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Federal Department for the Environment, Transport, Energy and Communications (DETEC)

Bundesamt für Verkehr BAV

Implementation of the energy strategy 2050 for public transport (ESPT 2050)

Research programme 2021-2024

Reference: BAV-021.11-11/1

Change history

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Reference: BAV-021.11-11/1

Contents

Abbreviations

ARE	Federal Office for Spatial Development
CB	Commissioning body (FOT Management)
COMO	Coordination Office for Sustainable Mobility
DETEC	Federal Department of the Environment, Transport, Energy and Communications
EG	Expert group
EnA	Energy Act
ERI	Promoting education, research and innovation (the Secretary of State's multi-year programme ERI - SERI)
ES 2050	Energy Strategy 2050
ESPT 2050	Energy Strategy 2050 for Public Transport
FC	Federal Council
FOCA	Federal Office of Civil Aviation
FOEN	Federal Office for the Environment
FOT	Federal Office of Transport
GCarA	Goods Carriage Act
ICT	Information and communications technology
IP-RailO	Implementing Provisions to the Railways Ordinance
NDAC	Non-depreciable additional costs
pkm	Passenger-kilometre
PM	Programme management
PMO	Programme management office
PPA	Public Procurement Act
PPO	Public Procurement Ordinance
PT	Programme team
PT	Public transport
PTC	Public transport company
PT-ICT	ICT for public transport
RIC	Research and Innovation Committee of the FOT (SC)
RIFA	Railway Infrastructure Fund Act
RIPA	Federal Act on the Promotion of Research and Innovation
SC	Steering Committee
SFOE	Swiss Federal Office of Energy
SG	Support group
SNSF	Swiss National Science Foundation
SubA	Subsidies Act
TU	Transport Undertaking

Summary

Context
As a continuation of the “Energy Strategy 2050 for Public Transport” (ESPT 2050), the 2021-2024 phase of the programme pursues the basic objectives of the 2017-2020 phase and builds on some of them, in light of the Federal Council's 2019-2023 legislative programme[1]. One of the programme’s objectives that is linked to the Paris Agreement, which Switzerland ratified in 2017, is that, by 2030, greenhouse gas emissions in Switzerland be halved compared with the baseline year of 1990. Moreover, it aims to contribute towards the implementation of the new CO_2 Act, which stipulates a reduction of 50% by 2030 (compared with 1990), with three-quarters of the measures being taken on Swiss territory. This CO_2 Act also calls for net zero carbon emissions by 2050.
The ESPT 2050 programme intends to make a significant contribution to the public transport sector by pursuing three action areas: developing knowledge, disseminating good practice and changing behaviour.

Objectives of the ESPT 2050 programme
Generally speaking, the objectives are revised every four years in the form of an updated multi-year research programme. The objectives are validated by DETEC, which is responsible for the Federal Administration's research in this sector.
The ESPT 2050 programme promotes coordinated research that is focussed on implementing the energy transition in the fields of public transport and rail freight. It takes account of other activities in this field, specifically the new “Swiss Energy Research for the Energy Transition (SWEET)” programme, which is run by the Swiss Federal Office of Energy (SFOE). It defines the criteria and general framework for awarding grants, as well as specifying the priorities for 2021-2024. These priorities embody the main research issues for which the Federal Office of Transport (FOT) particularly wishes to see new knowledge being developed, while avoiding any duplication of effort.

Differentiation from other support programmes
According to the dispatch relating to the initial package of measures for the Energy Strategy 2050 (ES 2050) and the federal popular initiative “In favour of the phasing out of nuclear energy” (13.074), FOT may conduct research into energy issues within its area of expertise.
The current programme, which has arisen from these circumstances, is intended to complement the research and innovation activities supported by other public bodies, in particular Innosuisse, the Swiss National Science Foundation (SNSF) and cantonal programmes.
During the period 2021-2024, FOT is committed in particular to maintaining and, where necessary, establishing links with the DETEC bodies involved in public transport and rail freight energy, via a lean structure aimed at facilitating the development and implementation of measures that contribute towards the ES 2050 objectives in this area. Coordination at a departmental level will be achieved via existing bodies, notably the Coordination Office for Sustainable Mobility (COMO). If necessary, some projects will form the subject of discussions with other offices or the General Secretariat. Other support bodies outside DETEC will be consulted as required.
ESPT 2050 is based on digitising and developing new information and communications technologies (ICT), the application of which influences the area of energy in transport. The field of ICT in public transport (PT-ICT) has been identified, but does not constitute a specific development theme for ESPT 2050 during this period. The ESPT 2050 programme is therefore only supporting those PT-ICT activities that could act as a catalyst for its priority themes.

Prior consultation

[1] https://www.admin.ch/opc/fr/federal-gazette/2020/1709.pdf

The needs of the industry have been evaluated and integrated into the process of drawing up the research programme. For this purpose, universities, universities of applied sciences, the associations involved, infrastructure operators and other federal offices have been consulted.

Criteria and requirements

Support by the ESPT 2050 programme is limited to the following phases of research and development: applied research, experimental development, pilots, demonstrations and field trials, as well as analyses, preliminary studies and feasibility studies of a technological, political or behavioural nature. To boost the impact of this work, the ESPT 2050 programme may occasionally fund the transfer of knowledge in its field.

To be eligible for the programme, projects are also required to:

- contribute towards transcending the state of the art in Switzerland in the subjects of energy efficiency, the production of renewable energy and/or the management of energy resources,
- optimally exploit the energy and economic aspects of all objects relating to public transport and/or rail freight,
- contribute directly or indirectly to reducing CO_2 emissions,
- and to do so without prejudicing safety, quality of service or protection of the environment.

