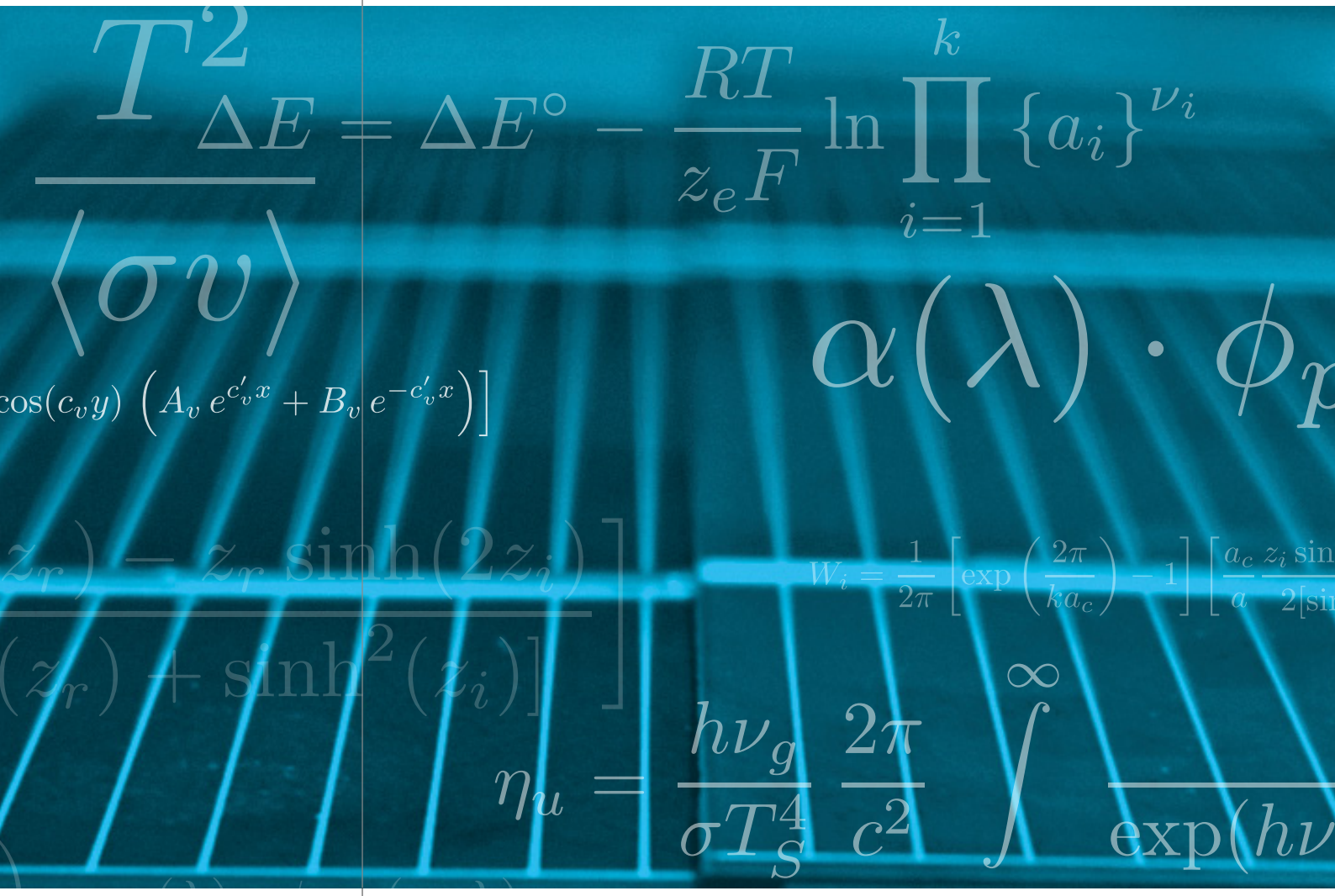
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Federal Office of Energy SFOE

Directive

on the submission and evaluation of applications for financial support for energy research, pilot and demonstration projects and authorisation of sandbox projects

20.12.2024 version



Source cover photo: Zürcher Hochschule für angewandte Wissenschaften ZHAW

Contents

Contents 3

1 General 4

1.1 Purpose of the Directive 4

1.2 Legal bases 4

1.3 Types of projects 5

1.4 Main principles and aims of promotion 5

2 Framework 7

3 Call for project proposals procedure 11

3.1 Call for project proposals (*top-down* approach) 11

3.2 Open procedure (*bottom-up* approach) 13

3.3 Submission of sandbox projects 13

3.4 Submitting the application 15

3.5 Evaluation of applications 15

3.6 Decision 16

3.7 Publication of project information 16

4 Project implementation 17

5 Miscellaneous 18

Appendix I: Technology readiness levels 19

Appendix II: Eligible project costs for P+D projects 21

Appendix III: Evaluation criteria for research projects 23

Appendix IV: Evaluation criteria for sandbox projects 27

Appendix V: Order of priority for P+D projects 29

Appendix VI Remuneration of personnel expenses in research and P+D projects 30

1 General

1.1 Purpose of the Directive

Since 1984 the Swiss Federal Office of Energy (SFOE) has been responsible for the coordination and promotion of fundamental and applied research and the initial development of new technologies. Within this framework, support is given to energy research projects and pilot and demonstration projects.

To support innovation and to contribute to the development of future legal provisions on electricity supply, "regulatory sandboxes" are also possible to allow the implementation of promising projects that partially deviate from the current legal framework.

This Directive lays down the principles and conditions for submission and evaluation of applications for funding (grants) for energy research projects, pilot and demonstration projects, as well as for authorisation of sandbox projects. Regarding funding, this document applies exclusively to projects that are eligible under Article 49 of the Energy Act EnA[1] and specifies the types of projects deemed eligible, the application procedure and corresponding selection criteria. With regard to approval of a regulatory sandbox, the Directive specifies the purpose of making such regulatory exceptions, the procedure and the requirements for obtaining authorisation.

1.2 Legal bases

The legal basis for federal involvement in research and in the promotion of research is provided by Article 64 of the Federal Constitution (SR 101), which states that the Confederation shall promote scientific research and innovation. Federal participation in promoting the development of energy technologies, in particular in the area of energy efficiency and renewable energies is grounded in Article 89 of the Federal Constitution (SR 101). The legal basis for SFOE support of energy research projects is Article 49 paragraph 1 and Article 51 paragraph 3 of the Energy Act of 30 September 2016 (EnA; SR 730.0), on the provisions of the Federal Act on the Promotion of Research and Innovation of 14 December 2012 (RIPA; SR 420.1) and on the Subvention Act of 5 October 1990 (SubA; SR 616.1). The legal basis for SFOE support of pilot and demonstration projects is Article 49 paragraphs 2 and 4 and Article 53 of the Energy Act (EnA; SR 730.0) and in particular Articles 54, 61, 63, 64, 66 and 67 of the Energy Ordinance (EnO; SR 730.01). The provisions of the Subsidies Act (SubA; SR 616.1) and of the Administrative Procedure Act (APA; SR 172.021) also apply.

Regarding funding, the budget is subject to approval by Parliament.

The constitutional basis for legislation in the area of electricity supply is Article 91 paragraph 1 of the Swiss Constitution. The authorisation of sandbox projects is based on Article 23*a* of the Federal Act of 23 March 2007 on the Supply of Electricity (ESA; SR 734.7). The framework for each regulatory sandbox is defined in an ad-hoc ordinance and decisions are communicated by way of an appealable decision.

