CoSi Scenario Objectives

CoSi aims to continue the coordination and harmonization process initiated with SWEET CROSS and builds upon previous joint scenario activities (i.e. SCCER JA-SM and SCCER CREST Swiss Modeling Platform). Its main objectives are:

1. ***Coordination of existing work:*** improve understanding of the differences between the scenarios generated by different models, an enhanced integration of these scenarios, and a better communication of the scenarios and the limitations of the models used to generate them.
2. ***Reflection of scenario results:*** assessment of the relevance of regulatory and institutional constraints, distilling potential tensions with results on individual or collective behavior or expected societal trends.
3. ***Co-evolution of society and the energy system:*** identify interfaces between models for exchanging information between qualitative and quantitative scenario work

In addition, the model and scenario based activities are to be following the open data principals.

From Input to Vision Design

CoSi aims to integrate the different experiences available in the modeling and non-modeling energy communities. The resulting scenario vision builds upon a strong model focus to ensure that today's activities can easily be integrated. Based on workshops with modelers and SSH researchers the following main criteria have been considered to extend this basic framework:

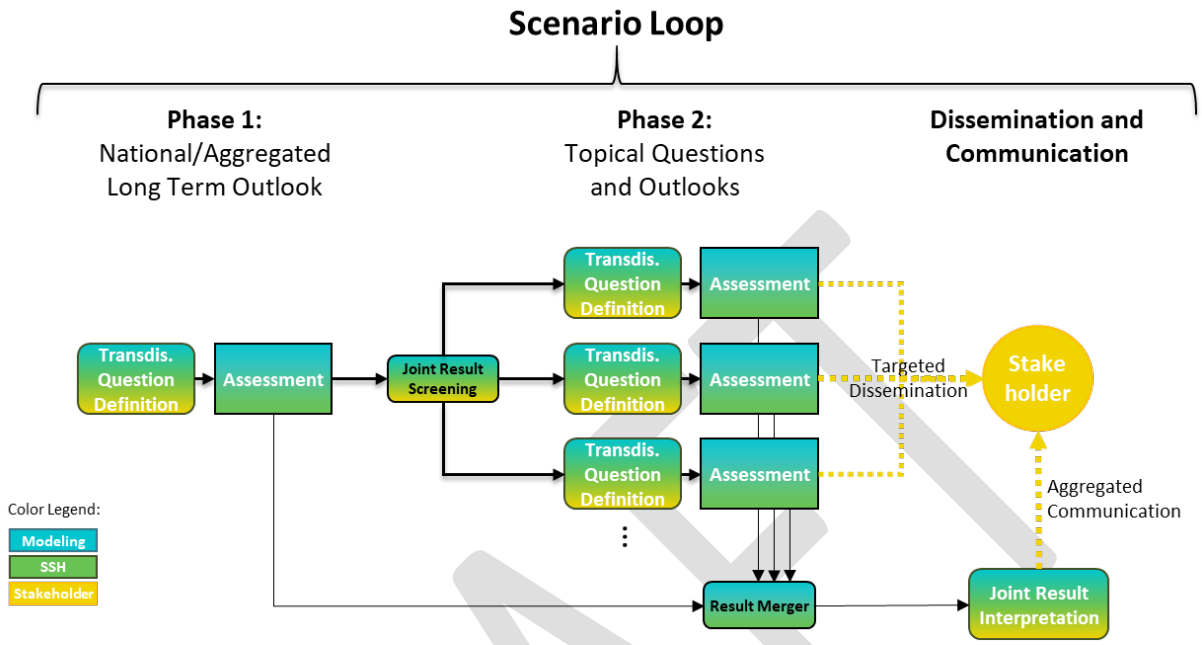
1. **More 'Humans':** both in modeling (i.e. behavior and decision making) and in useful data (i.e. actor and local data break-down)
2. **Clear Use-Case/Purpose:** clear definition of what is the question to be answered (i.e. think from the back), also enhances communication
3. **Linkages to non-quantitative research:** those can challenge models and assumptions, reflect results; i.e. contribute ex-ante and ex-post to the model steps
4. **Model capabilities:** different models for different questions
5. **Providing a 'fuller' picture:** extend the range of covered variations (more model runs/sensitivities) development over time, embedding in larger socio-economic and political context

The document at hand aims to provide a short summary of the envisioned CoSi Scenario structure. It presents the long term vision CoSi aims at. Overall CoSi has three scenario loops planned until 2032. Given this time frame the vision provides the objectives to work upon within CoSi, with each scenario loop moving closer to this vision.