Priorities of the ESPT 2050 programme

The weighting of themes will depend on the needs and evolution of the programme during the period in question. Potential project owners will be provided with information on this subject, specifically via newsletter. Furthermore, the project remains open to new themes that could prove to be relevant. The themes that have already been identified for 2021-2024 are:

- energy optimisation and reducing CO_2 emissions,
- energy production and the intelligent management of the energy system,
- instruments and other key factors involved in the energy transition,
- data, monitoring and reporting,
- energy management within organisations,
- knowledge transfer and good practice.

1 Introduction

In 2013, the Federal Council tasked FOT with contributing to the Energy Strategy 2050 (ES 2050) in the fields of (i) public passenger transport and (ii) rail freight. The ESPT 2050 programme was conceived in response to this request. Since 2014, this initiative has enabled financial resources to be allocated to applied research as well as pilot and demonstration projects aiming to support the energy transition in these two sectors.

As a continuation of the ESPT 2050 programme, this new 2021-2024 phase pursues and builds upon the basic objectives of the 2017-2020 phase. It aims to clarify the conditions that apply to the support provided by ESPT 2050 and contribute towards coordinating the implementation of the energy transition in Swiss public transport and rail freight.

The programme intends to make a significant contribution to the public transport sector by pursuing three action areas: developing knowledge, disseminating good practice and changing behaviour.

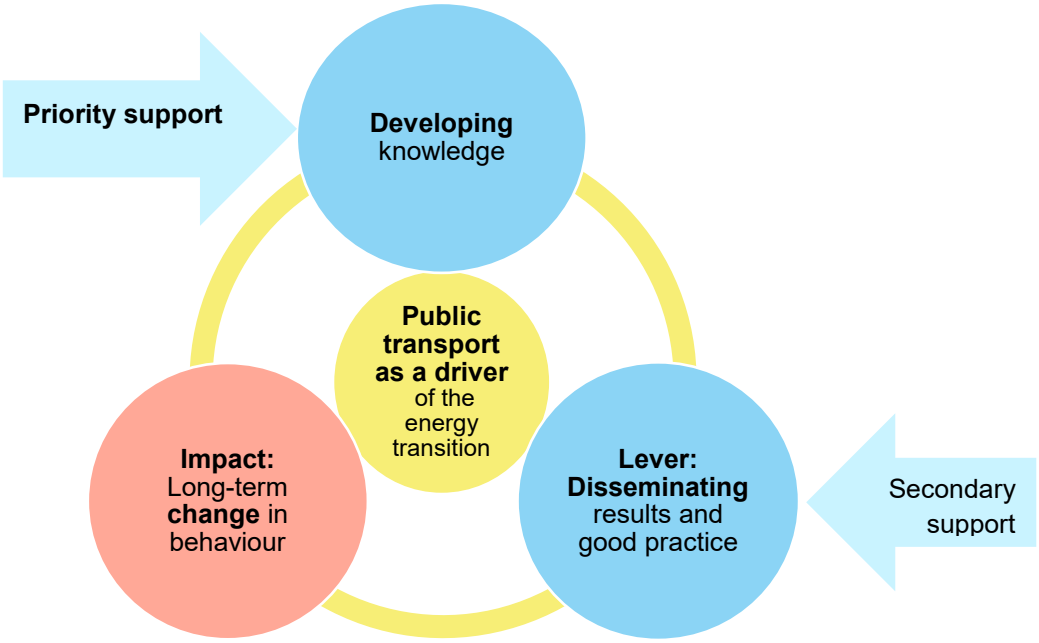

Figure 1: The programme's three action areas: developing knowledge, disseminating good practice and changing behaviour

- **Developing knowledge:** Supporting technical and scientific research and demonstration projects.
- **Disseminating good practice:** Supporting projects run by organisations proposing platforms that enable good practice to be disseminated and communicated (workshops, practical guides, publications, etc.).
- **Long-term changes in behaviour:** Supporting projects that influence the long-term implementation of the energy issue within organisations. Supporting projects concerning monitoring, statistics, behavioural analysis and regulatory analysis (instruments).

1.1 Context

The research programme conducted by the Energy Strategy 2050 for Public Transport (ESPT 2050) is aligned with the Federal Council's 2019-2023 legislative programme[2]. One of the programme's objectives that is linked to the Paris Agreement, which was ratified in 2017, is that, by 2030, Switzerland will halve its greenhouse gas emissions compared with the baseline year of 1990. Moreover, it aims to contribute towards the implementation of the new CO_2 Act, which stipulates a reduction of 50% by 2030 (compared with 1990), with three-quarters of the measures being taken on Swiss territory. This CO_2 Act also calls for net zero carbon emissions by 2050.

The 2019-2023 legislative programme expects that these reductions will be achieved notably by:

- improving the energy efficiency of vehicles, and
- developing renewable forms of energy.

The ESPT 2050 research programme forms part of the "Research concept for sustainable transport 2021-2024" [3], established jointly by the Federal Roads Office (FEDRO) and FOT. It is one of eleven research strategies being drawn up that will underpin the Federal Council's dispatch on promoting education, research and innovation between 2021 and 2024 (ERI Dispatch) [4]. This strategy coordinates the research activities within federal administrations concerned with the subject of "sustainable transport", and in particular indicates how FOT intends to respond between 2020 and 2024 to the mandate it has been given by the Federal Council to implement the "public transport" and "rail freight" components of the Energy Strategy 2050 (ES 2050). It also acts as a platform for providing guidance and facilitating cooperation with researchers outside the Federal Administration.

In this context, the notion of "sustainable transport" covers all aspects of road and rail transport (freight and passenger), including non-motorised traffic (foot and bicycle).

"Sustainability" is defined as being the management of mobility necessary for individuals that is as environmentally-friendly as possible and also cost-effective (environmental and economic sustainability), as well as the provision of mobility for all sections of the population in all regions (social sustainability).

The current programme has been established in conjunction with the Swiss Federal Office of Energy (SFOE), which oversees research in the field of energy within the Federal Administration. This document also aims to facilitate communication with other players concerned, as well as aiding coordination with other federal administrations.

