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Programme «NCCS-Impacts»

«Decision Support for Dealing with Climate Change in Switzerland: a cross-sectoral approach» - Project “Socioeconomic Scenarios for Switzerland”

Project and Programme Description

16 March 2023

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1 Aim and Scope of the Programme «NCCS-Impacts»

Climate change is under way with full force, thereby adversely affecting more and more facets of nature, health, society and economy. As an Alpine country, Switzerland is particularly vulnerable to these changes. Already today, Switzerland experiences a long-term warming that is about twice as much as the global average. Multi-sectoral climate impacts are anticipated, which calls for adaptation and mitigation efforts including reconsiderations of long-term planning. To this end, federal, cantonal, and local authorities, policy-makers and other stakeholders, such as the private sector, require a solid basis for decision-making. Therefore, the Swiss Confederation releases climate and hydrological scenarios as core climate services at regular intervals. The latest cycle of climate change scenarios published in 2018 («CH2018») identified drier summers, more hot days, heavier precipitation events and snow-scarce winters as main results of the model projections for Switzerland. The data of CH2018 served as input to calculate hydrological scenarios («Hydro-CH2018»), which were published in early 2021. They show far-reaching impacts on future water availability over the course of the year with changes in runoff and a growing hazard potential, among others. Climate and hydrological scenarios are an important and necessary, yet incomplete basis for decisions in politics and by stakeholders. What is missing is information on future climatic impacts that serves as a basis for climate-smart decision-making and action. Here, the National Centre for Climate Services' (NCCS) new programme «NCCS-Impacts» steps in by elaborating a cross-sectoral compilation of climatic impacts in Switzerland as well as a bundle of climate services for decision-support.

With the NCCS-Impacts programme, the NCCS pro-actively pursues its vision of «climate services for a resilient Switzerland today and tomorrow». The aim of the NCCS programme is to obtain an overview of impacts under future climate change in Switzerland and its ensuing central challenges for the environment, economy and society. It also aims at turning the results into user-centred products in the true fashion of climate services as decision support. The programme hence contributes to closing the gap identified between basic scientific research and climate mitigation and adaptation measures (see Figure 1).

The programme pursues the following overarching goals:

1. Impacts: Systemic overview of climate change impacts on and in Switzerland and the subsequent key challenges for the environment, economy and society.
2. Decision-Support: Broad availability and use of jointly produced climate services for targeted and sustainable management of the risks and opportunities of climate change.
3. Support for Authorities: Cross-sectoral support of the federal government and all actors in their future-oriented actions to meet the challenges of climate change.

Next to the generation of new science-based insights, the programme also has a clear focus on the development and provision of actionable products intended for decision-makers. The programme is specifically looking for solutions (i.e climate services) that help ensure the concerted uptake of information on climate impacts and risks by decision makers in the field of climate adaptation and mitigation. These solutions need to be relevant for all parts of Switzerland and should not be limited to local-scale case-studies. For reference, solutions could encompass the following products that build on and translate the newly gained knowledge into products: audio-visual information distillation, self assessments, country-, region- and industry-specific information, training manuals, reports, factsheets, guidelines and handbooks, gaming approaches, interactive web applications as well as web-based data and information for the NCCS web portal and the NCCS web atlas (non-exhaustive enumeration).

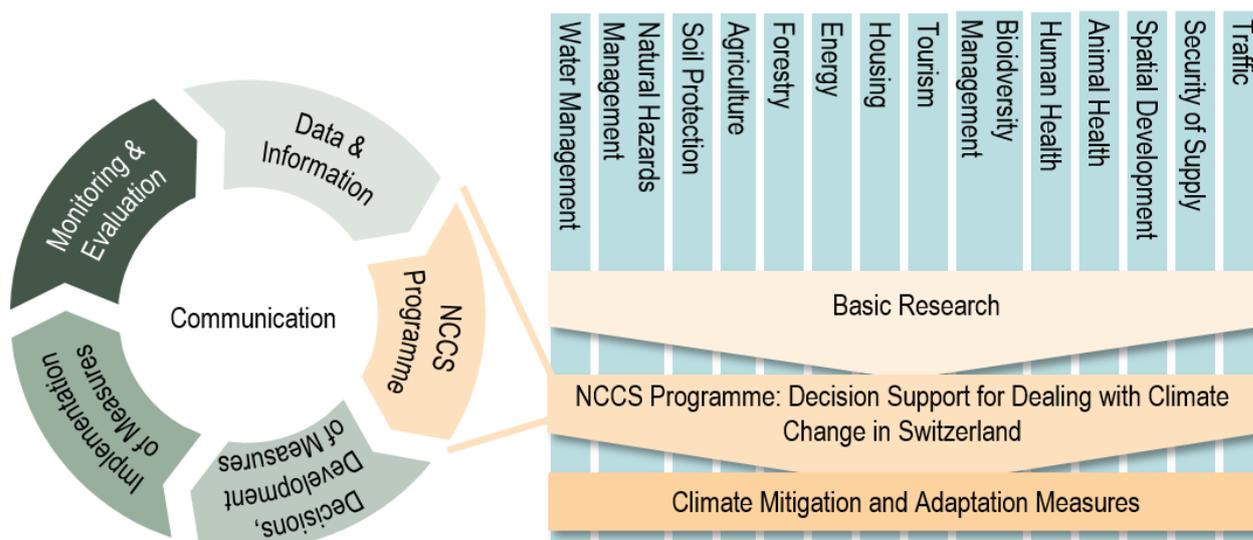


Figure 1. Embedding of the programme NCCS-Impacts in the climate management cycle.

