



**Note: this document is translated from the German version. In case of doubt the latter serves as the reference.**

17 November 2022 / eca

## Call for tender

### "Net zero greenhouse gas emissions in the building area"

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#### Initial situation

As part of the Paris Agreement, Switzerland has committed to reducing its greenhouse gas emissions to net zero by 2050. With the Long-Term Climate Strategy, the Federal Council shows which areas are covered by the climate strategy and what contributions individual sectors should make to achieve this goal by 2050. The interim goal is to halve greenhouse gas emissions by 2030 compared to 1990. While the climate strategy specifies the net zero target and sectoral reduction paths for Switzerland's territorial emissions, this has not yet been defined for the broader life cycle consideration of the building area.

Parliament is discussing several initiatives that are intended to pave the way in legislation towards net zero. Worth mentioning here are the postulate 20.4135 Schaffner "What does net zero mean for building construction, and how can this goal be achieved?", as well as the parliamentary initiative 20.433 "Strengthening the Swiss circular economy". The Indirect Counter-Proposal to the Glacier Initiative (Bundesgesetz über die Ziele im Klimaschutz, die Innovation und die Stärkung der Energiesicherheit (KIG)) aims to enshrine the net zero target in law by 2050. In an intermediate step, the legislator wants to set a 75% reduction in greenhouse gas emissions by 2040. The path to this goal is to be accompanied by sector-specific reduction paths<sup>1</sup>. The KIG was passed by the Federal Assembly in the autumn session of 2022; the SVP has lodged a referendum against it.

In the ZERO scenario (basis and sub-variants), the EP2050+ energy perspectives show concrete reduction paths for final energy demand in the building area and the associated GHG emissions. The grey GHG emissions from the construction and disposal of buildings are not or only partially included in the EP2050+ energy perspectives or the Long-Term Climate Strategy of Switzerland. However, these must be taken into account in an analysis of the building area in order to formulate targeted measures. For this reason, various organisations are currently working on a definition of net zero in the building area or on methods and instruments to achieve net zero:

- Ongoing work on the future SIA 390 energy efficiency path standard (net-zero compatibility)
- The City of Zurich is funding a study on negative emission technologies in the building sector. Results are expected at the end of 2022.
- The calculation methodologies of the GEAK, Minergie, Minergie-Eco, SNBS Hochbau and 2000-Watt-Areale building labels were harmonised in spring 2022 with regard to the assessment of energy. The weighting factors for supplied energy differ from the primary energy factors of the SIA, but the same principles apply to (embodies emissions of) construction (according to SIA 2032). In addition, an approach for taking into account construction is being tested in the Minergie verification.
- The energy agencies of Eastern Switzerland (EnFK Ost) are currently preparing an overview of the existing definitions and possibly proposing a definition for the cantons.

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<sup>1</sup> Operation of buildings 82% reduction by 2040, 100% by 2050



## Objective

How the net-zero target and the associated system boundaries in the building area are to be defined, which reduction paths lead there and which framework conditions are necessary to achieve the target set, is not clear today. In the project announced here, these gaps in knowledge are to be closed. The aim of this project is to develop a common definition of "net zero greenhouse gas emissions in the building area" for Switzerland that is accepted by all actors and can be used as a basis for setting limits and targets.

The SFOE research programme Buildings and Cities calls for applications from research teams specialised in this topic from universities (including applied sciences) and the private sector<sup>2</sup>. The research teams are requested to give the project the necessary priority in terms of time planning due to its urgency.

## Subject of the tender

The subject matter of this call for proposals was drafted by the SFOE. The opinions of various stakeholders were obtained in an informal consultation and incorporated in consultation with the FOEN. The questions according to the specifications in the enclosure are put out to tender.

