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Swiss Federal Office of Energy SFOE

Energy research and innovation
Report 2025

Editorial

Energy research is a key component of the further development of the Swiss energy system. It encompasses the provision of scientific foundations, applied research, as well as issues relating to systems, the economy and society. The aim is to generate new technological knowledge, foster a deeper understanding of energy technologies and systems, and thereby provide a sound foundation for future developments. For the Swiss Federal Office of Energy (SFOE), the coordinated support of selected research projects within the field of energy research is an important mandate, carried out in a manner that complements other national funding instruments.

The Energy Research Strategy 2025–2028 defines thematic priorities that guide the research activities supported by the SFOE. These include, among other things, the further development and testing of energy technologies, issues relating to the system integration of renewable energies, the resilience of the energy system, and interactions between different sectors. In addition, the strategy also takes social science perspectives into account, particularly with regard to the implementation and application of new technological solutions.

The projects presented in this brochure exemplify the diversity of energy research supported by the Swiss Federal Office of Energy and the topics currently being addressed within the framework of the SFOE's funding mandate. The QR codes and the additional links provided lead to further information and in-depth content.

Swiss Federal Office of Energy SFOE
Section Energy Research and Cleantech

(Cover picture) A three-storey extension, constructed mainly from reused building components, has been added to the gable end (in German "Kopfbau") of the historic Hall 118 on the Sulzer site in Winterthur. The aim of the K.118 project was to minimise construction emissions and resource consumption – around 60% of greenhouse gas emissions and 500 tonnes of primary materials were saved compared to a new build. Reused elements included the supporting structure, external steel staircase, windows and flooring. Natural materials such as straw, clay and wood complement the reused components. Concrete was used only where it was unavoidable for structural, acoustic or fire safety reasons. Further details on the current state of research into net-zero greenhouse gas emissions in the building sector and on the NN-THGG research project can be found in the article on page 11 (source: Baubüro in situ).

Content

Retrospective on SFOE Energy Research 2025

2025 was a year of significant structural and financial changes for federal energy research. The Federal Council's decision on SWEETER ("SWiss research for the EnErgy Transition and Emissions Reduction") established a new framework for systems-oriented energy research. SWEETER is the continuation of the SWEET funding instrument. Calls for proposals are now also carried out in collaboration with the FOEN, with emissions playing a central role in these calls.

At the same time, funding for new pilot and demonstration projects under the P+D programme was discontinued. For many years, this instrument had played a central role in testing innovative technologies in real-world settings. With its discontinuation, the funding landscape is changing, and with it the support for projects at the interface between research and market introduction.

In addition, the SFOE's energy research budget was reduced by around 10 % in 2025. This adjustment required greater prioritisation within the research portfolios and a focus on topics of high strategic importance for the implementation of the energy strategy.

In the context of these developments, CORE – the Swiss Federal Energy Research Commission – plays an important advisory role. It supports the federal government in the strategic direction of energy research and contributes to coordination between the relevant stakeholders.

The year 2025 from the perspective of the Swiss Federal Energy Research Commission CORE

Association with Horizon Europe: one of the most significant events for Swiss researchers in 2025 was full association with the EU's funding programmes – Horizon Europe, Euratom and the Digital Europe Programme – a decisive step for energy research as well. Direct funding and project coordination, as well as involvement in identifying research topics, are particularly relevant.

Strengthening coordination: CORE has provided the impetus for greater coordination between departmental research, the ETH Domain and funding agencies. In 2025, the Federal Council approved corresponding adjustments – drawn up by SERI – to avoid duplication and promote exchange.

Helping to shape funding programmes: CORE supports the SFOE's research programmes and, in 2025, examined the "Wind Energy", "Electricity" and "CCUS/NET"(Carbon Capture, Use and Storage; Negative Emission Technologies) research programmes, as well as the "Geoenergy" and "Industrial Processes" research programmes, and provided feedback. The research programmes are aligned with the priorities and strategic objectives of the Energy Research Concept. CORE was involved in identifying topics for SWEET.

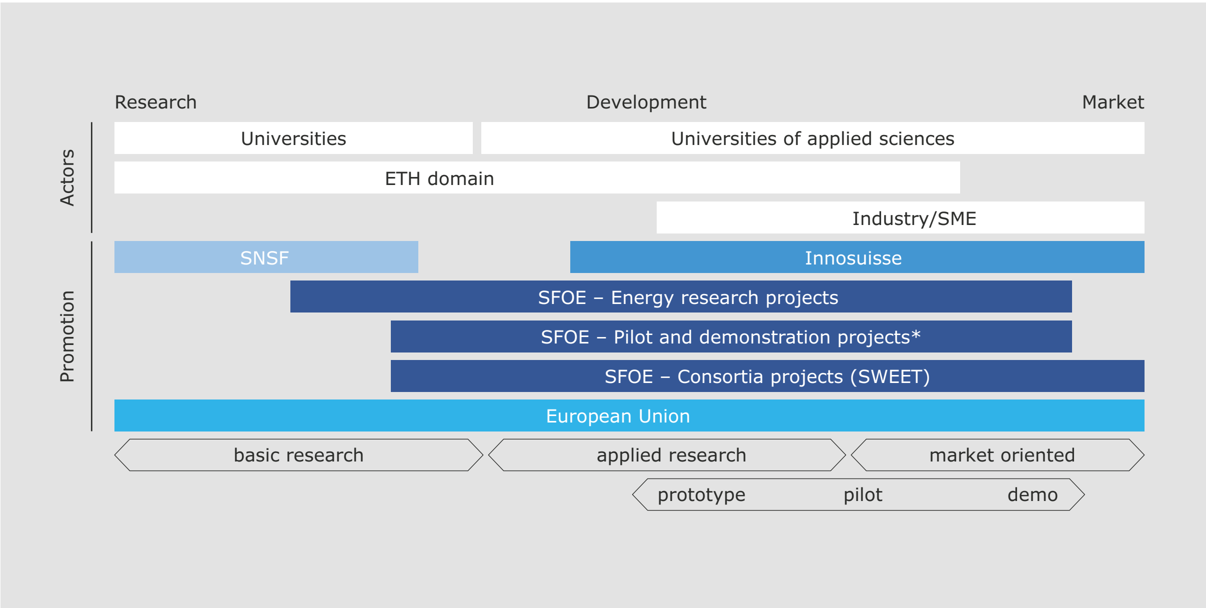
Position on the EP2027 austerity package: CORE advocated a moderate cut to energy research funding but warned against scrapping the Pilot and Demonstration Programme (P&D). Instead, it proposed a 40 % budget reduction to safeguard innovation and technology transfer.

Through these activities, CORE is committed to further developing energy research in Switzerland in a forward-looking and practical manner. It will take current developments into account in the drafting of the forthcoming Energy Research Concept.

Promotion of technology and innovation

With three complementary funding instruments for research and innovation in the energy sector, the Swiss Federal Office of Energy (SFOE) covers almost the entire technology spectrum. The SFOE bases its activities on the federal government's energy research strategy 2025–2028. FTechnical, social and human sciences (SSH) should work closely together right from the design stage of research projects so that research results can be geared towards later application at an early stage.

Funds from SFOE for energy research are used in a subsidising manner to close gaps in the funding landscape. It is allocated strategically in line with the concept in order to promote the national und international integration of researchers. In 2025, around 47 million Swiss francs per year are available for this and around 500 ongoing projects are closely monitored each year.

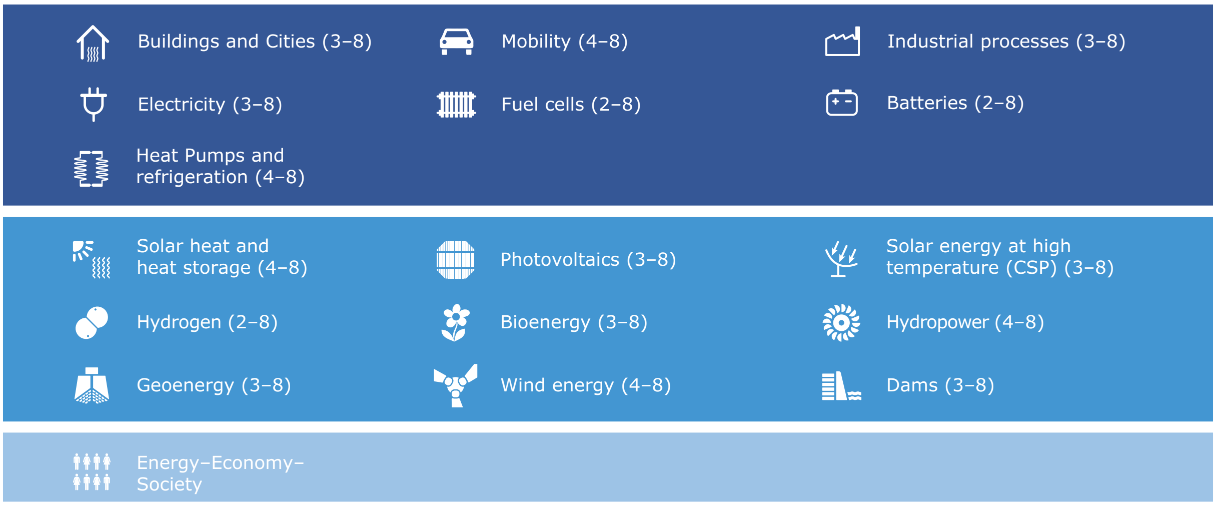


The Swiss Federal Office of Energy (SFOE) coordinates research and innovation in the energy sector across a large part of the value chain (Innosuisse = Swiss Agency for Innovation Promotion; SNSF = Swiss National Science Foundation).

*As part of the measures to relieve federal finances (Entlastungspaket 27), the Federal Council and Parliament have decided not to allocate any funds to the Pilot and Demonstration Programme until further notice.

Thematic energy research programmes

With its thematically oriented energy research programmes, the Swiss Federal Office of Energy (SFOE) covers a broad spectrum of energy research. These programmes are closely linked to the SFOE's other funding instruments (Pilot and Demonstration Projects Programme and the SWEET Programme). The individual programmes are oriented along the axes of "Energy efficiency", "Renewable energy", "Humanities and social science topics", "Storage and grids". Central topics such as "digitalisation", "sector coupling" and "energy storage" are addressed across the programmes.



The SFOE's thematic energy research programmes. The numbers in brackets indicate the technology maturity level of projects funded by the corresponding programme.

SWEET consortia pool insights on the path to net-zero

The SWEET funding programme supports inter- and transdisciplinary consortia that address key issues relating to Switzerland's Energy Strategy 2050 and long-term climate strategy, identify potential solutions and generate innovations. The consortia are selected via thematic calls for proposals across the three funding instruments: SWEET, SWEETER and SOUR.

Six SWEET calls for proposals have been carried out, four SOUR projects have been completed and ten consortia are currently at work. The most recent to commence work in 2025 is the ACHIEVE consortium (Pathways to ACHIEVE net-zero target for hard-to-abate Swiss emissions). The focus is on reducing hard-to-abate emissions from sectors such as agriculture and industry. Under the leadership of Empa, researchers are working together with stakeholders from society, politics and industry to develop well-founded roadmaps for achieving the net-zero target. At the same time, sustainable solutions are to be developed for CO_2 capture, utilisation, transport and storage, as well as for CO_2 removal.

For the second time since the funding programme began, the SWEET consortia, led by the SWEET Office and the Network for Transdisciplinary Research (td-net) of the Swiss Academies of Arts and Sciences, have produced a joint synthesis. The aim is to consolidate the results across the board and derive targeted, robust and as concrete as possible recommendations for achieving the 2050 energy and climate targets. To this end, the consortia submit relevant findings and recommendations, which are discussed and consolidated at a joint meeting. In 2025, a total of 25 recommendations on various topics aimed at politics, administration, business and society were formulated as part of the synthesis. For example, the SWICE, PATHFNDR and SURE consortia call on the cantons and energy suppliers to promote integrated systems featuring photovoltaics, heat pumps, bidirectional charging stations, home storage and other flexible technologies. EDGE, SURE and CoSi show municipalities, energy suppliers and associations how they can boost acceptance of decentralised renewable energies: It is important to emphasise the benefits for security of supply and energy policy and to involve the local population in developing solutions – under-represented groups should also be included in this process. The recommendations were presented during Energy Week at ETH Zurich and discussed with the relevant stakeholders.