In its core, the programme consists of six cross-sectoral and interlinked climate impacts projects. These were identified as priority needs in a comprehensive stakeholder dialogue with representatives from research, administration and the private sector, and by means of a desk review across various sectors. The work in the different projects will follow a co-production approach. This transdisciplinary approach will enable a coordinated effort between research groups and practitioners towards applied climate change impacts research and decision support in the form of climate services development. With its cross-sectoral setting, NCCS-Impacts deliberately pursues complex challenges in the context of climate change, which necessitate the collaboration of different actors along the climate services value chain.

NCCS-Impacts is politically anchored with the decision of the Federal Council from 12 August 2020 (Anpassung an den Klimawandel in der Schweiz – Aktionsplan 2020-2025), in which several Federal Departments are mandated to implement the cross-sectoral research programme «NCCS-Impacts» within the framework of the NCCS. As a new measure of the Second Action Plan on Climate Adaptation 2020-2025, the programme will also serve as an important basis for the further development of the Federal Council's strategy "Adaptation to Climate Change in Switzerland" beyond 2025. In summer 2020, the NCCS Board of Directors approved the structure, contents, governance and management of NCCS-Impacts for the period 2021-2025.

The programme is centrally managed by the Secretariat of the NCCS at MeteoSwiss. The project implementation is funded by the participating Federal Offices (financial means of policy research) and by in-kind contributions from NCCS members ETH, WSL, Agroscope, and FSVO. Furthermore, the NCCS members provide a substantial amount of in-kind contributions for the management of the projects, as each project is led by one or more NCCS members.

Background information on the National Centre for Climate Services NCCS

In response to the call of the Global Framework for Climate Services (GFCS) of the World Meteorological Organization (WMO) to establish national coordination mechanisms, Switzerland established its National Centre for Climate Services (NCCS) in late 2015. Currently, nine federal offices and research institutions are members of the NCCS, with MeteoSwiss serving as the host institution of the NCCS Secretariat. As a federal network and coordination body, the NCCS bundles existing climate services, promotes dialogue between actors and works together to develop and communicate tailored information, processes and solutions. All members are on a par and have an equal say, hence attention is given to both pure climate information as well as downstream applications along the climate services value chain. With its NCCS-Impacts programme, the NCCS is set to deliver a milestone with respect to the analysis of cross-sectoral climate impacts in Switzerland and the development of actionable decision support.

2 Programme Structure

The six NCCS-Impacts projects dealing with climate impacts and decision support all use the NCCS priority themes Hydro-CH2018 and CH2018 as common information and data basis (see Figure 2). The projects are interlinked through various synergies that need to be identified and addressed during the project realization. Furthermore, all projects must take into account and elaborate on two common cross-cutting topics:

1. Extremes, such as heat, heavy precipitation, or flooding
2. Social Justice, such as distributive justice, impact diversity across social groups particularly on the vulnerable, disadvantaged and marginalised populations, distribution of costs and benefits, equity-oriented adaptation and mitigation actions to avoid worsening inequities in connection to climate change impacts.

A seventh project of the programme supports – as an in-kind contribution through MeteoSwiss – the elaboration, tailoring and distribution of climate information and data to ensure the link between the climate impacts projects of the programme and their use of the CH2018 climate scenarios as a common data basis. An overview of the available CH2018 scenario data sets is provided [here](#).

