



SWEET Call 1-2023: Call Guideline

Critical Infrastructures, Climate Change, and Resilience of the Swiss Energy System

This call is a joint activity of the Swiss Federal Office of Energy (SFOE) and
the National Centre for Climate Services (NCCS)

**The call for pre-proposals closes on
18 October 2023 at 12:00 noon CEST**





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1 Introduction

1.1 SWEET: Research for the energy transition

SWEET (SWiss Energy research for the Energy Transition) is a funding programme owned and managed by the Swiss Federal Office of Energy (SFOE).¹ The purpose of SWEET is to fund inter-/transdisciplinary research² and innovation activities with a focus on the goals of Switzerland's Energy Strategy 2050³ and long-term climate policy.⁴ SWEET targets solution-oriented research and innovation in the natural sciences and engineering as well as in the social sciences and humanities (SSH) in the domains of energy efficiency, renewable energy production and consumption, storage, networks, society and energy, and security and safety of critical energy infrastructures. Within these domains, the SFOE, in collaboration with the Federal Energy Research Commission CORE, set the guiding theme of the current call as "Critical Infrastructures, Climate Change, and Resilience of the Swiss Energy System". Assisted by discussions with various stakeholders, the SFOE subsequently formulated the research challenge that is the subject of this call.

Meeting this research challenge specifically and Switzerland's energy- and climate-policy goals generally requires that solutions are developed not just from a technical perspective, but in the context of suitable legal and regulatory frameworks, innovative market designs, as well as social acceptance and agency. Therefore, inter-/transdisciplinary approaches that result from close collaborations between the SSH and the natural sciences and engineering are essential. Such collaborations, in the form of consortia that reflect the diversity of Switzerland's research and innovation community, are central to the SWEET programme.

In response to SWEET calls, consortia consisting of research partners from universities, institutes of the ETH domain, and universities of applied sciences as well as implementation partners from industry/the private sector, the public sector (such as cantons, cities, communes, districts/regions, and federal enterprises), and non-governmental organisations (NGOs) are invited to propose portfolios of interrelated research and pilot and demonstration (P+D) projects, see Figure 1-1.⁵ The portfolios should be composed of projects focusing on research, development, demonstration, and deployment/implementation, structured such that the projects build on and feed into each other. The projects may involve real-world laboratories and other formats in which the effects on and the agency of people can be explored. As a result, the consortia and project portfolios should cover significant parts of the innovation system depicted in Figure 1-2. Some projects may start as soon as a consortium is launched, while others may follow at a later stage as they build on the output of earlier projects. Iterative feedback loops between the projects are encouraged. The research and P+D projects are supported by management and coordination as well as knowledge and technology transfer (KTT) activities.

Successful consortia will normally receive SFOE funding for 6 to 8 years. SFOE's funding is subject to the principles of subsidiarity. In the context of SWEET, this means that the consortium partners contribute financially, each partner according to its abilities, to supplement SWEET funding and thereby ensure that the total financial resources are sufficient for the work programme of the consortium. Those partners that receive SWEET funding are referred to as members, while those that do not receive SWEET funding but finance their activities through own and/or third-party contributions are referred to as cooperation

¹ Further information is available at <https://www.bfe.admin.ch/sweet>.

² See Appendix A for descriptions of the terms "interdisciplinary research" and "transdisciplinary research".

³ <https://www.uvek.admin.ch/uvek/en/home/energy/energy-strategy-2050.html>

⁴ <https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/emission-reduction/reduction-targets/2050-target-climate-strategy-2050.html>

⁵ The complete list of eligibility of institutions to receive SWEET funding and therefore be part of a consortium is given in Section 3.2.2.



partners. The SFOE expects that every member of a consortium delivers complementary and significant contributions to the consortium's work programme.

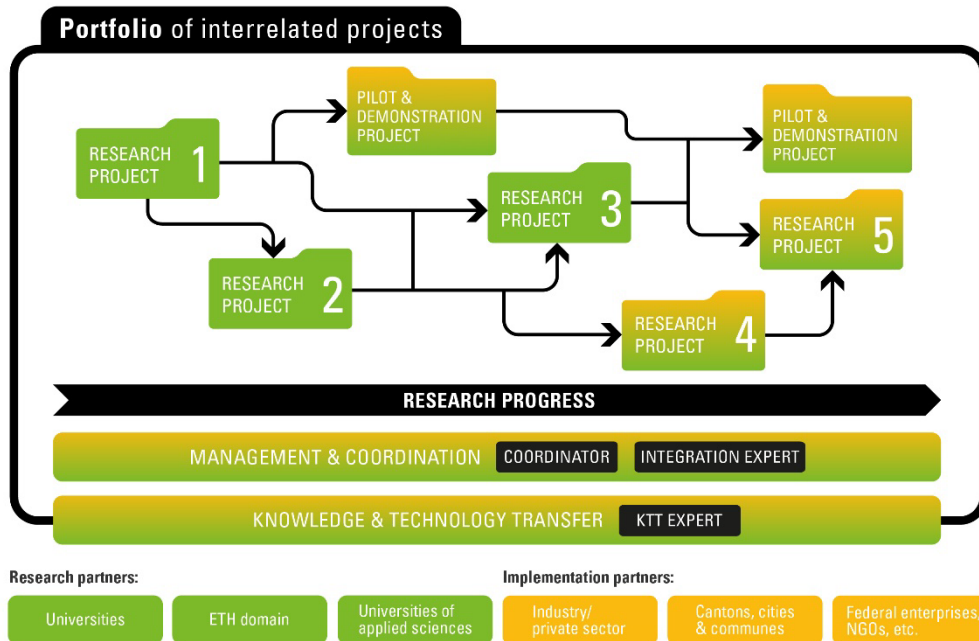


Figure 1-1: Schematic depiction of a portfolio of interrelated projects by a consortium of research and implementation partners, supported by management and coordination as well as knowledge and technology transfer activities. Section 3.2.4 describes the key positions of the coordinator, integration expert, and KTT expert.

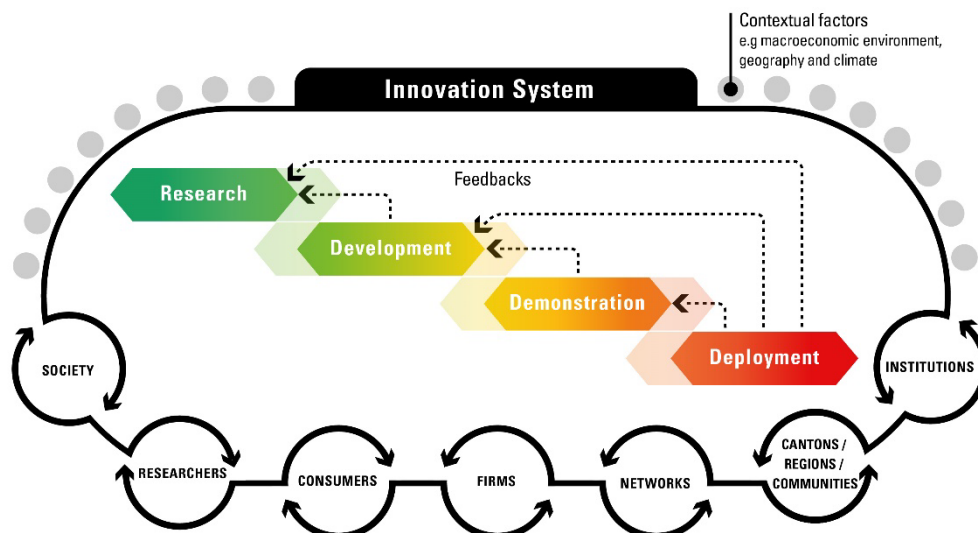


Figure 1-2: A schematic representation of the innovation system, significant parts of which should be covered by SWEET consortia and their project portfolios. The projects are expected to generate and exploit feedbacks, e.g., a market place or a community that demands innovations (deployment) is supplied with new knowledge and/or products from research, development, and demonstration. Adapted from International Energy Agency (2019), *Energy Technology Innovation Partnerships*, building on graphics and text sourced from Global Energy Assessment (2012), *Global Energy Assessment: Towards a Sustainable Energy Future*, Cambridge University Press and the International Institute for Applied Systems Analysis.



SWEET consortia are managed by a host institution. Consortia should strive for gender balance and reflect Switzerland's diversity in terms of languages and regions. Members from the SSH are expected to be equitably represented in the consortia and their management. Since the outputs of the consortia are expected to be relevant to the implementation of Switzerland's Energy Strategy 2050 and climate policy, consortia will be closely accompanied by the SFOE, with particular attention being paid to KTT.⁶

The research and innovation community is encouraged to regard the project portfolio of the consortium that will be funded through this call as a nucleus around which complementary projects relevant to the research challenge can be positioned and to pursue funding through national and international programmes for these projects.

1.2 Guiding theme: Critical infrastructures, climate change, and resilience of the Swiss energy system

The Swiss energy system is regarded as a critical infrastructure because its functioning is essential to the economy, the well-being of the population, and its vital resources. Analogously, a specific element of the energy system can be regarded as a critical infrastructure if its functioning is essential to the economy, the well-being of the population, and its vital resources. The likelihood of critical infrastructures functioning can be increased by lowering their vulnerability and increasing their resilience. A system is said to be vulnerable if it is susceptible to malfunction, failure, or destruction in response to internal or external shocks. A system is said to be resilient if it can withstand internal or external shocks (robustness) and either maintain functionality as much as possible (adaptation) or regain functionality (regeneration).⁷ A vulnerable system is not resilient.