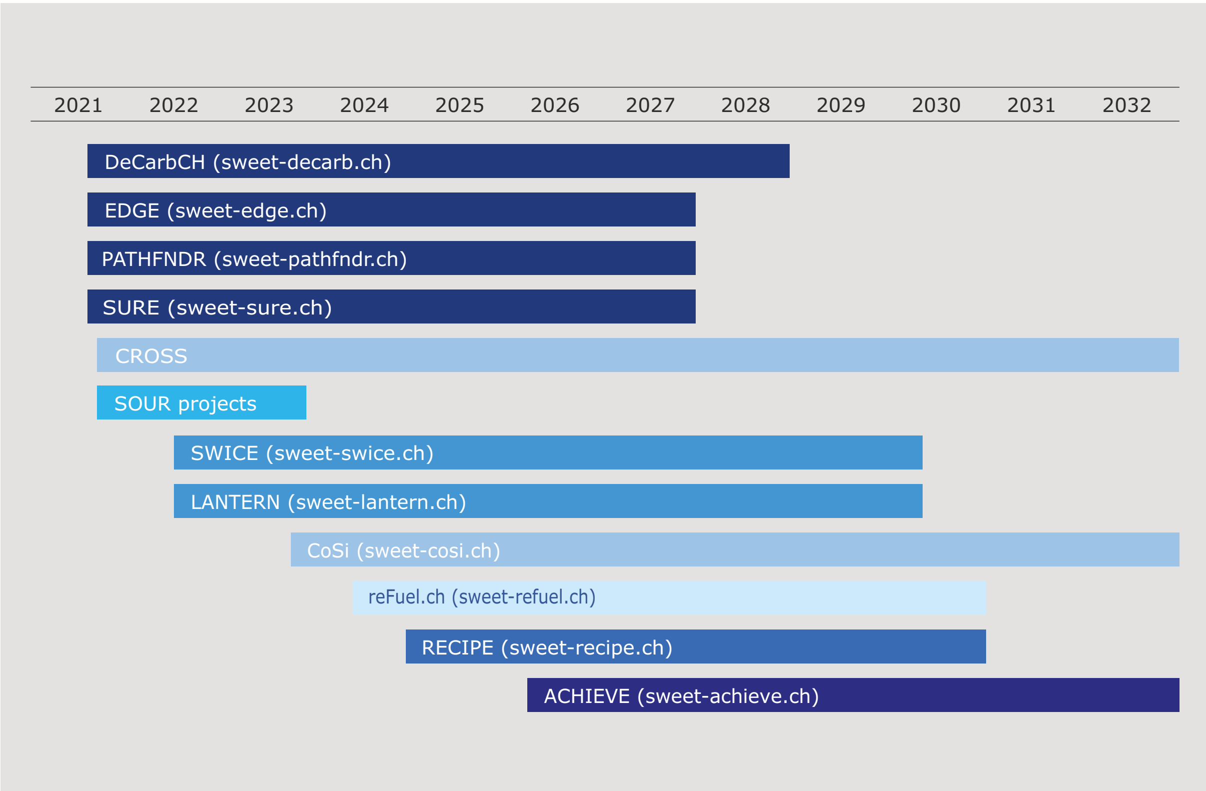
Irene Bättig, Sprachwerk GmbH

DeCarbCH

EDGE

PATHFNDR

SURE



SWICE

LANTERN

CoSi

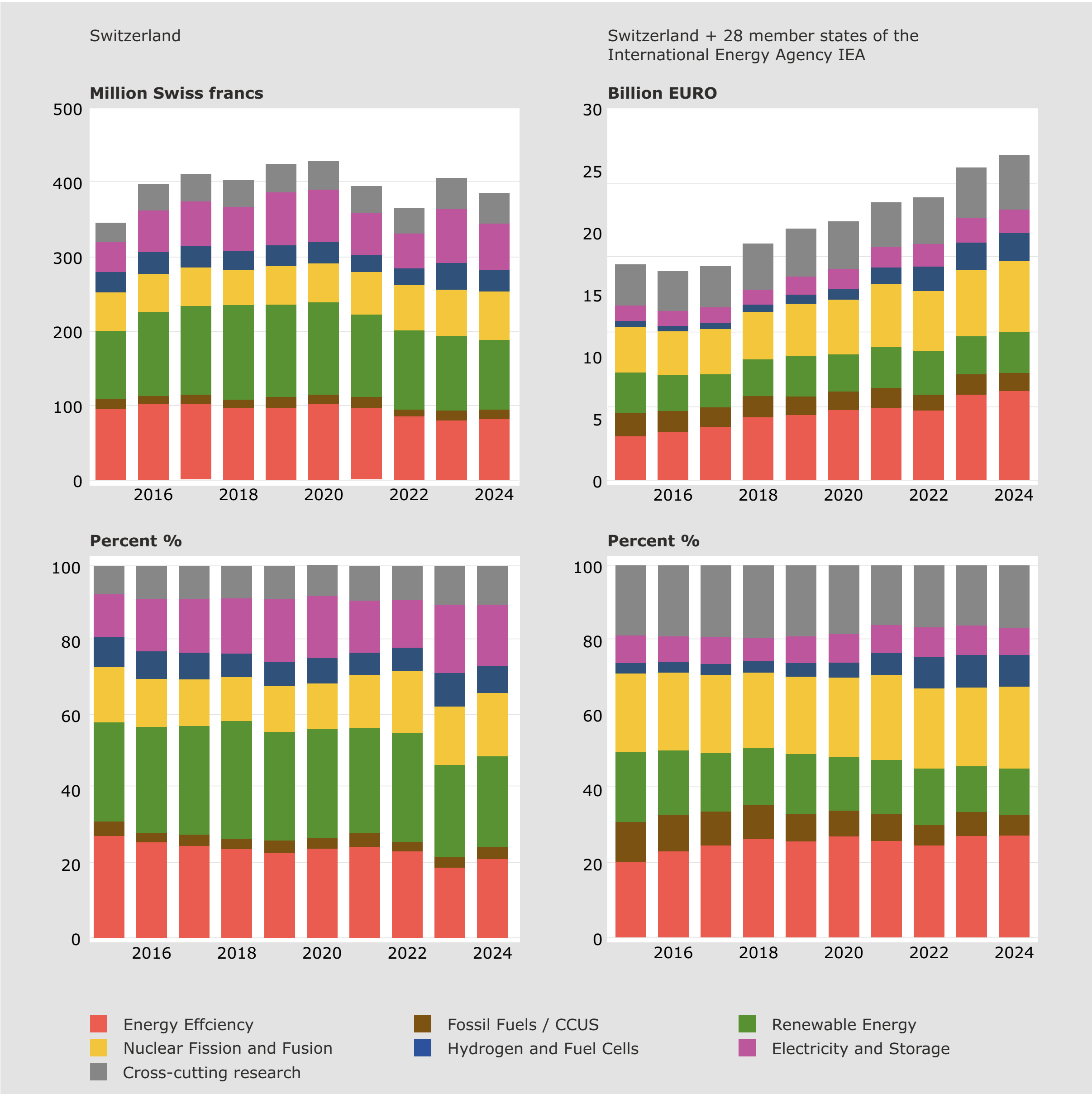
reFuel.ch

ACHIEVE

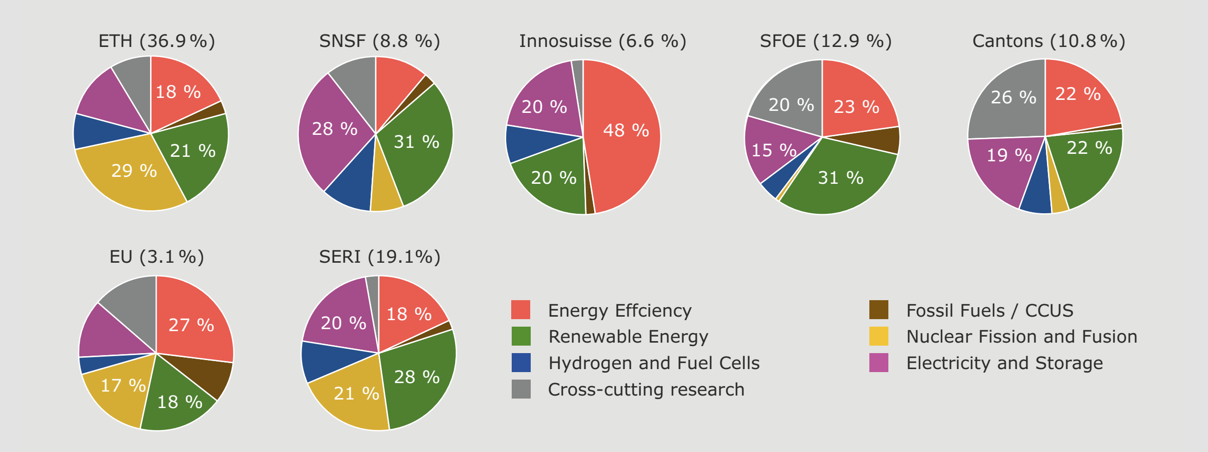
Overview of the consortia involved in completed, ongoing and planned calls for proposals under the SWEET funding programme. Consortia from previous calls for proposals remain active: DeCarbCH, EDGE, PATHFNDR and SURE are addressing various aspects of the future Swiss energy system, including the decarbonisation of heating and cooling, the integration of renewable energies, sector coupling, and sustainability and resilience. The two consortia, LANTERN and SWICE, are developing new ways of living, working and travelling, as well as solutions for a decarbonised, resource-efficient Switzerland, within the framework of so-called living labs. CoSi is investigating how the development of the Swiss energy system and Swiss society influence one another and is integrating these findings into models and scenario analyses. ReFuel.ch focuses on sustainable fuels and platform chemicals, whilst RECIPE addresses the risks posed by the changing energy system and climate change to Switzerland's energy and ICT infrastructure. ACHIEVE develops roadmaps to reduce hard-to-avoid emissions and offset remaining emissions through carbon capture and storage.

Swiss energy research statistics

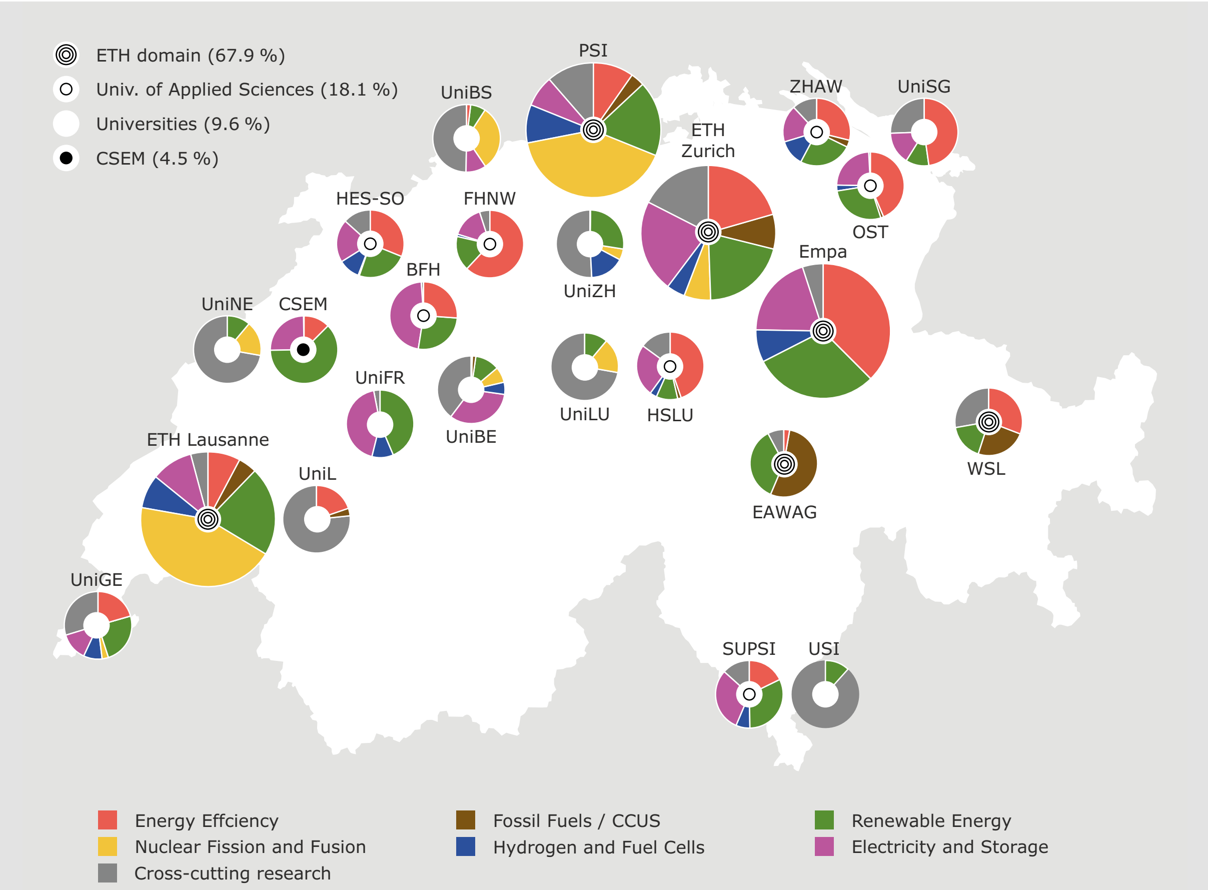
Since 1977, the Swiss Federal Office of Energy (SFOE) has been collecting data on projects that are funded in whole or in part by the public sector (Confederation and cantons), the Swiss National Science Foundation (SNSF), Innosuisse or the European Union (EU). Information on individual projects can be obtained from the publicly accessible information system of the Confederation (www.aramis.admin.ch), the SNSF (data.snsf.ch), the EU (cordis.europa.eu) and the respective websites of individual institutes. In 2024, the public sector in Switzerland spent 384.5 million Swiss francs. At around 36.9 %, the ETH domain contributed the largest share. The SERI accounted for the second-largest share, at 19.1 %, followed by the SFOE with 12.9 % and the cantons with 10.8 %. Of the CHF 49.8 million spent by the SFOE, around CHF 11.3 million went to projects in the field of energy efficiency, CHF 15.3 million to renewable energy projects and CHF 10.1 million to projects in the area of social sciences.