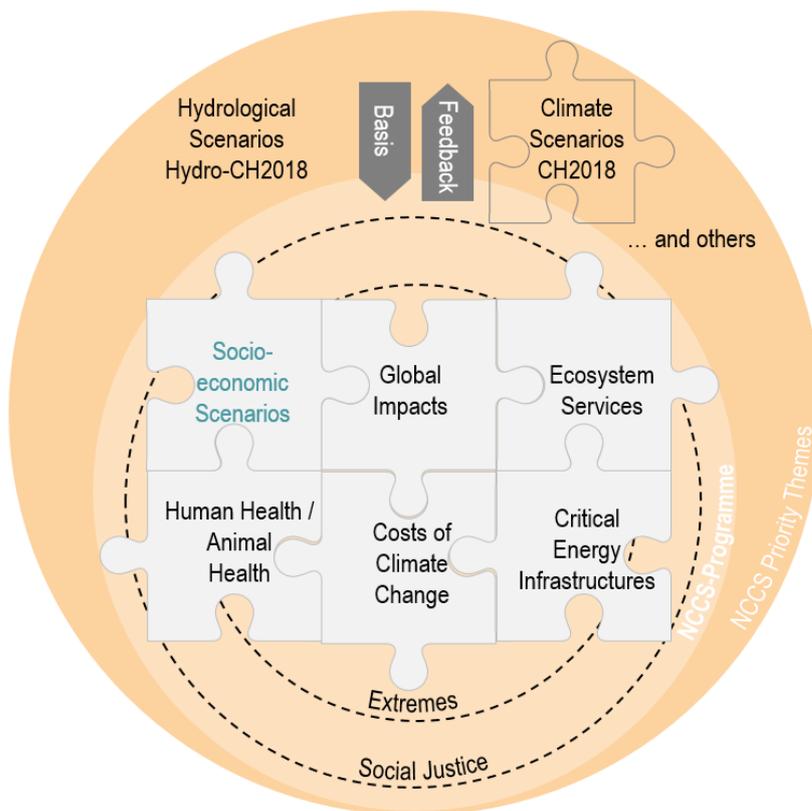


Figure 2. The programme NCCS-Impacts with its six climate impacts projects. The project on socio-economic scenarios is currently open for tender.

The projects should be jointly executed by partners from research and practice in order to ensure co-production from start to finish of the project. From the six climate impacts projects, parts of the project on socio-economic scenarios is currently open for tender (see Chapter 3). For four other projects (global impacts, ecosystem services, human and animal health and costs of climate change) a call for tenders was published on 9 June 2022 via simap, which is now in the contract phase with selected consortia. An overview on the participating projects within NCCS-Impacts is detailed on the [NCCS-website](#).

For some of the projects, internal partners from NCCS contribute to the realization of the impacts projects and are hence partners complementing the applicants. These internal partners from ETH Zurich, WSL,

Agroscope and FSVO were determined in an NCCS-internal call in May 2021. This first call was necessary, as these four institutions - as mandating organizations and members of the NCCS - are for legal reasons not allowed to participate in the current call for tenders.

3 Project “Socio-economic scenarios” - open for tender

The project “Socio-economic scenarios for Switzerland for risk analyses and adaptation and mitigation strategies” that is managed by the internal NCCS partner WSL develops Shared Socioeconomic Pathways for Switzerland (“SSP-CH”). The project, to be carried out in the time period from 2023 to 2025, is made up of five modules (numbered with letter «M») that comprise the objectives, several key questions, the aspired deliverables and an indicative budget (see table below). The work of the first two modules is carried out by WSL (Economics and Social Sciences Research Unit, Prof. Dr. Irmi Seidl). With the current tender a consortium is sought for the work of project modules 3-5.

Module 1: Conceptualisation and method design (WSL)
Module 2: Development of qualitative socio-economic scenarios (WSL)
Module 3: Modelling of land use and CO ₂ emissions (tender)
Module 4: Policy coherence analysis and development of Shared Policy Assumptions (tender)
Module 5: Communication and dissemination of results (Module 1–4) (tender)

Figure 3: Modular design of the project SSP-CH

In Module 1 and Module 2 WSL elaborates the Shared Socioeconomic Pathways (SSP-CH) in form of qualitative narratives and quantitative input tables. In Module 3 two topic areas (land use and CO₂ emissions) shall be modelled. In Module 4 Shared Policy Assumptions (SPAs) are formulated and a policy coherence analysis is conducted. Module 5 ensures communication and dissemination of the project results.

The SSP-CH should be based on the global SSPs in order to ensure comparability, and at the same time they should be specific to Switzerland in order to be policy-relevant and significant. For a better understanding of the objectives and deliverables of the individual modules, a brief introduction to the global SSP-SPA-RCP framework and its linkage to the modular project design is provided in the [Annex](#).

Applicants to the current call for tenders are asked to provide an offer that addresses all key questions of the three open project modules in full as outlined below, elaborates how module objectives are achieved and how required deliverables are developed. **Partial offers (e.g. offer for one module only) are not allowed.** Due to the complexity and scope of the project, it is believed that a minimum of two to three partners are needed to sufficiently fulfill the requirements of the project. If necessary, the indicative budget split per project module may be adjusted. However, the maximum budget summed over the three open project modules, may not be exceeded in the offer.

The framework of NCCS-Impacts puts emphasis on tailoring, communication and exploitation that runs from the start to the end of the project. This means that new science-based results as well as user-centred climate services are expected to be generated in form of customized and practical products, and that the project results are turned into climate services directed toward the mitigation and adaptation communities. It is therefore expected that in all project modules the tasks are performed taking on a product- and service-

oriented perspective, a demand- and user-driven perspective and a co-production approach. The products to be developed shall be made available in all official languages of Switzerland as well as in English. Translation costs need to be considered in the offer, and are hence financed through the available budget.