[1] This Directive is not applicable to the Dam Safety and Radioactive Waste research programmes

1.3 Types of projects

In principle the SFOE promotes the types of projects indicated below (according to the definitions in the OECD: Frascati Manual and of the SFOE):

Basic research: Basic research consists of experimental or theoretical work whose primary aim is to gain greater knowledge about the fundamental causes of phenomena and observable facts. In this sector the SFOE only supports goal-oriented basic research which addresses long-term research topics in the energy sector.

Applied research: Applied research is mainly carried out for the purpose of generating new knowledge that can help to solve real-world problems.

Experimental development: Experimental development is systematic work in which existing research findings or experience is applied to create new products or processes, or to substantially enhance existing products or processes.

Pilot and demonstration projects: The pilot and demonstration programme (abbreviation: P+D) is aimed at projects that build bridges between the laboratory and the market. Specifically, this programme focuses on testing and evaluating new solutions (technical plant, prototypes) and approaches (including socio-economic concepts and business models) in the appropriate environment (laboratory experiments or field testing and analysis) in the areas of renewable energies and energy efficiency sectors (including storage technology and grids). Here a distinction is drawn between pilot projects and demonstration projects (see Appendix I). Particularly interesting demonstration projects may be recognised as lighthouse projects by the SFOE. Applications for funding for sub-projects are also permitted (e.g. preliminary studies, planning, impact assessments).

In principle, the following types of projects potentially qualify as a sandbox project:

Regulatory sandbox: The only provisions that apply when granting approval to regulatory sandboxes are those concerning the basic energy supply (Art. 6 ESA), the tasks of grid operators (Art. 8 ESA), the use of the electricity grid (Art. 10 ff. ESA) and the associated implementing provisions. In a real environment, the projects test and evaluate innovative solutions and approaches with implications for the Electricity Supply Act and for which the current legal framework is potentially not suitable. The expected results of the project should be relevant to the potential development of future legislation on the energy supply.

1.4 Main principles and aims of promotion

Main principles

The SFOE's promotion of research and authorisation of sandbox projects is based on the following principles:

Integrated approach: An integrated approach is essential in the promotion of projects. In particular, great attention is paid to strengthening the relationship between technology and the environment, as well as to societal and economic aspects of projects, while preference is given to interdisciplinary and transdisciplinary projects. The SFOE is mainly committed to researching seminal topics, which have either not been handled or have been insufficiently handled by the private sector. Sandbox projects must be able to deliver results that are relevant to the whole of Switzerland.

Focus on security of supply: In accordance with the strategic direction taken by the SFOE, projects promoted by the office and/or sandbox projects focus on security of supply for Switzerland and efficient knowledge and technology transfer.

Relevance of projects: Projects supported by the SFOE or sandbox projects concern a relevant field in the energy sector.

Value creation in Switzerland: Projects supported by the SFOE or sandbox projects are primarily carried out by competent partners, which contribute to the development of strategic competencies, potentially bring considerable scientific and/or economic added value for the Switzerland or make a significant contribution to global sustainable development. Support for projects conducted abroad is only given if they create

added value in Switzerland or if the findings are required for Swiss researchers or for the SFOE's own research purposes.

Cooperation with the private sector: A requirement for allocation of federal funding to the private sector is that the companies make their own adequate contribution to project funding, based on market circumstances, dependent on the market proximity of the project. This ensures that preference is given to projects with good prospects of being implemented. Applying the intellectual property acquired by the private sector with the aid of public funding is a priority. The findings gained within the framework of SFOE project promotion are therefore published.

The results obtained in sandbox projects are published to avoid market distortions and so that the results of the projects can be disseminated, thus increasing the likelihood that the solution being tested will be implemented in future.

Aims of promotion and regulatory sandboxes

Innovative energy projects can be supported either under the SFOE's energy research programme or the pilot and demonstration programme or can obtain authorisation for a partial exemption from the legal framework in force through a regulatory sandbox.

To specify the actual **research targets**, every four years the SFOE develops an energy research concept based on the Confederation's energy research concept[2]. This involves a series of thematic research programmes, which may also include a detailed concept.

Support can be given under the **pilot and demonstration programme** for projects, provided they meet the conditions of Article 61 paragraph 1 EnO):

- Projects must contribute to the economic and efficient use of energy or the use of renewable energies;
- The application potential and the likelihood of success must be sufficiently great;
- Projects must be aligned with the energy policy of the Confederation; and
- The findings gained must be made accessible to the public and interested parties are informed about such.

The criterion of alignment with federal energy policy is based on the targets and measures laid down in Energy Strategy 2050[3]. In addition, federal energy research priorities as stated in the energy research concept also apply[4].

A **sandbox project** may be authorised if the following conditions are met (Art. 23*a* para. 1 of the Electricity Supply Act):

- It focuses on an innovative technology, an innovative business model or an innovative product;
- The project cannot be carried out within the existing legal framework and only infringes one or more of the following legal provisions: Article 6, Article 8, Articles 10–20*a* ESA.
- the innovative technology/solution contributes to a more secure electricity supply and/or a competitive electricity market; and
- The project is needed in order to gain experience that can be used as the basis for revision of existing legal provisions.

[2] www.bfe.admin.ch/ec-publications-en

[3] Cf. Dispatch on the initial package of measures of Energy Strategy 2050.

[4] www.bfe.admin.ch/ec-publications-en

2 Framework

Funds

The SFOE has its own funds, which it allocates on a subsidiary basis. This means on the one hand that the projects are primarily planned and financed by the project partners, and not by the SFOE, and on the other that SFOE funding can be requested if project funding cannot be assured elsewhere, or if only partial funding is available because of the specific nature of the project. Authorisations for sandbox projects are not linked to financial support from the SFOE.

Submitting a project

A project can be submitted in either a *bottom-up* or a *top-down* procedure. Using the *bottom-up* approach, applications for projects can be submitted in principle at any time (open approach). The *top-down* approach (oriented approach) involves responding to a call for project proposals published by the SFOE (tendering procedure). The SFOE website provides information on whether, when and under what conditions applications can be submitted. Applications on the topics contained in the calls for projects can only be taken into consideration within the framework of the corresponding tendering procedure. Thereafter, a 12-month exclusion period generally applies across the SFOE research programmes from the submission deadline of the first round of the tendering procedure.[5]

Eligible applicants

Funding applicants may come from the private sector or from public companies, trade and industry associations, universities, research institutes, non-governmental organisations, the public sector (cantons, cities, communes), or joint undertakings (composed of a number of the organisations or institutions named above) that participate in carrying out the project or in financing it. In the case of applications for building projects at least the names of the building owners must be stated in the application. Suppliers of goods or services are not counted as project participants and do not need to be named in the application. Financial support for projects proposed by entities in the central Federal Administration is excluded.

Among the project applicants, a project lead has to be formally defined that will then be responsible for managing and coordinating the project with the SFOE.

Consent

By signing the application form, applicants confirm that they consent to the project being carried out. Project participants only involved in funding a project are not required to sign the application form but confirm their intentions in a separate declaration of intent (see Chapter 3.4).

[5] International calls for project proposals are exempt from this exclusion period.

Solvency of project partners (P+D projects)

To assess the financial risks associated with **pilot and demonstration projects**, the solvency of all project participants (apart from organisations in the public sector) will be checked (see. Evaluation Criteria). If the contribution requested exceeds the sum of CHF 500,000, the most recent annual accounts and, if applicable, the latest auditor's report should be submitted for this check. In exceptional cases, the SFOE may also request documentation for projects with a funding contribution of less than CHF 500,000 if the economic viability of the project is not clearly evident.