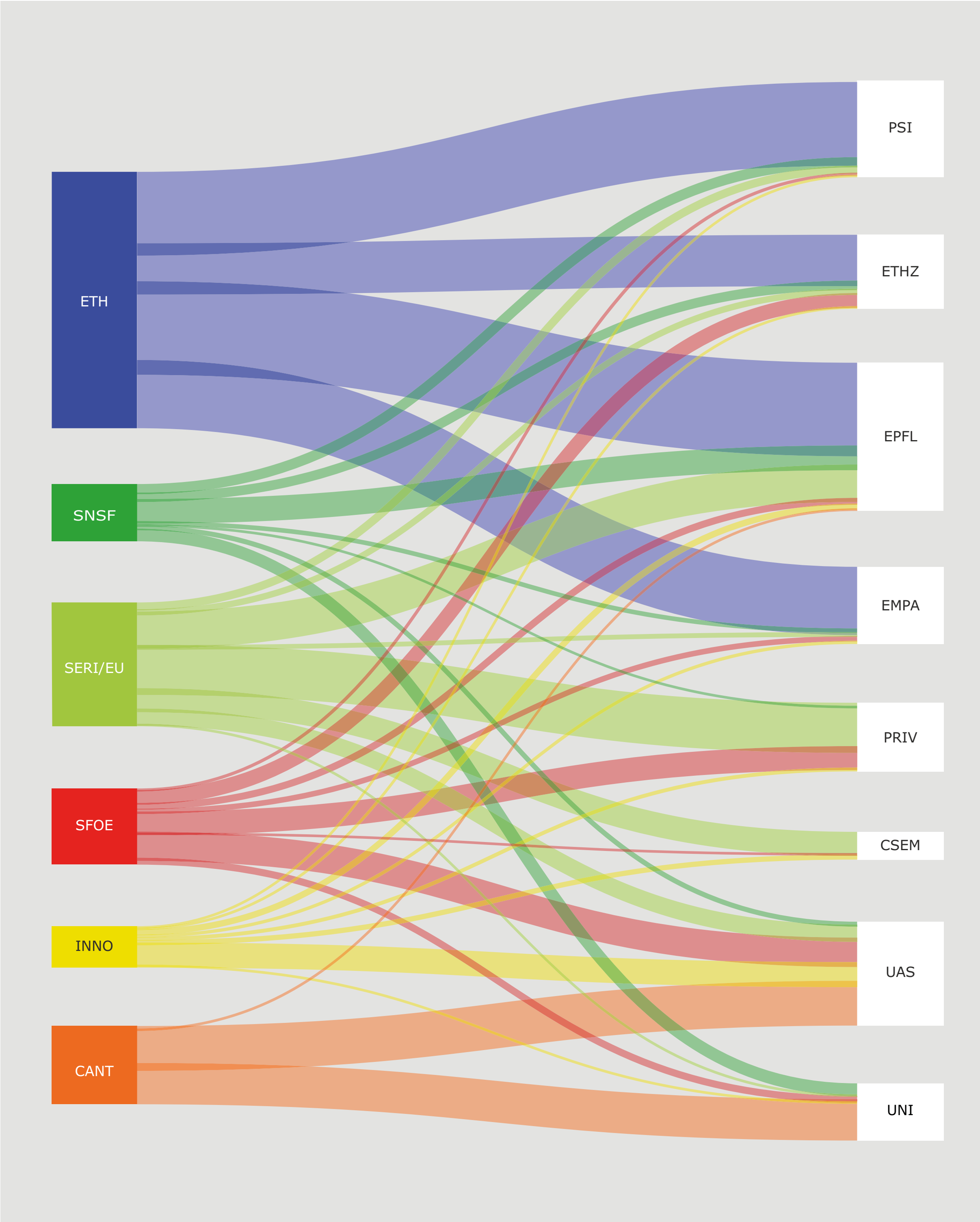
Public funds spent on energy research in Switzerland (left) and in 29 member countries of the International Energy Agency (IEA) (right). Swiss expenditure is in the range of 0.4 to 0.58 per mille of the gross domestic product. The funds are broken down according to the classification of the IEA (source: SFOE energy research statistics, IEA).



Public funding for energy research (data 2024) by funding agency and thematic area. Around 37 % of the funding for energy research in Switzerland comes directly from the ETH Domain, and around 11 % from cantonal funding for universities of applied sciences and universities. The rest is competitive funding. ETH: Council of the Swiss Federal Institutes of Technology, SNSF: Swiss National Science Foundation, Innosuisse: Swiss Agency for Innovation Promotion, SFOE: Swiss Federal Office of Energy, EU: European Union, SERI: State Secretariat for Education, Research and Innovation (source: SFOE energy research statistics).



Various energy research topics at Swiss universities (data 2024). The topics are broken down according to the classification of the International Energy Agency (IEA). Most of the public energy research (68 % of the public funds used) takes place in the ETH Domain. BFH: Bern University of Applied Sciences, CSEM: Centre suisse d'éléctronique et de microtechnique, EMPA: Swiss Federal Laboratories for Materials Testing and Research, EPFL: Swiss Federal Institute of Technology Lausanne, ETHZ: Swiss Federal Institute of Technology Zurich, FHNW: University of Applied Sciences Northwestern Switzerland, FHO: University of Applied Sciences Eastern Switzerland, FHZ: University of Applied Sciences of Central Switzerland, HES-SO: University of Applied Sciences of Western Switzerland, PSI: Paul Scherrer Institute, SUPSI: University of Applied Sciences of Italian-speaking Switzerland, UniBE: University of Bern, UniBS: University of Basel, UniFR: University of Fribourg, UniGE: University of Geneva, UniLS: University of Lausanne, UniLU: University of Lucerne, UniNE: University of Neuchâtel, UniSG: University of St. Gallen, UniZH: University of Zurich, USI: University of the Italian-speaking part of Switzerland, ZFH: Zurich University of Applied Sciences. Other federal research institutions, research institutions in the private sector and those abroad are not shown here for the sake of clarity (source: SFOE energy research statistics).



Where does the public funding for energy research in Switzerland come from and where does it go? A large part comes directly from the ETH Domain. Funds from private sources, such as own contributions to Innosuisse projects or pilot and demonstration projects of the SFOE, are not included. Cash flows of less than CHF 0.2 million are not shown.

Source of funds: ETH: ETH Board, SNSF: Swiss National Science Foundation, SERI/EU: funds from European projects or from SERI (State Secretariat for Education, Research & Innovation), SFOE: Swiss Federal Office of Energy, INNO: Innosuisse, CANT: cantons.

Use of funds: PSI: Paul Scherrer Institute, ETHZ: ETH Zurich, EPFL: ETH Lausanne, EMPA: Swiss Federal Laboratories for Materials Testing and Research, PRIV: Private Sector, CSEM: Centre Suisse d'Electronique et de Microtechnique, UAS: Universities of Applied Sciences, UNI: Universities (source: SFOE energy research statistics).

Net-zero greenhouse gas emissions in the building area – State of research

Achieving net-zero greenhouse gas emissions (GHG) by 2050 is one of Switzerland's key climate policy objectives. The term "net-zero" describes a state in which anthropogenic greenhouse gas emissions are balanced by equivalent removals from the atmosphere. In contrast to the time-bound target for 2050 net-zero for buildings entails a consistent consideration of the entire life cycle: from raw material extraction and the manufacture of building materials, through the construction phase and operation, to demolition and disposal. The year 2050 is not relevant in this context, which also makes sense in light of climate targets when one considers that GHG emissions must become net negative in the second half of the 21st century in order to slow down global warming.

From research to market in record time

The research project "Net-Zero Greenhouse Gas Emissions in the Building Area" (Netto-Null Treibhausgasemissionen im Gebäudebereich, NN-THGG), initiated by the SFOE and completed in November 2024, addresses the systematic investigation and assessment of GHG emissions in the building area. Key finding: In addition to providing a scientifically sound definition, the project has shown that reducing the "grey" emissions of buildings is the most urgent priority and, at the same time, the greatest challenge. However, it also became clear that net-zero buildings are, in practice, currently unachievable under the life-cycle assessment rules applicable in Switzerland (see NN-THGG box).

The Minergie Association, which participated in the research project's steering group alongside the SIA and other stakeholders, had set itself the goal of publishing a net-zero standard for Minergie buildings based on the results of the NN-THGG research project. To make this possible, Minergie expanded the scope of the calculation by allowing credits for non-building-related CO_2 removals. Furthermore, two methodological adjustments were introduced: significantly reduced emission factors for determining the GHG emissions to be offset, and the partial crediting of temporary negative emissions from biogenic sources to achieve net-zero, which represents a departure from the recognised rules of life-cycle assessment. Nevertheless, the result is that, with the "Minergie-Net-Zero" standard, a product has been on the market since March 2026 that provides effective incentives to reduce the embodied carbon emissions of buildings, store carbon and also partially offset them.

Buildings with low embodied carbon emissions

The new SIA standard 390/1 quantifies greenhouse gas emissions from construction and operation in accordance with recognised life-cycle assessment principles and sets out requirements. This includes the emissions associated with the manufacture of energy-generating building components such as photovoltaic systems, solar thermal collectors and geothermal probes. In turn, these elements reduce emissions during operation. A requirement is set for a total budget for the sum of all GHG emissions from construction and operation. The standard contains two requirement levels: Basic (B) and Ambitious (A).