Aim: Developing socio-economic scenarios for Switzerland, which vary according to societal, economic, and political developments.	
Outcome/Products: Resulting climate services in form of applicable products with relevance for all parts of Switzerland, for example (non-exhaustive enumeration): Web atlas on the NCCS web portal, practical guidelines for the implementation of new scenarios, audio-visual information distillation, reports, sub-sites to the NCCS web portal, brochure, recommendations for action, or other.	
Target group: Results of this project should serve different users with different background levels. One target group are decision-makers from administration, politics, organizations and the private sector. Another target group are data-driven users from research, industry and consulting companies that apply the data for subsequent use (e.g. as input for specific models) in climate adaptation, climate mitigation or other scientific fields.	
Implementation: The work in Module 1 and 2 is undertaken by the internal NCCS partner WSL (Economics and Social Sciences Research Unit, Prof. Dr. Irmi Seidl). Hence, with the current tender a consortium is sought for the work of modules 3-5. It is expected that this consortium jointly carries out the project work together with the internal NCCS partner, thereby forming a project consortium that addresses all key questions of this project in full. The interdependencies between modules and a coarse time table is shown at the end of this section.	
The maximum budget for the requested services available through the current tender (M 3-5) is CHF 550'000.- (sum of tender) . The overall budget of the project (M1-5) is CHF 1'000'000.-	
M1	Conceptualisation and method design (work by WSL)
	Objectives: In Module 1, the methodological procedure is designed, needs are clarified and stakeholders and experts for the qualitative scenario process of SSP-CH are identified.
	Key questions: <ol style="list-style-type: none"> 1. What method is employed to develop the scenarios (SSP-CH)? 2. Who are the relevant experts in the socio-economic sub-fields to be examined? 3. Who are the relevant experts in terms of use and development of scenarios? 4. How are existing socio-economic scenarios used in the field of climate change, and what are the users needs in respect of scenarios in the climate context? 5. How can the relevant experts be involved over the duration of the project? 6. Which existing international and national scenarios will be included in the development of the SSP-CH, and in what way? 7. Which socio-economic sub-fields and factors are not covered by the existing socio-economic scenarios and should be addressed?
	Expected deliverables: <ol style="list-style-type: none"> 1. Method paper (incl. timetable) conceptualising the SSP-CH 2. Identification of the sounding board 3. Identification of stakeholders and of experts <p>Budget: CHF 100'000.- (not part of this tender)</p>
M2	Development of qualitative socio-economic scenarios for Switzerland SSP-CH (work by WSL)
	Objectives: In Module 2, SSP-CH narratives for Switzerland are developed: Qualitative socio-economic scenarios will be developed with an explorative, future-open approach, involving relevant experts and stakeholders. For this purpose, key factors with a strong influence on the socioeconomic sub-fields to be investigated are identified.
	Key questions: <ol style="list-style-type: none"> 1. What socio-economic developments are plausible to shape Switzerland in the future? 2. What are – according to experts – the relevant key factors for the development of scenarios? How can these factors be combined and put into relation to each other (consistency, singularity)? 3. How do the scenarios evolve over time (mid and late century)? 4. How and which of Shared Socioeconomic Pathways (SSPs) can be derived for Switzerland? How do they compare with the global/EU SSPs? How can the SSP-CH be efficiently updated? (Global SSP: SSP1 Green road - sustainable society; SSP2 Middle of the road - business as usual; SSP3 A rocky road - regional rivalry; SSP4 A road divided - inequality; SSP5 Tacking the highway – fossil-fueled development. Detailed description see Annex.)
	Expected deliverables: <ol style="list-style-type: none"> 1. Impact diagrams and impact networks: Impact diagrams are used to determine the mutual effects of selected key factors

	<p>in order to subsequently create an impact network. Impact networks relate the key factors in mutual interaction to each other by describing and weighting their mutual effects. Impact networks thus help to understand complex systems and their functioning.</p> <ol style="list-style-type: none"> 2. SSP-CH: Short texts describing the society at the chosen points in time, taking all key factors into account. 3. Semi-quantitative input tables of the key factors or their quantifiable variables. 4. Quantifiable variables to best describe the key factors
	<p>Implementation:</p> <p><i>Investigated socioeconomic sub-fields</i></p> <ul style="list-style-type: none"> - Economy - Environment and natural resources - External relations - Knowledge and education - Politics and state - Population - Technology - Values and lifestyles <p>Each sub-field is characterised by key factors. These key factors will be described in a qualitative manner and they will be bundled into scenarios according to consistency criteria. Based on these scenarios, the narratives are formulated (SSP-CH). The key factors used are quantified by means of defuzzification (Pedde et al. 2019¹ and Harmáčková et al. 2022). For each key factor, quantifiable variables are identified that best describe the key factor (e.g. key factor mobility; qualitative description: Mobility is solved structurally; quantifiable variable: average length of work trips). For selected key factors, the corresponding quantifiable variables are then quantified linguistically (more, much more, very much more; less, much less, very much less) for the periods 2035, 2060 and 2085. Subsequently, these trends are translated into quantitative uncertainties using the "fuzzy set theory". This defuzzification is carried out using the centre of gravity (CoG) method (Pedde et al. 2019).</p> <p>Budget: CHF 350'000.- (not part of this tender)</p>
M3	<p>Modelling of land use and CO₂ emissions (OPEN TO TENDER)</p> <p>Objectives: The objective of Module 3 is to model land-use and CO₂ emissions for each narrative of the SSP-CH (deliverable of M2) up to the year 2100 (4-6 narratives), relying on data generated during the stakeholder process in Module 2 (fuzzy sets approach by Pedde et al. 2019) and on existing statistical data. For each SSP-CH two distinct sets of modelling shall be developed: (a) without additional climate policies (e.g. baseline scenario) and (b) with additional climate policies i.e. shared policy assumptions (SPAs) (e.g. mitigation scenarios).</p> <p>Key questions:</p> <ol style="list-style-type: none"> 1. How shall the qualitative SSP-CH narratives, the (semi-) quantitative variables (deliverables of Module 2) as well as the SPAs (deliverable of Module 4) be integrated into quantitative models? 2. Modelling a baseline and several mitigation scenarios of land use and CO₂ emissions for all SSP-CH-narratives: Which input data are to be generated during the stakeholder process (in Module 2, using the fuzzy sets approach)? 3. Which of the existing data sets of other scenarios (i.e. EU-SSP, IIASA data base) and trend analyses (i.e. trend analysis of the Swiss federal administration, SFOE's SWEET-CROSS activity) are available and fit with the elaborated narratives?
	<p>Expected deliverables:</p> <ol style="list-style-type: none"> 1. Method paper describing the procedure, challenges and solutions of the modelling of the qualitative narratives and (semi-) quantitative variables 2. Datasets of land use and CO₂ emissions modelled for all the SSP-CH narratives developed in Module 2 up to the year 2100 with and without application of SPAs. <ol style="list-style-type: none"> a. <u>land use</u>: result will be spatially explicit yearly data at Swiss Arealstatistik resolution of 100m on land use and land use related CO₂-emissions