In the 2020 edition of the National Risk Analysis,⁸ the Federal Office for Civil Protection (FOCP) found that two of the top ten risks are associated with the energy system. A sustained shortage of electrical energy, which could be induced by the combination of low water levels in rivers and hydropower reservoirs on the one hand and a shortage of electricity imports on the other hand, represents the highest risk and was estimated to result in damages of about 185 billion Swiss francs. An outage of the electrical supply represents the sixth-highest risk and is associated with estimated damages of about 3.3 billion Swiss francs. (Accidents in nuclear and hydropower plants were estimated to result in damages of about 36 billion and 1.3 billion Swiss francs, respectively.⁹)

To meet the energy- and climate-policy goals by 2050, the Swiss energy system is undergoing a fundamental change: New nuclear power plants may not be built but existing nuclear power plants may continue to operate as long as they are safe (i.e., possibly beyond 2050). Distributed renewable energy sources are being integrated, and fossil-fuel use must be mostly eliminated. The future energy system will depend on decentralised renewable energy sources, various energy conversion and storage technologies, and electricity/gas/thermal grids, all of which will be integrated and orchestrated to balance supply and demand across sectors and over time scales ranging from seconds to months. The captured CO₂ emissions from waste-incineration and cement-production plants may be routed through a pipeline

⁶ The SFOE has developed a toolbox with 30 suggestions for measures that SWEET consortia may use to plan their KTT activities. For further information, see <https://www.bfe.admin.ch/bfe/en/home/research-and-cleantech/funding-program-sweet/ktt-for-sweet.html>.

⁷ See the *National Strategy for Critical Infrastructure Protection 2018-2022*, available in German, French, and Italian at <https://www.babs.admin.ch/en/aufgabenbabs/ski.html>.

⁸ <https://www.babs.admin.ch/en/aufgabenbabs/gefaehrdrisiken/natgefaehrdanalyse.html>.

⁹ The damages given were estimated for assumed scenarios and are subject to uncertainties. For example, in the case of an accident in a hydropower plant, the damage was estimated assuming a scenario such as spillover due to a rock slide with sufficient advance warning. More severe scenarios such as the failure of a major dam may put several 10'000 people, their housing, as well as nearby infrastructures at risk.



network to subsurface storage sites abroad.¹⁰ As the Swiss energy system changes, it is necessary to (re-)evaluate the criticality¹¹ of the underlying existing and new infrastructures, to understand how the system will react to the malfunction, failure, or destruction of one or more of the infrastructures, and to develop and implement suitable mitigation measures.

The re-evaluation must begin by identifying the hazards to the infrastructures underlying the energy system. Following the National Risk Analysis, hazards may be classified as technical, natural, and societal. New technical hazards can originate from the increasing decentralization of the energy system. On the one hand, by phasing out nuclear power plants and expanding small-scale photovoltaic (PV) and wind-turbine installations, the electricity supply will become more volatile. On the other hand, the electricity is no longer supplied through synchronous generators connected to the transmission grid but increasingly through power-electronic converters connected to the distribution grid. The resultant bidirectional energy flows and reduced rotational inertia and self-synchronization can cause instabilities in the electrical grid, which in turn can cause blackouts.

The instabilities can be compounded by the electrification of the energy system, i.e., the increased use of heat pumps and battery-electric vehicles (BEV) that are needed to reduce the greenhouse-gas emissions of the building and transport sectors. Increased demand in the distribution grid that could be caused by the near-simultaneous large-scale activation of heat pumps and charging of BEV can be avoided by smart grids.¹² Smart grids are thus essential to future energy systems, but they can also create new hazards.¹³ For instance, the complexity created by interconnecting a large number of devices – whose behaviour can depend on local insolation and wind patterns, consumer behaviour, machine-learning-based control algorithms, and perhaps automated local or peer-to-peer energy markets – makes predicting the behaviour of smart grids very challenging. In addition, the dependence of smart grids on information and communication technologies (ICT), which in turn depend on power supplied by the electricity grid, may create an interdependency in which a limited failure of an ICT system could cause the failure of part of the electricity grid and thus set up a cascading failure that could end in a blackout.¹⁴ The foregoing points to the vulnerability of smart grids to software faults and cyberattacks:^{15,16} The large number of interconnected and interdependent devices and systems, especially if procured from a small number of suppliers, creates a cluster risk in that a single fault or attack could pose a hazard to the entire electricity system. It is therefore imperative that smart grids are investigated for elements that must be viewed as critical infrastructures.

¹⁰ The CO2NET project studied the feasibility and costs of such a network, for which various reports are available at <https://www.aramis.admin.ch/Texte/?ProjectID=47346>.

¹¹ The criticality of an infrastructure refers to its relative importance in terms of the consequences that its malfunction, failure, or destruction would have on the economy, the well-being of the population, and its vital resources. Criticality depends on the particular level of perspective: for example, some critical infrastructures may have a high level of criticality at local or communal levels (e.g., a transformer station in the distribution grid), while others have a high level of criticality at the national or even international level (e.g., central control systems in the transmission grid). See the *National Strategy for Critical Infrastructure Protection 2018-2022*, available in German, French, and Italian at <https://www.babs.admin.ch/en/aufgabenbabs/ski.html>.

¹² <https://www.bfe.admin.ch/bfe/en/home/supply/electricity-supply/electricity-networks/smart-grids.html>

¹³ acatech/Leopoldina/Akademienunion (2021): *Resilienz digitalisierter Energiesysteme. Wie können Blackout-Risiken begrenzt werden?*, available in German at <https://energiesysteme-zukunft.de/publikationen/digitalisierung>.

¹⁴ Federal Office for National Economic Supply (2021): *2017-2020 National Economic Supply (NES) Report with lessons from the pandemic period*, available in German and French at https://www.bwl.admin.ch/bwl/en/home/wirtschaftliche_landesversorgung/prasentation_wl.html.

¹⁵ National Cyber Security Centre (2018): *National strategy for the protection of Switzerland against cyber risks (NCS) 2018-2022*, available at <https://www.ncsc.admin.ch/ncsc/en/home/strategie/strategie-ncss-2018-2022.html>.

¹⁶ Swiss Federal Office of Energy (2021): *Strategie Cyber Security für die Stromversorgung*, available in German at <https://www.bfe.admin.ch/bfe/de/home/versorgung/digitalisierung.html>.



Beyond the technical hazards, the energy system is also exposed to a range of natural hazards, e.g., storms, cold and heat waves, forest fires, flooding, mass movements¹⁷, earthquakes, and solar storms. Climate change is expected to exacerbate some of these hazards. For instance, the melting of glaciers, the thawing of permafrost, and more frequent severe weather events are expected to lead to more frequent and intense mass movements that can threaten transmission lines and pipelines¹⁸ as well as hydropower dams. In addition to direct hazards to elements of the energy system, climate change also poses indirect hazards. For example, more frequent dry spells during the summer and less snowfall during the winter lead to lower water levels in rivers during the summer, which will reduce the electricity production of run-of-river hydropower plants.¹⁹ At present, the lower water levels, when coupled with higher water temperatures, can result in nuclear plants having to reduce or cease power production.²⁰ In the future, the lower water levels could negatively affect the large-scale production of hydrogen near run-of-river hydropower plants and the higher water temperatures of rivers and lakes could impact their use for cooling and heating and thereby affect the decarbonisation efforts in the building and industrial sectors.

Societal hazards, such as the above-mentioned cyberattacks and others, e.g., sabotage, disinformation, and terrorism, must also be considered in (re-)evaluating the criticality of critical infrastructures. The relationship between critical infrastructures and society is particularly important because certain aspects of society can threaten the energy system and – if the energy system malfunctions or fails or if an element of it is destroyed – society can be threatened by the energy system. This gives rise to questions relating to, e.g., the liability in the case of cascaded failures and failures that are made more likely by climate change, the benefits and costs of a resilient energy system, the prioritization of the mitigation of selected hazards, and the distribution of the benefits and costs associated with reduced risks and increased resilience. The manner in which such questions are addressed may influence the social acceptance of certain infrastructures and the underlying technologies. For instance, reductions in the social acceptance may spring from the increasing decentralization of the energy system, which implies that more infrastructures will be located near and in populated areas, and this may influence the perception of risks associated with their malfunction, failure, or destruction. Such reductions in the social acceptance can be far-reaching if they concern technologies that are crucial to meeting Switzerland's energy- and climate-policy goals. Given the sustained effort required to meet these goals and the population's decisive role in shaping policy, maintaining or increasing the social acceptance of critical infrastructures and the underlying technologies is essential.

SWEET Call 1-2023 is a joint activity of the SFOE and the National Centre for Climate Services (NCCS)²¹ that complements the NCCS-Impacts programme "Decision Support for Dealing with Climate Change in Switzerland: A Cross-Sectoral Approach". Therefore, by completing its work programme, the successful consortium will also contribute to NCCS-Impacts.²² This means participating in programme-wide activities of the NCCS, such as meetings and workshops, contributing to synergies, as well as aligning communication to allow for the creation of cross-cutting syntheses.

¹⁷ "Mass movement" is an umbrella term for rock falls, debris flows, mudflows, and avalanches.

¹⁸ Federal Office for the Environment (2020): *Climate change in Switzerland: Indicators of driving forces, impacts, and responses*. Available in German and French at <https://www.bafu.admin.ch/bafu/en/home/topics/climate/publications-studies/publications/climate-change-switzerland.html>.

¹⁹ Federal Office for the Environment (2021): *Effects of climate change on Swiss water bodies: hydrology, water ecology and water management*, available at <https://www.bafu.admin.ch/bafu/en/home/topics/water/water-publications/publications-water/effects-of-climate-change-on-swiss-water-bodies.html>.

²⁰ <https://www.ensi.ch/de/2018/08/08/hohe-wassertemperaturen-beeinflussen-kkw-betrieb> (German and French)

²¹ <http://www.nccs.ch>

²² <https://www.nccs.admin.ch/nccs/en/home/climate-change-and-impacts/nccs-impacts.html>



NCCS is a network and coordination body of nine federal offices and research institutions, including the SFOE and the FOCP. It bundles existing climate services, promotes dialogue between actors, and works together to develop and communicate tailored information, processes, and solutions. The programme NCCS-Impacts (“Decision Support for Dealing with Climate Change in Switzerland: A Cross-Sectoral Approach”) is set to mark a milestone with respect to the analysis of cross-sectoral climate impacts in Switzerland. The aim of the programme is to obtain an overview of future climate impacts in Switzerland and its central challenges for the environment, economy, and society. It will turn the results into actionable and user-centred products in line with the aim of climate services as decision support. The programme hence contributes to closing the gap identified between basic scientific research and measures in the fields of climate adaptation and climate mitigation.