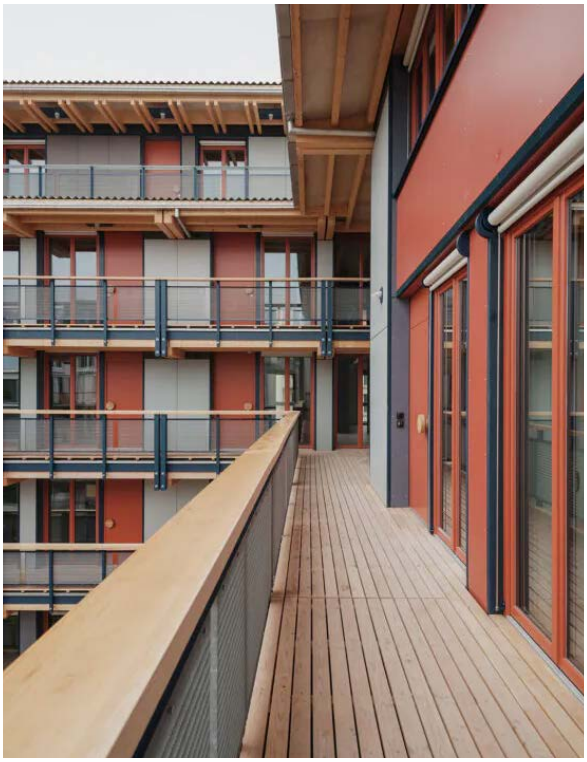
In contrast, the new model regulations for the cantons in the energy sector (MuKEn 2025), adopted in autumn 2025, specify a statutory limit value for construction emissions for each building category. This comprises a base limit value and surcharges for unheated areas, geothermal probes and solar installations. Minergie-Net-Zero, on the other hand, requires compliance with the ECO1 limit for construction and permits the same surcharges as the MuKEn. This results in a construction limit for both the MuKEn and Minergie that must be calculated on a project-specific basis. For operational emissions,

Burkwil housing estate in Meilen: Burkwil offers high-quality, barrier-free flats for around 160 people. The six new buildings were constructed with the lowest possible emissions, using solid timber, clay and low-cement concrete (source: © Tend AG).

Net-zero buildings according to the NN-THGG research project

"A building with net-zero greenhouse gas emissions – or "net-zero building" for short – has minimal greenhouse gas emissions during construction and operation throughout its entire life cycle and reduces the remaining GHG emissions through eligible negative emissions at the level of building materials and components. Negative emissions are eligible if the permanent storage of biogenic carbon is guaranteed. This option is not yet available in practice."

however, no limit is specified under either the MuKEn or Minergie. Initial practical examples show that buildings with very low embodied carbon emissions are already possible today. Projects such as the Burkwil housing estate in Meilen (2025), the LysP8 residential and commercial development in Basel (2024) and the K.118 commercial extension in Winterthur (2021) all meet the requirements of MuKEn, Minergie-Net-Zero (ECO 1 limit value) and SIA 390/1 Basis (see diagram). They demonstrate how significant emissions reductions can be achieved through



Lysbüchel Plot 8, new-build residential and commercial development in Basel: The project meets the high standards of sustainability and cost-effectiveness on a variety of levels. The open stairwell and open-access corridors reduce the energy reference area. The pergolas on the south side provide permanent summer heat protection for the façade, whilst vertical and drop-arm awnings offer additional protection when required (source: Loeliger Strub Architektur, © Federico Farinatti).

integrated planning, material-efficient construction – including reuse – and the use of renewable energy. These projects serve as important references for other implementation projects.

Further research needs

The example of Minergie-Net-Zero shows that, despite expanded accounting boundaries, net-zero can only be achieved through the partial crediting of temporary biogenic negative emissions. To enable harmonisation of the calculation methodology in the medium term, methods are required for the legally binding verification of the permanence of biogenic carbon sinks. There are still substantial gaps in knowledge in this area.

Furthermore, the timing of emissions must be taken into account in future. Emissions from buildings do not occur linearly, but are largely concentrated during the construction phase, whilst emissions from operation will steadily decrease due to ongoing decarbonisation. To account for this effect, referred to as "emissions reality", in calculations, there is currently a lack of time-differentiated emission factors for electricity and district heating that can reflect the likely decrease in GHG intensity.

Outlook

The knowledge gaps described above are to be closed through projects from the 2026 call for proposals of the SFOE research programme "Buildings & Cities" In parallel, the SIA plans to further develop the SIA 2032 guideline into a more binding standard in order to update the calculation of grey emissions in line with the current state of knowledge and to take account of the requirements of emissions reality.

In addition, future experience gained from the application of SIA 390/1 and Minergie-Net-Zero is to be systematically evaluated. On this basis, the continuous further development of the norms and standards is planned. The increasing number of completed

Minergie-Net-Zero according to minergie.ch

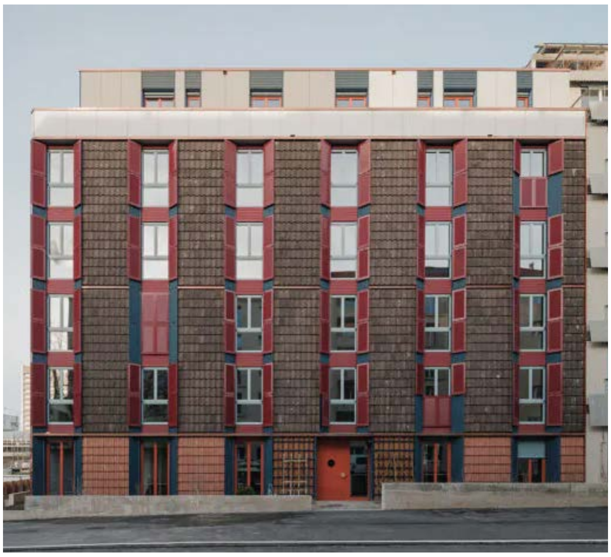
"The Minergie net-zero building is a newly constructed or renovated building that generates very low greenhouse gas emissions over its defined 60-year life cycle. After calculating the life-cycle emissions, the carbon stored in the building is deducted from the remaining emissions, thereby reducing the greenhouse gas footprint. The remaining emissions are then offset."

buildings with minimised embodied carbon emissions will play a central role in this: it provides empirical data, strengthens market acceptance and enables an accelerated transformation of the builing area towards a climate-neutral building stock.

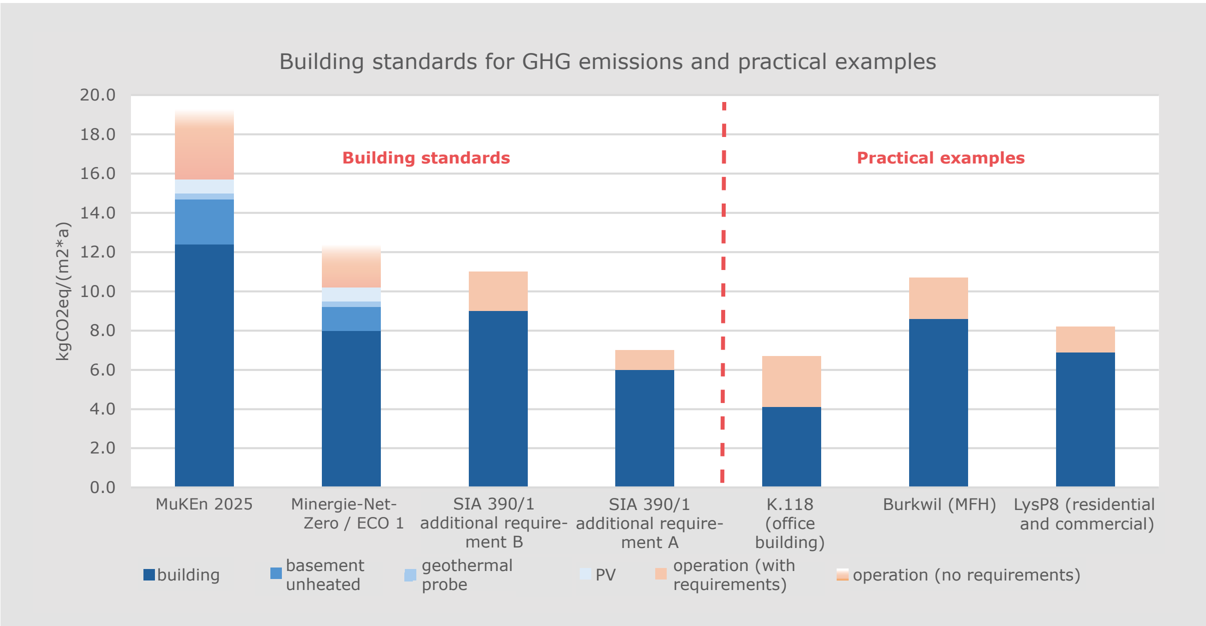
Conclusion

Overall, it is clear that achieving net-zero greenhouse gas emissions in the building sector requires an integrated approach. In addition to the further development of methodological foundations, practice-oriented solutions, target-supporting verification systems and suitable policy frameworks are particularly crucial. Only through the interplay of research, standardisation, implementation and legislation can the building area make its contribution to achieving climate targets.

Andreas Eckmanns, SFOE



LysP8 in Basel: An innovative and space-efficient new build with a maximum proportion of reused building components, comprising 27 small flats and commercial premises on the ground floor. A rear-ventilated reused façade with brick cladding (source: Loeliger Strub Architektur, © Federico Farinatti).



Left: Comparison of gross emissions (excluding negative emissions) for the construction and operation of the main Swiss building standards. Due to differences in calculation methods, the requirements of the standards shown have been converted to a model multi-family house so that they can be compared with one another. As MuKEn and Minergie do not set any requirements for operational emissions, these have been visualised using bars that taper off at the top. The graph shows that the Minergie-Net-Zero requirements for construction emissions (ECO 1 limit value) are of the same order of magnitude as those of the SIA Supplementary Requirement B, whilst those of MuKEn are significantly higher. This picture remains the same even when taking into account the (exemplary estimated) operational emissions. Right: The case studies were calculated in accordance with SIA 390/1 following the specifications of the NN-THGG research project (with HKN sale, without green electricity). They are directly comparable with the requirement values of SIA 390/1. As the limit values for construction in MuKEn and Minergie are project-dependent and no requirements are imposed on operational emissions, a direct comparison is not possible here. The graph shows that all three practical examples meet SIA 390/1, Level B. However, there are significant differences in construction emissions between the buildings. K.118 achieves the lowest grey emissions thanks to the repurposing of the existing building (conversion with an extension) and the maximum possible reuse of building components, and meets the SIA supplementary requirement A despite a relatively high proportion of operational emissions. Another reason for this is that there is no unheated area – e.g. a basement – to be taken into account. In contrast, despite optimised construction methods, both new buildings LysP8 and Burkwil (calculated on the basis of an optimised self-consumption rate of 50%) exhibit significantly higher construction emissions per m² of energy reference area. If one adds the operational emissions – which, in the case of LysP8, are lower than in the Burkwil project thanks to fossil-free district heating – both achieve the Additional Requirement B (Sources: Calculation of construction emissions for the standard projects: Jörg Dietrich, SIA; emission assumptions for operation in the standards and for K.118: SFOE; calculation of emissions for the case studies on construction and operation: Katrin Pfäffli, Architekturbüro K. Pfäffli; graph: SFOE).


Up to 3 terawatt-hours of solar power could be generated each year using plug-and-play solar power systems on balconies and small roofs (sources: hassler energia (left) / Meteotest (right)).

Plug-and-play PV – small systems with huge potential

With plug-and-play solar power systems installed on balconies and roofs, Switzerland could generate around 3 terawatt-hours of electricity every year, with around a third of that coming in winter. A study shows what is needed to make better use of this enormous potential in the future.

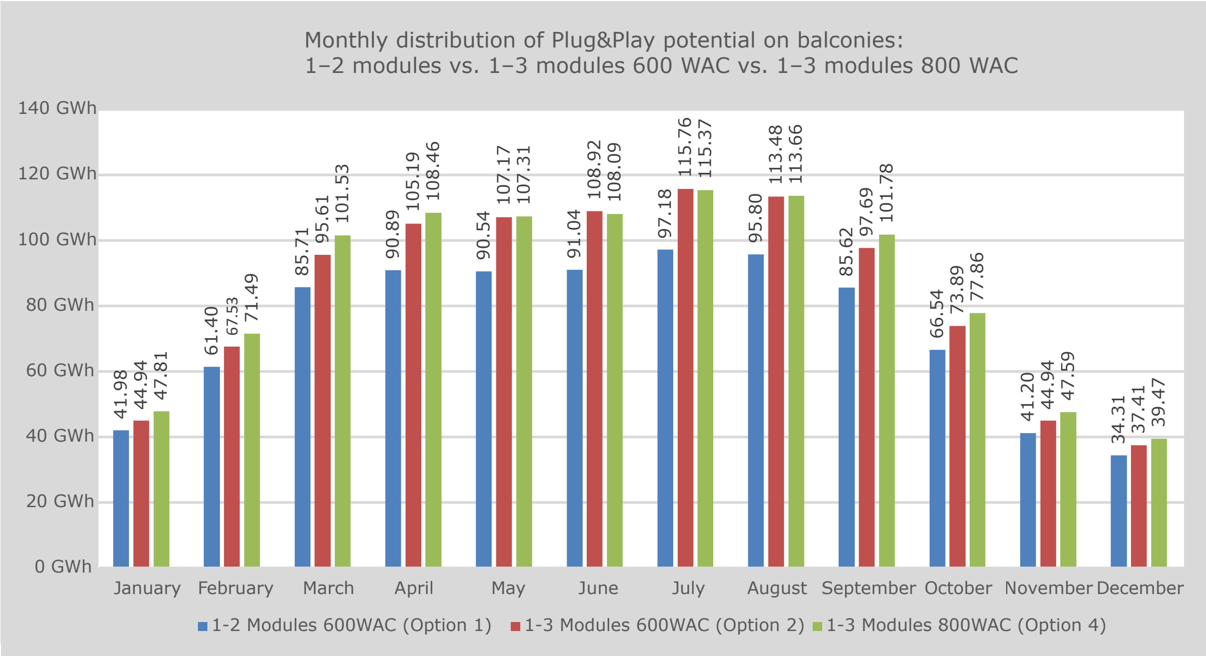
Photovoltaic systems in the form of plug-and-play systems are becoming increasingly popular in Switzerland. These are solar power systems that can be mounted on one's own balcony or roof and plugged into a socket to generate electricity for personal use.