1.2 Research scope and delimitation

The research projects help to maintain the value of the rail infrastructure and exploit, maintain and develop it efficiently, cost-effectively, safely and in an environmentally friendly manner.
The current research programme applies to the funding of contributions for research activities directly related to the energy transition in (i) public transport and (ii) rail freight. To be eligible for the programme, projects are required to:

- contribute towards transcending the state of the art in Switzerland in the fields of energy efficiency, the production of renewable energy and/or the management of energy resources, notably through the management of decentralised production,
- optimally exploit the energy and economic aspects of all objects (notably rolling stock/vehicles, infrastructure, buildings and ancillary equipment) relating to public transport and/or rail freight,

2 https://www.admin.ch/opc/fr/federal-gazette/2020/1709.pdf

3 https://www.astra.admin.ch/dam/astra/fr/dokumente/forschung_im_strassenwesen/forschungskonzept_nachhaltiver-verkehr_2021-2024.pdf.download.pdf/11_Concept_de_recherche_Transports_et_durabilit%C3%A9_2021-2024_F.pdf

4 [ERI Dispatch expected during the winter session 2020], source : https://www.sbfi.admin.ch/sbfi/fr/home/services/publications/base-de-donnees-des-publications/s-n-2019-1/s-n-2019-1f.html

- contribute directly or indirectly to reducing CO_2 emissions, either globally or in terms of transport operations (CO_2/person-kilometre, or CO_2/tonne-kilometre),
- without prejudicing quality of service, safety or protection of the environment.

Support by the ESPT 2050 programme is limited to the following phases of research and development:

- Applied research, consisting of work undertaken with a view to acquiring new knowledge, the primary aim of which is to help solve practical problems.
- Experimentation, consisting of systematic work utilising knowledge obtained by research and practical experience with a view to launching new products or processes, or in particular developing those that already exist.
- Pilots and demonstrations relating to projects at the interface between the laboratory and the marketplace. Specifically, this concerns the testing and evaluation in the real world (laboratory or field trials, plus analysis) of new solutions (technical facilities or prototypes) and approaches (including socio-economic aspects and commercial models).
- Field trials and analysis to test and evaluate new technologies, evaluate policy measures or gather the data needed for these tasks.
- Preliminary studies and feasibility studies for pre-evaluating and ascertaining the potential of new solutions and exploratory measures of a technological, policy-based or behavioural nature.

To boost the impact of this work, the ESPT 2050 programme may also fund the transfer of knowledge in its field.

Furthermore, the Goods Carriage Act (GCarA) permits grants to be awarded for investing in technical innovations in the field of rail freight. These innovations must at least meet the criteria listed above in order to be potentially eligible.

However, the ESPT 2050 programme is not intended to support basic research or the implementation of other innovative developments.

1.3 Research and legal basis

In its dispatch dated 4 September 2013 relating to the initial package of Energy Strategy 2050 measures[5], the Federal Council tasked FOT with defining the funding and implementation of energy projects in the field of public passenger transport and rail freight.
No changes to legislation were needed, and it was possible to launch the implementation immediately, independently of deliberations on ES 2050 in the Federal Assembly. On 30 September 2016, these deliberations resulted in a total revision of the Energy Act of 26 June 1998 (EnA)[6], which fully supports the objectives of the aforementioned package of measures.
In keeping with the Federal Council's mandate, the ESPT 2050 programme focuses on supporting:

- applied research projects,
- the collection, analysis and communication of data, and
- the development of prototypes and experimental pilot installations.

[5] FF **2013** 6771

[6] SR **730.0**

The research activities that the Federal Office of Transport intends to conduct in order to implement ESPT 2050 are subject to:

- Article 16 para. 2 of the Federal Act of 14 December 2012 on the Promotion of Research and Innovation[7] (RIPA), which lays down the foundations for implementing the instruments required for ESPT 2050 activities,
- the Subsidies Act (SubA).

The following also apply:

- the guidelines entitled “Quality assurance in Federal Administration research activities” by the committee for interdepartmental coordination for the Administration's research (dated 26 March 2014) [8]
- and the general terms and conditions of the Confederation relating to research contracts (dated: December 2013) [9]

Furthermore, Article 10 of the Goods Carriage Act (GCarA) permits grants to be awarded for investing in technical innovations in the field of rail freight.

The current ESPT 2050 programme is aimed primarily at financial contributions in accordance with the Federal Act on Financial Assistance and Subsidies (SubA, SR 616.1) and, to a lesser extent, the awarding of research contracts (research under contract) in accordance with RIPA Article 16 para. 2, letter d. Any mandates, notably for carrying out complementary studies, will be awarded in accordance with the Federal Act on Public Procurement (PPA, SR 172.056.1).
Moreover, in the area of expertise assigned to it by the Confederation, the Federal Office of Transport seeks to develop its legal tools in order to enshrine the programme’s results in the public transport and rail freight sector for the long term.

2 Objectives of the ESPT 2050 programme

In the form of ESPT 2050, FOT is providing an operational structure capable of supporting the objectives arising from the Federal Council’s ES 2050 programme. ESPT 2050 makes it possible to devise, implement and disseminate measures targeted at public transport and rail freight companies holding a federal franchise or benefiting from federal funding, and also at other actors who influence these companies, notably the universities of applied sciences, through their scientific input.
The lessons learned in the previous period have, in particular, highlighted the need to support the large-scale deployment of theoretical results and pilot projects, and also to strengthen the legal bases governing the management of energy production by companies holding federal franchises for transport.