1.3 The application process

To render the application process more efficient for both consortia and evaluators, SWEET calls are organised into two steps, see Figure 1-3. In the first step, consortia submit a pre-proposal. All submitted pre-proposals will be subjected to an admissibility and eligibility check by the SFOE. The admissible and eligible pre-proposals will be evaluated and ranked by a panel of independent experts. The two highest-ranked consortia will be invited by the SFOE to submit more detailed full proposals. In the second step, the invited consortia prepare and submit full proposals that will again be evaluated by the expert panel. The consortium with the highest-ranked full proposal will be awarded with SWEET funding.

The pre-proposal contains only brief descriptions of the consortium, the objectives, the overall concept and methodology, the work packages (WPs), and the budget. Only the host institution must submit a letter of commitment. For the other members, letters of intent are sufficient. The full proposal will have to describe the WPs and budget in more detail and include letters of commitment for all members.

The process for submitting proposals is described in Section 4. As explained in that section, consortia must notify the SFOE of their intent to submit a pre-proposal. The notification allows the SFOE to better prepare for the evaluation of the pre-proposals and in particular to appoint a sufficient number of evaluation panels.

Important dates associated with this call are shown in Table 1-1. The deadline for submission of full proposals will be announced together with the invitation to submit full proposals.

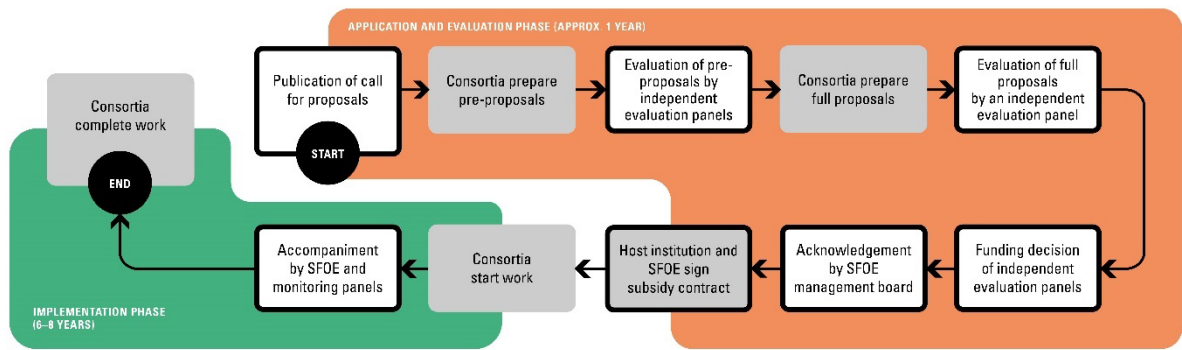


Figure 1-3: The two-step application and evaluation phase of SWEET calls (indicated by the orange background), and the implementation phase (indicated by the green background). Grey boxes and white boxes with a black margin represent activities by consortia and the SFOE, respectively. Grey boxes with a black margin indicate activities that involve both consortia and the SFOE.



Table 1-1: Important dates associated with this call. Dates in italics are provisional.

Event	Date and time
Deadline for notification of intent to submit pre-proposal	29 August 2023
Deadline for submission of pre-proposals	18 October 2023 at 12:00 noon CET
Announcement of evaluation results	<i>January 2024</i>
Invitation to submit full proposals	<i>January 2024</i>
Deadline for submission of full proposals	<i>April 2024</i>
Announcement of funding decision	<i>July 2024</i>
Consortium starts operations	<i>October 2024</i>

2 Research challenge

This call comprises one research challenge. One consortium will be supported with a budget of at most CHF 8 Mio. to tackle the challenge over 6 years, see Section 3.4.1. Additional funding is available through the SFOE's P+D programme, see Section 3.4.3.

2.1 Critical infrastructures, climate change, and resilience of the Swiss energy system

Consortia are required to address all research questions.

2.1.1 Research questions

Research question 1: How does the criticality of the infrastructures of the Swiss energy system change as the system transforms to meet Switzerland's energy- and climate-policy goals and as it is exposed to climate change?

As made clear by the phrasing, the focus is on the energy system as it transforms from its present state to a state that meets the energy- and climate-policy goals in 2050. In other words, consortia must not focus just on the energy system in its current state or just on its anticipated state in 2050. Instead, the impacts of events such as the decommissioning of nuclear power plants as well as trends such as the increasing electrification, decentralization, and digitalization between the present and 2050 must be considered. The focus on the changing energy system also applies to research questions 2 and 3.

Research question 2: How vulnerable is the energy system to technical, natural, and societal hazards?

Consortia are expected to take into account the hazard files compiled by the FOCP for the National Risk Analysis 2020²³ and its update in 2025. Consortia may choose which hazards they will consider in their vulnerability assessment, but they are expected to justify their choices and must pay particular attention to hazards that may arise from the changing energy system itself (i.e., the above-mentioned events and trends) and to hazards that arise from or are accentuated by climate change. Because the focus is on the changing energy system, consortia must consider how the hazards might be influenced by current

²³ Federal Office for Civil Protection (2020), *Hazard files and scenarios*, available in German, French, and Italian at <https://www.babs.admin.ch/en/aufgabenbabs/gefaehrdrisiken/natgefaehrdanalyse/gefaehrdossier.html>.



and foreseeable trends, e.g., digitalization, automation, artificial intelligence, and cyberattacks. Consortia are expected to base their vulnerability assessments on the CH2018 Climate Change Scenarios and their update in 2025.²⁴

Research question 3: How can the risks to the energy system and the population that result from the malfunction, failure, or destruction of critical infrastructures be mitigated and thereby the resilience of the energy system be improved?

In assessing the resilience of the energy system, consortia must consider its stability, i.e., its temporal response to a disturbance. By analogy to the stability of a power system, the stability of an energy system may be defined as its ability, given an initial operating condition, to regain an operating equilibrium after being subjected to a disturbance.²⁵ Consortia must consider disturbances that are caused by the malfunction, failure, or destruction of critical infrastructures in Switzerland and should also consider disturbances that might originate in the European energy system.

Consortia should consider risks associated with the simultaneous or near-simultaneous manifestation of hazards. Possible examples are the reduced power supply caused by (i) technical faults, low water levels, or cyberattacks during a period of increased power demand caused by a heat wave or a cold spell and (ii) mass movements, which are more likely due to the thawing of permafrost and more frequent severe weather events, that could damage or destroy critical infrastructures during a heat wave or a cold spell.

2.1.2 Scope

Prior hazard and risk analyses²⁶ must not be repeated except if consortia can convincingly demonstrate that additional hazards must be considered or that new findings are likely to significantly alter the results of the prior analyses.

Hazards and risks associated with the transport and storage of nuclear waste and the decommissioning of nuclear power plants are not within the scope of this call. However, consortia are encouraged to study the benefits and risks associated with the continuing operation of nuclear power plants until they are phased out. For instance, the energy system might benefit from the load-following ability of nuclear power plants, but this mode of operation could result in increased maintenance needs and a higher probability of unscheduled shut-downs.

Studying measures to mitigate a loss of social acceptance that might result from real or perceived risks to the population is within the scope of this call, provided that the critical infrastructures that give rise to the risks are necessary for reaching Switzerland's energy- and climate-policy goals.

2.1.3 Expected outputs

The consortium's work is expected to lead to the following outputs:

1. Identification of those infrastructures of the energy system with the highest criticality in response to technical, natural, and societal hazards. The identification should be based on an initial evaluation of the hazards, followed by quantitative investigations of a selection of hazards and infrastructures.

²⁴ <https://www.nccs.admin.ch/nccs/en/home/climate-change-and-impacts/swiss-climate-change-scenarios.html>

²⁵ P. Kundur et al., *Definition and Classification of Power System Stability*, IEEE Transactions on Power Systems, 19(2):1387-1401, 2004.

²⁶ Such as, e.g., seismic hazards for nuclear power plants (PEGASOS project, <https://www.ensi.ch/en/topic/pegasos-erdbeben-schweizer-kernkraftwerke/>) or impacts of extreme flood events on hydropower and nuclear power plants on the river Aare (EXAR project, <https://www.wsl.ch/en/projects/exar.html>).



2. Findings for relevant stakeholders (e.g., policy makers, federal/cantonal/local authorities, infrastructure owners and operators, and equipment suppliers) on how the vulnerability of the energy system changes over time. Wherever feasible, the recommendations should be based on quantitative investigations.
3. Recommendations for relevant stakeholders on how the resilience of the energy system can be increased, e.g., using structural/topological and operational measures. Wherever feasible, the recommendations should be based on quantitative investigations, deduced from suitable resilience metrics, and weighed against the economic and environmental impacts of the measures.

2.1.4 Collaborations and coordination

Close collaboration with relevant federal authorities (e.g., the FOCP, the NCCS, the Federal Electricity Commission, the Federal Office of National Economic Supply, and the National Cyber Security Centre) as well as cantonal and municipal authorities is strongly encouraged. As stated in Section 1.2, consortia are expected to participate in programme-wide activities of the NCCS, such as meetings and workshops, contributing to synergies, as well as aligning communication to allow for the creation of cross-cutting syntheses.

Consortia are expected to coordinate their activities with those of other SWEET consortia, especially DeCarbCH,²⁷ EDGE,²⁸ PATHFNR,²⁹ and SURE.³⁰ Furthermore, consortia must build on the outputs of the CROSS activity³¹ and contribute to the continuing harmonization of assumptions, scenarios, and narratives/storylines by the CROSS activity as part of the CoSi consortium.