## Steering group

The steering group has the task of providing expert strategic guidance for the project. In particular, it comments on fundamental methodological decisions that require a consensus among the stakeholders involved. The steering group is appointed and chaired by the SFOE. It should be made up of representatives from the SIA (Directorate, Commissions 390 and 2032), the GEAK, Minergie, ecobau and NNBS associations, the 2000-Watt Society, EnFK/EnDK and the Confederation (BLO<sup>3</sup>, FOEN, SFOE). Other organisations can be added if necessary. The discussion in the steering group will be conducted mainly in German.

## Application and assessment

A one-step procedure is used for the present call. Complete project applications should be submitted. Based on these applications, the SFOE will award the individual project parts (lots). The evaluation is carried out by the SFOE in consultation with the FOEN and external experts. The decision is final.

The applications are evaluated according to the "Checklist for Research Funding" (Annex III). Of the Qualitative Criteria, only the criteria Q1 "Organisation" and Q2 "Excellence" are fully applied, of Q3 only the sub-criterion "Cost/Benefit Ratio, Subsidiarity". The remaining qualitative criteria and sub-criteria are considered to be fulfilled (3 points).

## Dates

Publication of the call for tender:	17 November 2022
Questions by email to <a href="mailto:energieforschung@bfe.admin.ch">energieforschung@bfe.admin.ch</a> :	04 December 2022
Question will be answered until:	06 December 2022
Deadline (receipt will be confirmed by e-mail):	31 December 2022
Evaluation, information of applicants:	20 January 2023
Award, contract issuance:	31 January 2023

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<sup>2</sup> To maintain the separation of powers, the organisations represented in the steering group should not be part of the project team.

<sup>3</sup> Bau- und Liegenschaftsorgane des Bundes, represented by BBL and/or Armasuisse



## Tender

The tender for the topics is public and is divided into four lots:

Lot	Name	Questions	Budget (indicative)
A	F1	Top-down consideration	CHF 50'000
B	F2	Bottom-up view	CHF 50'000
C	F3	Overview of possible implementation paths	CHF 20'000
D	F4	Bases for limit and target value setting	CHF 25'000

In addition, two questions are tendered as options:

	Name	Question	Budget (indicative)
	F0	Methodological questions	CHF 30'000
	KO	Overall coordination	CHF 25'000

Interested research teams are invited to submit a project proposal for one or more lots. A maximum of 4 lots will be awarded (A, B, C and D). The questions F0 and KO will only be awarded in connection with one of these four lots (the indicative budgets add up). F0 and KO are to be shown in the applications as options with separate budgets.

If a team submits applications for several lots, these must be submitted in separate applications (with independent budgets). The SFOE reserves the right to award the lots individually or to allocate only individual lots to a team. The SFOE also reserves the right to award research contracts with or without the options offered.

The budget amounts to a total of CHF 200,000. The budget figures per lot are indicative. The SFOE hourly rates for departmental research apply in accordance with the Implementation Directive, Annex VI. For the overall coordination (KO), there is no limit to the project time spent on project management (in hourly rate category A). The corresponding clause in the Implementation Directive, Annex VI is waived for the overall coordination.

## Documents to be submitted

- 1) Application form: [Buildings and cities \(admin.ch\)](#) / Documents / Application for project call 2022 "Net-zero GHGE in the buildings area" (DOC)
- 2) Finance sheet: [Research programmes \(admin.ch\)](#) / Documents / Finance sheet for applications ... (XLSX)

## Enclosures

Checklist for research funding: [Research programmes \(admin.ch\)](#) / Documents / Directive on the submission ... (PDF), see Annex III on page 20ff

Specifications with the questions of this call for tenders (below in this document)