Given the CoSi timeframe and available resources the vision translates into the following roadmap:

1. ***First scenario loop (2024-2026***): building on the CROSS and SWEET model activities a mostly numerical model focused scenario loop will be initiated, extending on the engagement and data structures, as well as the linkage between national and sub-topical model runs
2. ***Second scenario loop (2027-2029):*** utilizing SWEET funding and external funding the identified structural elements of the vision are to be implemented and the assessment focus is to be extended beyond numerical modeling if possible. The second scenario loop is envisioned as test-case; i.e. should be accompanied by supporting research activities to identify further gaps, method improvements and the suitability of the underling structure.
3. ***Third scenario loop (2030-2032):*** the insights from the second loop are to be implemented and the qualitative and non-model based activities are to be extended. The last run is envisioned to be the long term template of successful scenario assessments bridging energy and societal pathway assessments.

CoSi Scenario Vision



Basic Setup:

- Each Scenario Loop includes a 2-Phase process supported by a joined dissemination structure
- Phase 1 covers the overarching long term energy system development in relation to long term societal developments on a national level (i.e. similar to todays 'Energy Perspectives' or the CROSS scenario comparison in scope and scale and extended by accounting for socio-economic dimensions and aspects neglected so far)
- Phase 2 builds on the results of the 1. Phase and addresses specific sub-topics (i.e. local developments, sectoral questions, follow-up questions on the national layer)
- All results will be gathered and put in context of the larger energy/societal development for dissemination, this will be supported by individual topical disseminations
- The insights derived from the two phases and the joint interpretation will form the basis of the following scenario loop (i.e. adjustments resulting from phase 2 into phase 1 will happen in the following Scenario loop)

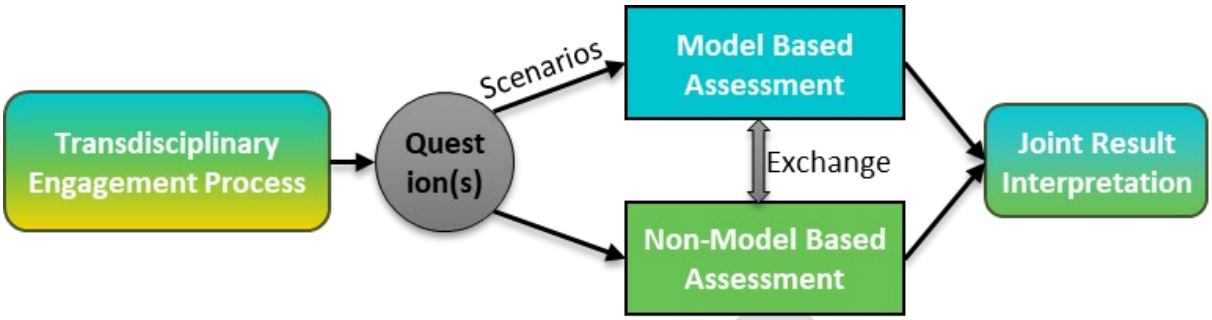
Envisioned Advantages:

- Represents a more formalized structure of the workflow currently applied across the Swiss energy modeling community, but aims to establish a 'label' that embeds all those activities and harmonizes the underlying data/scenario structure
- Opens up the model focused structure to non-model and qualitative research
- Different layers allow different groups to participate where their expertise is best utilized
- Easy adjustment over time to include new aspects/topics (i.e. phase 1 does not to be repeated each loop, phase 2 aspects can move in and out)

Main Challenges:

- Establishing the needed (administrative) structure for all elements
- Convincing participation of research groups and stakeholders

From Engangement to Questions to Insights



Basic Setup:

- The main element for each assessment in Phase 1 and 2 is the definition of the underlying question(s) that set the objective(s) for participating research groups
- The definition of the question(s) should emerge from a joint and transdisciplinary process to ensure that the purpose of the assessments is clear from the start
- The resulting research question can then be 'answered' by different means:
    - For the numerical model assessments, a translation of the question(s) into a scenario structure and accompanying dataset is needed so that the participating models can be harmonized with regard to the main question aspects (i.e. similar to the scenario process in the CROSS comparisons)
    - For non-model based assessments, the question(s) form the guiding objective, but given the large range of potential assessment methods no standardized 'scenario process' will be implemented to enable a large range of research groups to participate; if scenario structures are part of the assessment method a close coordination with the model based stream should be ensured
- Ideally the different assessment stream exchange intermediate insights during their respective work
- The derived results of the participating research groups should be jointly screened and put back into the context of the original question(s) to provide meaningful answers covering the range of participating disciplines

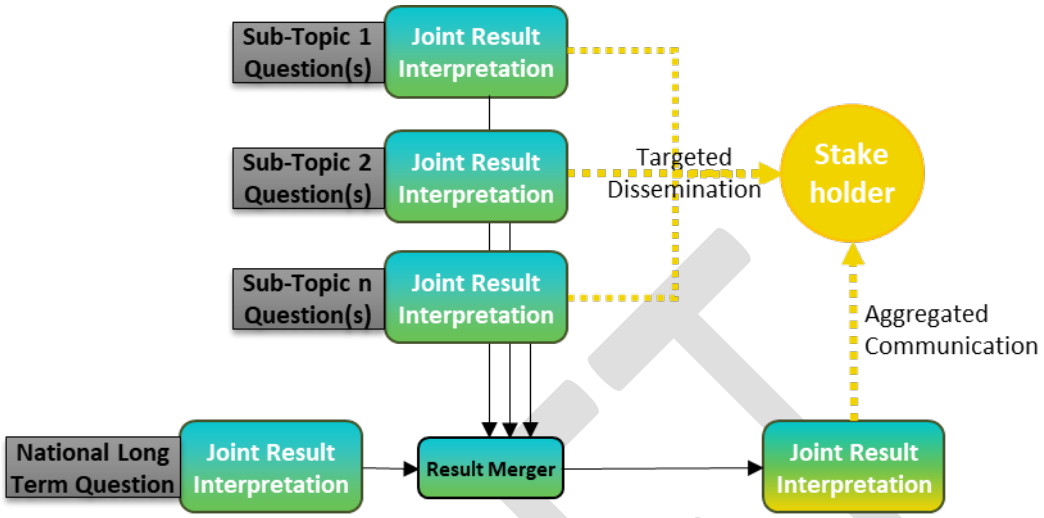
Envisioned Advantages:

- Clear starting definition of underlying question(s) ensures that the 'use case' of the assessments is transparent for all participants
- Openness for different methods beyond modeling enables a larger range of researchers to participate; similar expertise beyond modeling can enter the engagement and interpretation step

Main Challenges:

- Establishing a successful engagement structure to identify 'useful' questions
- Ensuring that the participating approaches can actual contribute to the assessments (i.e. how to handle 'quality' control?)
- Joint interpretation requires interdisciplinary and topical understanding and manpower to be carried out

Dissemination Aspects



Basic Setup:

- Main dissemination should be focused on providing answers to the initial questions for each phase/topic (loop back to initial stakeholder engagement)
- All results are to be gathered and put into an overarching representation (i.e. report/webpage) that is accessible for different stakeholder groups
- Each model group remains able to conduct individual result dissemination