In planning its work programme, the consortium is expected to seek synergies and avoid substantial overlaps with the projects that will be funded by the SFOE's research programme on grids as part of its 2023 call for proposals.³² It is anticipated that the projects that will be awarded funding through that call will be announced by mid-August on the web page of the research programme.³³

3 Participation

3.1 Need for consortia

Answering the research challenge requires an inter-/transdisciplinary approach. To this end, the research and innovation community has to organise consortia consisting of diverse members, see Figure 3-1, that establish the portfolios of interrelated projects shown in Figure 1-1. A consortium is a network of members that adhere to the rights and obligations set forth in their compulsory consortium agreement. The consortium is managed by a host institution that signs a subsidy contract with the SFOE and represents the consortium to the SFOE. The subsidy contract ensures, among other things, the flow of funds via the host institution to the members. As indicated by Figure 3-1, the members are expected to work closely with so-called cooperation partners, which finance their activities not through SWEET funding but through own and/or third-party contributions. The consortium and cooperation partners together form the so-called extended consortium.

²⁷ <https://www.sweet-decarb.ch/>

²⁸ <https://www.sweet-edge.ch/en/home>

²⁹ <https://sweet-pathfndr.ch/>

³⁰ <https://sweet-sure.ch/>

³¹ <https://sweet-cross.ch/>

³² <https://pubdb.bfe.admin.ch/en/publication/download/11241>

³³ <https://www.bfe.admin.ch/bfe/en/home/research-and-cleantech/research-programmes/grids.html>

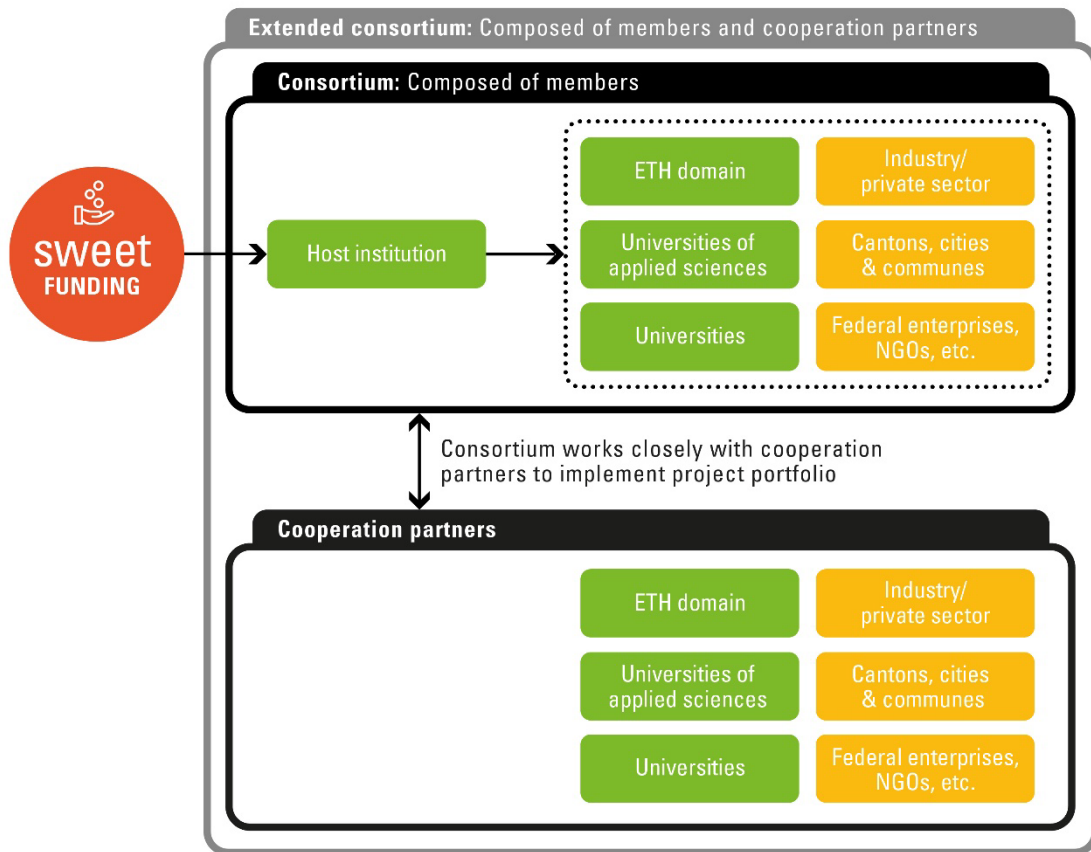


Figure 3-1: SWEET consortia are composed of members that interact with cooperation partners to implement the portfolio of interrelated projects. SWEET funding flows to the consortium members via the host institution. The consortium and cooperation partners together form the so-called extended consortium.

3.2 Consortium structure

3.2.1 Host institution

The host institution must be a Swiss institution of higher education entitled to receive SFOE funding³⁴ and is the legal entity applying for funding on behalf of the consortium. The host institution must provide a letter of commitment to demonstrate its commitment to fulfil the obligations associated with its role in the consortium (see Section 4.2.2). The obligations include appointing one of its employees as the consortium coordinator (see Section 3.2.4) and, if the consortium is awarded funding, negotiating a subsidy contract between the host institution and the SFOE as well as negotiating a consortium agreement with all the member institutions. The consortium agreement must be signed by all the members and submitted to the SFOE before the SFOE will sign the subsidy contract.

Upon request and SFOE approval, the host institution may change during the application and implementation phases, provided that the new host institution makes similar commitments and that all contracts are reassigned.

³⁴ All institutions pursuant to Article 4 letter c of the [Federal Act on the Promotion of Research and Innovation \(RIPA; SR 420.1\)](#) are eligible as host institutions.



3.2.2 Members

Partners that apply for SWEET funding through the consortium are called members. SWEET funding is primarily envisaged for research and innovation activities that are undertaken by Swiss institutions of higher education and non-commercial research organisations. The eligibility of other institutions is summarised in Table 3-1. Institutions that are not eligible for SWEET funding may participate in a consortium’s activities as cooperation partners.

Table 3-1: Eligibility of various institutions for SWEET funding.

Origin	Institution	Eligible for SWEET funding?
Swiss	Institution of higher education Non-commercial research organization Private for-profit institution Professional association Enterprise associated with the Swiss confederation Canton, city, commune, district, region Non-governmental organization Citizen association Cooperative	Yes
	Federal department and its administrative units	No
	Other	Check with the SWEET Office
Foreign	Institution of higher education Non-commercial research organization Private for-profit institution	Yes, provided that their contributions are essential to achieving the consortium’s objectives, cannot be provided by Swiss members, and generate added value in Switzerland. The inclusion of such institutions must be justified in the notification of intent to submit a pre-proposal (see Section 4.1) and is subject to approval by the SFOE.
	Other	No

In the SWEET programme, the term “member” appears in three ways, see Table 3-2.

Members may join more than one consortium provided that they inform the coordinators of all affected consortia. Members may not offer substantially the same contribution to more than one consortium, with the exception of the KTT expert (see Section 3.2.4). Each member entity must submit a letter of intent with the pre-proposal and a letter of commitment with the full proposal (see Sections 4.2.2 and 4.3.2).

Upon award, all member institutions become beneficiaries of the subsidy contract between the SFOE and the host institution. During the application phase, member institutions, member entities, and members may change subject to the restrictions given in Section 5.2.2. Similarly, during the consortium’s implementation phase, member institutions, member entities, and members may change subject to approval by the monitoring panel and the SFOE.



Table 3-2: Overview of the three ways in which the term “member” appears in the SWEET programme.

Term	Meaning	Relevance and comments
Member institution	An organisation such as a university, institute of the ETH domain, university of applied science, private-sector company, etc.	The member institution must be a legal entity with due representation. The letter of commitment by the host institution must be on the institution’s official stationery and be signed by authorised representatives of the institution, see Section 4.2.2.
Member entity	The smallest unit within the member institution, such as a department, an institute, a laboratory, or a group, that individually reports its costs to the member institution.	If the member institution is not organised into units, the member entity is identical to the member institution. In the proposals, the requested SWEET funding as well as own and third-party contributions must be reported at the level of member entities. Letters of intent and commitment by member entities must be on the institution’s official stationery and be signed by authorised representatives of the member entity, see Sections 4.2.2 and 4.3.2.
Member	A person who is employed by the member institution and who leads the member entity’s contributions to the consortium. (In academic institutions, this person is often called the principal investigator.)	The potential financial award to the consortium is linked to the number of members, see Section 3.4.1. In Table 1-2 of the proposals, each member entity is represented by one member.

3.2.3 Cooperation partners

Partners that do not apply for SWEET funding may participate in the work programme of the consortium as cooperation partners. Cooperation partners must finance their activities from own and/or third-party contributions. Cooperation partners may join more than one consortium. Changes in the cooperation partners must be reported to the SFOE.

3.2.4 Key positions

The coordinator represents the consortium on behalf of both the consortium and the host institution and serves as the single point of contact for the SFOE regarding all administrative, legal, and financial matters. The coordinator is responsible and accountable for the preparation and submission of the pre-proposal and the full proposal. Once the subsidy contract is signed, the coordinator is responsible and accountable for the administrative and financial management of the consortium, which includes the preparation and timely submission of the yearly reporting documents.

The consortium must appoint a KTT expert who is responsible for ensuring that the outputs of the consortium are disseminated and communicated to all target groups through appropriate channels. The KTT expert involves stakeholders from an early stage to ensure that the outputs are fully exploited and thereby develop an impact on reaching Switzerland’s energy- and climate-policy goals. The KTT expert is expected to have relevant prior experience with KTT, preferably through activities funded by programmes that bear some similarities to SWEET, e.g., the Swiss Competence Centers for Energy Research and the Flagship Initiative by Innosuisse, the National Research Programmes and National Centres of Competence in Research by the Swiss National Science Foundation, or the Horizon 2020 and Horizon Europe programmes of the European Union. Experience gathered through private institutions that specialise in KTT is also considered to be relevant.



The consortium must appoint a so-called integration expert who, as part of the management and coordination activity, is responsible for ensuring knowledge integration between the WPs (i.e., the interrelationships in the project portfolio) as well as knowledge integration with other SWEET consortia and in particular the above-mentioned continuation of the CROSS activity. The designation “integration expert”³⁵ is used to indicate that the responsibilities go beyond those of a technical manager, because ensuring knowledge integration will require know-how about how to constructively combine the distinct perspectives from various scientific disciplines as well as how to effectively operate at the intersection of science and society. While it is desirable that the integration expert has a scientific background, it is essential that the expert is open to all scientific disciplines represented in the consortium (and the different approaches adopted by them) and seeks and promotes connections between the disciplines specifically as well as between science and society generally.