A project consortium comprising the Bern University of Applied Sciences, Electrosuisse, Meteotest and the Swiss Association of Electrical Inspectors has, with the support of the Swiss Federal Office of Energy, investigated for the first time the potential for plug-and-play small-scale systems on balcony parapets in Switzerland. The study shows that such systems, each with a maximum of three modules, could produce around 1 terawatt-hour of solar power annually. In addition, an estimated further 2 terawatt-hours per year could be generated by plug-and-play solar systems on very small roofs, such as bicycle shelters. Approximately one third of the total 3 terawatt-hours is generated during the winter months. The figures already take into account that feed-in is partially reduced to prevent overloading the electricity grid.

Minimising risks

As plug-and-play PV systems are used by laypeople, the installations must meet high safety requirements. In Switzerland, their use has not yet been comprehensively regulated. The notice from the Swiss Federal Inspectorate for Heavy Current Installations (ESTI) in Bulletin 7/2014 regulates only the most important electrical engineering aspects. According to this, systems with a cumulative AC power of up to 600 watts may be plugged into domestic sockets. This is subject to certain requirements being met – for example, the presence of a residual current device and written notification of the distribution network operator prior to commissioning.

To further minimise risks, the study identified, among other



The potential monthly energy production of balcony systems with 1 to 2 or 3 modules with 600 watts AC feed-in power, compared to 1 to 3 modules with 800 watts AC feed-in power (source: Meteotest, edited).

things, gaps in current standards as well as hazards relating to system safety, fire protection, overload or protection against electric shock. Based on numerous tests, it was demonstrated which characteristics safe products possess or should possess. Where necessary, risk mitigation measures were identified.

Developing new guidelines

To close the regulatory gaps, the project team recommends developing a Swiss Standard Guideline (SNG) based on the findings of the study and the technologies available today. This should also take into account an increase in power from 600 to 800 watts (single-phase) as well as an extension to new system categories (including three-phase systems and those with battery storage). The project consortium has already initiated the key steps to replace the 2014 ESTI regulation and has drawn up a framework for the SNG. The next step will be to form a working group to develop the details. The aim is to publish the SNG by mid-2027.

The new guidelines for plug-and-play PV systems are intended to create optimal conditions so that the significant potential of ready-to-plug-in systems on balcony parapets and small roofs for solar power generation can be utilised more effectively and safely in future.

Sandra Arberhard, Faktor Journalisten AG

Part of the project involved, among other things, mitigating risks and establishing a basis for new guidelines on plug-and-play systems (source: BFH).

View of the reservoir of the "Hongrin-Léman" pumped-storage power station in the Vaud Alps. The plant utilises the difference in altitude between Lac de l'Hongrin (1,255 m above sea level) and Lake Geneva (377 m above sea level) for the production and storage of electricity (source: Commons Wikimedia, Gcottenc, CC BY-SA 2.5).

Hydropower acts as a compensating factor

Reservoirs are like giant batteries for the domestic electricity supply. Meanwhile, river-based power stations help prevent blackouts in the grid. A multi-year study funded by the Swiss Federal Office of Energy (SFOE) shows that the stabilising effect of hydropower plants can be increased relatively easily.

Domestic hydropower is a reliable source. In 2024, it supplied around 37 terawatt-hours of electricity, which is almost one per cent more than in the previous year. If output continues to grow at this rate, the expansion target of the national energy strategy is well within reach. By 2050, hydropower is set to provide an additional two terawatt-hours, bringing the total to 39 terawatt-hours of electricity.

Efforts to achieve this are already underway: many hydropower plants are due for renewal in the short to medium term. And expansion is planned for several sites to generate as much electricity as possible from climate-friendly sources.

However, hydropower is also indispensable for security of supply. Reservoirs are needed as energy storage facilities for surplus wind and solar power. Meanwhile, river-based power stations help to quickly balance the voltage in the electricity transmission grid. If an overload is threatening to occur, production is immediately reduced. On the other hand, if a voltage drop is imminent, more energy is immediately produced to feed into the grid.

Changing operating mode
Short response times, however,

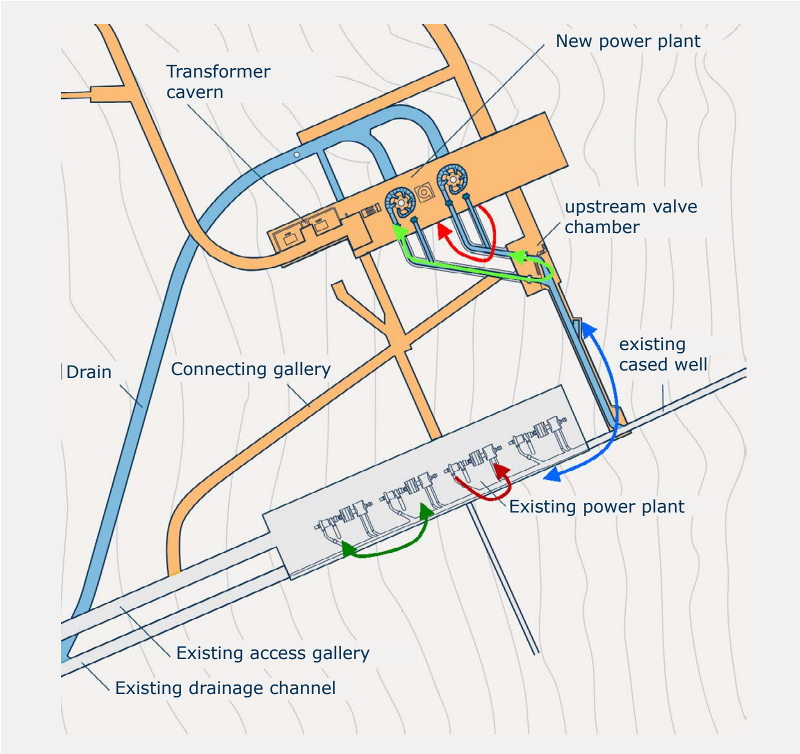


Diagram of the "hydraulic short-circuit" system, which enables the power station to operate in parallel "turbine" and "pumping" modes (source: final report HydroLEAP, 2025, edited).

have a detrimental effect on power station operations: every switch-over and every change in pressure increases wear and tear on mechanical components. With the support of the SFOE, domestic researchers have now completed a multi-year study aimed at improving storage and balancing operations in hydropower plants.

An initial optimisation measure is available for pumped-storage power stations, which store or generate electricity as required. Under certain conditions, the turbine and pump can be synchronised with one another, allowing operations to be organised much more flexibly. Depending on the choice, the mechanical systems can switch more quickly from production to storage mode. Alternatively, pump operation can be adapted more flexibly than at present to small or large surpluses of electricity in the grid.

View of the Pelton turbine used for electricity generation (source: final report HydroLEAP, 2025).

Test in Vaud

With the help of the research, the flexible operating mode was successfully tested at the "Hongrin-Léman" power station in the Vaud Alps. A key factor in this was setting up a novel water circuit within the existing pipeline system – the so-called hydraulic short-circuit – in a way that was as gentle on the plant as possible.

The optimisation of balancing operations was also tested at a river-based power station. During the refurbishment of a plant in Upper Valais, an additional electrical storage unit was installed. This serves as an energy buffer for the turbines: if more electricity is needed in the grid or less is required from it, the command is first sent to the battery storage unit. This releases or absorbs energy, allowing the turbine to continue running at a constant speed for the time being. This operating method is particularly gentle on the blades, as they would otherwise be immediately exposed to changes in pressure in the water flow.

Both hydraulic short-circuiting and the additional storage unit are already in widespread use in hydropower plants across Europe. The study's findings offer hope that these measures will also be increasingly adopted in domestic hydropower.

Paul Knüsel, Faktor Journalisten AG

The maximum charging power of the mobile charging solution was tested at the test site in Oberbüren. An electric truck with a large battery (capaci
more than 1 megawatt over ten minutes (source: Designwerk Technologies AG).

Mega-chargers for electric trucks

Mobile charging stations with integrated energy storage can charge electric trucks at locations of the user's choosing and faster than usual. The results of a practical project lasting several months demonstrate how the concept works and what advantages it offers.

Whilst Northern European countries lead the way in new registrations of battery-electric cars, Switzerland is at the forefront when it comes to electric trucks. By 2025, one in five heavy commercial vehicles sold in this country had an electric motor – ranking first in Europe. This suggests that an increasing number of local transport companies see economic benefits in purchasing an electric truck. Although their purchase prices remain higher than those of conventional diesel-powered trucks, battery-electric trucks cost less to operate. On the one hand, charging with electricity is cheaper than refuelling with diesel; on the other, electric trucks are (still) exempt from the performance-based heavy vehicle tax (LSVA). Over their entire lifecycle, battery-electric commercial vehicles can therefore be more economical than trucks powered by fossil fuels.

Smaller batteries, faster charging

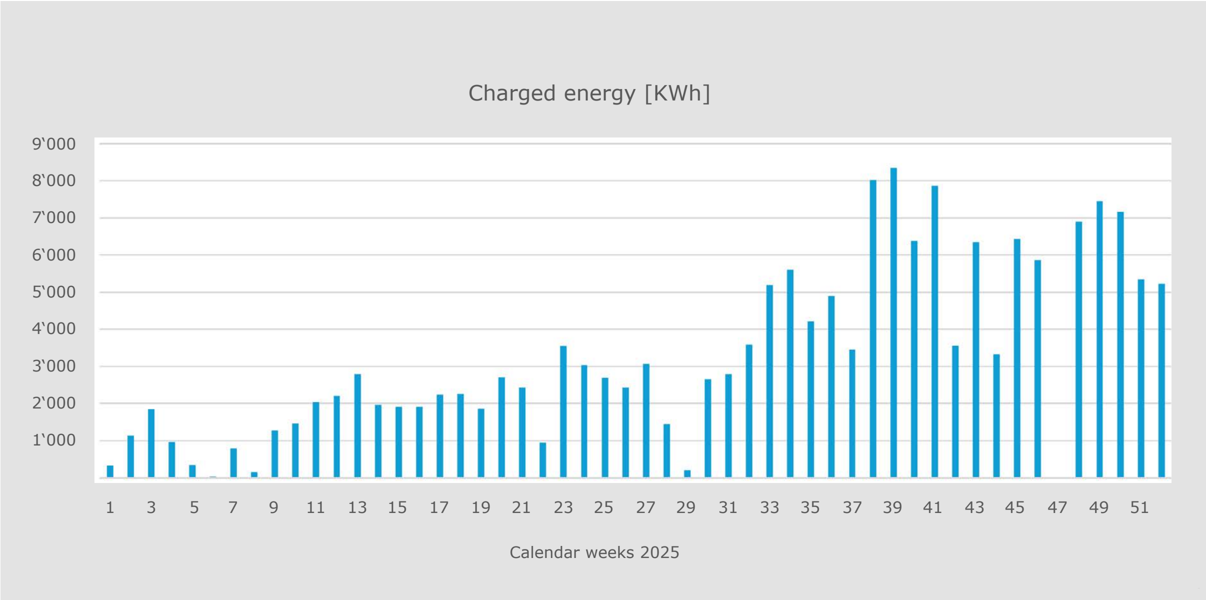
For a freight operator to opt for an electric truck, however, it is not only the financial aspects that

ty 1,000 kilowatt-hours) was charged from 10 % to 90 % within 52 minutes. The charging current reached 1,500 amperes with a charging power of

matter, but operational requirements must also be met. Specifically: the vehicle must be able to complete its daily route within the required time using a battery that has been fully charged overnight. Typically, large batteries with a storage capacity of around 1,000 kilowatt-hours and a weight of approximately 5.5 tonnes are fitted into electric trucks. Whilst this achieves the desired range of up to 1,000 kilometres, it has drawbacks such as high purchase costs and a lower payload than fossil-fuel-powered trucks. An alternative to this is smaller batteries with a capacity of 500 kilowatt-hours and a weight of approximately 2.8 tonnes, which are charged more frequently and more quickly. Although long downtimes are generally avoided in the transport industry, in Switzerland drivers must take a break of at least 45 minutes after 4.5 hours at the latest. This time can be used to recharge the battery sufficiently for the electric truck to complete the rest of its daily workload. To make this possible, suitable fast-charging stations are required.