[7] SR **420.1**

[8] https://www.ressortforschung.admin.ch/dam/rsf/fr/dokumente/dokumentation/publikationen/qualitaetsrichtlinien/richtlinien-qs-dt-Revision-v.6.pdf.download.pdf/RichtlinienQS_dt_Revision_V.6_FR.pdf

[9] https://www.beschaffung.admin.ch/dam/bpl/fr/dokumente/Anbieter/AGB/Forschung/CG_de_la_Confederation_relatives_aux_contrats_de_recherche.pdf.download.pdf/CG_de_la_Confederation_relatives_aux_contrats_de_recherche.pdf incl. guide:
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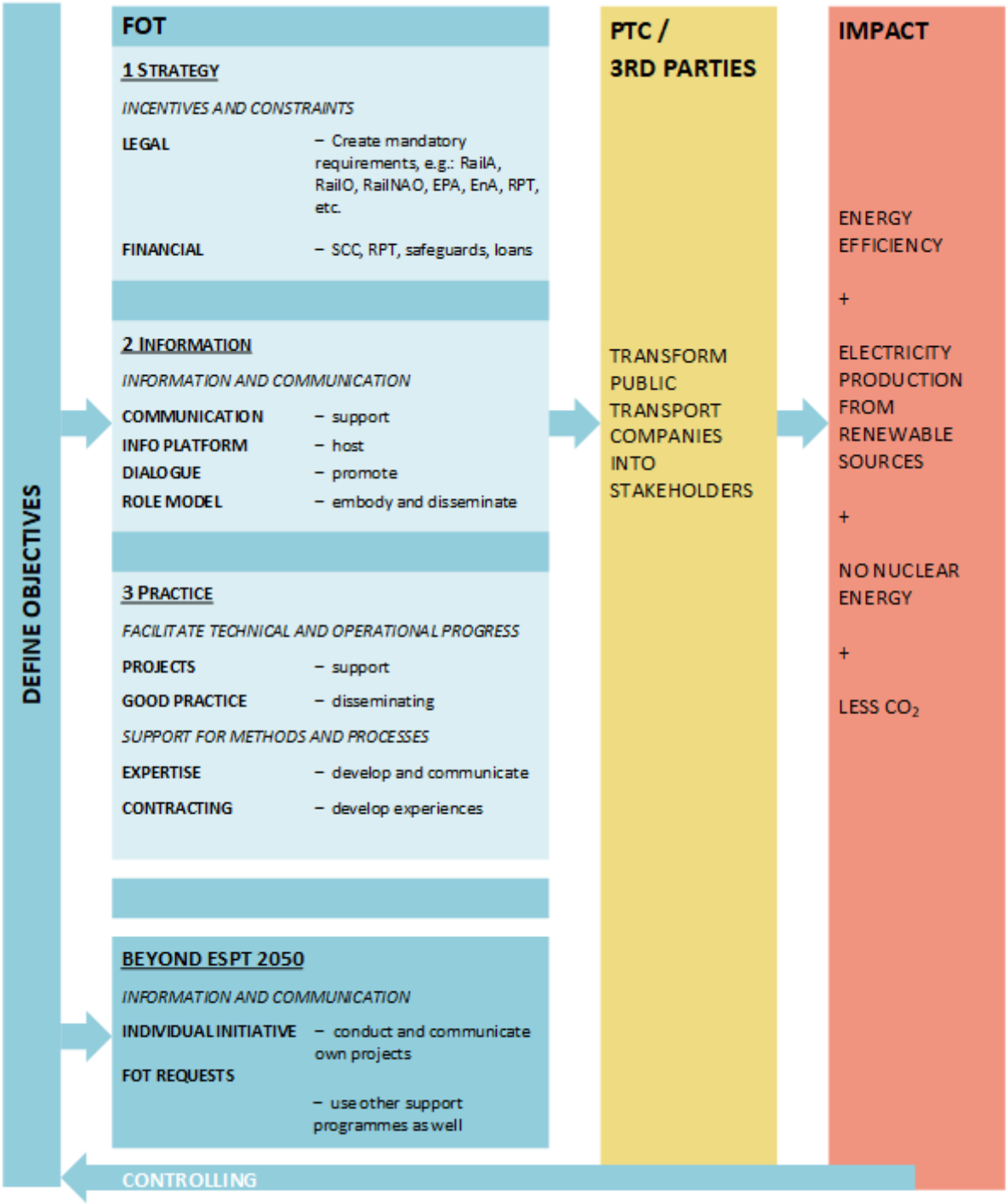

Figure 2: Links between the objectives and main tasks of the ESPT 2050 programme.

The programme promotes coordinated research that is focussed on implementing the energy transition in the fields of public transport and rail freight. It takes account of other activities in this field, specifically the new “Swiss Energy Research for the Energy Transition (SWEET)” programme, which is run by the Swiss Federal Office of Energy (SFOE). It defines the criteria and general framework for awarding grants, as well as specifying the priorities for 2021-2024. These priorities embody the main research issues for which the Federal Office of Transport particularly wishes to see new knowledge being developed, while avoiding any duplication of effort.

2.1 Strategic objectives

In its dispatch of 4 September 2013 on the initial package of Energy Strategy 2050 measures, the Federal Council aims to reduce national energy consumption per person by 54% compared with the baseline year of 2000. Furthermore, the Paris Agreement ratified by Switzerland in 2017 specifies that greenhouse gas emissions should halve by 2030 in Switzerland, and even reduce by 70-85% by 2050, in particular by improving the energy efficiency of vehicles and developing forms of renewable energy.
In September 2020, parliament approved the new CO_2 Act, which provides for a halving of national emissions by 2030, achieving three-quarters of this reduction on Swiss territory. The objective is to become climate-neutral by 2050.

In view of this, ESPT 2050 supports the achievement of these national objectives by providing incentives to all the stakeholders involved so that the public transport sector takes appropriate measures by itself.

2.2 Intended impact

In the long term, the programme's objectives should meet the ongoing energy-related needs of energy and transport stakeholders. In particular, these stakeholders should regularly improve their knowledge, communicate, apply relevant good practice and modify their behaviour.