The SFOE expects the coordinator and the KTT and integration experts to collaborate closely. With reference to Figure 1-1 and Figure 3-1 and expressed in simple terms, the integration expert is responsible for the communication within the extended consortium and with other consortia, whereas the KTT expert is responsible for the communication, dissemination, and exploitation of the outputs of the extended consortium. Because the profiles of the three positions are very different, the consortium must fill them with separate persons.

3.3 Consortium requirements

A consortium must:

1. Be led by 1 host institution.
2. Consist of at least 5 different member institutions.
3. Consist of at least:
 - a. 1 member institution from Swiss universities or institutes of the ETH domain (ETH Zurich, EPF Lausanne, Empa, Eawag, PSI, and WSL),
 - b. 1 member institution from Swiss universities of applied sciences,
 - c. 2 member institutions from Swiss industry and/or the Swiss private sector.

In addition:

1. The extended consortium should consist of members and cooperation partners that span the innovation system (see Figure 1-2) and thereby enable an inter-/transdisciplinary approach commensurate with the research challenge.
2. The consortium should be compact, i.e., large enough to bring together the necessary expertise and enable an inter-/transdisciplinary approach yet small enough so that members deliver complementary and significant contributions to the consortium's work programme and receive an adequate share of the potential financial award.
3. The consortium should be gender-balanced³⁶ and reflect Switzerland's diversity in terms of languages and regions.

³⁵ <https://itd-alliance.org/integration-experts/>

³⁶ The Swiss Confederation attaches great importance to the adequate representation of women in management positions. Through its involvement in the Technology Collaboration Programme “Clean Energy Education and Empowerment (C3E)” (<http://www.c3e-international.org>) of the International Energy Agency (IEA), the SFOE actively supports the development of a community of women leaders in the field of clean energy across various sectors.



3.4 Funding rules

The SFOE funds in accordance with the principle of subsidiarity: To ensure that the overall funding is sufficient for the work programme of the consortium, members and cooperation partners supplement the requested SWEET funding, each according to its abilities, with own and third-party contributions:

- Own contributions are financial contributions (cash or in-kind) from members and cooperation partners.
- Third-party contributions are financial contributions (cash or in-kind) from sources other than members, cooperation partners, and the Federal Administration (e.g., Federal Offices, Innosuisse, and the Swiss National Science Foundation).³⁷

The consortium has the right to reallocate SWEET funds to its members provided that the funding rules are adhered to and that the reallocation is transparent and traceable.

3.4.1 Core budget

The potential financial award as specified in the subsidy contract is referred to as the core budget and represents the SFOE's funding for research projects as well as management and coordination and KTT activities. To encourage the formation of compact consortia, the core budget is tied to the number of members N ,

$$\text{core budget in Mio. CHF} = \begin{cases} 8 & \text{if } N \leq 10, \\ 8[1 - 0.171(N - 10)] & \text{if } N > 10. \end{cases}$$

The number of members must be equal to the number of entries in Table 1-2 of the pre-proposal and full-proposal templates. The core budget is subject to annual parliamentary appropriations and the schedule of payments agreed to in the subsidy contract. The core budget cannot be revised to higher amounts.

Because the SFOE provides a supplementary budget, see Section 3.4.2, consortia are not encouraged to reserve part of the core budget for unplanned activities. If a consortium nevertheless creates its own supplementary budget anyway, the consortium must (a) limit that budget to no more than 10% of the core budget, (b) describe in the pre-proposal and the full proposal the processes by which funds from the budget are requested and granted or refused, and (c) describe how the SFOE and the monitoring panel (see Section 6) will be involved in these processes and in particular the decision whether a request is granted or refused. The SFOE reserves the right to require changes to or to veto a consortium's plans for its own supplementary budget.

P+D projects in the portfolio are not funded through the core budget, but may be funded through a separate application to the SFOE's P+D programme, see Section 3.4.3.

3.4.2 Supplementary budget

Subject to the availability of additional funds, the SFOE may grant a supplementary budget in response to a request by the consortium or by the SWEET Office. The supplementary budget is limited to 10% of the core budget over the term of the consortium. The SWEET Supplementary Budget Guideline describes what the supplementary budget may be used for as well as how and when a consortium may request it.³⁸

³⁷ Contributions from cooperation partners should be declared by them as own contributions and not by members as third-party contributions.

³⁸ <https://pubdb.bfe.admin.ch/de/publication/download/11357>



3.4.3 Funding for pilot and demonstration projects

Through the SFOE's P+D programme,³⁹ additional funds are available to support the P+D projects in the project portfolio. To apply for these funds, legal and budgetary considerations require that a separate formal application be submitted, just like for P+D projects that are not part of the project portfolio. The process by which P+D projects are handled in the SWEET programme is shown in Figure 3-2.

The following points should be noted:

- Consortia are not expected to propose fully elaborated P+D projects in the pre-proposal and the full proposal. Instead, for the P+D projects that are anticipated to start within the first three years, the proposals should contain conceptual descriptions akin to a P+D project note, with each P+D project forming a separate WP. Once the activities of the consortium are under way and a P+D project has been fully elaborated, the above-mentioned formal application for funding must be submitted to the P+D programme.
- The conceptual descriptions of the P+D projects will be assessed by the evaluation panel with particular attention on whether they are well integrated into the project portfolio, i.e., whether the interrelationships with the research projects and other P+D projects are clear and strong. In addition, the SFOE will assess whether the proposed P+D projects meet the basic requirements of the P+D programme. Favourable assessments of these projects do not guarantee funding by the P+D programme, however. Any decisions by the SFOE on P+D projects are subject to legal hearings and formal objections.
- Depending on whether a conceptual description of a P+D project was contained in the full proposal, the evaluation of the interrelationship with other projects in the portfolio, and the assessment of whether the basic requirements of the P+D programme have been met, anticipated P+D projects are initially assigned to one of three categories, see Figure 3-2. In subsequent steps, revised conceptual descriptions or project proposals determine whether a P+D project will be integrated into the SWEET project portfolio.

The WPs dedicated to P+D projects must not contain tasks for the elaboration of the projects and the preparation of the applications for funding. However, consortia may choose to include such tasks in the WPs on management and coordination, see Section 3.4.4, in which case they must include the submission of the application for funding as a deliverable of that WP.

3.4.4 Further particulars

In preparing their budgets, consortia must take into account the following:

- Only the costs actually incurred and that are absolutely necessary for the fulfilment of the work programme are eligible for funding.⁴⁰ Costs incurred before the start date specified in the subsidy contract are not eligible for funding.⁴¹
- The cumulation of federal financial assistance to fund a project is inadmissible if the legal provisions or rules of any of the concerned funding instruments are breached. For instance, if funding from one instrument has been secured and that assistance is sufficient for the project to go ahead, applying for assistance from other instruments for the same project would result in an inadmissible cumulation.⁴² Similarly, an inadmissible cumulation would occur if the maximum funding rate of one instrument is violated by the assistance from other instruments. To prevent

³⁹ <https://www.bfe.admin.ch/bfe/en/home/research-and-cleantech/pilot-and-demonstration-programme.html>

⁴⁰ Article 14 para. 1 of the [Federal Subsidies Act \(SR 616.1\)](#).

⁴¹ Article 53 para. 1 of the [Federal Energy Act \(SR 730.0\)](#) and Article 26 para. 1 of the [Federal Subsidies Act \(SR 616.1\)](#).

⁴² Article 6 letter c and Article 7 letters c and d of the [Federal Subsidies Act \(SR 616.1\)](#).



inadmissible cumulations, members that seek financial assistance from several federal instruments must clearly disclose all sources of financing and inform all concerned authorities.⁴³

