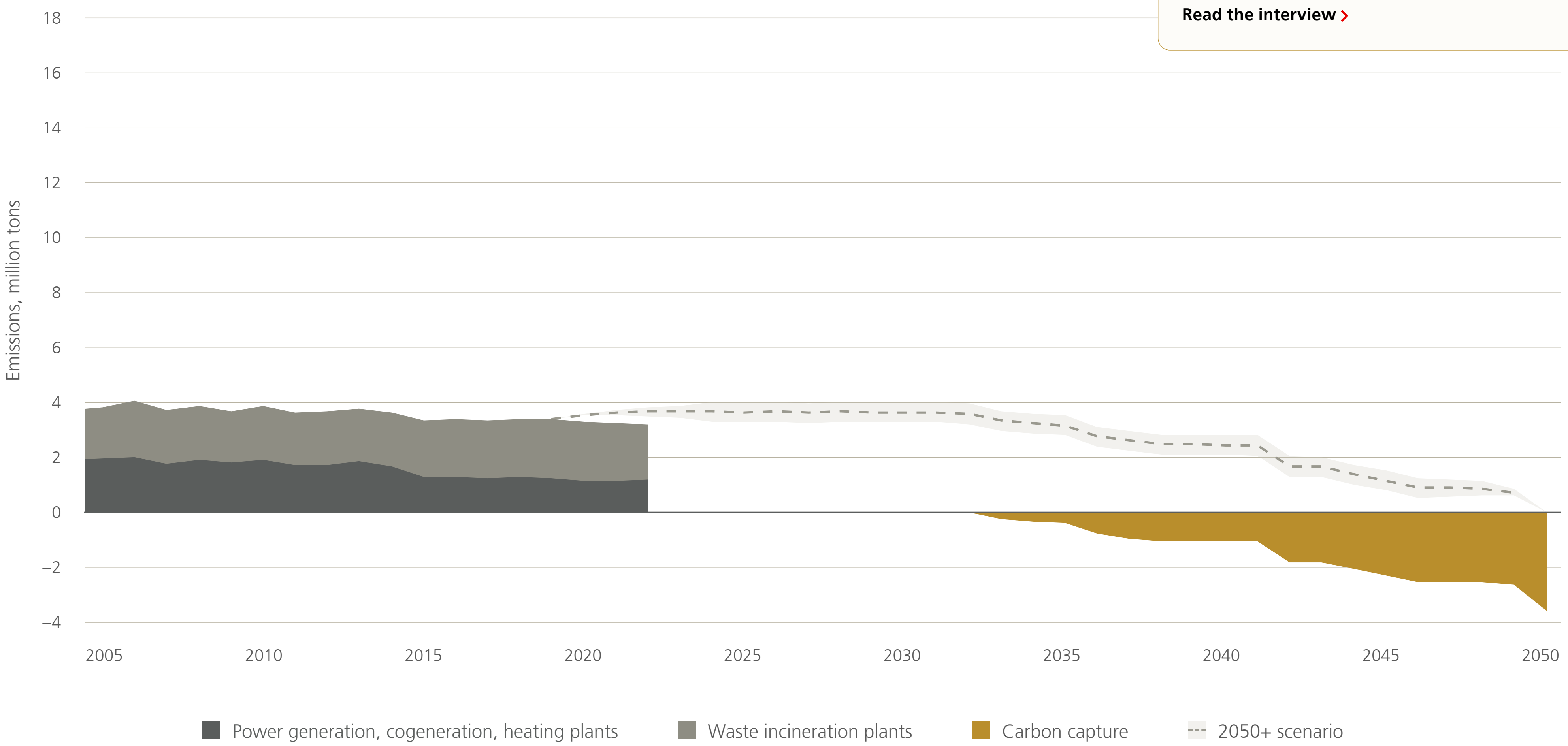
Finally, Switzerland's geography and know-how offer opportunities to expand the use of water for thermal storage, heating, and cooling. One study found that water from Switzerland's biggest lakes and rivers could potentially provide over 100 TWh of heat energy annually,[27] comfortably more than the 55 TWh the Swiss government targets for building energy use by 2050.[28]

### Challenges

Wind energy is expected to act as the third most abundant renewable source after solar and hydro, but it faces a challenge to win greater social acceptance. Higher use of renewables also means higher intermittency, which will require measures to avoid grid instability, like increased levels of storage. All these changes may combine to raise electricity prices. The EP2050+ baseline scenario anticipates these will be 40–50% higher in the Net Zero scenario than they would otherwise be in 2050.[29] While this sounds expensive, it is likely to be comparable to surrounding countries. The magnitude of the increase depends on the final technology mix; the more the 2050 power generation relies on expensive hydrogen and biogas, the higher electricity prices will be. Power plants that burn waste will still exist in 2050, both to produce power and reduce waste going to landfill, requiring the proliferation of CCS technologies to absorb the resulting emissions.