Project location

Pilot and demonstration facilities located abroad and pilot and demonstration projects to be carried out abroad may be supported in exceptional cases if added value is created in Switzerland.

Project duration

Unless otherwise stated (e.g. in calls for projects) there is no predefined limit on the **research** or **pilot and demonstration** project. The duration of the project should be stated in the application and an agreement will be drawn up on this basis. There may be several phases to a project if required. **Sandbox projects** last a maximum of four years and can be extended one time for a further two years.

Project financing

Applicants are required to conceive projects in an expedient and cost-effective manner, to make their own reasonable financial contribution and to exhaust all other funding possibilities (Art. 7 SubA). In the application, all funds already requested and available to meet project costs must be declared according to the following categorisation:

- Own funds: Financial contributions from the partners actively involved in the project; this includes in-kind contributions (staff provisions, materials, facilities, etc.) as well as cash payments to cover external procurements or to meet the costs of other project partners.
- Federal financial assistance: Financial contributions from the central and decentralised Federal Administration (SFOE, Innosuisse, FOEN, SNSF, FOT, FEDRO, etc.) or their funding instruments.
- Third-party funding: Financial contributions, usually in the form of cash payments, less usually in the form of free services or in-kind contributions, from sources outside the Federal Administration and the project partners (i.e. from organisations not actively involved in the project: cantons, communes, EU, foundations, associations, companies, etc.).

Double financing

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 (Art. 6 and 7 SubA). Similarly, an inadmissible cumulation would occur if the maximum funding rate of one instrument is violated by the assistance from other instruments. To prevent inadmissible cumulations, applicants that seek financial assistance from several federal instruments must clearly disclose all sources of financing and inform all concerned authorities (Art. 12 SubA).

Level of contributions for research and P+D projects

The SFOE takes various factors into consideration to determine the amount of financial support: the type of project (plant, field trial or analysis), readiness for implementation (see technology readiness level in Appendix I), the financial situation of the applicants and (in the case of pilot and demonstration projects and facilities) the degree of amortisation of capital and operational costs of plant. The project participants must themselves contribute an appropriate level of funds.

Expenditure is only considered eligible if it is actually incurred and is absolutely necessary for the practical implementation of the project (Art. 14, para. 1 SubA). Double funding is not permitted.

In general, costs for Open Access / Data / Model are not eligible (see below).

VAT may be listed in the project costs for goods and services obtained from third parties. Project partners' professional fees directly relating to the project are not subject to VAT.[6] The hourly rates for the project partners' own personnel costs are subject to the instructions in Appendix VI.

No retroactive support will be granted (Art. 53, para. 1 EnA and Art. 26, para. 1 SubA). Any costs incurred before the official start of the supported project cannot be included in the eligible cost. The date agreed for the project to commence as indicated in the agreement is valid.

If a profit is made, a request can be made for repayment of the financial support in proportion to the earnings (Art. 53, para. 4 EnA).

Within the **energy research** programme projects may receive up to 100% support from the SFOE. No overhead contributions will be paid to compensate for research costs (Art. 16 FIFG). Measuring devices, laboratory facilities and similar items are not financed by the SFOE. The eligibility of material costs specifically incurred for the realization of the project (e.g. consumables, operating costs for research infrastructure) will be examined on a case-by-case basis.

The funding granted by the SFOE to **pilot and demonstration projects** is restricted to 50% (70% in exceptional cases) of the eligible project costs (funding rate) according to Article 53 EnA. The non-amortisable portions of the costs that are directly related to the development and testing of the innovative aspects of the project are deemed to be eligible project costs (see Appendix II). In determining the level of financial support, the SFOE takes into consideration the type of project, its degree of proximity to the market and its national scale-up potential (Art. 61, para. 3 EnO). Once the project has been completed, the final amount of the financial support is determined based on the actual project costs incurred and their non-amortisable portions. Relevant factors include the funding rate from the original approval of the approved.

Article 53, para. 2bis EnA is valid for application of the exception clause. Specifically, a project must meet all of the following conditions to receive support of between 50% and 70% of the eligible costs:

- the project is categorised as a pilot project;

[6] MWST-Branchen-Info 25 Forschung und Entwicklung, Eidg. Steuerverwaltung, Bern, 2017

- the output generated by the project (equipment, products, software, processes, intellectual property, etc.) is not utilised in a commercial context and does not generate any relevant financial returns or savings; and
- the application achieves the maximum score for criteria M1 and M5 in the evaluation.

Open Access / Data / Model in Research

The SFOE is committed to the principle of Open Science and expects the results of the funded research projects to be publicly accessible. Measures must be provided to enable Open Access (OA, e.g. according to the 'Gold' model) to scientific publications that will result from the project.

The SFOE also adheres to the 'Open Data' and 'Open Model' principles. Provided that there are no legal, ethical, copyright or other clauses to the contrary, the SFOE welcomes the fact that results, data and models generated in the course of research work are made publicly available.

3 Call for project proposals procedure

The submission process varies depending on the approach (see Chapter 2). Chapter 3.1 describes the call for project proposals procedure (*top-down* approach). Chapter 3.2 describes the open procedure (*bottom-up* approach); in this case, it is recommended to submit the project idea to SFOE before a full application is submitted. Submissions for **sandbox projects** follow the open procedure (see Chapter 3.3) and the submission of a project draft **is mandatory**. A statement from ElCom may be required, addressing whether a regulatory sandbox is necessary for the implementation of the project, for example if the reasons that the applicants give as to why the project cannot be carried out within the existing legal framework are considered insufficient by the SFOE.

The actual submission of applications is described in Chapter 3.4 and the evaluation in Chapter 3.5.

3.1 Call for project proposals (*top-down* approach)

Figure 1 shows the procedure in the *top-down* approach (also known as call for project proposals). If this approach is taken, the procedure can be carried out in one or two stages. In the one-stage procedure, a *full project proposal* is submitted and evaluated. For the two-phase procedure, the timely submission of a summary of the project description (*pre-proposal*) and a conclusive formal and material examination are prerequisites for the subsequent filing of the *full project proposal*. The exact deadlines and modalities can be found in each call for project proposals, as published on the SFOE website.