¹ In a participatory process, quantifiable variables are identified per key factor. These variables are then quantified linguistically for the specified time periods. Subsequently, these trends are translated into quantitative uncertainties using the "fuzzy set theory" by querying individually quantitative ranges of these trends, which are then evaluated using the centre of gravity method.

	<p>b. <u>CO₂-emissions</u>: result will be yearly nationwide data on energy-, consumption- and industry-related CO₂-emissions.</p> <p>3. The datasets will be made freely available in a user-oriented format, incl. description of the underlying model assumptions for subsequent use by other modelling and data analysis teams in the climate change mitigation and adaptation field (among others).</p> <p>4. Technical report including a description and interpretation of the model results for Swiss policy makers and administration.</p>
	<p>Required Implementation:</p> <p><i>Cooperation</i> Close cooperation with the team of Module 2 (WSL) and Module 4 is necessary to ensure a common understanding of working methods, type and form of data generation and defuzzification methodology. This requires a common project management plan that is aligned with the milestones defined in the stakeholder process of Module 2. The modelling of the two areas (land use, CO₂) can be done separately or jointly regarding modelling techniques and hence modelling teams. Close cooperation and regular exchange must be ensured between the two modelling teams (land-use and CO₂-emissions). To this end, a coordinated schedule is necessary in order to benefit from synergies and to be able to jointly resolve arising issues.</p> <p><i>Models</i> <i>Land-use-modelling:</i> For land use modelling, the use of the open source dynamic transition land-use-model of ETH D-USYS (Benjamin Wilde, Adrienne Grêt-Regamey in preparation), based on the Swiss land use statistics, is highly recommended: Spatially explicit yearly data on land use at Swiss Arealstatistik resolution of 100m (match exact grid points, mind the geoid) and land use related CO₂-emission up to the year 2100 are required. Where no other input data is available, quantified key factors from Module 2 and the SPA from Module 4 are to be used. The successful applicant requires openness to extension and experimentation, an understanding of the semi-qualitative data of Module 2 and an adequate processing depth. <i>CO₂-modelling:</i> The models used must be suitable for modelling CO₂ emissions, depending on the relevant key factors from Module 2 and the policy assumptions from Module 4 up to the year 2100. If necessary, existing models need to be adjusted and extended to undertake the work and to reach the project goals as described here: the models must be able to not only consider technical mitigation measures adequately, but also societal changes, i.e. changes in consumption behaviour or the structure of the Swiss economy. The successful applicant requires openness to extension and experimentation, an understanding of the semi-qualitative data and an adequate processing depth. The applicant for the CO₂-modelling and land use modelling, unless he uses the CO₂ model mentioned above, is requested to answer the following question regarding the models to be used:</p> <ul style="list-style-type: none"> • How is the chosen modelling approach able to take up the socioeconomic scenario fields and their key factors (see Annex)? • What are the models calibrated against? • What were the models used for in the past? <p><i>Input data</i> Data sets which might be used (e.g. Swiss sector scenarios (FOSD, SFOE, SECO), Swiss energy scenarios (SFOE), Swiss transport scenarios (FOSD), Swiss GDP scenarios (FSO), population scenarios (FSO)) need to be checked for their compatibility with the narratives of Modul 2 and chosen accordingly. For the modelling of those SSP-CH with a high correspondence to the global or EU-SSPs, the corresponding data on population, urbanisation level and GDP provided by IIASA at country level can be used. For SSP-CH that do not correspond to any global or EU-SSP or for which the deviations are too large, Module 2 will quantify the needed inputs using fuzzy sets for the years 2035, 2060 and 2085. The selection of further key factors (in addition to population, GDP and degree of urbanisation) to be quantitatively described by Module 2 largely depends on the necessary input data of the models used in Module 3. These must be determined in a first step together with the team of Module 2. Operationalisation of the model is the responsibility of the applicant.</p> <p><i>Access</i> Free and user-friendly access to the output data must be ensured (i.e. under CC BY 4.0, free commercial use expressly permitted and even desired).</p>