[27] Gaudard, A., (2019), *Using lakes and rivers for extraction and disposal of heat: Estimate of regional potentials*, Renewable Energy.
[28] Climate Action Tracker, *Switzerland*.
[29] 29 Federal Office of the Environment (2022), *Swiss Net Zero Strategy Technical Report EP2050+*, Figure 198; based on the difference in 2050 electricity prices of the Zero Basis, A and C scenarios, versus the WWB scenario.

**Figure 11:** Energy emissions vs. the 2050+ scenario




New energy

Flurin Mössinger, Head of Sustainability, BKW

**Read the interview ›**

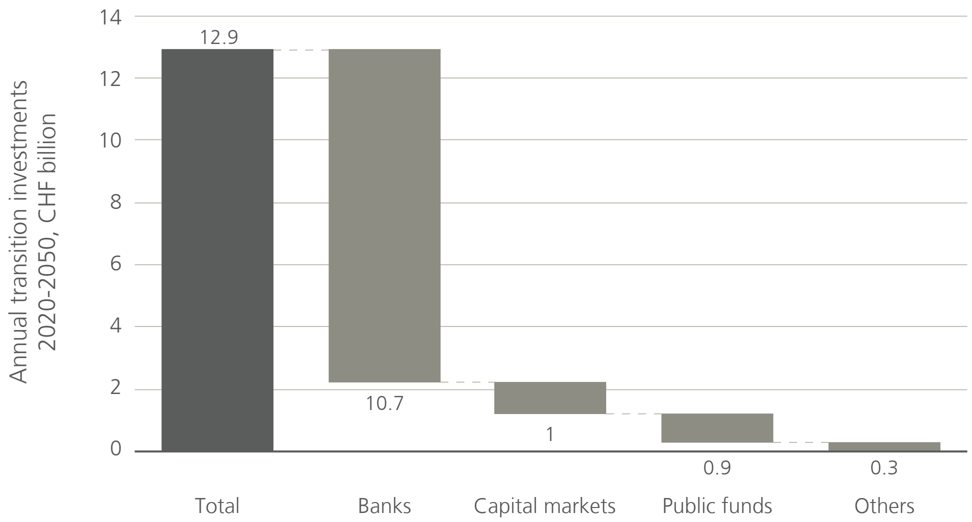
Note: EP2050+ baseline scenario aligned with 2019 emissions to reflect changes in emissions measurement. Band represents a +/– 10% range around the baseline EP2050+ scenario.
Source: Federal Office for the Environment; UBS

## The role of finance

The financial sector is crucial to provide the funding for the capital-intensive climate transition process. In 2021, the Swiss Banking Association (SBA) estimated that about CHF 13bn per year will be required through to 2050 to achieve Swiss Net Zero targets, equivalent to roughly 2% of annual Swiss GDP (Figure 12).[30] It projected that 83% of that would likely take the form of bank loans; 8% would be financed by capital markets, in the form of bond and equity investments; roughly 7% would be funded by public subsidies; and the remaining 2%, allocated to higher risk, unproven technologies like carbon removals, may require blended finance solutions or public-private partnerships.[31] Based on the latest available data (2022), we estimate that CHF 10.7bn of bank loans equates to just under 12% of the annual flow of new loans in the Swiss financial system, suggesting it is well-positioned to provide the required funding.

**Figure 12:** Bank job

*Projected sources of investment required per year from 2020-2050 to achieve Net Zero*




Source: Swiss Banking Association; UBS

[30] Swiss Banking Association, (2021), *Investment and financing needed for Switzerland to reach net zero by 2050.*

[31] Ibid; In 2022 new mortgage loans to private and corporate clients totaled CHF 80bn, and mortgage loans were 86% of total outstanding loans. If we assume new loan volumes follow the same proportions, the total would be CHF 93bn. CHF 10.7bn was 11.5% of this.

## Beyond funding

The financial sector can play a role beyond pure financing. It is plugged into all sectors and parts of the economy, from public to private, SMEs to multinationals, business owners to homeowners, raw materials producers to consumer goods manufacturers. As such it is in a prime position to advise, connect, engage, and innovate to support the Swiss transition.