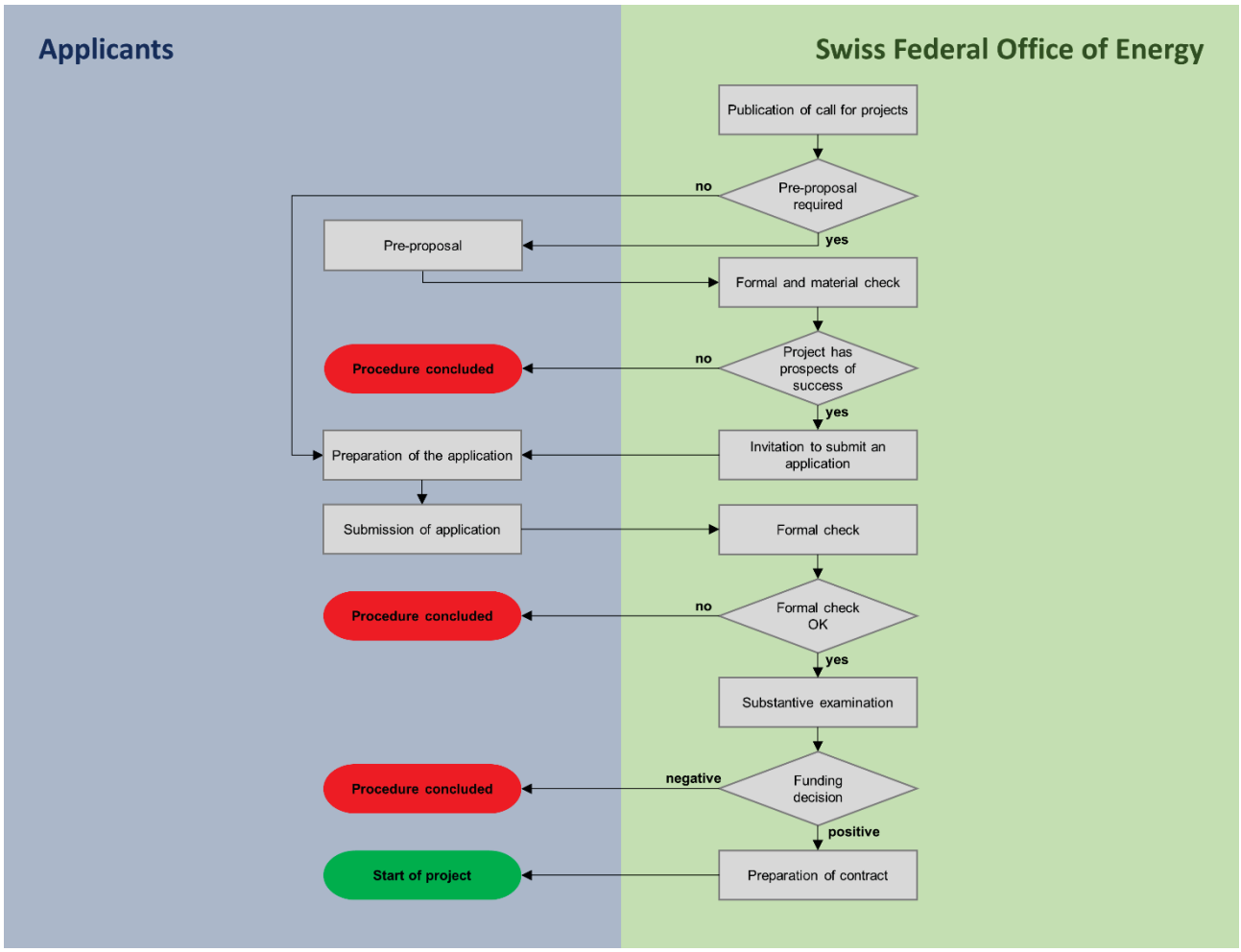


Figure 1: Funding award procedure after a call for project proposals.

3.2 Open procedure (*bottom-up* approach)

If a project is submitted using the open procedure (*bottom-up* approach), it is recommended to contact the programme manager in question and, if necessary, to submit a project outline before submitting a full application. This helps avoid drawing up an application that has no prospect of success on formal or budgetary grounds or because of its content.

Figure 2 shows the evaluation procedure for submitting research and P+D projects using the open procedure.

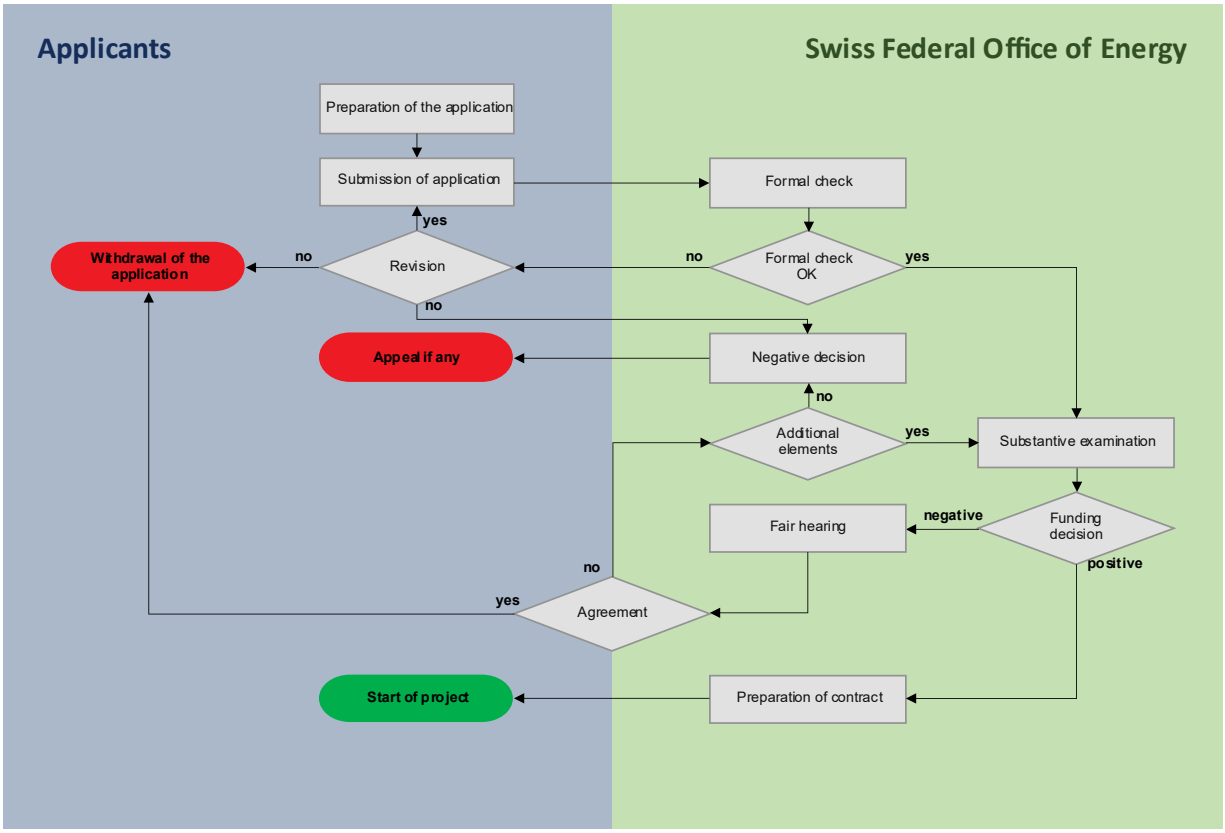


Figure 2: Evaluation process for open procedure for research and P+D programmes

3.3 Submission of sandbox projects

It is mandatory to contact the SFOE and to submit a project draft before preparing an application for sandbox project authorisation. A statement from ElCom may be required, addressing whether a regulatory sandbox is necessary for project implementation. This helps avoid drawing up an application which has no prospect of success on formal grounds or because of its content. Figure 3 shows for the evaluation process for sandbox projects considered in the open submission procedure.