To achieve the progress called for by ESPT 2050, the impact of these activities should be noticeable in the five following areas:

1. **Improving their energy efficiency**: Depending on the application area, the energy efficiency of components and their utilisation could be increased by 10-15% by 2050.
2. **Dispensing with nuclear energy:** With the aim of 100% of the energy used by vehicles and infrastructure coming from renewable sources.
3. **Reducing CO_2 emissions**: This chiefly involves reducing the consumption of fossil fuels in public transport and rail freight, both in terms of vehicles and infrastructure as well as in terms of construction machinery and buildings. The aim is for the public transport sector to become climate-neutral by 2050.
4. **Helping to produce renewable energy**: It will be necessary to produce more renewable energy in order to replace nuclear energy and meet the increasing demand for electric mobility. Transport companies should speed up the development of photovoltaic and wind-powered capacity on their property as well as that of combined heat and power in facilities wherever possible.
5. **Managing networks intelligently**: Transport companies will exploit their ability to manage electricity networks intelligently or develop their capability in this field in order to facilitate and incentivise the production and use of new forms of renewable energy, which are often decentralised.

3 Priority themes for 2021-2024

The summary of work carried out as part of ESPT 2050 since 2014 and the information resulting from consultation with key stakeholders within the industry, as well as programmes associated with ES 2050, have highlighted several **priority themes** to be developed during the current phase of the programme.

The weighting of these themes will depend on the needs and evolution of the programme during the period in question (independently of the order in which they are listed below). Potential project owners will be provided with information on this subject, specifically via newsletter. Furthermore, the project will remain open to new themes that could prove to be relevant.

3.1 Theme 1: Energy optimisation and reducing CO_2 emissions

Innovative projects aiming to make public transport and rail freight more energy-efficient, notably in terms of vehicles of all types relevant to the ESPT 2050 programme (thermal, structural, electrical and engine optimisation, the use of new energy carriers and on-board energy storage), auxiliary systems (construction machinery, etc.), infrastructure (points, etc.), buildings, energy system (the storage, transportation and conversion of energy, network design, etc.) and vehicle sizing in relation to operating conditions. All of these measures will contribute to a reduction in CO_2 emissions in the public transport sector.

3.2 Theme 2: Energy production

Projects aiming to increase the production of renewable energy through the innovative use of the potential of public transport and rail freight, in particular by considering the latest developments in solar and wind power, energy recovery (electrical and thermal), optimisation through self-consumption, biomass, biogas, the production of synthetic fuels, etc.

3.3 Theme 3: Intelligent management of the energy system

Innovative projects for the intelligent management of the energy system, from producer and storage through to the consumer. The aim is to optimise energy utilisation in public transport (reliability and supply costs) and ensure it is compatible with public energy networks. For example, the dynamic management of energy sources managed by the public transport system and research into contributions to the energy market.

3.4 Theme 4: Instruments and other key factors involved in the energy transition

Innovative projects aimed at developing incentives and other levers of a technological, legal or socio-cultural nature to develop and/or modify instruments that promote the energy transition in public transport and rail freight. For example, in the fields of the practical integration of existing technologies, and also the legal and financial framework.

3.5 Theme 5: Data, monitoring and reporting

Projects aimed at developing datasets and reference values to improve understanding of the energy efficiency of public transport and rail freight, in particular statistics to evaluate the progress being made in terms of energy in the sector and by its stakeholders. Projects intended to encourage industry stakeholders to compare themselves with each other to identify and implement measures that could enable them to participate actively in the energy transition.

3.6 Theme 6: Knowledge transfer and good practice

Projects promoting the large-scale dissemination of knowledge and good practice among industry stakeholders and activities promoting the communication, utilisation and showcasing of the results obtained within the context of the programme.

3.7 Theme 7: Energy management within organisations

Projects aimed at developing methods and tools suitable for public transport and rail freight companies. Contributions making it possible to transform the management structures of these companies so that energy issues are managed professionally across the entire organisation and are monitored systematically by dedicated bodies, in terms of both corporate management and service delivery.

3.8 Other themes that are not a priority at the time of writing

If the situation warrants it, the programme may be prepared to consider other themes that are not a priority at the time this programme was drawn up, but are in keeping with the legal context and the objectives laid out in sections 1 and 2.

4 Coordination

ESPT 2050 activities during 2021-2024 emanate from the institutional framework of the Swiss Confederation's Energy Strategy 2050. In this context, ESPT 2050 represents one of the Federal Office of Transport's contributions to ES 2050 as a whole, and is in no small part a result of its ongoing interactions with the other offices concerned.

4.1 Coordination with bodies connected with energy

ESPT 2050 is primarily intended to complement the research and innovation activities supported by other public bodies, in particular Innosuisse, the Swiss National Science Foundation (SNSF) and cantonal programmes. If need be, ESPT 2050 undertakes to transfer any project requests to these bodies.

Within DETEC, each office has the ability to influence the energy efficiency of the overall transport system in Switzerland, in terms of different aspects of mobility and even in terms of the need for mobility itself. Specifically, the development of airport buildings and infrastructure is the responsibility of ARE; FOCA influences the demand for transport in passenger-kilometres (pkm); the planning of service offerings (FEDRO, ARE and FOT) influences the generation of traffic and its modal split (pkm/mode => kWh); and environmental standards and their implementation (FOEN and FEDRO) influence technological choices (engine configuration, energy source: diesel/petrol/electric). Each DETEC office is able to implement or develop tools aimed at improving the energy efficiency of transport. DETEC's impact will therefore depend directly on coordinating the actions that are undertaken. Until now, these actions have not been formally synchronised except with the SFOE, which is steering ES 2050. FOT consults with the SFOE regarding each of the projects submitted within the framework of ESPT 2050, to align its position and potentially transfer the request for financial support to the SFOE. Furthermore, the implementation guidelines of the ESPT 2050 programme have been modelled on those of the SFOE, thus ensuring that energy project owners are treated the same by FOT and the SFOE. The ESPT 2050 programme is being run in close collaboration with the SFOE, including matters concerning the granting of funding and project support.