**Advise:** Financial institutions advise a wide variety of stakeholders, from corporate and consumer borrowers, to retail and institutional investors. These exchanges create opportunities to highlight climate-based incentives, e.g., concessional loans for building efficiency upgrades, and highlight, where appropriate, the returns that may be associated with Paris-aligned business practices and investment strategies. Such interactions are also being molded by industry initiatives like the SBA's guidelines on promoting building energy efficiency upgrades as part of mortgage services, which became effective in 2023,[32] and integrating ESG questions into investment advice from 2024.[33]

**Connect:** Connecting investors to promising companies, projects, and start-ups is a key role of financial institutions, particularly when it comes to the transition, where bankable projects are often in shorter supply than financing in markets like Switzerland. In addition, connecting with other finance stakeholders via bodies like GFANZ can help to reinforce norms and spread best practices.

**Engage:** One of finance's strongest cards to play is engagement with portfolio companies. The Swiss financial sector has made progress in this area, but there is more to be done. The latest PACTA Climate Test report, which gathers responses from 146 banks, pensions funds, asset managers, and insurance companies in Switzerland, found that 60% engage in climate stewardship, e.g., through exercising "voting rights and engaging in climate dialogue with their portfolio companies."[34] Active stewardship, including encouraging credible disclosures and emission reduction plans, is a major part of setting portfolios on a track to Paris alignment while at the same time managing transition risks that could undermine long-term returns.

**Innovate:** Decarbonization can largely be achieved via traditional financing, but in the case of newer technologies, solutions like blended finance may be necessary, while for larger, capital-intensive undertakings, measures to derisk and enable project finance could unlock transition investments. Other options like mini bonds, private placements, or sustainability-linked loans, can also help. The latter, which link their interest levels to emissions reductions are enabled by new digital tools to track the impact both of corporates' direct activities, and those of their supply chain.

[32] Swiss Banking Association, (2022), *Guidelines for mortgage providers on the promotion of energy efficiency.*
[33] SBA, (2023), *Guidelines for financial service providers on integration of ESG preferences and risks into investment advice and portfolio management.*
[34] PACTA, (2024), *Climate Test 2024 Switzerland.*

# Summing up

1 Decarbonization is well underway in Switzerland, with its emissions falling consistently since 2011, and the path to 2050 etched out by a long-term policy- and market-based framework.

2 However, the road ahead is challenging, long, and uncertain. It will be a delicate balancing act of ramping up electrification while maintaining a stable power market and grid. Building large amounts of new energy infrastructure – to meet rising demand but also to become more independent of neighboring countries – presents not only a huge engineering challenge, but also a political one.

3 Similar challenges persist elsewhere. In buildings, retrofit rates will lag without support and incentives to reduce costs; in light traffic, consumer preferences should shift faster toward electric vehicles and alternative modes of transport, each of which needs adequate supporting infrastructure; and in industry, processes must be electrified, and where this is not possible, emissions must be captured and permanently sequestered – all of which can carry a hefty price tag.

4 While overcoming these technical, commercial, and social challenges requires interventions for each sector, some high-level levers apply. The most important is a stable and clearly communicated policy framework, consisting of clear decarbonization goals, and cross-sector incentives, such as the $CO_2$ levy. Switzerland is making good progress on this front. Other important levers include regulatory solutions to hasten infrastructure development; targeted incentives to lower costs in sectors where "sticks" may not be desirable, such as buildings; and a sustained educational campaign to win the hearts and minds of consumers, whose preferences will make or break decarbonization in agriculture and transport.

5 Carbon capture and storage is an important part of the solution for decarbonizing Swiss industry, but it remains nascent, and a "last resort" to mop up residual emissions *only after* reducing them as much as possible. All sectors must pursue their own decarbonization strategies, innovating and implementing solutions wherever they make economic sense, and rely on CCS only when there is no other alternative.

6 The finance sector plays a key role in channeling the funding for the capital-intensive transition journey, but is also in a prime position to advise, connect, engage, and innovate to help develop and deploy the technologies needed to meet Switzerland's climate goals.

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The UBS Sustainability and Impact Institute was founded in 2021 to contribute to the sustainability debate, with a focus on actionable and timely contributions. The Institute is a collaborative effort with sustainability experts from across UBS's business divisions. We strive to encourage objective and fact-based debate, provide new impulses for action, and identify innovations that will help shape our collective efforts and awareness about sustainability and impact.

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