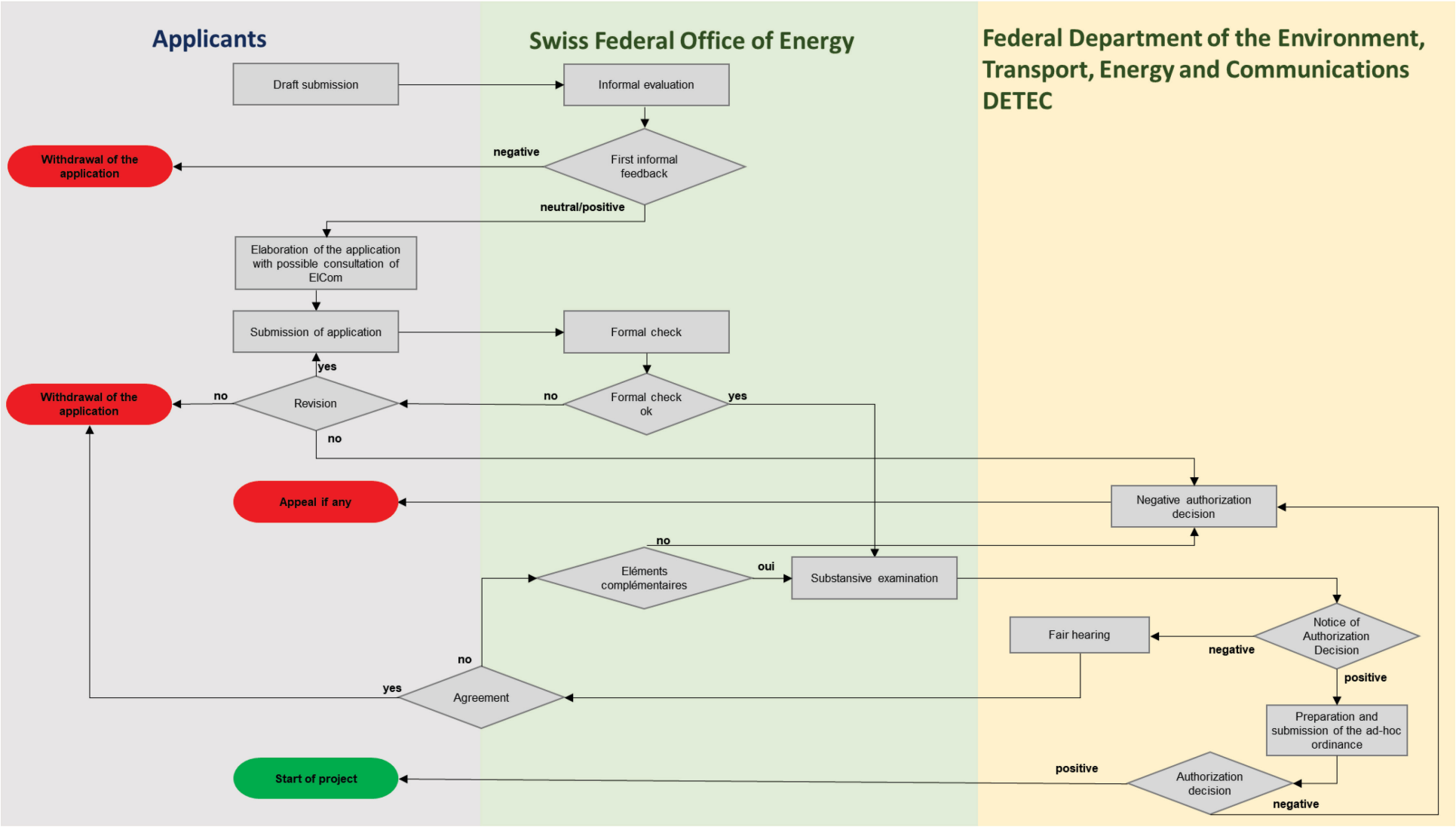


Figure 3: Evaluation process for sandbox projects.

3.4 Submitting the application

In principle, applications must be submitted prior to project commencement:

- at least two months in advance for **research** programmes;
- at least nine months in advance for **sandbox** projects. The earlier deadline is necessary because an ad-hoc order must be established before the project is put out to consultation;
- In the case of calls for project proposals the deadlines and dates can be found in the specific call for project proposals;
- Due to the decision of the Federal Council on the proposed measures to relieve federal finances, which, among other things, provides for the cancellation of support for **pilot and demonstration** projects from 2027 (and possibly as early as 2026), no new financial contributions for P+D projects is granted. Applications submitted will therefore no longer be considered.

Applications must be submitted using the official SFOE forms. Incomplete applications and applications submitted in another format will be rejected. The application file must contain the following documents:

Application for financial support and/or authorisation for a sandbox project. By signing the application form, applicants confirm that they consent to the project being carried out. The completed application form must be signed by all applicants who will be participating in the project.

Declaration(s) of intent. Parties who only finance a project are not required to sign the application form but confirm their intentions by signing separate declarations of intent.

Finance sheet on project costs and financing (submit as an Excel file).

All documents with the exception of the Excel files must be submitted in PDF format.

The entire application file can be submitted to:

- the programme manager for **research** projects;
- the email address sandbox@bfe.admin.ch for **sandbox** projects.

Documents can be submitted in English, German, French or Italian. Use of a variety of languages in the application dossier is permitted. The SFOE will confirm receipt of the entire application file.

By signing the application form the applicants declare 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 (FoIA). Specifically, interim reports, final reports and the main project information are published on the ARAMIS information platform (www.aramis.admin.ch) and if required on the Confederation's geoportal (map.geo.admin.ch) or the SFOE web page on sandbox projects.

3.5 Evaluation of applications

Formal criteria, the content and the quality of a project are taken into consideration to assess whether it is eligible for funding or, in the case of sandbox projects, whether they should be authorised (criteria for research projects, see Appendix III; for sandbox projects, see Appendix IV; for call for project proposals see the modalities described in the text of the call). The SFOE may consult external experts to evaluate the applications submitted. If formal criteria are not met even after more time has been granted to complete the paperwork, the project will not be accepted. Applications which meet formal criteria are then checked for content. When a call for project proposals is made, the proposals are ranked in a list.

If the financial scope of the submitted or anticipated applications exceeds the funds available, the order of priorities set out in Appendix V is applied to **pilot and demonstration projects**.

3.6 Decision

3.6.1 Funding decision

If a funding application is approved, the cooperation modalities will be agreed as a rule by means of a contract between the SFOE and the applicants (cf. Art. 16, para. 2 and Art. 19 SubA).

The SFOE issues a formal decision regarding applications that do not meet the content and quality requirements or cannot be financed using the funds currently available. Applicants have the right to appeal against this decision.

In the case of a call for project proposals, applications that cannot be taken into consideration because of their ranking are also rejected. If there is substantial overlap in the proposed topics, the best-ranked application is approved. Applicants are informed about the ranking list – their position is indicated – in anonymised form.

There is no subjective right to funding.

3.6.2 Decision on authorising sandbox projects

For the authorisation of sandbox projects, an ad-hoc ordinance is created to establish the scope of each regulatory sandbox, as well as the rights and obligations of project participants. The approval decision is based on this ordinance and is communicated through an appealable decision. The decision contains elements including the implementation approval, the scope of the project and, if applicable, the approval to submit an application at the end of the project for the possible socialisation of uncompensated additional costs as provided for in Article 23*a* paragraph 4 ESA. Applications that do not meet substantive and quality requirements will be rejected by means of an appealable decision.

There is no subjective right to authorisation of a sandbox project.

3.7 Publication of project information

Once a contract has been signed, the SFOE publishes the following project information on www.aramis.admin.ch: name and institution of funding recipients, project title, brief description, duration, amount of funding awarded.

The same information is published on the SFOE web page on sandbox projects at the beginning of approved sandbox projects. After the project is concluded, a final report is published. Interim reports may be published during the course of the project depending on the programme and contractual conditions.