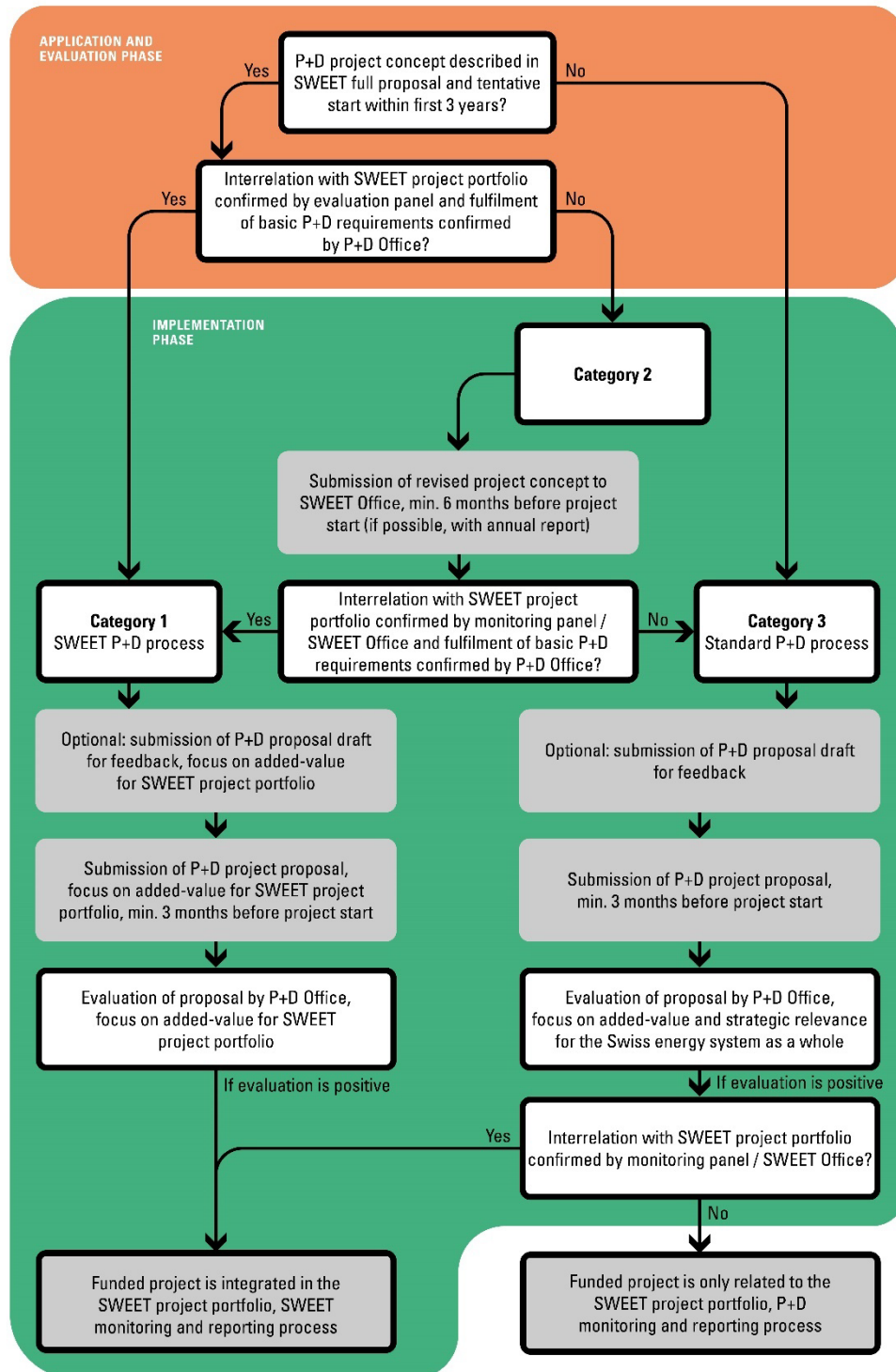


Figure 3-2: Overview of the process by which P+D projects are handled in the SWEET programme.

⁴³ Article 12 of the [Federal Subsidies Act \(SR 616.1\)](#).



- The WPs associated with research projects, management and coordination, and KTT must be fully funded by the core budget, own contributions, and third-party contributions and be independent of the outputs of unfunded activities.⁴⁴
- Table 3-3 lists restrictions on the maximum funding level and share of the core budget depending on the funding source and WP. The eligibilities of cost types by SWEET funding as well as own and third-party contributions are specified in Table 3-4.

There is no entitlement to funding.

Table 3-3: Restrictions on the maximum funding of WPs and the share of the core budget depending on the funding source.

Funding source	Work packages	Maximum funding level	Share of core budget
SWEET programme	Research projects	TRL 1-4: 100% TRL 5 & 6: less than 100% SSH: 100%	Max. 90% (sum of all research projects)
	Management and coordination	100%	Min. 5%
	KTT	100%	Min. 5%
P+D programme	P+D projects	TRL 4-9: Max. 40% of non-amortizable supplementary costs ⁴⁵	n/a

3.5 Data availability

3.5.1 Open science

The SFOE subscribes to the notion of Open Science and expects that results and data generated by funded projects are publicly accessible. Should legal restrictions prevent public access to the data as originally generated, the consortium is expected to create a publicly accessible version through aggregation, anonymization, or normalization. Furthermore, the consortium is encouraged to publish data that is of national interest on the Swiss public administration’s central portal for open government data.⁴⁶ In the full proposal, the consortium will need to present a data management plan.

Measures must be included to provide open access (free online access, such as the gold model) to peer-reviewed scientific publications that result from the project.

When life cycle inventories (LCI) are elaborated or updated as part of the work programme, they must be submitted in the format of the DETEC database based on ecoinvent v2.2 (ecoSpold v1, including metadata, quantified uncertainty, and technical report) for reasons of transparency and comparability. They can then be integrated into the federal administration’s DETEC database so that they can subsequently be published free of charge in accordance with federal guidelines.

⁴⁴ In the pre-proposal and full proposal, the coordinator must declare that each member has the financial capacity to carry out its tasks within the work programme. In the subsidy contract, the grant recipient and coordinator must confirm that the total consortium funding, consisting of the core budget plus own and third-party contributions, is fully secured and sufficient to carry out the work programme (except for the P+D projects).

⁴⁵ See Appendix II of the SFOE’s “Directive on the submission and evaluation of applications for financial support of energy research, pilot and demonstration projects and sandbox projects”. The currently valid directive is dated 21.12.2022 and available at <https://pubdb.bfe.admin.ch/en/publication/download/9952>.

⁴⁶ <https://opendata.swiss/en>. The SFOE can be consulted at ogd@bfe.admin.ch for advice about publishing data on the portal.



Table 3-4: Eligibilities of cost types by SWEET funding and own and third-party contributions.

Cost		Eligibilities of cost types by funding and contribution source		
Type	Definition and restrictions	SWEET funding	Own contrib.	Third-party contrib.
Internal costs	Internal costs are personnel costs. The maximum contribution of SWEET funding to internal costs must follow specified hourly rates. ⁴⁷ VAT cannot be included.	Yes	Yes	Yes
External costs	External costs include: <ul style="list-style-type: none"> • equipment (e.g., devices and consumables), • external services (e.g., subcontracts), • expenses (e.g., travel, conference fees, gold open-access fees), and • other costs (e.g., licenses). The maximum contribution of SWEET funding to equipment purchases must correspond to the actual use of the equipment in SWEET projects. The remainder can be declared as own contribution. VAT can be included.	Yes	Yes	Yes
Overhead	Cannot be covered through SWEET funding. ⁴⁸ The following may be reported as costs covered by own and third-party contributions: <ul style="list-style-type: none"> • Internal costs for administrative personnel, which must be calculated not as a fixed percentage of the sum of internal and external costs, but by multiplying the personnel hours by the specified hourly rates. • External costs not specifically related to the fulfilment of the work programme, e.g., costs related to the maintenance of standard laboratory facilities and standard consumables. 	No	Yes	Yes
Depreciation	Cannot be covered by SWEET funding. ⁴⁹	No	No	No
Interest on capital costs	Cannot be covered by SWEET funding. ⁵⁰	No	No	No

3.5.2 ARAMIS publication

By signing the pre-proposal on behalf of all members and cooperation partners, the consortium coordinator declares that they agree to the publication and distribution of the findings gained from the project in compliance with the Federal Act on Freedom of Information in the Administration.⁵¹ Specifically, final

⁴⁷ See Annex VII of the directive cited in footnote 45.

⁴⁸ Article 14 para. 1 of the [Federal Subsidy Act \(SR 616.1\)](#).

⁴⁹ Article 14 para. 3 of the [Federal Subsidy Act \(SR 616.1\)](#).

⁵⁰ Article 14 para. 2 of the [Federal Subsidy Act \(SR 616.1\)](#).

⁵¹ <https://www.fedlex.admin.ch/eli/cc/2006/355/en>



reports and the main project information will be published on the ARAMIS information platform⁵² and, if deemed beneficial, on the geoportal of the Confederation.⁵³

4 Submission

4.1 Notification of intent to submit a pre-proposal

Consortia that intend to submit a pre-proposal must inform the SFOE by sending a notification of intent to submit to sweet@bfe.admin.ch no later than **29 August 2023**. The notification must be prepared in English using the template that is available on the [SWEET website](#). The SFOE will acknowledge having received the notifications by contacting the coordinators named in the notifications.

The notification includes a section that must be completed if the consortium wishes to include foreign member institutions (see Section 3.2.2 and the conditions in Table 3-1). The SFOE will strive to inform the coordinator within 10 working days whether the foreign institutions are approved.

The notification is mandatory, i.e., if a consortium did not submit a notification by the deadline given above, its pre-proposal will fail the admissibility check and hence not be evaluated (see Section 5.1). However, the notification is not binding, i.e., a consortium may choose not to submit a pre-proposal although it had previously notified the SFOE of its intention to do so.

4.2 Pre-proposal stage

At the pre-proposal stage, a complete application must contain (with *Acronym* denoting the consortium's acronym):

1. A Microsoft Word document containing the pre-proposal, named *Acronym_preproposal*.
2. A pdf document containing the pre-proposal, named *Acronym_preproposal*.
3. A pdf document containing all the letters, named *Acronym_preletters*.
4. A Microsoft Excel document containing the pre-proposal budget, named *Acronym_prebudget*.

It is desired, but not required, that the application contains:

5. A pdf document containing the curricula vitae of the coordinator, the KTT expert, and the integration expert, named *Acronym_preCVs*.

Coordinators must submit the application to sweet@bfe.admin.ch no later than **18 October 2023 at 12:00 noon CET**. The SFOE will acknowledge having received the application by informing the coordinators.

If the size of the complete application exceeds 20 MB, it must be submitted via the file transfer system of the Swiss federal administration (www.filetransfer.admin.ch). To receive the required access credentials, the SWEET Office should be contacted well in advance of the submission deadline.

4.2.1 Pre-proposal

The pre-proposal must be prepared in English using the template that is available on the [SWEET website](#). The font, font size, line spacing, and margins must not be changed, otherwise the pre-proposal will not be considered for evaluation. Furthermore, the page limits specified in the template must be obeyed.

⁵² <http://www.aramis.admin.ch>

⁵³ <http://map.geo.admin.ch>



Content that exceeds a specified limit or that was not specifically requested will be removed before the pre-proposal is forwarded to the evaluation panel.

4.2.2 Letters of commitment and intent

The host institution must submit a letter of commitment whereas members must submit letters of intent. The letters must be printed on the host institution's or member entities' official stationery, be addressed to the SFOE, and be signed by authorised representatives.

The letter of commitment must demonstrate the host institution's commitment to fulfil its obligations (see Section 3.2.1). Since the host institution will be the contractual partner of the SFOE, the commitment must be confirmed by the institution's board. The letter must contain the full name and contact information of the person who is authorised to act as the consortium coordinator.

By submitting letters of intent, members express their intent to contribute the work programme should the consortium be awarded funding. The letters must include a list of the WPs that the members intend to contribute to and succinctly describe the contributions for each WP. The requested SWEET funding as well as the own and third-party contributions must be specified in the letters.