## Specifications

Ref.	Question
F0	<p><b>Methodological questions<sup>4</sup></b></p> <p>Q0.1 What CO2 budget by 2050 is derived from the reduction path for the building sector (direct emissions) according to the KIG? What proportion of the emissions budget still available for Switzerland needs to be supplemented in a comprehensive life cycle assessment for the building area?</p> <p>Q0.2 How is the lifespan of a building taken into account in terms of grey energy/THG emissions in a methodologically meaningful way: one-off crediting when used during the construction phase, or write off over years (in the case of the latter: how should the existing building stock be dealt with)?</p> <p>Q0.3 What methodologies exist to take into account negative emission technologies<sup>5</sup> (e.g. carbonation of concrete, biochar) or CO2 sinks (e.g. intermediate storage of biogenic carbon)?</p> <p>Q0.4 What methodologies exist for modelling a) the reuse of building components, b) the recycling of building materials at the end of the building's service life, and c) the feeding of electricity into the grid from solar systems that are part of the building?</p> <p>Q0.5 What role do the measures according to F0.4 play in relation to the development of the reduction paths and the net zero target in the buildings area?</p> <p>Q0.6 What framework conditions are to be defined for the calculation methodology of the operation of buildings (e.g. crediting of electricity fed back into the grid, balancing period of electricity<sup>6</sup>, crediting of supply contracts and certificates<sup>7</sup>)?</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• Further methodological questions can be suggested. The methodological questions are to be answered with the involvement of the steering group.</li><li>• For this purpose, an outline is to be drawn up by the end of February 2023 for the attention of the steering group members and discussed with them (organised by the overall coordination, cf. KO). Further meetings with the steering group are planned to deepen and finalise the open points from the first meeting (see section "Steering group meetings").</li><li>• The methodological principles and specifications agreed upon in this committee are to be recorded in a report. They serve as a guideline for the development of F1 and F2. The F0 team will organise a joint meeting with the F1 and F2 teams at the end of April 2023 to explain the methodological principles and specifications found.</li><li>• In order to prepare for a rapid start of the project, a start meeting with the SFOE/FOEN must be scheduled in the application (date proposal in week 5 agreed in the project team). This serves as a briefing and discussion of the procedure.</li></ul>

<sup>4</sup> Design the calculation methodology(ies) in such a way that both an LCA view and a CO2 Act (or Paris Agreement) view are possible.

<sup>5</sup> According to the Climate Strategy, negative emissions are reserved for emissions that are difficult to avoid. Emissions for the production and operation of buildings are considered to be fully avoidable in principle. In the view according to the CO2 Act (or Paris Agreement), negative emissions for net zero in the building area cannot be accounted for.

<sup>6</sup> The electricity mixes used (production mix, supplier mix HKN, mix of renewable electricity products, consumer mix) must be shown.

<sup>7</sup> In particular:

- Supply contracts for grid-bound renewable energy sources for the production of building materials
- Certificates for permanently stored CO2 for the production of building materials
- Certificates for avoided greenhouse gas emissions for the production of building materials
- Supply contracts for grid-bound renewable energy sources at building operation level



Ref.	Question
<b>F1</b>	<p><b>Top-down consideration</b></p> <p>F1.1 Target definition: What does net zero mean in terms of GHG emissions (GHGE) caused by the construction<sup>8</sup> and operation of the Swiss building stock by 2050, including Scope 1, 2 and 3?</p> <p>Q1.2 What GHGE reductions and what negative emissions are expected from construction and what GHGE reductions from operation to achieve net zero in the building area in a life cycle assessment?</p> <p>F1.3 How great are the potentials or sustainable availability of building materials (especially biomass-based) that lead to negative emissions in the building area.</p> <p>Q1.4 Which reduction paths in 2030/2040/2050, in compliance with the CO2 budget for the building area according to F0.1 and differentiated according to GHGE and negative emissions, result from this, differentiated according to existing buildings and new buildings?</p> <p>F1.5 Quantify the impact of the reduction paths on the increase/decrease of carbon stocks in used wood and other building materials based on renewable resources.</p> <p>Q1.6 What are the territorial shares of the emission targets and reduction paths (according to the Long-Term Climate Strategy, in which NET are reserved for unavoidable emissions) in a life cycle assessment of buildings or the building stock?</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• The work on F1 depends on the results and determinations in F0. These must be awaited (end of April 2023). The time before that should be used to prepare the work. Further dependencies, especially on F2, must be clarified.</li><li>• The definitions of net zero in the "Leitkonzept für die 2000-Watt-Gesellschaft" serve as a basis</li><li>• Consideration of the targets for reduction paths according to the Long-term climate strategy (only includes CH balance!).</li><li>• A literature study<sup>9</sup> including a look across borders, especially EU and member states, should serve to avoid reinventing the wheel</li><li>• A final report is to be written.</li></ul>
<b>F2</b>	<p><b>Bottom-up view</b></p> <p>F2.1 What technical<sup>10</sup> and non-technical<sup>11</sup> measures to reduce GHG emissions from construction and operation exist at the level of individual buildings, differentiated by new construction and existing buildings (incl. refurbishment)<sup>12</sup>? The measures can concern the building itself and/or their supply chains (especially building material manufacturers).</p> <p>Q2.2 Which strategies (combination of measures) are suitable for achieving net zero for individual buildings by 2050?</p>