4 Project implementation

Start of the project

The start date of the project should be set as soon as possible:

- after the conclusion of the **research** or **P+D** grant agreement. The SFOE can grant an exception in cases where there is good reason to do so;
- after the entry into force of the ad-hoc ordinance and the communication of the decision for **sandbox** projects.

  As a rule, the project should start no later than six months after the decision has been made.

Monitoring and reporting

The SFOE should be informed in writing at least once every year about the state of the project and about the interim findings (interim report). The SFOE may publish such reports on Aramis or on the SFOE web page on sandbox projects. Any special provisions are set in the research or grant contracts or, in the case of sandbox projects, in the decision document.

When the project has been concluded, a comprehensive final report should be submitted for approval using the SFOE template, including a detailed description of the results and findings from the project. The final report must be published on www.aramis.admin.ch at the end of the project or, in the case of sandbox projects, on the SFOE website for sandbox projects. In cases where there is good reason to do so, the report may be published at later date as agreed with the SFOE.

In consultation with the SFOE, a detailed description of the methodology and results may be omitted in the final report if details are given of academic publications with relevant content that are available with open access at the time of publication of the final report.

After the project has been concluded, a detailed financial report (on the basis of the finance sheet) should be submitted for approval if financial support is to be granted. This must be submitted even if the project is not completed as planned (if it is discontinued or cancelled).

5 Miscellaneous

Protection of intellectual property

The SFOE does not claim any right to intellectual property created by projects. Protection of intellectual property arising from a project funded by the SFOE is expressly permitted provided this does not restrict implementation of the findings.

SFOE contact

The contacts for specific programmes are listed on the SFOE website.

The SFOE can bring in external experts to evaluate applications and to monitor projects if required.

Confidentiality

All submitted applications are handled confidentially, as is information exchanged during project funding.

Appendix I: Technology readiness levels

Research projects play a role in the methodical search for new scientific findings. They include both basic fundamental research and applied research (technology readiness levels 1–6 according to Table 1). The TRL system cannot be applied directly to research in the social sciences and humanities sector. Here basic research and applied research are permitted.

Pilot projects serve to test technical systems that are built to a scale that allows researchers to gather scientific, technical, economic and societal data that cannot otherwise be gained in laboratory tests. Such projects are a necessary stage in the development of industrial products, concepts and procedures (technology readiness level stages 4–7 according to Table 1) and are generally not yet realised in a commercial context.

Demonstration projects serve to test the market. Such projects are realised in full scale and allow a comprehensive technical, economic and societal evaluation with a view to effectively introducing a product to market. They provide answers to questions about the costs of maintenance and upkeep. They also help to attract the attention of potential users to the new technology, product, form of organisation or new tool (technology readiness levels 7–9 according to Table 1).

R	P	D			
			TRL 9	Actual system operated over the full range of expected conditions.	The technology is in its final form and has been operated under the full range of operating conditions.
			TRL 8	Actual system completed and verified through test and demonstration.	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of the system development stage. Supporting information includes operational procedures that are virtually complete.
			TRL 7	Full-scale, similar (prototypical) system demonstrated in appropriate environment.	This represents a major step up from TRL 6, requiring demonstration of an actual system prototype in a relevant environment. Examples include testing full-scale prototype in the field. Supporting information includes results from the full-scale testing and analysis of the differences between the test environment, and analysis of what the experimental results mean for the eventual operating system/environment. Final design is virtually complete.
			TRL 6	Engineering/pilot-scale, similar (prototypical) system validation in appropriate environment.	Engineering-scale models or prototypes are tested in an appropriate environment. This represents a major step up in a technology's demonstrated readiness. Supporting information includes results from the engineering-scale testing and analysis of the differences between the engineering scale, prototypical system/environment, and analysis of what the experimental results mean for the eventual operation or performance of system/environment. TRL 6 begins true engineering development of the technology as an operational system. The major difference between TRL 5 and 6 is the step up from laboratory scale to engineering scale and the determination of scaling factors that will enable design of the operating system. The prototype should be capable of all the functions that will be required of the operational system. The operating environment for the testing should closely represent the actual operating environment.
			TRL 5	Laboratory scale, similar system validation in relevant environment	The basic technological components are integrated so that the system configuration reflects the final application in almost all respects. Examples in-

R	P	D			
					clude testing a high-fidelity, laboratory-scale system in a simulated environment. Supporting information includes results from the laboratory-scale testing, analysis of the differences between the laboratory and eventual operating system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. The major difference between TRLs 4 and 5 is the increase in the fidelity of the system and environment to the actual application. The system tested is almost prototypical.
			TRL 4	Component and/or system validation in laboratory environment	The basic technological components are integrated to establish that the pieces will work together. This is relatively 'low fidelity' compared with the eventual system. Examples include integration of ad hoc hardware in a laboratory and small-scale tests. Supporting information includes the results of the integrated experiments and estimates of how the experimental components and experimental test results differ from the expected system performance goals. TRLs 4–6 represent the bridge from scientific research to engineering. TRL 4 is the first step in determining whether the individual components will work together as a system. The laboratory system will probably be a mix of on-hand equipment and a few special-purpose components that may require special handling, calibration or alignment to get them to function.
			TRL 3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development (R&D) is initiated. This includes analytical studies and laboratory-scale studies to physically validate the analytical predictions of separate elements of the technology. Supporting information includes results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. At TRL 3 the work has moved beyond the paper phase to experimental work that verifies that the concept works as expected on simulants. Components of the technology are validated, but there is no attempt to integrate the components into a complete system. Modelling and simulation may be used to complement physical experiments.
			TRL 2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytical studies. Supporting information includes publications or other references that outline the application under consideration and that provide analysis to support the concept. The idea moves from pure research at TRL 1 to applied research at TRL 2. Most of the work involves analytical or written studies with the emphasis on understanding the science better. Experimental work is designed to corroborate the basic scientific observations made at TRL 1.
			TRL 1	Basic principles observed and reported	This is the lowest level of technology readiness. Scientific research begins to be translated into applied R&D. Examples might include studies of a technology's basic properties or experimental work that consists mainly of observations of the physical world. Supporting information includes published research or other references that identify the principles that underlie the technology.

Table 1: Technology readiness levels (TRLs) and authorised segments for energy research projects (R, blue), pilot projects (P, red) and demonstration projects (D, orange)[7]

[7] Source: Technology Readiness Assessment (TRA) / Technology Maturation Plan (TMP) - Process Guide, U.S. Department of Energy, Office of Environmental Management, 2008.

Appendix II: Eligible project costs for P+D projects

Non-amortisable costs (NAC)

The eligible costs are deemed to be the non-amortisable portions of the costs incurred after the funding decision that are directly related to the development and testing of the innovative aspects of the project. The decisive factor for determining the funding contribution is primarily the returns and savings that can be expected over the useful life of the innovative systems, products (e.g. software), processes, intellectual property, etc. realised in the project and that contribute to offsetting the costs for their realisation and operation. To this end, the application form contains statements on the type and timeframe of the utilisation of the innovations realised in the project, as well as an estimate of their financial value in the case of success.

Overhead contribution

For pilot and demonstration projects, a fixed overhead contribution of 15% of the personnel costs is granted. The overhead contribution is used to cover internal costs incurred in the implementation of development projects. The overhead contribution is used to cover, among other things, the following expenses and expenditures and may therefore no longer be declared as part of the direct costs.

- Internal services, administration and general management costs;
- General laboratory equipment, measuring instruments, technical consumables, etc.