See Appendix B for mandatory sections that must be contained in the letters.

Cooperation partners are not required to submit letters of commitment or intent. It is the responsibility of the host institution to secure appropriate letters from cooperation partners, especially if their contributions are critical to the consortium's work programme.

4.2.3 Budget workbook

The budget workbook must be prepared using the template that is available on the [SWEET website](#). The built-in tables and formulas must not be changed. The budget workbook includes the research projects, the management and coordination activity, and the KTT activity. The budget of the P+D projects are not described in the budget workbook, only an estimation is provided.

4.2.4 Curricula vitae

The coordinator, the KTT expert, and the integration expert are encouraged to submit a one-A4 page curriculum vitae (CV) that includes:

- A list of achievements in the last five years relevant to the guiding theme of this call, e.g., publications, products, and services (e.g., widely used datasets or software).
- A list of the previous projects or activities in the last five years relevant to the guiding theme of this call and their positions in the consortium.

The consortium is encouraged to create its own CV template.

4.3 Full-proposal stage

At the full-proposal stage, a complete application must contain:

1. A Microsoft Word document containing the full proposal, named *Acronym_full_proposal*.
2. A pdf document containing the full proposal, named *Acronym_full_proposal*.
3. A pdf document containing the letters of commitment, named *Acronym_letters*.
4. A Microsoft Excel document containing the full-proposal budget, named *Acronym_budget*.



5. A pdf document containing the curricula vitae, named *Acronym_CVs*.

Coordinators must submit the application to sweet@bfe.admin.ch. The submission deadline will be communicated to the coordinators of the consortia that will be invited to submit full proposals. The SFOE will acknowledge having received the application by informing the coordinators.

If the size of the complete application exceeds 20 MB, it must be submitted via the file transfer system of the Swiss federal administration (www.filetransfer.admin.ch). To receive the required access credentials, the SWEET Office should be contacted well in advance of the submission deadline.

4.3.1 Full proposal

The full proposal must be prepared in English using the template that will be made available to the coordinators of the consortia that will be invited to submit full proposals. The font, font size, line spacing, and margins must not be changed, otherwise the full proposal will not be considered for evaluation. Furthermore, the page limits specified in the template must be obeyed. Content that exceeds a specified limit or that was not specifically requested will be removed before the full proposal is forwarded to the evaluation panel.

4.3.2 Letters of commitment

The host institution and all member entities must submit letters of commitment. The letters must be printed on the host institution's or member entities' stationery, be addressed to the SFOE, and be signed by authorised representatives.

The letter of commitment of the host institution should be identical to that submitted with the pre-proposal (see Section 4.2.2), except for possible updates to its commitments.

By submitting a letter of commitment, members commit to contributing to the work programme should the consortium be awarded funding. The letter must include a list of the WPs that the member commits to contribute to and succinctly describe the contributions for each WP. The requested SWEET funding as well as the own and third-party contributions must be specified in the letter.

See Appendix B for mandatory sections that must be contained in the letters.

Cooperation partners are not required to submit letters of commitment or intent. It is the responsibility of the host institution to secure appropriate letters from cooperation partners, especially if their contributions are critical to the consortium's work programme.

4.3.3 Budget workbook

The budget workbook must be prepared using the template that will be made available to the coordinators of the consortia that will be invited to submit full proposals. Compared to the budget workbook at the pre-proposal stage, the budget workbook at the full-proposal stage will be more detailed. The built-in tables and formulas must not be changed. The budget workbook includes the research projects as well as the management and coordination activities and the KTT activities. The budget of the P+D projects are not described in the budget workbook, only an estimation is provided.

4.3.4 Curricula vitae

The coordinator, the KTT expert, the integration expert, members, and WP leaders must provide a one-A4 page CV that includes:



- A list of achievements in the last five years relevant to the guiding theme of this call, e.g., publications, products, and services (e.g., widely used datasets or software).
- A list of the previous projects or activities in the last five years relevant to the guiding theme of this call and their positions in the consortium.

The consortium is encouraged to create its own CV template.

4.4 Data protection

Proposals submitted in response to this call will be treated confidentially. They will be checked by the SFOE and evaluated by an expert panel. Following the selection of a consortium for funding, the proposals will be studied by the SFOE and the monitoring panel (see Section 6).

Proposals and evaluation reports will be stored on secure servers. The experts will be required to sign declarations concerning confidentiality and conflicts of interest before they will be granted permission to access proposals.

By submitting proposals, consortia agree to them being forwarded to experts for the purposes of evaluation and monitoring.

5 Evaluation

5.1 Admissibility and eligibility check by the SFOE

The SFOE will check all applications for admissibility (completeness of the application and satisfaction of pre-proposal requirements) and eligibility (satisfaction of consortium and member requirements) prior to forwarding the application to the expert panel. An application is admissible and eligible if all of the questions in Table 5-1 have been answered with “yes”.

If any admissibility and eligibility criteria are not fulfilled, the application will be rejected and not evaluated. The SFOE will inform the coordinator of the rejected application in writing and state which of the criteria were not met.

Table 5-1: The admissibility and eligibility criteria.

Admissibility		
A1	Pre-proposal stage only: Did the consortium notify the SFOE of its intention to submit a pre-proposal and did it do so by the deadline given in the call text?	See Section 4.1
A2	Was the application received before the deadline?	See Section 1.3
A3	Is the application complete?	See Sections 4.2 and 4.3
A4	Was the pre-/full proposal prepared with the correct template and formatting?	See Sections 4.2.1 and 4.3.1
A5	Did the host institution submit a duly signed letter of commitment with the mandatory content?	See Section 4.2.2
A6	Pre-proposal stage: Did each member submit a letter of intent with the mandatory content? Full-proposal stage: Did each member submit a letter of commitment with the mandatory content?	See Sections 4.2.2 and 4.3.2



A7	Has at least 5% of the core budget been allocated to the WP on management and coordination?	See Table 3-3
A8	Has at least 5% of the core budget been allocated to the WP on KTT?	See Table 3-3
A9	Have all questions in the self-declaration section of the pre-/full proposal been answered positively?	See templates
Eligibility		
E1	Is the host institution entitled to receive SFOE funding and has one consortium coordinator been appointed on its behalf?	See Section 3.2.1
E2	Does the consortium consist of at least 5 different member institutions?	See Section 3.3
E3	Does the consortium consist of at least (a) 1 member entity from Swiss universities or an institute of the ETH domain, (b) 1 member entity from Swiss universities of applied sciences, and (c) 2 member entities from Swiss industry/private sector?	See Section 3.3
E4	Did the SFOE approve all foreign members?	See Table 3-1
E5	Have the key positions been filled with 3 different persons?	See Section 3.2.4

5.2 Evaluation by the expert panel

Admissible and eligible pre-proposals and full proposals will be evaluated by an independent panel appointed by the SFOE. The panel will consist of recognised experts from fields relevant to this call.

5.2.1 Evaluation criteria

Pre-proposals and full proposals will be evaluated according to the criteria shown in Table 5-2.

Table 5-2: Evaluation criteria and their weights.

Criterion 1: Excellence	Weight: 25%
<ul style="list-style-type: none"> a. Clarity of the objectives and pertinence to the research challenge(s) b. Soundness of the proposed concept c. Credibility of the proposed methodology (in particular appropriateness of the inter-/transdisciplinary approach and scientific merit, including the preliminary life-cycle analyses) d. Novelty and originality, extent to which proposed work is beyond the state of the art and demonstrates innovation potential (e.g., ground-breaking objectives; novel concept and methodology; new products, services, or business and organizational models) 	
Criterion 2: (Extended) Consortium	Weight: 25%
<ul style="list-style-type: none"> a. Composition of extended consortium: members and cooperation partners span the innovation system and thereby enable an inter-/transdisciplinary approach commensurate with the research challenge b. Compactness of consortium: large enough to bring together the necessary expertise and enable an inter-/transdisciplinary approach yet small enough so that members deliver complementary and significant contributions to the work programme and receive an adequate share of the core budget c. Gender balance and reflection of Switzerland's diversity in terms of languages and regions 	
Criterion 3: Impact	Weight: 25%



<ul style="list-style-type: none"> a. Extent to which the consortium’s results are likely to attain the expected outcomes and outputs b. Appropriateness of the KTT concept c. Appropriateness of the collaboration with stakeholders 	
Criterion 4: Work programme	Weight: 25%
<ul style="list-style-type: none"> a. Quality and effectiveness of the work programme, including the extent to which the resources assigned to WPs are in line with their objectives and deliverables b. Appropriateness of the project portfolio given the consortium objectives, including the interrelation of research and P+D projects c. Pre-proposal stage: Appropriateness of the management of the consortium Full proposal stage: Appropriateness of the management of the consortium and the data-management plan d. Appropriateness of the coordination (with other SWEET consortia and the CROSS activity) 	

5.2.2 Pre-proposal stage

Pre-proposals are evaluated in terms of major and minor flaws:

- Major flaws compromise the whole proposal and can be remedied only with substantial effort. Major flaws are divided into two types:
 - A major flaw is considered to be corrigible if the evaluation panel believes that it can be eliminated during the preparation of the full proposal. Corrigible major flaws include, but are not limited to, objectives that are unclear, a lack of expertise in a key area, unclear outcomes and outputs, and unclear collaboration with stakeholders.
 - Otherwise, a major flaw is considered to be incorrigible. Incorrigible major flaws include, but are not limited to, objectives that are not pertinent to the research challenge(s), unsound concepts, a methodology that lacks credibility, and a lack of expertise in several key areas.
- Minor flaws do not compromise the whole proposal and can be remedied in the full proposal without substantial effort.

The evaluation of pre-proposals consists of the following steps:

1. For each of the criteria listed in Table 5-2, the panel assigns a score according to the presence of incorrigible and corrigible major flaws, see Table 5-3. It should be noted that minor flaws do not influence the scores. The panel may assign half-scores.
2. From the scores for each criterion and the associated weights given in Table 5-2, the panel determines the weighted score for each pre-proposal.
3. The panel ranks the pre-proposals according to their weighted scores:
 - a. If two pre-proposals have equal weighted scores, the pre-proposal with fewer member entities will be ranked higher.
 - b. If two pre-proposals have both equal weighted scores and equal numbers of member entities, the pre-proposal with the better gender balance at the levels of coordinator and work-package leaders will be ranked higher.
4. The panel produces a shortlist of those pre-proposals that reach two thresholds:
 - Individual threshold: The score of each criterion must be at least 3.
 - Overall threshold: The scores of the criteria must sum to at least 13.