	Indicative budget: about 50% of total sum of tender
M4	Policy coherence analysis and development of Shared Policy Assumptions (SPAs) (OPEN TO TENDER)
	<p>Objectives: (i) Identification, in a backcasting process, which of today's policies are leading us towards a SSP1-CH future (sustainable pathway developed in Module 2) and which policies are not. Therefore, relevant current policies are to be selected and their influence on socioeconomic development towards a SSP1-CH future to be examined.</p> <p>(ii) Formulation of Shared Policy Assumptions for Switzerland (SPA-CH) for each SSP-CH, which describe various possible future policy mixes that can be combined with the different SSP-CH to be developed in Module 2 and modelled in Module 3.</p>
	<p>Key questions:</p> <ol style="list-style-type: none"> 1. How strong is the coherence between current Swiss policies (political goals, strategies, concepts, programmes and measures) and the SSP1-CH pathway? 2. Which current policies are moving society in the direction of an SSP1-CH pathway? Which ones are moving us away from such a pathway? 3. Which different policy-assumptions (SPAs) are plausible in Switzerland in the 21st century? 4. What consequences can be derived from the answers to key question 1 for today's Switzerland's climate policy?
	<p>Expected deliverables:</p> <ol style="list-style-type: none"> 1. Formulation of several SPA-CHs 2. Report on policy coherence analysis: Systematic examination of selected policies significantly influencing climate mitigation and climate adaptation measures in Switzerland in various sectors, analysis of whether these policies hinder or favour socio-economic development towards a SSP1-CH-society, policy recommendations and options for action for decision- and policy makers.
	<p>Required implementation:</p> <p><i>Cooperation</i></p> <p>Module 4 is related to the other modules as follows:</p> <p>Module 4 needs input from Module 2: In order to examine current relevant policies and their influence on socioeconomic developments towards a sustainable society, the SSP1-CH from Module 2 must be available (Since SSP1-CH will constitute the basis to describe the sustainable development of Swiss society). The process of selecting appropriate policies for the consistency analysis can, however, be undertaken independently (orientation can be given by the EU-SSP1). The coherence analysis needs to be carried out with the involvement of relevant experts from the relevant sectoral policies.</p> <p>Use of output from Module 4 in Module 3: The SPAs are needed in Module 3 for modelling the mitigation scenarios.</p>
	Indicative budget: about 30% of total sum of tender
M5	Tailoring, communication and exploitation (throughout the project – from beginning to end) (OPEN TO TENDER)
	<p>Objectives: The objective of Module 5 is to turn the results of Modules 1 to 4 into products, communicated in a pertinent way and disseminated to target groups. The products shall be made available in German, French, Italian and English with translation costs factored into the offer. Module 5 shall further support the stakeholder process in Module 2 by developing visualisations of the scenarios. Stakeholders should be adequately engaged in a co-creation process in close cooperation with Modules 1 to 4.</p>
	<p>Key questions:</p> <ol style="list-style-type: none"> 1. Which participative methods are suitable for adequately engaging with relevant stakeholders in the co-production of climate services? <ul style="list-style-type: none"> o Final choice and planning of the transdisciplinary approaches, implementation of collaborative formats and evaluation in cooperation with the other modules. 2. What are useful user-centred products to support decision-making in climate mitigation or adaptation, and how can they be designed, developed and implemented as climate services? <ul style="list-style-type: none"> o Joint development of products, testing and finalizing of products 3. How can the basics of scenario development (intermediate products, methods, existing national scenarios, etc.) be made accessible to an interested expert public? 4. How can the SSP-CH-narratives be visualized to stimulate the process of scenario development in Module 2? 5. Which formats are suitable for communicating results? <ul style="list-style-type: none"> o Developing a communication concept which is tailored to the project, and implementing the formats (e.g. printed matter, webpages and -applications for NCCS web portal, management summaries, networking events, media relations, etc.) in cooperation with the project and communication leads of the programme.

	<p>6. How can the products be introduced to the target groups?</p> <ul style="list-style-type: none"> ○ Designing and starting the roll-out of a concept for the dissemination and exploitation of the new climate services in close cooperation with the persons responsible for the overall communication of the NCCS programme.
	<p>Expected deliverables:</p> <ol style="list-style-type: none"> 1. Products to communicate and disseminate the results of Modules 1-4 (content need to be conveyed in a way that is appropriate to the target groups; the products may take creative and innovative forms)². Final product ideas will be developed together with the teams of Modules 1-4. 2. Visualisations of the SSP-CH Narratives to stimulate the process of scenario development in Module 2 (these visualisations shall (i) facilitate the consistency check of key factor characteristics with corresponding futures and (ii) support the quantification of variables). 3. Detailed communication and dissemination plan, including target users. 4. Workshops and trainings for the different target users incl. guidelines which instruct them how to use various outputs of the Module 1-4.
	<p>Implementation:</p> <p>Module 5 lasts for the entire duration of the project (until 2025). Close cooperation with Modules 1-4, stakeholders and end users must be ensured.</p> <p>Indicative budget: about 20% of total sum of tender</p>