Integrated storage

The pilot project “Mega Charger: Megawatt-Batterie-Ladesystem für schwere Nutzfahrzeuge (Megawatt Battery Charging System for Heavy Commercial Vehicles)”, supported by the Swiss Federal Office of Energy, addressed this issue. It investigated the extent to which a so-called Megawatt Charging System (MCS) – a charging concept significantly more powerful than those used for electric cars – can meet the operational requirements of electric trucks with (relatively) small batteries. For this purpose, the charging station was



The figure shows the total amount of energy loaded per week at the Altishofen site in 2025. During the trial operation, the volume was increased, particularly following an adjustment to the hardware in calendar week 29. By way of comparison: with the maximum of 8,000 kilowatt-hours per week achieved, it would be possible to supply more than 100 average single-family households with electricity over the same period (source: Designwerk Technologies AG, edited).

installed in a container that also features an energy storage unit. This makes it mobile and allows it to be positioned wherever electric trucks with high power requirements need to be charged. Furthermore, thanks to the integrated energy storage system, the mobile charging station can provide charging power that exceeds what the local grid connection would otherwise allow. Moreover, the grid is relieved of strain because the energy storage system can smooth out peaks in load and feed-in. For example: if local solar installations generate high surpluses, the storage unit can absorb them, thereby protecting the grid from overload.

Successful practical test

As part of the pilot project, two prototypes of the mobile charging station were built and tested at different locations. One was in operation for around nine months at a freight forwarder’s depot in Altishofen, Lucerne, where it carried out up to ten charging cycles per working day. A typical working day for one of these electric trucks involved, for example, driving from Altishofen to Geneva twice a day. This corresponds to a total distance of around 900 kilometres – a journey for which the electric truck needs to be recharged en route. This usually took place after the first return journey in the late afternoon, so that the vehicle could then set off on its second trip. The other mobile charging station was located at a maintenance depot for the national road network in Oberbüren, St. Gallen. Among other things, tests were carried out there to determine the maximum charging power the system could achieve. In one test, a prototype electric truck with a battery capacity of 1,000 kilowatt-hours was charged from 10 % to 90 % within 52 minutes. An assessment of the impact on the electricity grid showed that the grid operator’s limits were adhered to – meaning there was no overloading of the grid. This demonstrated that the mobile charging station meets the technical requirements.

Higher load capacity as an advantage

And what about cost-effectiveness? To assess this, the project team compared the total cost of ownership (TCO) over the life cycle of an electric truck with a large battery charged conventionally with that of an electric trucks with a smaller battery charged using the mobile charging station described above. The scenario involving the electric lorry with a smaller battery did indeed show certain cost advantages, such as lower vehicle-related investment, a potentially higher payload and shorter downtime. Furthermore, energy costs are lower because lighter vehicles consume less electricity and because the storage system can absorb cheap solar power and discharge it at night. Grid costs are also reduced because, thanks to the storage system, a comparatively lower grid connection capacity is sufficient. However, the advantages depend on energy prices, the truck's utilisation rate and the degradation (capacity loss) of the battery. The life cycle assessment was also part of the study. A key influencing factor here was the second-life batteries used for the energy storage system in the loading container. It turned out that the CO_2 intensity of the electricity used and the system efficiency have the greatest influence on greenhouse gas emissions. In terms of kilometres driven, the CO_2 emissions of the two scenarios compared are roughly on a par. When the mass transported is taken into account, the system with smaller batteries has a slight advantage due to the higher payload.

Contribution to decarbonisation

The project's conclusion: the concept of a smaller electric truck battery combined with a mobile charging station featuring an energy storage unit works from a technical standpoint. Operational suitability and grid compatibility were also demonstrated in practical testing. Whether economic benefits also arise depends heavily on the design. According to the project team, the use of this innovative charging solution makes particular sense at locations where the grid infrastructure is insufficient to supply an electric lorry fleet. It can be deployed quickly and without major on-site modifications. Conversely, locations with very limited space are challenging because the container housing the charging station and storage unit cannot be divided or made smaller. Overall, the concept could be a key component in the decarbonisation of heavy goods transport in Switzerland.

Remo Bürgi, Faktor Journalisten AG

The drilling site for the first borehole (SLA-1) next to Grob Gemüse AG in the municipality of Schlattingen, Canton of Thurgau (source: Nagra).

Advancing the research and use of underground energy

In Schlattingen (TG), the greenhouses of a vegetable producer are heated using heat sourced from around 1,200 metres below the surface. A research project has now used the existing deep boreholes to investigate in greater detail the origin, circulation and composition of the thermal water. The aim was to expand the fundamental understanding of the Muschelkalk aquifer in order to improve its future geothermal utilisation in northern Switzerland.

Northern Switzerland is considered a promising region for geothermal energy, as aquifers are present in the subsurface in manyareas, including in the municipality of Schlattingen in the canton of Thurgau. Since 2016, the local company Grob Gemüse AG has been heating its greenhouses with carbon free geothermal heat, extracted from the subsurface through two deep boreholes.

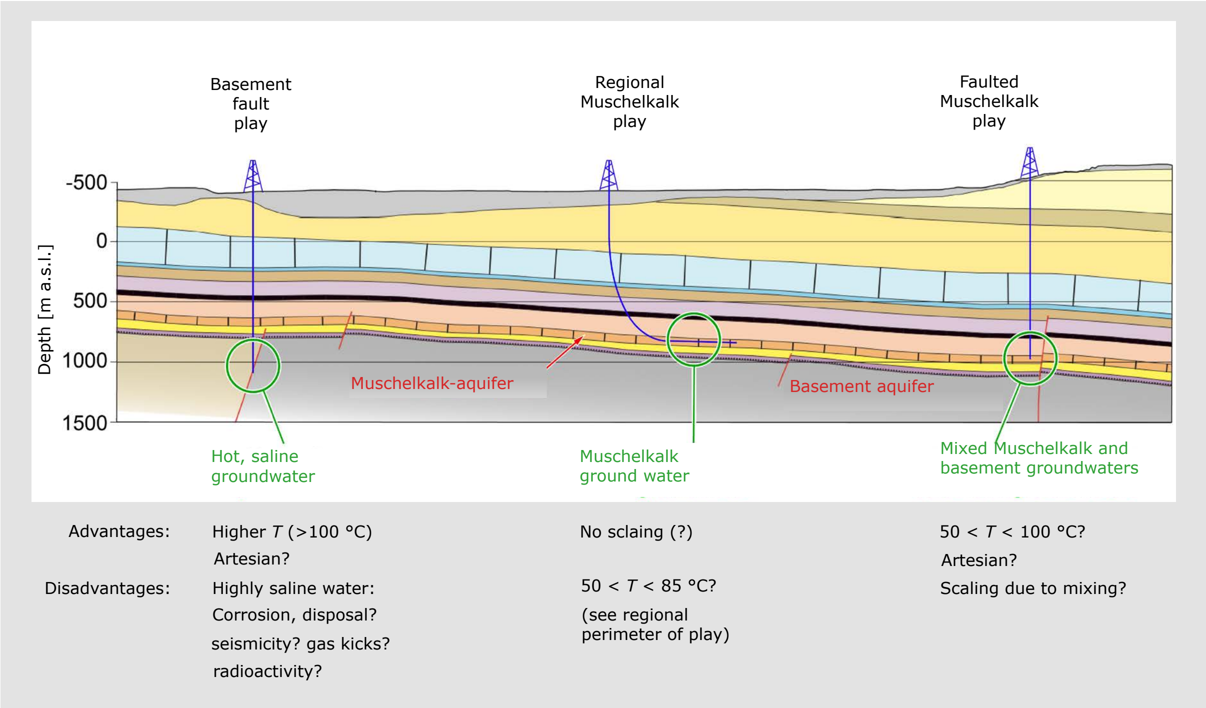
A productive Muschelkalk aquifer

Both the first vertical borehole and the second horizontally deviated borehole encountered a water-bearing rock formation at a depth of around 1,200 metres: the Upper Muschelkalk aquifer. Water at a temperature of around 62 °C is pumped from this formation to the surface. Long-term production rates of up to 10 litres per second in total can be expected from both boreholes.

To gain insights into the formation, origin, groundwater flow paths and long-term production potential of the Muschelkalk aquifer, a two-year research project was launched in 2023, supported by the Swiss Federal Office of Energy and the Canton of Thurgau. Grob Gemüse AG, as developer of the geothermal project, provided access to the boreholes and water samples for the scientific investigations.

Different origins of the thermal water?

Based on analyses of water samples, the researchers were able to demonstrate that the water from the two wells has different origins. The water from the vertical borehole originates from precipitation that fell in the southern Black Forest during the last ice age. In that regions, the Muschelkalk formation, which are located at a depth



The analyses identified three promising geological targets (plays) for future geothermal development (graph: final report MK-Aquifer-Charakterisierung, 2026, edited).

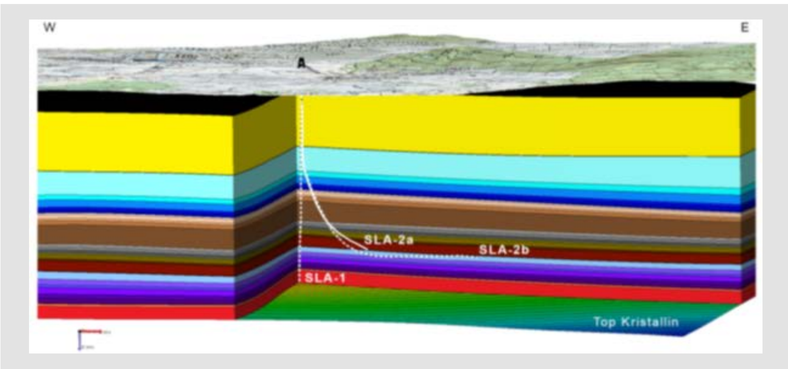
of 1,200 metres in Schlattingen, outcrop at the surface, allowing precipitation to infiltrate.

In contrast, a significant proportion of the water from the deviated borehole originates from the crystalline basement, i.e. from an even deeper rock formation. Numerical modelling showed that the upward migration of water occurs along fault zones, through fractures and fissures. Based on these findings, the researchers recommend that future investigations in the canton of Thurgau and northern Switzerland focus on three different geological targets: the regional Muschelkalk aquifer, the water-bearing fault zones within the Muschelkalk aquifer, and the water-bearing fault zones within the crystalline basement.

Providing a basis for further practical projects

At the same time, the project also highlighted the challenges associated with the use of deep groundwater resources. For example, mineral deposits (i.e. scaling) can lead to clogging and technical problems in production facilities, while high salinity can promote corrosion. These findings make it possible to identify suitable mitigation measures at an early stage.

By using deep geothermal heat, Grob Gemüse AG saves around half a million litres of heating oil annually, corresponding to 1,500 tonnes of CO_2 emissions. The new findings from the research project, completed in autumn 2025, provided a solid basis for decision-making aimed at increasing the chances of success of future geothermal projects. The next step will be to identify further sites in the canton of Thurgau and northern Switzerland for the use of geothermal energy from the deep underground.