<sup>8</sup> Construction incl. disposal at end of life (according to SIA 2032)

<sup>9</sup> The recently published paper by Priore, Habert, Juselme, 2022 already gives possible answers to various questions, but with its own assumptions on the methodological issues. The results should therefore be critically questioned.

<sup>10</sup> Efficiency, decarbonisation

<sup>11</sup> Sufficiency in ordering (building owner), planning and operation (owner, landlord, user)

<sup>12</sup> See section "Terms and definitions"



Ref.	Question
	<p>Q2.3 How are these strategies assessed from a constructional and economic point of view?</p> <p>Q2.4 How should the various building standards and labels (MuKE 2014, GEAK, Minergie, SNBS, as well as the SIA efficiency path) be classified in relation to the net zero target and what are the methodological differences between them?</p> <p>Q2.5 To what extent do the limits and targets of these standards meet the net zero target for individual buildings?</p> <p>F2.6 Quantification on concrete examples on different building categories.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• The work on F2 is dependent on the results and determinations in F0. These must be awaited (end of April 2023). The time before that should be used to prepare the work. Further dependencies, especially on F1, must be clarified.</li><li>• A final report is to be written.</li></ul>
<b>F3</b>	<p><b>Overview of possible implementation paths</b></p> <p>F3.1 What are the current political framework conditions (outline)?<sup>13</sup></p> <p>Q3.2 What policy measures (regulations, incentives) could in principle be used to achieve the objective defined in question 1.1?<sup>14</sup></p> <p>Q3.3 Which existing policy measures fall short when taking a life cycle approach, i.e. when considering Scope 1, 2 and 3?</p> <p>Q3.4 How should the strategies from question 2.2 be assessed in terms of implementation opportunities and risks in the periods 2030/2040/2050?</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• The primary aim of this question (F3) is to compile existing findings and discuss them in relation to the questions.</li><li>• Dependencies on other questions must be clarified after the start of the project.</li><li>• The results are to be clearly presented in a report.</li></ul>
<b>F4</b>	<p><b>Bases for limit and target value setting</b></p> <p>Elaboration of uniform bases for setting limits and targets in relation to the net-zero GHG emissions target of the Confederation, cantons, SIA, Eco-building, SNBS, GEAK and Minergie (according to F0):</p> <p>Q4.1 Where are there uniform definitions and assumptions, where are there differences? How can the different evaluation systems of the energy supplied (primary energy or political factors) be dealt with?</p> <p>Q4.2 What approaches are there to include a common net-zero definition based on the different methodological approaches in the various planning and implementation instruments of SIA, Eco-building, SNBS, GEAK and Minergie?</p> <p>Q4.3 How can the limit and target values based on different methodological approaches be set so that they are aligned?</p>

<sup>13</sup> Based on current political business, in particular the Schaffner postulate and the Palv circular economy

<sup>14</sup> A focus should be placed on limit values for grey greenhouse gas emissions: The economic assessment (C. Nathani et al. 2022, VOB) has shown: By setting limit values for grey greenhouse gas emissions or energy of buildings, effective, efficient and technology-neutral incentives would be set for resource-efficient, circular and innovative construction.