² Applicable products with relevance for all parts of Switzerland, for example: Web atlas on the NCCS web portal, practical guidelines (e.g. event trees), audio-visual information distillation (e.g. pictures, video), reports (short stories, newspaper of the future), sub-sites to the NCCS web portal, brochure, recommendations for action, or other. As an orientation, examples of possible SSP products are illustrated here: [UK-SSP Products](#), [EU-SSP products](#)

There are interdependencies between the Modules, which are shown in Figure 4. The timetable is approximate and can be adjusted when developing the management plan. Interdependencies between the Modules must be taken into account.

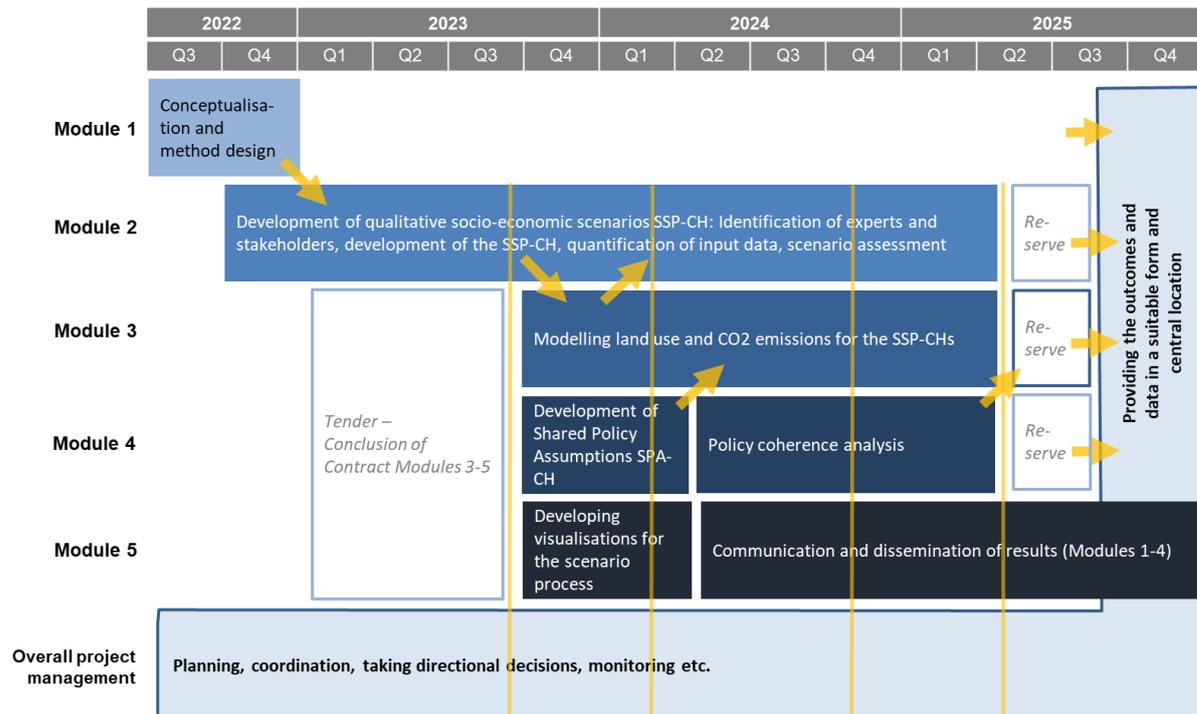


Figure 4: Timetable and coordination between the project Modules of the SSP-CH project.

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Annex: The global SSP-RCA-RCP framework

For a better understanding of the objectives and deliverables of the individual modules, a brief introduction to the global SSP-SPA-RCP framework is provided here.

The SSP-SPA-RCP framework consists of various components: (i) the five global SSP narratives, (ii) the input tables, (iii) the baseline elements (quantifications of the key drivers GDP, population and urbanisation), (iv) the baseline scenarios (IAM), (v) the shared policy assumptions (SPAs), and (vi) the mitigation scenarios (according to Riahi et al. 2017).