For this call, at most two pre-proposals will be shortlisted.



- The SFOE will inform coordinators about their pre-proposal's rank and provide them with an evaluation report that lists the major and minor flaws identified by the panel. The coordinators of the shortlisted pre-proposals will be invited to submit a full proposal and provided with the corresponding templates and instructions.

Table 5-3: Determination of scores for pre-proposals according to the presence of incorrigible and corrigible major flaws.

		Incorrigible major flaws		
		None	Few	Many
Corrigible major flaws	None	5 (excellent)	2 (fair)	1 (poor)
	Few	4 (very good)		
	Many	3 (good)		

The panel's evaluation cannot be rebutted. The coordinators of pre-proposals that are not shortlisted can submit a formal objection within 30 days. After this period, the SFOE's decision to invite the coordinators of the shortlisted pre-proposals to submit full proposals enters into force.

If a pre-proposal is not short-listed, suitably improved and expanded parts of it may be submitted to the research programmes and the P+D programme of the SFOE.

The consortia that have been invited to submit a full proposal will be expected to take into account the feedback contained in the evaluation report. Responses to the feedback and changes to the work programme between the pre-proposal and the full proposal have to be detailed in a dedicated section of the full-proposal template. Changes to the consortia through the addition or departure of member entities will also have to be detailed and will be permitted only if the associated total redistribution of SWEET funding amounts to less than 30% of the total requested SWEET funding.

5.2.3 Full-proposal stage

The steps at the full-proposal stage mirror those at the pre-proposal stage. The evaluation is again based on major and minor flaws, but they are defined somewhat differently:

- Major flaws compromise the whole proposal. They could be remedied only with substantial effort during the negotiation or implementation phases, which would result in what would effectively be a new full proposal that would require a re-evaluation. Major flaws include, but are not limited to, objectives that are unclear or not pertinent to the research challenge(s), an unsound concept, a methodology that lacks credibility, a lack of expertise in key areas, an insufficient impact, and an unconvincing KTT strategy.
- Minor flaws do not compromise the whole proposal. They can be remedied without substantial effort during the negotiation or implementation phases and do not require a re-evaluation. Minor flaws include, but are not limited to, unclear details regarding the methods, outputs and outcomes, and inconsistencies in the schedule.

Based on the presence of major and minor flaws, the evaluation panel assigns a score for each criterion according to Table 5-4. In contrast to the pre-proposal stage, minor flaws do influence the score. The panel may again assign half-scores. The thresholds are identical to those at the pre-proposal stage,



which means that only full proposal that do not exhibit any major flaws will be shortlisted. The evaluation panel will recommend to the SFOE that the highest-ranked full proposal on the shortlist be funded.

Table 5-4: Determination of scores for full proposals according to the presence of major and minor flaws.

		Major flaws		
		None	Few	Many
Minor flaws	None	5 (excellent)	2 (fair)	1 (poor)
	Few	4 (very good)		
	Many	3 (good)		

In case of a positive funding decision, the SFOE and the host institution will enter the negotiation phase. The evaluation panel may recommend that the consortium address certain points during the negotiation and implementation phases. In addition, the SFOE reserves the right to require additional clarifications and modifications during the negotiation phase. The negotiation phase concludes once the subsidy contract is signed.

In case of a negative funding decision, coordinators can submit a formal objection within 30 days. After this period, the SFOE's decision enters into force. The panel's evaluation cannot be rebutted.

6 Monitoring and reporting

The SFOE will appoint a panel to monitor the consortium, which will include independent experts as well as representatives from the SFOE, the NCCS, and the FOCP. Beyond standard reporting such as final reports on research and P+D projects, the consortium will be required to provide annual progress and finance reports. Detailed monitoring guidelines including reporting templates will be provided after the publication of the funding decision. The consortium will be responsible for organizing an annual one-day review meeting (site visit) between the monitoring panel and at least the coordinator, the integration expert, the KTT expert, and the WP leaders. Consortia are expected to set aside appropriate resources for the site visits. Furthermore, consortia are encouraged to organise a public event immediately before the site visit, e.g., a symposium or a conference, at which the extended consortium is present. The SFOE views these events as serving a dual purpose: to inform the monitoring panel in more detail than is possible during the site visit and to inform the broader research and innovation community.

7 Contacts and further information

Questions about this call, including questions about the collaboration with the NCCS and the FOCP, should be directed to the SWEET Office:

Swiss Federal Office of Energy
SWEET Office
Section Energy Research and Cleantech
P.O. Box
CH-3003 Berne / Switzerland
sweet@bfe.admin.ch

The questions and answers will be published on the [SWEET website](#) and regularly updated.



Appendix A: Descriptions of interdisciplinary and transdisciplinary research

As stated in Section 1.1, the purpose of SWEET is to fund inter-/transdisciplinary research. Because these terms are not well defined, the following provides brief descriptions of them as interpreted by the SFOE in the context of the SWEET programme.⁵⁴

To clarify the characteristics of interdisciplinary and transdisciplinary research, it is instructive to contrast them with multidisciplinary research. In multidisciplinary research, each discipline receives input from other disciplines, for example in the form of knowledge and data, but the discipline boundaries remain distinct. However, each discipline retains its paradigms, nomenclature, knowledge, and methods and hence there is little to no lasting impact of the research on the disciplines. Multidisciplinary research is adequate for problems that can be solved by a single discipline but where the solution benefits from the input of other disciplines.

In interdisciplinary research, the disciplines provide inputs to each other to solve a problem that could not be solved by one discipline by itself. Thus, although the discipline boundaries remain distinct, there is an integration of the disciplines. The integration enriches each discipline's paradigms, nomenclature, knowledge, and methods. The enrichment in turn leads to the development of new knowledge, methods, and tools, thereby having a lasting impact on the disciplines.

Transdisciplinary research may be viewed as a deeper and broader form of interdisciplinary research. It is deeper because it transcends disciplines and thereby blurs discipline boundaries. It is broader because it includes not just scientists, but also stakeholders such as citizens and authorities, who should ideally participate in all phases of the research process. Transdisciplinary research represents a unified problem-solving approach in which problems are tackled not only from a disciplinary perspective but grappled with in their entire complexity. Therefore, transdisciplinary research is necessary to solve problems that arise at the intersection of science and society or what is sometimes referred to as the "lifelworld".⁵⁵ The outcomes of transdisciplinary research cannot be assigned to a single discipline and include not just new knowledge and methods but also new paradigms.

Transdisciplinary research that tackles problems at the intersection of science and society may be thought of as research that generates not only systems knowledge (what is?), but also target knowledge (what are desirable target states?) and transformation knowledge (how to change?).⁵⁶ Each discipline and stakeholder contributes to the three types of knowledge, depending on its methods, its approach to framing and formulating research questions, and its capacity to link abstract and context-specific knowledge. This heterogeneity of contributions is viewed as an asset in transdisciplinary research, but also requires a respectful collaboration that begins with a joint framing of the problem.

Appendix B: Mandatory sections in letters of commitment and intent

The SFOE does not provide complete templates for the letters of commitment and intent, but it does require that the following sections be included in the letters:

⁵⁴ A comprehensive overview of definitions of transdisciplinarity may be found in Annex A1 of C. Pohl and G. Hirsch Hadorn, *Principles for Designing Transdisciplinary Research, Proposed by the Swiss Academies of Arts and Sciences*, oekom Verlag, Munich, Germany, 2007.

⁵⁵ See, e.g., G. Hirsch Hadorn, S. Biber-Klemm, W. Grossenbacher-Mansuy, C. Pohl, U. Wiesmann, and E. Zemp, The Emergence of Transdisciplinarity as a Form of Research, in: *Handbook of Transdisciplinary Research*, G. Hirsch Hadorn, H. Hoffmann-Riem, S. Biber-Klemm, W. Grossenbacher-Mansuy, D. Joye, C. Pohl, U. Wiesmann, and E. Zemp (eds.), Springer, 2008, pp. 19-39.

⁵⁶ A description of the three types of knowledge may be found in C. Pohl and G. Hirsch Hadorn, *Principles for Designing Transdisciplinary Research, Proposed by the Swiss Academies of Arts and Sciences*. oekom Verlag, Munich, 2007, pp. 36-39.



Letter of commitment of the host institution

(Insert host institution) commits to hosting the (insert consortium acronym) consortium and has appointed (insert name and contact information) to act as the consortium coordinator. Should the consortium be awarded funding, the host institution commits to negotiating a subsidy contract with the SFOE as well as a consortium agreement with all the member institutions.

Letter of commitment of member entities

(Insert member entity) commits to participating in the (insert consortium acronym) consortium and to contribute as follows:

1. WPx (replace x by work-package number): (Add a succinct description of contribution)
2. WPy (replace y by work-package number): (Add a succinct description of contribution)
3. (Add entries as needed)

These contributions will be financed as follows:

Requested SWEET funding (kCHF)	(Enter amount in kCHF)
Own contributions (kCHF)	(Enter amount in kCHF, enter 0 if none)
Third-party contributions (kCHF)	(Enter amount in kCHF, enter 0 if none)

Letter of intent of member entities

(Insert member entity) intends to participating in the (insert consortium acronym) consortium and to contribute as follows:

1. WPx (replace x by work-package number): (Add a succinct description of contribution)
2. WPy (replace y by work-package number): (Add a succinct description of contribution)
3. (Add entries as needed)

These contributions will be financed as follows:

Requested SWEET funding (kCHF)	(Enter amount in kCHF)
Own contributions (kCHF)	(Enter amount in kCHF, enter 0 if none)
Third-party contributions (kCHF)	(Enter amount in kCHF, enter 0 if none)