SWEET Call 1-2020

PATHFNDR activities overview

1 Abstract

The PATHFNDR project will address the challenge of how to incorporate a higher share of renewable energy sources into the Swiss energy system. Furthermore, it will help the Swiss energy system to reach the Federal Council's goal of net-zero greenhouse-gas emissions by 2050. The project aims to answer the following research questions:

1. *What will an efficient, flexible, resilient, cost-competitive, and sustainable **Swiss energy system by 2050** look like?*

2. *What **legislative and regulatory frameworks** should be adopted to enable the transition to the system identified in Q1, including the needed incentives for flexibility providers as well as sector coupling?*

3. *Which **business models** and commercial value propositions should be developed to value needed flexibility and sector coupling?*

4. *What measures are necessary to ensure **acceptance and participation** of citizens and their organizations?*

5. *How can **pilot and demonstration projects** of flexible energy systems at the district / village / city scale be best exploited to increase our understanding of technical and socio-economic aspects as well as to trigger wider adoption?*

These questions will be answered by building upon a strong research team together with top cooperation partners from the industry. The PATHFNDR project will deliver feasible pathways to enable flexibility providers across various sectors, along various temporal and spatial scales. It will also provide planning and operation tools as well as demonstrated technologies for exploiting the flexibility of local resources.

5 keywords: *renewable energy, sector coupling, energy systems, pathways, energy transition*

2 Work packages

2.1 WP1: *Pathways on a national and international scale* (start: M1, duration: 60 months)

WP 1 will develop consistent pathways for the development of an efficient, flexible, resilient, cost-competitive, and sustainable Swiss energy system, with consideration of a broad range of flexibility and sector-coupling strategies. It will quantify scenarios and objectives Europe-wide at the national scale, as well as provide detailed Swiss pathways on the cantonal and municipal scales. It will also deliver methodological advancements for the multi-scale modelling necessary for the research and for implementation in the pilot and demonstration projects.

2.2 WP2: *Pathways on a district / village / city scale* (start: M1, duration: 60 months)

WP2 will identify the value of the various resources at local site and distribution network level, as well as the specific role that they can play, as part of determining/finding an optimal pathway to a renewable flexible energy system. The potential of those resources will be identified, while methods and tools will be developed, enabling the holistic utilization of the distributed and abundant flexibility, stemming from all energy carriers. Optimal infrastructure expansion and operational strategies for Swiss local energy utilities and site operators will be proposed.

2.3 WP3: *Technology and model development* (start: M1, duration: 48 months)

In line with the pathways being identified in WPs 1, 2, and 3 will develop technology models based on new equipment and evaluate to a high extent on Research and Demonstration platforms. The developments will be added to persistent databases and model libraries and broadly made available. Selected new technologies will be further developed at the partner organizations regarding fundamental research and in collaboration with industry partners.

2.4 WP4: *P&D – Establishing a DSO flexibility market and piloting site-level flexibility optimization* (start: M22, duration: 48 months)

WP4 will use a grey-field approach to demonstrate how flexible resources from multiple sectors (e.g., electricity, mobility, heat, hydrogen) can be coupled and how these flexibility potentials can be offered to the distributed system operators (DSO) and be coordinated by a flexibility market. This will be achieved by setting up a DSO-level flexibility market, and by extending multi-energy systems optimization methodologies to optimize investments in and operational deployment of flexibility resources for a given site.

2.5 WP5: *P&D – Implementations of flexibility utilization along the pathways to sustainable district multi-energy systems* (start: M25, duration: 48 months)

WP5 will define and conduct a P&D project that will implement the pathways determined in WPs 1-3, 6, and 7 in appropriate environments and check whether these findings withstand real-life scrutiny, i.e., whether the pathways are indeed feasible. This check is crucial since the pathways determined in WPs 1-3, 6, and 7 are based on modeling and citizen panels.

2.6 WP6: *Business opportunities and innovation strategies* (start: M1, duration: 60 months)

WP6 will focus on organizations (e.g., utilities, technology providers, intermediaries) tackling the energy transition. It will analyze innovation challenges and strategies at three levels: the cross-sector level, the value chain level, and the firm level. Through close the collaboration with firm representatives and industry experts, this WP will analyze business strategies and industry databases (e.g., BNEF, patent data), and apply quantitative techno-economic models.

2.7 WP7: *Policies for sector coupling and enhanced flexibility* (start: M13, duration: 48 months)

WP7 will evaluate alternative policies and transition policy mixes to address the needs of sector coupling and flexibility. It starts with a case-based analysis of policies already implemented in front-runner jurisdictions, to identify key strengths and weaknesses of alternative instruments. It then develops alternative sets of policies to compare for their political, economic, and social effects. Furthermore, it will conduct citizen panels to evaluate the technology and policy choices and provide the information needed to rank them according to their public desirability.

2.8 WP8: *Management and coordination* (start: M1, duration: 72 months)

WP8 includes the whole project management, including coordination, management, and monitoring of the consortium, ensuring the efficient achievement of its tasks, milestones, and deliverables. An essential part of this WP is also to develop the consortium's data management plan and monitor its implementation.

2.9 WP9: *Knowledge and technology transfer* (start: M1, duration: 72 months)

WP9 will organize the PATHFNDR knowledge and technology transfer strategy. It will improve the KTT impact by building on the exchange between all consortia funded in the SWEET program, industry partners, national and international stakeholders. This broad exchange will improve the transfer of the insights and knowledge gained during this program and promote new development implementation.

2.10 WP10: *Integration and synthesis* (start: M1, duration: 72 months)

The unique interdisciplinary nature of this consortiums requires special attention to the collaboration and the exchange of insights, results and data between the work packages. WP10 will promote the close collaboration with dedicated tasks and deliverables to ensure that the consortium will be able to generate meaningful and impactful synthesis over the entire WPs. In addition, the link between the research and development work packages and the pilot and demonstration packages will be ensured in this WP.

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