During the period 2021-2024, FOT is committed in particular to establishing links with the DETEC bodies involved in public transport and rail freight energy via a lean structure aimed at facilitating the development and implementation of measures that contribute towards the ES 2050 objectives in this area. Coordination at a departmental level will be achieved via existing bodies, notably the Coordination Office

for Sustainable Mobility (COMO). If necessary, some projects will form the subject of discussions with other offices or the General Secretariat. Other support bodies outside DETEC will be consulted as required.

Furthermore, a joint venture is planned specifically with universities, universities of applied sciences and other institutions or research centres. Themed workshops will be organised as required. The research programme may also support national and international conferences organised by Swiss institutions. When necessary, the programme will also seek to coordinate its activities with those of energy producers and distributors, cantons and interested professional associations.

The results, reports, etc. obtained as part of the work supported by the programme will be published regularly on the Swiss Confederation's ARAMIS website. Depending on their dissemination potential, they will also be communicated directly to interested parties in workshops and at conferences, and published in scientific journals.

4.2 Coordinating research into information and communications technology

ESPT 2050 relies on digitisation and the development of new information and communications technologies (ICT), the application of which extends significantly beyond the field of energy in transport. As far as possible, the programme's implementation will be based on the potential of ICT with the aim of improving energy efficiency in public transport at a national level.

Strictly speaking, ICT for public transport (PT-ICT) does not constitute an objective. However, depending on requirements, ESPT 2050 undertakes to support the targeted implementation of applications that use ITC and which it anticipates will deliver significant energy benefits. Specifically, it may be possible to support transport company projects that seek to remotely activate or de-activate on-board equipment (e.g. heating and air conditioning in passenger areas) or infrastructure (e.g. heating of railway points, lighting) that until now have been permanently powered-on. Likewise, ESPT 2050 may support the implementation of devices for collecting, transmitting and aggregating data in real time with the intention of improving energy efficiency in vehicle operations. Project requests in the field of PT-ICT will generally be communicated to other FOT programmes (specifically research into infrastructure [Rail Infrastructure Fund]) and to programmes being run by other offices.

The field of ICT in public transport (PT-ICT) has been identified, but does not constitute a specific development theme for ESPT 2050 during this period. The ESPT 2050 programme therefore only supports those PT-ICT activities that could act as a catalyst for its priority themes.

5 Defining the future direction and implementation of the results

Strategic objectives are generally defined every four years. They are validated by DETEC, which is responsible for the Federal Administration's research in this sector (Article 16, para. 5 of the Railway Infrastructure Fund Act of 21 June 2013 [RIFA]10).

Based on the programme's results, discussions with the support group (SG), external consultations and discussions with other federal offices – particularly the SFOE, which is steering ES 2050 – FOT senior management each year adjusts the priorities and the supplementary themes needed to keep the research programme on track.

FOT drew up this research programme taking account of the "Research concept for sustainable transport 2021-2024", in conjunction with the two programmes "Research into the rail infrastructure" and "Funding innovation in regional passenger transport (RPT)". The priorities are based on FOT's research requirements, which were agreed upon in consultation with the stakeholders concerned. If required, the State Secretariat for Education, Research and Innovation (SERI) provides FOT with methodological support for the programmes it operates.

6 Organisation

6.1 Instruments available

Any project owner can submit a request for support to the programme. FOT may decide to provide support via ESPT 2050, provided the relevant conditions are met. However, there is no automatic entitlement to financial support, and FOT may reject requests.

The evaluation criteria for projects are laid down in the ESPT 2050 implementation guidelines.

Furthermore, to be eligible, projects must address the research priorities mentioned in this document. Their scientific quality and approach must make it possible to produce results that transcend the state of the art in Switzerland and fill in knowledge gaps that are not protected by patents. ESPT 2050 support is focussed on the research and development phases detailed in section 1.2.

The choice of projects and their monitoring, funding and distribution across the Offices are fundamental questions necessary to ensure that FOT funding is used efficiently. However, these project-related actions must not obscure other supplementary measures that take effect later on in the implementation process but which may prove more significant in terms of timescales and finances. Eventually, in order to achieve the ESPT 2050 objectives, FOT expects to utilise other specific instruments at its disposal, for example service level agreements and the Implementing Provisions to the Railways Ordinance (IP-RailO)[11]. Ultimately, these instruments are extremely powerful levers for influencing the behaviour of transport companies. However, they will only be totally effective if stakeholders are fully aware of their requirements and wholeheartedly accept them.

With this approach, FOT's efforts will be primarily devoted to achieving the level of knowledge needed to make proposals for changes, support corresponding efforts and, if relevant, incorporate them into a framework that would be legally binding for all franchise-holding transport companies.

In view of this, FOT principally issues mandates for external support and research, whereas it may entrust the SFOE with running and funding pilot and demonstration projects whose scope extends beyond

10 SR **742.140**

11 SR **742.141.11.** The Implementing Provisions (not published in the AS) can be downloaded (in French) from www.oft.admin.ch > Droit > Autres bases légales et prescriptions > Dispositions d'exécution de l'OCF (DE-OCF).

the field of public transport, while providing appropriate technological and legal support. The FOT may also carry out such projects if collaboration with the SFOE is deemed beneficial.