Ref.	Question
	<p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• It is important that any differences in the target values are recorded and that there is a mechanism for transferring the targets from one approach to another. In operation, clarification is needed for SNBS, GEAK and Minergie regarding the conversion of the (weighted) energy demand into greenhouse gas emissions.</li><li>• A final report is to be written.</li></ul>
<b>KO</b>	<p><b>Overall coordination</b></p> <p>KO.1 The work on the various (research) questions should be coordinated as a whole. This should ensure that the interdependencies at the interfaces are coordinated and that the project is completed on time.</p> <p>KO.2 The progress of the project in the individual questions F0 to F4 is to be monitored continuously. For this purpose, bilateral team contacts or coordination meetings must be held monthly.</p> <p>KO.3 In order for the steering group to be able to fulfil its function (cf. section Steering group), its decisions must be documented and the implementation of the decisions in the individual issues must be ensured.</p> <p>KO.4 Organisation and convening of the meetings of the steering group in consultation with the SFOE</p> <p>KO.5 A summary report on the results of all questions is to be prepared. This includes an executive summary addressed to politicians and documents the decisions and strategic recommendations of the steering group.</p> <p><b>Note:</b> Due to the political relevance of the project and the tight time frame, the overall coordination has a central role. It should be carried out by an experienced and reliable key person.</p>

## Dates

Project start: 1 February 2023 (for all questions)

The report on F0 (methodological principles and specifications) shall be available by the end of April 2023.

In October 2023, present the provisional results on questions F1 and F2 and, where possible and appropriate, also on questions F3 and F4 for discussion in the steering group.

Final reports: March 2024

## Meetings of the steering group

SG1: February/March 2023: Kick-off meeting and methodological principles (part 1, introductory debate)

SG2: March/April 2023: methodological principles (Part 2, deepening and directional decisions)

SG3: End of April 2023: methodological principles (part 3, decisions)

SG4: October 2023: Interim presentation of all questions, recommendations of the SG

SG5: March 2024: Final presentation of all issues, discussion of implementation measures





### System boundaries building

- Consideration of construction and operation; building-induced mobility is not considered.
- Life cycle assessment (according to SN EN 15804:2013+A2:2019, modules A-C): Manufacturing phase; Installation phase; Use phase; Disposal phase
- Scope 1, 2 and 3 (from the perspective of the building)
- Balance perimeter buildings, balance perimeter site, aggregation to building stock

### Methodology

- Scientific basis of the IPCC
- In this document, view according to the CO2 Act means a UNFCCC-compatible view in order to fulfil Switzerland's obligations under the Paris Agreement (i.e. emissions are reported at the place and time where they occur).
- KBOB Recommendation 2009/1:2022 Life cycle assessment data in the construction sector

### Terms and definitions

- In this document the term "Building area" includes the building stock in a life cycle consideration
- In this document the term "Building sector" includes direct emissions from buildings according to the CO2 Act
- Definitions of net zero in the guiding concept of the 2000-watt society (Leitkonzept der 2000-Watt-Gesellschaft)
- In general, GHG emissions, carbon storage and negative emissions should be considered separately. No mutual offsetting of the same.
- Definition of "construction" (balancing, methodology, system boundaries) according to SIA 2032:2020
- Definition of "new construction" is incl. replacement new buildings and extensions to existing buildings<sup>15</sup>
- Definition of "stock" is incl. repair

### Publications and current projects on the topic

D. Kellenberger et al. 2022, Laufendes Projekt F-Gebäude und Städte: ZeroStrat – Strategien für Neubauten mit nahezu Null Treibhausgasemissionen in der Erstellung

R. Frischknecht und K. Pfäffli, 2022 Laufendes Projekt Stadt Zürich: Bilanzierung von Negativemissionen (NET) im Bauwesen.