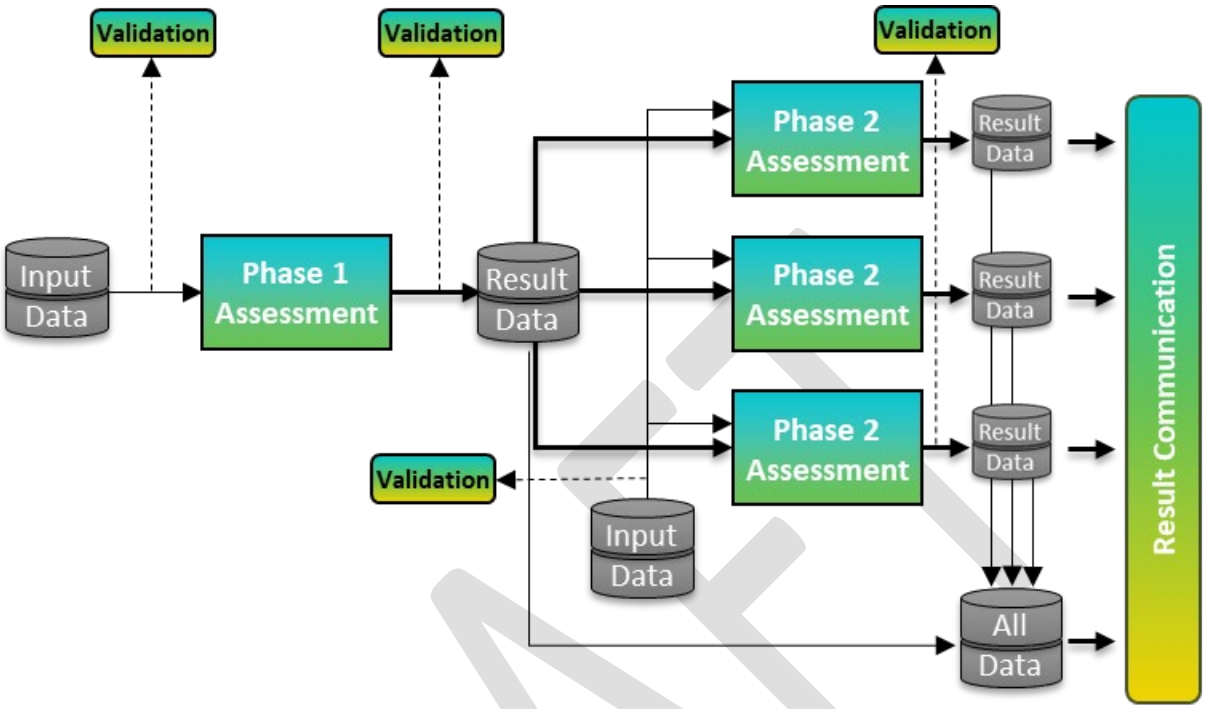
Envisioned Advantages:

- Linkage of all result communications with the larger overarching structure eases the embedding of the own findings (i.e. all results are part of the harmonized scenario/data structure)
- Focus on questions as driving element provides an anchor point for communication
- Sub-Topics provide a clear stakeholder group to be targeted

Main Challenges:

- Joint interpretation may not lead to agreement on joint insights → communication strategy needed on how to disseminate (i.e. lead group or all participants responsible)
- Develop support structures for interdisciplinary result communication (e.g. communication guidelines?)

Data Structre



Basic Setup:

- The whole scenario structure will be supported by a data architecture that ensures a consistent flow of numerical data between the phases and participating teams
- The main internal data flow will go from the phase 1 assessment to the phase 2 assessments, representing the national/aggregated results
- Each phase will be complemented by external data inputs for the respective models/assessments
- All result data will be merged and provided for the communication activities
- Both input and output data needs to pass a validation step (ideally not only an automated one, but also a 'manual' sanity check by experts)

Envisioned Advantages:

- A consistent data architecture ensures easy data transfer between participating teams and reduces workload for data handling for the involved researchers (increasing incentives to participate)
- A central data structure provides easy accessibility of all results for external stakeholders and enables a consolidated linkage to other open data activities

Main Challenges:

- Requires centralized resources and continuous funding to maintain infrastructure availability
- Flexibility of the structure for accommodation of new/altering data requirements