Direct material costs for infrastructure

Material costs for infrastructure that are directly related to the realization of the project and do not concern the basic equipment of a research facility, or a company are declared as direct costs and checked for their eligibility in each individual case. These material costs include, among others, the use of existing research infrastructure (e.g. test benches, special clean rooms, etc.) as well as existing production and manufacturing facilities. The following costs are eligible:

- Original procurement costs distributed over the operational lifetime;
- Ongoing maintenance costs (servicing, spare parts, etc.);
- Operating costs in the project (supervision, energy, consumables, etc.).

The costs must be reported in the form of hourly rates and number of operating hours in the project. If required, the cost structure and the effective operating time in the project must be documented in writing, e.g. with logbooks, accounting documentation, etc.

If major procurements are made in the project which have a functional residual value after completion of the project and thus become part of the infrastructure of a research institution or a company, a maximum of the cost share over the project duration is considered. This is particularly the case for production facilities for which commercial utilisation is foreseeable after completion of the project.

Costs for software development

The costs for the development of software are generally recognised and funded in full, provided that

- These activities are innovative;
- the software will be available as open source;
- commercial utilisation is not foreseeable and;
- the costs for software development represent a smaller part of the total costs.

If these criteria are not met, the eligible part of the costs can be reduced according to the cost/benefit assessment.

Appendix III: Evaluation criteria for research projects

The evaluation criteria for technology-oriented projects differ in some respects from those for the social sciences and humanities (SSH) (please note the details in the table). A project must fulfil all the conditions for admission to the programme so that it can be evaluated qualitatively. If one or more of the criteria for admission to the scheme are not fulfilled, the project will be rejected.

Eligibility criteria

Formal criteria

Criterion		Fulfilled?	
F1	Are the documents submitted complete (application and any attachments)?	Yes	No
F2	Are the required details and information complete (e.g. budget plan, payment plan)?	Yes	No
F3	Is the request clearly written? Are the targets clearly formulated and distinguishable?	Yes	No
F4	Has written approval been submitted by all project partners involved?	Yes	No
F5	Has the project topic not been dealt with in the last 12 months in an SFOE call for project proposals and is there not any SFOE call for project proposals currently open that addresses the same project topic?	Yes	No
F6	In the case of a call for project proposals: Was the submission date adhered to?	Yes	No
F7	In the case of scientific publications: Is Open Access granted?	Yes	No

Content criteria

Criterion		Fulfilled?	
C1	Does the project concern the security of supply of Switzerland and does it have the potential in the mid-term or long-term future to reduce energy consumption and/or greenhouse gas emissions or to help substitute non-renewable energies or to expand the use of renewable energies?	Yes	No
C2	Does the project conform to scientifically recognised principles (e.g. physical laws)?	Yes	No
C3	May the findings of the project be made accessible to the public? (See provisions on monitoring and open access.)	Yes	No
C4	Does the project lie within the SFOE's field of activity or within the scope of the topics called for?	Yes	No
C5	Is the project purposeful and application-oriented and will the results serve in some practical application (state-, business- or customer-driven targets)?	Yes	No
C6	Is the current technology readiness within a value creation segment that is appropriate for the programme (TRL according to Appendix I)? For SSH: Is this application-oriented basic research or application-oriented research?	Yes	No

Content criteria

The evaluation is done on a scale of 1–5 with ratings as follows: 1 poor, 2 fair, 3 good, 4 very good, 5 excellent.

For a project to receive support, the minimum evaluation per qualitative criteria (Q1 to Q5) must be attained or exceeded. Evaluations of the sub-criteria flow into the evaluation and serve as indicative points for the overall evaluation. The sub-criteria marked with ** must be fulfilled.

Criterion		Minimum evaluation
Q1	Organisation	ø 3
	Competencies, organisation, responsibility ** Are all the competencies crucial to the project covered? Are the essential skills for organising the project (management experience, communication, etc.) covered and are all relevant partners (including research infrastructures) involved? Are the responsibilities laid down clearly?	At least 3
	Approach, methodology ** and data Applies to all projects (technical and SSH): Is the proposed approach suitable to deal with the issue? Is the methodology adequate to solve the issue? For SSH: Is access to the data required guaranteed/has the strategy to compile data been clearly defined?	At least 3
	Schedule and milestones Is the proposed schedule structured logically and drawn up realistically and efficiently? Have clearly measurable milestones been stipulated (stage-gate targets)?	
Q2	Excellence	ø 3
	Preliminary work, suitability, expertise Can the project team build on previous work? Does the project team have the expertise required (within the competencies)?	
	Academic record, recognition Does the project team have broad experience and are members of the project team recognised among experts (academic record: national and international specialist publications, experience as part of expert committees)?	
	Teams' potential for success Is clear potential for success discernible in this project team?	

Q3	Content of project	ø 3
	Relevance, national and international cooperation ** Is the project scientifically, politically and strategically relevant and does the content contribute to a priority in the SFOE energy research concept? Is it part of an international cooperation under the IEA, the EU research programmes or other national or international collaboration schemes (e.g. DACH)?	At least 3
	Added value, innovative content Do the findings lead us to expect high value creation for Switzerland – in an economic or scientific respect? Does the project build up a large body of knowledge or know-how and/or does it pursue an innovative or novel approach?	
	Cost-benefit ratio, subsidiarity Does a project hold out the prospect of significant benefits in relationship to the costs involved? Have sufficient own funds and third-party funds been earmarked?	
Q4	Impact potential	ø 3
	Energy potential Does the technology/procedure hold out the prospects of more energy savings or a higher energy yield? Does the technology/procedure also have the potential to avoid GHG emissions? Is there a potential to influence societal behaviour?	
	Acceptance, discussion in public or before a professional audience Are the results of the research of interest for the general public or for the broader professional audience or do they provide a useful foundation for informed opinion-building and decision-making?	
	Sustainability Will the findings contribute to sustainable development in all three dimensions (ecological, economic and social) at national or global level?	
Q5	a) Dissemination: applicable to all technical projects	None
	Potential for implementation Is an implementation plan included in the project application? Is the project team responsible for further developing the technology or does it already have potential customers? Are the business partners required for implementation adequately integrated commensurate with the readiness of the technology (Appendix I)?	
	Potential as a multiplier When compared to the current state of technology, does the technology/procedure display technical or economic advantages that indicate it has potential as a multiplier?	
	Public interest Does the plan/project generate interest among the general public? Is an open access / data / model strategy included?	

	b) Diffusion: only applicable to SSH projects	None
	Monitoring Is a monitoring or other accompanying activity such as workshops or a monitoring group planned?	
	Knowledge transfer Are knowledge transfer and publications planned? Is an open access / data / model strategy included?	
	Promotion of doctoral candidates Are doctoral candidates working on the project?	

Appendix IV: Evaluation criteria for sandbox projects

To assess whether a project is eligible for obtaining a derogation, formal and material criteria are taken into consideration, the latter being based on Article 23*a* ESA and Article 26*a* ESO. If formal criteria are not met even after additional time has been granted to complete the application, the project will not be accepted. Applications which meet formal criteria are then checked with the material criteria. If after this check it is found that one of the material criteria is not fulfilled, the application will be rejected. While the questions to formal criteria can be answered with yes or no, the material criteria are evaluated by grading various sub-criteria

Formal criteria

The formal requirements for the application are assessed according to the following criteria F1 to F3: Each of the aspects mentioned is assessed as «yes» or «no». The respective criterion is deemed to be not fulfilled if one of the associated aspects is assessed as «no».