Geological block model showing a vertical cross-section along the first (SLA-1) and second (SLA-2) boreholes, drilled in 2011 and 2013, respectively (source: Bläsi et al., 2014).

Sandra Aeberhard, Faktor Journalisten AG

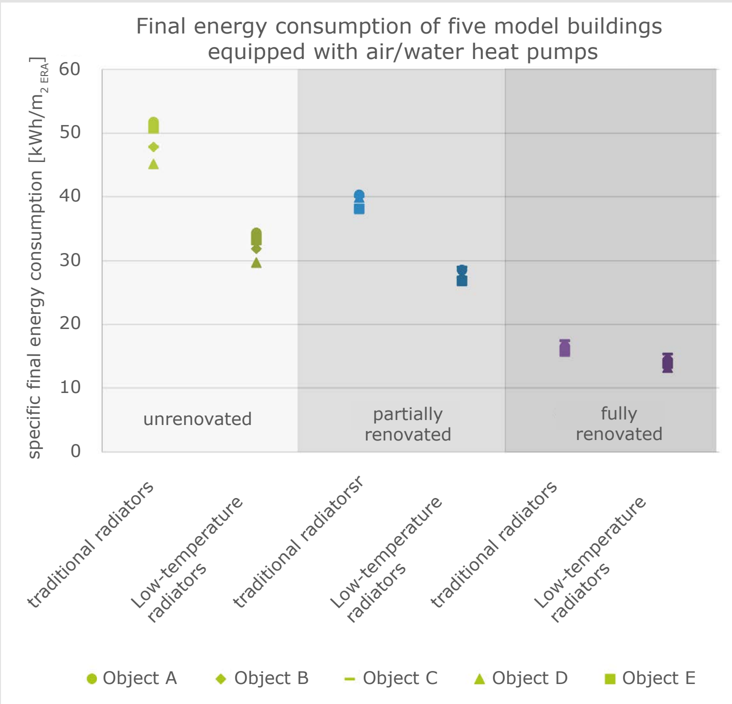
Alternatives to radiators

CO_2 emissions in the building sector must be reduced. But what is the best approach for existing residential buildings: simply replacing fossil fuel heating systems? Or improving the insulation of the building envelope at the same time? A representative analysis points to another option: replacing the heat distribution system.

When it comes to climate protection, too, there are many ways to achieve the same goal. To reduce greenhouse gas emissions in the building sector, various approaches are recommended in practice: either each individual house is better insulated to reduce energy demand, or the fossil fuel heating system is replaced to make way for a renewable, low-carbon energy system. Ideally, both measures can be combined. The combined approach of insulation and heating system replacement even promises multiple benefits: not only do CO_2 emissions fall, but energy consumption and running costs can also be significantly reduced. This is because a well-insulated house can be heated using a system with a significantly lower output than its predecessor.

Seeking alternatives

However, the complete renovation programme will cost more than individual improvements. This makes it all the more important for homeowners to know which measures deliver the greatest impact in relation to the costs. A consortium comprising the planning sector and academia also asked whether there are cost-effective alternatives to the complete renovation of a building. With the support of the Swiss Federal Office of Energy, it investigated the energy and economic benefits of various established and innovative building renovation options. A key requirement for this practical study of renovation options was that the objectives of the federal government's energy and climate strategies be met in equal measure.



A comparison of renovation options for five existing residential buildings shows that the use of low-temperature distribution systems leads to significant energy savings in heating (source: Lemon Consult, edited).

Which option involves the least expenditure?

Model calculations based on five real-life apartment blocks yielded the following findings: replacing the fossil fuel heating system with a heat pump delivers the greatest reduction in greenhouse gas emissions. These are reduced by as much as 80 per cent if the electricity powering the heat pump comes from a renewable source.

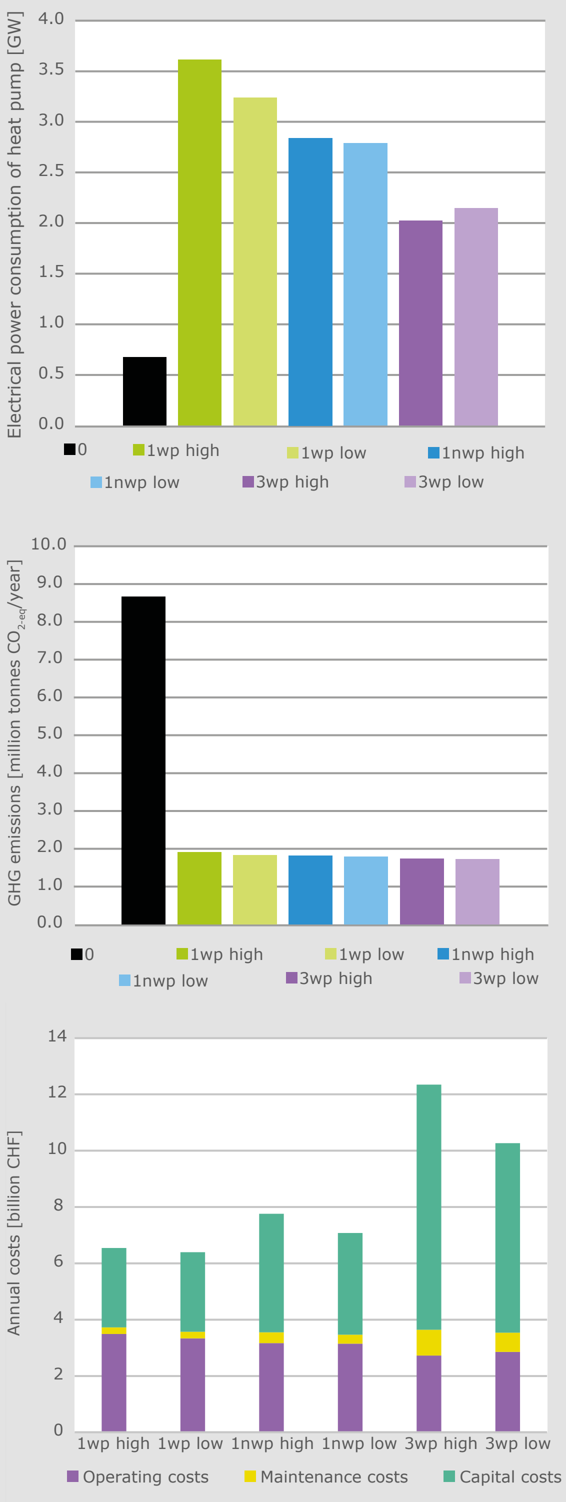
A full renovation, i.e. insulating the building envelope, can certainly reduce additional emissions. However, according to the study, this measure comes at a comparatively high additional cost. For the first time, replacing the heat distribution system (HDS) is now being proposed as an alternative: the CO_2 footprint of the residential buildings studied can be improved almost as effectively as with a full renovation, whilst replacing the distribution system costs significantly less.

Large-area ceiling heating systems enable heat to be distributed at a low temperature (source: SOLTOP Energie AG).

Heat transfer via surface area
The distinctive feature of such systems is that they transfer heat to a room via a large surface area, which is why the heating flow temperature can be set to lower levels than with conventional radiators. Underfloor heating works on this principle, as do large-surface heating elements that can be installed on a wall or under the ceiling without compromising thermal comfort.

Low-temperature heat distribution systems also improve the efficiency of heat generation. Heating the flow temperature to just 35 °C to 45 °C, rather than to around 60 °C as with a radiator, saves a heat pump a great deal of work – and consequently increases its efficiency.

Output as a new performance indicator
The WAG study also examined the potential for improvement at a broader level: what would happen if all buildings in Switzerland were fitted with a low-temperature heat distribution system? The answer is once again promising: if the heating surface area in homes is increased and the flow temperature reduced, the heating system



1 wp: Scenario with heat pump & high-temperature heat distribution system

1 nwp: Scenario with heat pump & low-temperature heat distribution system

3 wp: Scenario with complete refurbishment of the building envelope & heat pump & high-temperature heat distribution system

High: Scenario with 55 °C flow temperature at the design point

Low: Scenario with 60 °C flow temperature at the design point

(top) The power requirement of a heat pump decreases when heat is supplied via a low-temperature system (scenario: 1nwp) rather than a high-temperature heat supply system (scenario: 1wp). Scenario: 3wp reflects the renovation of the building envelope.

(middle) Annual greenhouse gas emissions fall almost as much when switching from a high-temperature heat distribution system (scenario: 1wp) to a low-temperature heat distribution system (scenario: 1nwp) as they do following refurbishment of the building envelope (scenario: 3wp).

(below) The annual operating and capital costs for building heating (with a heat pump) are significantly lower following the switch from a high-temperature heat distribution system (Scenario: 1wp) to a low-temperature heat distribution system (Scenario: 1nwp) than following refurbishment of the building envelope (Scenario: 3wp). (source: final report EFFIWAG, 2025, edited).

requires less power. In the case of a heat pump, this means: the falling maximum demand for electrical power has a positive effect on Switzerland's electricity supply during the heating season.

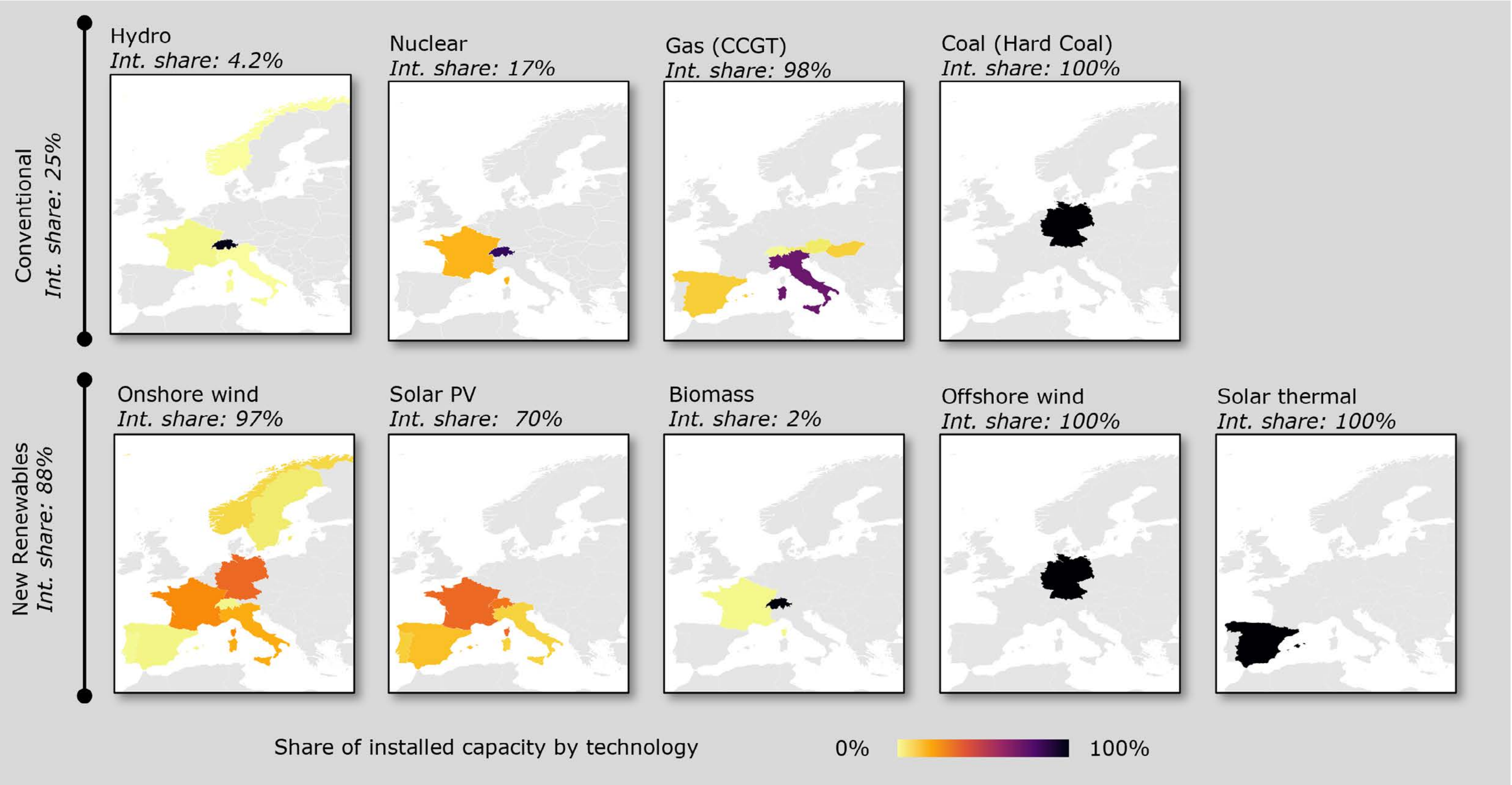
In fact, the power consumption of heat pumps is crucial for the electricity supply in winter. This is because the electricity that all heat pumps together draw on the coldest day of the year must be available immediately. A high power peak means that a lot of electricity is required to heat buildings. Conversely, every single heating system whose peak output can be reduced helps to relieve the strain on the domestic electricity grid. The switch from a high-temperature heat emission system to a low-temperature variant therefore offers multiple benefits: the homeowner requires less energy to power the heat pump. And Switzerland can reduce its electricity demand in winter.