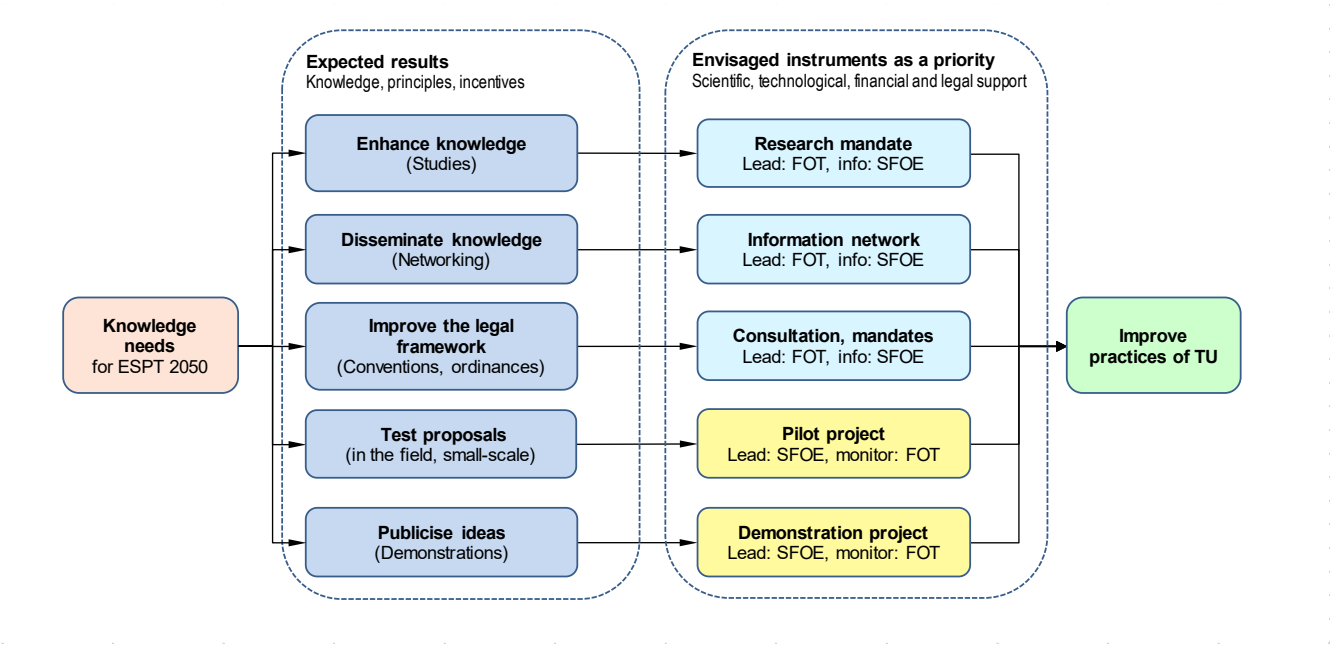

Figure 3: Some of the main instruments for achieving the expected results

This combination of measures, which is specific to FOT and other partner offices, makes it possible to significantly increase the consistency and effectiveness of implementation.

6.2 Bodies and roles

The programme has a lean structure consisting of six bodies, each with a precise role:

- **FOT Management** is the commissioning body (CB) and is responsible for the global mandate. It defines the principles and key aspects of the implementation. Management are periodically informed of project progress and undertake the supervisory and corrective measures needed. FOT Management has delegated its decision-making authority to the Steering Committee, while maintaining its crucial role of approving contacts with programme participants and clients.
- **Steering Committee** (SC): The steering committee responsible for ESPT 2050 is the Research and Innovation Committee (RIC) of the FOT. It represents the CB in the project management and provides a strategic vision. Moreover, it validates funding proposals issued by the Expert Group (EG). This steering committee monitors and guides the programme and prepares the management decisions.
- **Programme Management (PM)** manages the programme and assumes operational responsibility for designing its content and utilising resources. With the support of the Programme Management Office (**PMO**), it coordinates the evaluation of projects, the drawing-up of funding agreements and expertise in deliverables, as well as coordinating activities with other federal organisations, notably the SFOE. In agreement with the Steering Committee and in consultation with the Expert Group, Programme Management updates the ESPT 2050 objectives and coordinates research efforts and the evaluation of results. It works closely with other offices concerned, in particular the SFOE, FEDRO and ARE.
- **The Programme Team (PT)** consists of a group of people with additional skills who are made available to Programme Management. It is a lean body that is rarely called upon, and can be

thought of as a “working group”. The Programme Team provides expertise in particular areas of the programme, and may assist in supporting specific projects.

- **The Expert Group (EG)** is tasked with critically and constructively examining all the requests principally relating to project support with which they have been entrusted by Programme Management. The members of the Expert Group deal with these requests in an independent, unbiased manner. The experts decide whether to recommend accepting or rejecting each project, and this recommendation is then passed to the Steering Committee for its decision. The Expert Group also has to anticipate research themes and propose ways of promoting them, particularly in political and scientific circles (articles, events).
- **The Support Group (SG)** is a group of influential stakeholders that acts as a communication channel between FOT and the environment in which ESPT 2050 is to be implemented, including first and foremost the SFOE. The SG meets as required, and highlights the needs of users and businesses, as well as disseminating project results in a targeted manner.
- **The Programme Management Office (PMO)** supports Programme Management in its task of implementing the energy strategy. Specifically, it carries out the administrative activities involved in preparing invitations to tender, carrying out formal checks, monitoring projects and maintaining an overview of all activities. It manages the information network and publicises the work being carried out. The PMO maintains direct contact with other programme management bodies within FOT in order to generate synergy and avoid any duplication of effort, particularly in terms of communication.

6.3 Procedures for granting requests

The ESPT 2050 programme primarily uses two types of instrument to achieve its objectives: it supports projects proposed by transport companies (in the form of partial funding, in accordance with the Federal Act of 5 October 1990 on Financial Assistance and Subsidies [SubA][12]) and, where necessary, directly orders specific services in the form of mandates (in accordance with RIFA, the Federal Act of 16 December 1994 on Public Procurement [PPA][13] and the Ordinance of 11 December 1995 on Public Procurement [PPO][14]).

Contracts and mandates may be awarded via an open procedure, a selective procedure, by invitation or as a discretionary procedure. Although an open procedure provides the greatest market coverage, it is not suitable for all invitations to tender – in the case of ESPT 2050 in particular, where the aim is to closely involve transport companies, selective procedures or the use of invitations may prove significantly more effective.