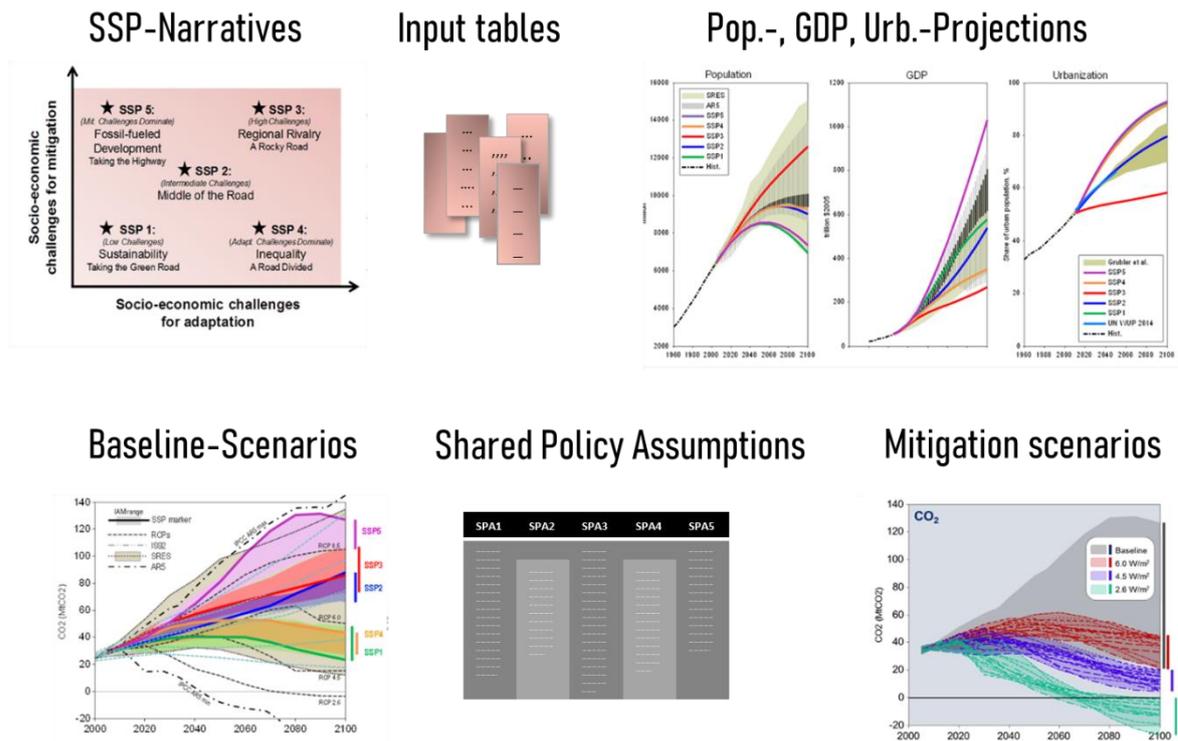


Figure 5: The SSP-SPA-RCP framework consists of various components.

(i) The global SSP narratives describe five different socioeconomic futures with different challenges in climate mitigation and adaptation (see box). They take into account demographic, economic, technological, social, governance and environmental factors, but exclude climate impacts and additional climate policies.

(ii) Input tables: Qualitative and semi-quantitative descriptions of the key factors used for scenario building.

(iii) Pop., BIP-, Urb.-Projections: The three factors of population, GDP and urbanisation level used as key inputs in the Integrated Assessment Models (IAM) are quantified by KC and Lutz (2017) and Dellink et al. (2017) for each country and each of the five narratives up to the year 2100.

(iv) Baseline scenarios: Based on the narratives, the input tables and the quantifications of the main drivers (GDP, urbanisation and population), energy, air pollutants, emissions and land use are modelled for five world regions using Integrated Assessment Models (IAMs). This modelling does not include climate impacts and climate policies. They result in radiation forcings (RCP levels) between 5 and 8.5 W/m².

(v) Shared Policy Assumptions (SPAs): The SPAs are used to link the SSP narratives to the concentration levels of the RCPs (see below) (Kriegler et al. 2014). SPAs describe varying degrees of policy efforts (targets, measures, time of implementation and barriers) to mitigate and adapt to climate change. SPAs are formulated to be policy-relevant on the one hand, and on the other hand to be broad enough to explore a wide possible future space. SPAs describe climate policy goals (e.g. ambitious vs. lax), the type and number of political regulations and measures to achieve the goals, an approximate time for their implementation, as well as limits and obstacles (Kriegler et al. 2014).

(vi) Mitigation scenarios: The SSP narratives were developed excluding climate impacts and additional climate policies (as was the case for the previous SRES scenarios, Special Report on Emissions Scenarios). Hence, the SSP narratives can be used in different climate contexts and can be combined with different RCPs. By doing so, the impacts of different climate policies can be evaluated: when the baseline scenarios are combined with different SPAs (mitigation scenarios), different RCP levels will result. The RCP (Representative Concentration Pathways) were developed for the 5th IPCC assessment report (2014). They specify changes in radiative forcing compared to the pre-industrial era by the end of the 21st century (e.g. RCP 2.6 shows an increase in radiative forcing of 2.6 W/m² in 2100 compared to 1850).

The five SSP storylines

SSP1: Sustainable and cooperative society with a low-carbon economy and high adaptive capacity to structural disruptions and preparedness for transformation. (Low challenges in climate protection and adaptation).

SSP2: Business as usual: moderate economic growth, continued use of fossil fuels. Environmental pressures persist. (Medium challenges in climate protection and adaptation)

SSP3: Increasing protectionism, nationalism, deglobalisation and competition. Resource demand is high, conflicts arise. (Major challenges in climate protection and adaptation)

SSP4: Unequal distribution of resources between and within states. The consequences are weak social cohesion and riots. (Minor challenges in climate protection and major challenges in climate adaptation)

SSP5: Technology-dependent world with globalised, rapidly growing economy, highly dependent on fossil energy. (Major challenges in climate protection and minor challenges in climate adaptation)