Subsidies for replacing the heat distribution system?
The study also discusses how the uptake of low-temperature distribution systems can be improved in practice. A survey of experts revealed potential areas for technical and regulatory improvements. Immediate hurdles include a lack of space for large radiators indoors or the significant effort involved in retrofitting underfloor heating. However, practical experience is already being gained in converting existing distribution systems to low-temperature operation at a reasonable additional cost. The study calls for the simultaneous replacement of the heat distribution system to be routinely assessed whenever the replacement of a fossil fuel heating system is imminent. Among other things, this renovation measure could be subsidised by the cantons. This is because switching to a low-temperature heat distribution system would provide financial support for a highly cost-effective improvement measure.

Greater focus on the heat distribution system
The Cantonal Energy Performance Certificate (GEAK) could also help to further optimise heat distribution and heating demand. For example, the building assessment, which has so far been based on heating demand, should also verify the maximum required heating flow temperature.

The study generally recommends paying greater attention to the replacement of heat distribution systems. This would require a wide range of measures at various levels. In this respect, many avenues remain open in the future for effectively exploiting the efficiency potential in the existing building stock.

Paul Knüsel, Faktor Journalisten AG



The study also examined which technologies Swiss energy suppliers tend to invest in abroad and which they tend to invest in domestically. The results show that, for conventional technologies such as hydropower and nuclear power, investment is primarily domestic, with only a small proportion (4.2 % and 17 % respectively) of the funds flowing into foreign projects. In contrast, investment in CO_2-intensive technologies such as gas and coal-fired power stations is almost exclusively directed abroad. Similarly, more investment is being channelled into foreign projects than into those in Switzerland when it comes to "new" renewable energies. The sole exception is biomass, in which investment is predominantly domestic (source: final report FINDIT, 2025, edited).

Swiss players are investing in the energy transition – but mainly abroad

The transition to a climate-friendly energy supply requires significant capital. A study has now examined which Swiss companies are investing in the energy transition, how they are doing so, and where. The result: a great deal of money is going into projects abroad.

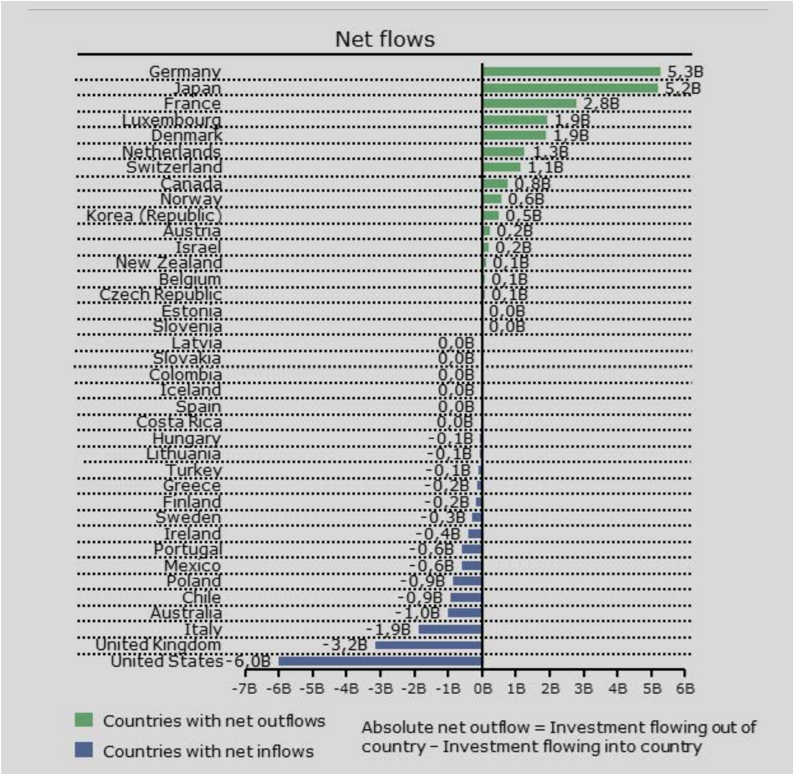
For the energy transition to succeed, suitable technology, public acceptance, favourable framework conditions – and money – are needed. However, it was previously unknown which private-sector players were investing in renewable energy, how much they were investing, and where exactly. The Swiss Federal Office of Energy therefore supported a study by the ETH Zurich, which took a closer look at investment flows into the transformation of the energy supply.

Swiss investments abroad
To identify general patterns, the researchers analysed all financial flows between 2004 and 2022 in the 38 OECD countries into facilities that generate renewable energy. The technologies examined mainly included onshore and offshore wind power, photovoltaics, as well as biomass and waste recycling. The results show that foreign capital is relevant for many countries in the energy transition – albeit to a very varying extent.

Swiss companies invest heavily in projects abroad relative to the size of the domestic renewable energy market. This is quite unusual compared with other countries in the OECD. Most of these investments were made in neighbouring European countries – primarily Germany, France and Italy – as well as in Northern European countries and the US. One reason for investing in foreign projects could be that the construction of large-scale energy plants is perceived as more costly and less lucrative in Switzerland, for example due to complex approval procedures, limited land availability and restricted scaling possibilities.

Active energy suppliers
It is also interesting to take a closer look at the key players. Banks are not the only ones making significant investments in renewable energy production – their involvement is below average relative to the size of the financial sector. Energy suppliers also play an active role.

Using available data and interviews conducted by the project team, the motivations and obstacles behind the investment decisions of these Swiss players were examined. It is interesting to note that their motivations differ. Whilst expected returns are the main deciding factor for financial institutions, regulatory and social considerations also play a role for energy suppliers. On one hand, this means that they also finance projects in Switzerland, even if these are not attractive in terms of returns. Furthermore, these considerations influence the choice of countries for investments: The focus remains on Europe or even just neighbouring countries.



The chart shows the balance of investment flows in renewable energy across the 38 OECD countries. With a net outflow of around 1.1 billion US dollars, Switzerland is among those countries where more money flows out than in (source: final report FINDIT, 2025, edited).

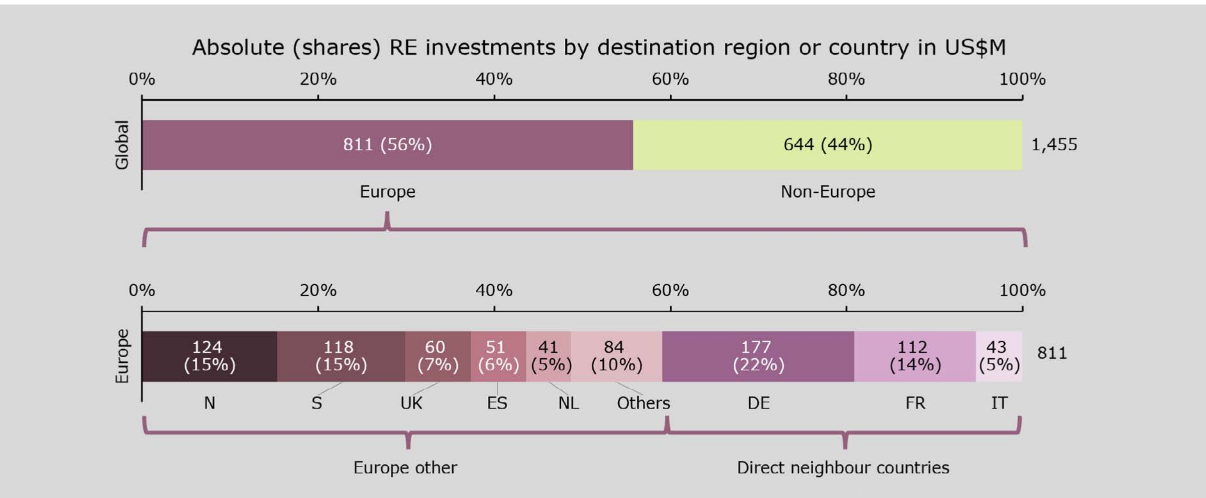
Climate policy is decisive

The study also demonstrates a link between a country's climate policy framework and the scale of foreign investments. The more ambitious and credible a country's climate policy, the more money it attracts from abroad for relevant projects. A reliable policy is therefore a key factor in attracting foreign capital.

The analysis also shows that Switzerland does not lack the capital or the will to invest in renewable energy generation facilities. The problem is that, due to the complex regulatory framework, there are too few viable projects.

According to the researchers, Switzerland is already contributing to the global energy transition beyond its borders. Improved domestic framework conditions could further strengthen its role and make it a driving force in global investment in the energy system of the future.

Remo Bürgi, Faktor Journalisten AG



Where do investments from Switzerland go? Just over half flows into projects in Europe (top bar). There, alongside Norway and Sweden, the direct neighbours Germany and France are the most important investment destinations (bottom bar) (source: final report FINDIT, 2025, edited).

International cooperation

Switzerland attaches a great deal of importance to international cooperation in the field of energy research. At the institutional level, the Swiss Federal Office of Energy (SFOE) coordinates its research programmes with international activities in order to utilise synergies and avoid redundancies. Cooperation and exchanges of experience within the framework of the International Energy Agency (IEA) are of particular importance to Switzerland. Here, for example, the SFOE participates in various IEA "Technology Collaboration Programmes" (cf. www.iea.org/tcp), see list on following page.

At the European level, wherever possible Switzerland participates in EU research programmes. Here, at the institutional level the SFOE coordinates its energy research in alignment with the energy-reated European Partnerships, the European Research Area Networks (ERA-NET), Joint Technology Initiatives (JTI), the European technology platforms, etc. Beyond that, intensive multilateral cooperation with selected countries also exists in certain fields (smart grids, geothermal energy, hydrogen etc.).

Participation in technology cooperation programmes of the IEA

Energy Efficient End-Use Equipment (iea-4e.org)

Heat Pumping Technologies (heatpumpingtechnologies.org)

Industrial Energy-Related Technologies and Systems (iea-industry.org)

Advanced Motor Fuels (iea-amf.org)

Electric Vehicle (ieahev.org)

Concentrated Solar Power (solarpaces.org)

Geothermal Energy (iea-gia.org)

Hydropower (ieahydro.org)

Photovoltaic Power Systems (iea-pvps.org)

Greenhouse Gas R&D (ieaghg.org)

Energy in Buildings and Communities (iea-ebc.org)

User-Centred Energy Systems (userstcp.org)

Advanced Fuel Cells (ieafuelcell.com)

Clean and Efficient Combustion (ieacombustion.com)

Bioenergy (ieabioenergy.com)

Energy Storage (iea-es.org)

Hydrogen (ieahydrogen.org)

International Smart Grid Action Network (iea-isgan.org)

Wind Energy Systems (iea-wind.org)

Energy Technology Systems Analysis Program (iea-etsap.org)

Participation in European cooperation programmes

Accelerating CCS Technologies (act-ccs.eu)

Concentrated Solar Power (csp-eranet.eu)

Geothermica (geothermica.eu)

Smart Energy Systems (eranet-smartenergysystems.eu)

Geothermal Implementation Working Group (geothermal-iwg.eu)

Clean Energy Transition Partnerhsip (cetpartnership.eu)

Driving Urban Transitions (dutpartnership.eu)

Materials (m-era.net)

Solar (solar-era.net)

Further international cooperation

Fuel Cells and Hydrogen Joint Undertaking

International Partnership for Geothermal Technology

DACH-Kooperation Smart grids

Collective Research Networking CORNET

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