The evaluation criteria applied to requests for funding are detailed in the programme’s implementation guidelines. In the case of invitations to tender, the criteria are listed in the requirements specification.

The documents for submitting projects (request form) are available on the FOT website:
https://www.bav.admin.ch/bav/en/home/topics/research.html

6.4 Procedure for evaluating requests

The PMO carries out an initial formal check on each project, then passes it to Programme Management, who decide whether to proceed (or to forward it to other offices in the case of grant requests). The SFOE expresses its view on the project and reserves the right to take ownership of the request in order to deal

12 SR **616.1**

13 SR **172.056.1**

14 SR **172.056.11**

with it at a later stage. Once the SFOE's decision has been made known, the Programme Team uses the documents in its possession to carry out a pre-selection, which Programme Management then submits to the Expert Group for evaluation. Once Programme Management is in possession of the independent evaluations, it draws up a proposed decision which it then forwards to the SC. The SC examines the documentation and makes its decision. Programme Management then retrieves the documentation and prepares possible contracts with the help of the PMO.

Each project is evaluated by the Expert Group, whose job is to study the requests given to it by Programme Management critically, constructively and independently. If any similarities are identified or there is likely to be synergy between projects, the Expert Group encourages those concerned to coordinate their resources in order to collaborate on a single common project.

More detailed information on the grant procedure can be found in the ESPT 2050 implementing directive.

6.5 Target audience for the programme and the proportion financed

The ESPT 2050 is aimed at public transport companies that hold a federal franchise or benefit from federal funding, as well as actors who are in a position to influence these companies directly, such as industry and vehicle or equipment manufacturers, ETH research units, universities, universities of applied sciences and research institutes (private and public).

In the case of financial contributions towards research projects, the Subsidies Act (SubA) applies (see also section 1.3). According to SubA Article 7, letters c and d, the beneficiary has to make its own contribution in line with its economic capacity and must make full use of its own resources and other sources of funding at its disposal. In this context, when a project is submitted, the authorities must check whether it is of a commercial nature (in other words, if the research results generate viable products, the requirements of EnA Article 54, para. 4 must be fulfilled). The authorities must also check that the beneficiary is carrying out the task in compliance with the relevant provisions, and that the legal requirements are being observed, in accordance with SubA Article 25, para. 1. Only non-depreciable additional costs may be taken into account when assessing the amount of funding that will be granted by FOT.

The conditions and procedure for requesting the return of funding that has been promised or granted must be dealt with on a case-by-case basis between the beneficiary of the subsidy and FOT, as part of a specific and harmonious agreement.

6.6 Monitoring, reporting and quality assurance

Monitoring is carried out at programme and project level (operational monitoring).

- **Programme monitoring**: The criteria for monitoring the effectiveness of the ESPT 2050 programme are established jointly with the SFOE, as part of evaluating the effectiveness of all ES 2050 activities. This monitoring specifically involves estimating the extent to which actions in the field of public transport and rail freight have been able to contribute to improved energy efficiency and facilitate the transition to forms of energy that are renewable, dependable and economically viable, while maintaining the capacity to improve public services.

  It is expected that the Confederation will have access to data enabling it to evaluate the impact of the programme. A large part of the monitoring will entail measuring and transmitting essential data emanating directly from public transport companies. The collection of this data will be expanded from 2021 onwards. In general terms, the programme's success will be measured by the progress of the public transport sector towards energy efficiency and carbon neutrality (see “Objectives”).

- **Operational monitoring:** Project progress is monitored by Programme Management, which organises specific support groups as required. This coaching aims to facilitate progress and the implementation of results.

  Monitoring results and finances are activities that are carried out by Programme Management. FOT officials assist Programme Management in this task, particularly officials from the FI division who help with the financial aspects of implementing projects, and the BO division who assist with budgeting and billing.

  Each project manager contractually undertakes to deliver one or more reports during the course of their project. The payment of subsidies is linked to the provision of these documents.

  The quality of deliverables is verified by an external expert where necessary. This expert will communicate any requests for improvements, which FOT will make to the project owner.

- **Reporting:** Each year, ESPT 2050 Programme Management submits an activity report to FOT management. This report can be viewed by the general public.

7 Financial resources

7.1 Financial capacity

The financial resources available to the programme form part of FOT's ExU/R budget and are allocated in line with budgetary costs and subsidy expenditure. Between now and 2024, the planned budget for covering novel practices and pilot projects is CHF 3 million per year.

Year	2021	2022	2023	2024
Budget	CHF 3 million	CHF 3 million	CHF 3 million	CHF 3 million

7.2 Co-financing and the principle of subsidiarity

According to EnA Article 53 para. 2, subsidies for research projects may only cover part of the total project costs. The amount funded by the Confederation may not exceed 40% of the project's non-depreciable additional costs. This figure may be increased to 60% in exceptional cases (see also section 6.5).

If the project owner submits more than one request for financial support, SubA Article 12 states that the project owner must inform the relevant authorities. If he/she fails to do so, the assistance or allowance that has been unduly received may have to be repaid.

7.3 Prioritisation

If the requests for funding exceed the total amount available, projects will be prioritised as follows:

- Projects addressing current priority themes will be given top priority.
- If several projects deal with the same priority theme they will be encouraged, where relevant, to coordinate their efforts. The scientific and technological quality of the project and also the FOT staffing requirements needed to achieve the programme's objectives efficiently and effectively will be decisive.

8 References

The programme proposed for 2021-2024 is based on input received via a consultation with stakeholders that took place in July 2020, the results of the summary report for 2017-2020, meetings between offices and other FOT support programmes, and prior consultation with members of the Expert Group, the Steering Committee and the PMO.

Federal Council's legislative programme 2019-2023 (not available in English): https://www.newsd.admin.ch/newsd/message/attachments/60110.pdf

Federal Office of Transport, FOT strategy 2019. Link to document

Federal Roads Office and Federal Office of Transport, Research strategy for sustainable transport 2020-2024, Link to document