F1	Form of the application	Fulfilled?
	Completeness Are the submitted documents complete (application form, finance sheet and possible annexes)?	Yes/No
	Consent Has the consent of all project partners been verified in writing (signatures, letters of intent)?	Yes/No
	Deadlines Are the time limits adhered to (submission date, project start, exclusion periods)?	Yes/No
F2	**Content of the application**	**Fulfilled?**
	Comprehensibility Is the application clearly written, and is the content and context of the project comprehensible? Are there sufficiently clear descriptions of the legal provisions to be deviated from in the project and the reason for the deviation?	Yes/No
	Legal compliance Does the project comply with the law (with the exception of one or more of Articles 6, 8, and 10–20a ESA and the related provisions)? Has there been an initial legal assessment by ElCom or is this not necessary?	Yes/No
	Public accessibility Will the project results made publicly accessible?	Yes/No
F3	**Financing of the project**	**Fulfilled?**
	Overall financing Is the overall financing of the project ensured (own funds, financial contribution and third-party funds cover the project costs)?	Yes/No

Material Criteria

The quality of the project is assessed according to the following criteria M1 to M4: The sub-criteria (a/b) are each given a grade from 1 to 5 with the following meaning: 1 = unsatisfactory , 2 = poor, 3 = sufficient, 4 = good, 5 = very good. A mean value is calculated from these grades for each criterion. The sum of these five mean values gives the total score. The material evaluation is deemed to be unsatisfactory if one of the sub-criteria receives a grade of 1 or if the mean value of a criterion is less than 3.

M1	**Contribution to the objectives of the ESA and the further development of this legislation**	**ø 3**
1a	**Security of electricity supply and a competitive market** Does the innovative solution, new approach or new business model being tested contribute to a more secure electricity supply and/or a competitive electricity market?	Grade 1-5
1b	**Development of the relevant legal provisions** Does the project contribute to the development of the relevant legal provisions?	Grade 1-5
M2	**Innovation content**	**ø 3**
2a	**Novel character of development work and practical experimentation** Does the project involve the implementation of a particularly innovative solution/concept/approach or business model?	Grade 1-5
2b	**Added value** Can substantial new knowledge, expertise and/or economic added value be generated for Switzerland from the insights gained?	Grade 1-5
M3	**Application potential**	**ø 3**
3a	**Multiplication potential** When compared to the current state of technology, does the new solution display technical or economic advantages that indicate it has potential to be replicated in Switzerland?	Grade 1-5
3b	**Implementation potential** Are there concrete plans for the future market implementation of the innovation? Have the potential implementation partners and end users for the innovation and its results been identified? Do the designated implementation partners share the financial risks?	Grade 1-5
M4	**Probability of success**	**ø 3**
4a	**Preliminary work, experience, competences** Is the preliminary work required for the realisation of the project available and identified? Does the project team cover all essential experience and expertise for the project?	Grade 1-5
4b	**Procedure and organisation** Are the project content and the procedure appropriate for achieving the set objectives and generating sufficient added value? Are the project organisation, responsibilities, timetable and work plan clear and appropriate?	Grade 1-5

Appendix V: Order of priority for P+D projects

Subject matter and area of application

In this section the order of priority is established for the dispensation of the annual budgeted funds available to support pilot and demonstration facilities and projects if the number of applications submitted or anticipated exceeds the available funds.

It applies to the financial support as foreseen in Art. 49, para. 2 of the Energy Act of 30 September 2016 (EnA) [8] and Art. 63, paras. 1 and 2 of the Energy Ordinance of 1 November 2017 (EnO) [9] within the remit of the Swiss Federal Office of Energy (SFOE) and of the Federal Department of the Environment, Transport, Energy and Communication (DETEC).

Principle

In principle, pilot and demonstration facilities and projects as well as analysis and field tests may be promoted by the Confederation on the basis of the EnA and the enforcement provisions if they comply with the stipulations of Art. 61 EnO.

Priorities in the case of insufficient of funds

If the number of applications submitted or anticipated exceeds the funds available, applications will be evaluated and considered in accordance with the following priorities:

First priority is accorded to projects which are accredited with having high energy potential. Energy potential is defined as the energy savings or the energy yield per solution unit multiplied by the estimated multiplication potential in Switzerland.

Second priority is accorded to all other projects.

Application process

If it is unlikely that a second priority application will receive support in the current year because of insufficient funds and the order of priority, it will be officially rejected through an appealable decision.

The reasons given for rejection shall refer to this order of priority.

If the funds available are insufficient to take all first priority projects into consideration, applications for first-priority projects may also be rejected.

Exceptions

As an exception, second priority projects can be taken into consideration if seasonal and strategically urgent projects would otherwise not be carried out and could not be financed from another source.

[8] SR 730.0

[9] SR 730.01

Appendix VI Remuneration of personnel expenses in research and P+D projects

Principle

The determination of the own personnel costs of the project partners is based on the actual hours worked and the actual gross salaries paid to the employees plus the following supplements:

- Employer contributions according to AHVG / IVG / EOG, BVG, AVIG and UVG.
- Opportunity costs due to incomplete productive utilization of employees, e.g. due to vacations, training, internal administrative work, order acquisition etc.
- In the case of private companies, additional opportunity costs in connection with loss of revenue and profits due to development activities.

The defined maximum hourly rates merely specify the upper limit of the allowable project costs. In case of doubt, the declared hourly rates and expenses must be substantiated. Self-employed persons who do not pay themselves a salary may declare gross salaries customary in the market for an equivalent position without a management function.

The following rule of thumb can be used to roughly estimate the permissible hourly rate: The employee's gross salary divided by the regular yearly working hours (usually 2'100 h at 100% workload) and multiplied by a supplement factor. This factor is 1.5 for universities and public research institutions and 2.0 for private companies.

For pilot and demonstration projects, a fixed overhead contribution of 15% can be added to this hourly rate (see Appendix II).

Functional categories

The eligibility of hourly rates depends, among other things, on the function and, in a broader sense, on the education and training of the employee:

Category	Universities & public research institutions	Private companies
A [10]	Professor	Upper management/ Head of company or division
B	Senior scientist (min. 5 years experience after graduation/PhD)	Middle management/ Head of business unit or team
C	Post-doc (max. 5 years of experience after graduation/PhD)	Expert with high education and/or min. 5 years of relevant work experience
D	PhD student or technical/scientific staff member	Expert with low education and/or max. 5 years of relevant work experience

[10] For category A, a maximum of 20% of the total working hours and not more than 200 hours per year and employee may be declared. This limit may only be exceeded if it is proven that the increased cooperation of these persons is indispensable for the implementation of the project.

Maximum hourly rates

For the defined organization types and function categories, the following maximum hourly rates apply (excl. overhead surcharge for P+D projects). However, these only represent the highest possible rates that will be accepted. Decisive for determining the hourly rates are the effective salary costs (see rule of thumb).

Calculation examples: According to the rule of thumb, an hourly rate of 115 CHF/h in a university corresponds approximately to a gross salary of CHF 161,000.-. An hourly rate of 135 CHF/h in a private company corresponds approximately to a gross salary of CHF 142'000.-.

Category	Universities & public research institutions	Private companies
A	135 CHF/h	170 CHF/h
B	115 CHF/h	135 CHF/h
C	80 CHF/h	115 CHF/h
D	50 CHF/h	90 CHF/h

Swiss Federal Office of Energy
CH-3003 Berne

contact@bfe.admin.ch
www.energy-research.ch