C. Nathani et al. 2022, VOBU von Kreislaufwirtschaftsmassnahmen im Bauwesen - Volkswirtschaftliche Beurteilung von Massnahmen zur Umsetzung des Erlassentwurfs zur Palv 20.433 "Schweizer Kreislaufwirtschaft stärken"

D. Savi et al. 2022, SuffiBer – Suffizienzorientierte Berechnung der Grauen Energie und Treibhausgasemissionen von Wohnbauten (Schlussbericht noch ausstehend)

Y. Priore, G. Habert, T. Jusselme, 2022, Exploring the gap between carbonbudget-compatible buildings and existing solutions – A Swiss case study

P. Näf und P. Sacher et al. 2021, Klimapositives Bauen: Ein Beitrag zum Pariser Absenkpfad

A. Galimshina et al. 2021, What is the optimal robust environmental and cost-effective solution for building renovation? Not the usual one

M. Wiprächtiger et al. 2020, A framework for sustainable and circular system design: Development and application on thermal insulation materials

K. Pfäffli 2017, Methodikpapier SIA-Effizienzpfad Energie: Bestimmung der Ziel- und Richtwerte Top-Down und Bottom-Up

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<sup>15</sup> If useful or necessary, a different definition is possible in coordination with questions 1, 2 and 5.





N. Heeren et al. 2015, Environmental Impact of Buildings What Matters

Stadt Zürich, 2022, Holz als Kohlenstoffspeicher im Gebäudepark, Diverse Studien

Diverse Autoren 2022, Laufende EWG-Projekte zur Erarbeitung von Politikmassnahmen: POLIZERO – Swiss Policy towards Zero CO2 Emissions compatible with European Decarbonisation Pathways, DECARB – Policy mix for full decarbonisation by 2050, POLINNOG – Optimal energy policy mix in the light of induced innovation and endogenous growth.

Bundesgesetz über die Ziele im Klimaschutz, die Innovation und die Stärkung der Energiesicherheit (KIG) <https://www.fedlex.admin.ch/eli/fga/2022/2403/de>

Stellungnahmen zur Vernehmlassung der Revision des Umweltschutzgesetzes (parlamentarische Initiative)

2018, Übereinkommen von Paris

Halbierung des CO2-Ausstosses | Synthese Nachhaltige Betonkonstruktionen | Nationales Forschungsprogramm Energie (nfp-energie.ch)

Studie UBA Deutschland: RESCUE – Wege in eine ressourcenschonende Treibhausgasneutralität | Umweltbundesamt

Dänemark: Why Building Regulations Must Incorporate Embodied Carbon - Commentaries (buildingsandcities.org)

UK: Net Zero Whole Life Carbon Roadmap for the Built Environment - UKGBC - UK Green Building Council

EU:

EU Policy Whole Life Carbon Roadmap for buildings | World Green Building Council (worldgbc.org)  
Towards an EU roadmap for reduction of whole life carbon in buildings (ramboll.com)

Bausteine einer Lebenszyklusperspektive für mehr Klimaschutz und Ressourcenschonung im Gebäudesektor - Der Deutsche Rechtsrahmen und gute Beispiele aus der Praxis > BPIE - Buildings Performance Institute Europe

European framework for sustainable buildings Level(s) (europa.eu)

EU-Green Deal: Da dürfte vor allem der Entwurf der Richtlinie (noch nicht verabschiedet) für die Energieeffizienz von Gebäuden von Interesse sein (Teil des Fit for 55-Paketes der EU-Kommission)

Botschaft zur Richtlinie (Embedded Carbon ab S.46, Abschnitt 40ff)