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Federal Department of the Environment,
Transport, Energy and Communications DETEC

Swiss Federal Office of Energy SFOE
Energy Research and Cleantech

Research Programme Electricity
Call 2026 for Research Proposals

Full proposals accepted for funding

CALL TOPIC 3: POWER QUALITY AND STABILITY

Title:	**MASQUE – Measurement and analysis of power quality in high and medium voltage grids for the coordination of harmonic emissions**
Main applicant:	Berner Fachhochschule (BFH), Biel, Prof. Stefan Schori
Project duration:	01.10.2026 – 31.03.2029
Abstract:	Power quality in high and medium voltage grids is essential for a safe, efficient, and sustainable electricity supply. More cabling, power electronic components, and higher loading of grid assets increase harmonic emissions and complicate planning and operation. At the same time, limited knowledge of the propagation, superposition, and simultaneity of harmonic emissions hinders a robust assessment of their impacts. MASQUE addresses these gaps by combining analysis of existing data, specific measurement campaigns with grid operators, and harmonic power flow simulations of propagation across voltage levels, resonances, and damping. It provides a comprehensive overview of power quality at higher grid levels and delivers a concept for optimal use of measurement infrastructure, evidence-based recommendations for technical rules and standards, and practical guidance for grid planning and operation. MASQUE improves understanding of cause-and-effect relationships and provides a transferable knowledge base for future grids with high shares of power electronic systems.

Title:	**ML-PQFilter – Machine Learning-Based Network Filters for Adaptive Improvement of Network Quality**
Main applicant:	Ostschweizer Fachhochschule (OST), Buchs SG, Simon Nigsch
Project duration:	01.08.2026 – 31.07.2028
Abstract:	The increasing electrification and growing use of power-electronically interfaced generators and loads are altering grid structures and impedances across all voltage levels, leading to greater challenges in maintaining power quality. In particular harmonics, reactive power flows, and local over- and undervoltages are becoming more significant, adversely affecting secure and economic grid operation. This project develops and investigates a novel data-driven control approach for the multifunctional improvement of power quality. The method is based on a machine learning-assisted iterative compensation strategy for network filters that does not rely on high-resolution real-time measurements. Harmonics, reactive power, and voltage deviations are progressively identified and mitigated through adaptive adjustment of the amplitude and phase of compensation signals. The results provide experimentally validated foundations for robust and scalable power quality solutions, supporting grid operators in making informed decisions regarding the integration of future power-electronic assets.

Title:	**INSIGHT – Intelligent Network Sensing for Grid Health & Transparency**
Main applicant:	Zürcher Hochschule für Angewandte Wissenschaften (ZHAW), Winterthur, Prof. Dr. Petr Korba
Project duration:	01.11.2026 – 31.10.2029
Abstract:	The INSIGHT project introduces compressed yet informative-preserving indicators for power quality (PQ) monitoring in low-voltage distribution grids increasingly dominated by power electronics. The project will develop novel edge-computed PQ indicators that extract diagnostically relevant features from voltage and current waveforms, achieving significant data compression while preserving grid health information. This is beneficial for efficiency of communication and compliant with monitoring requirements. Data-driven algorithms deployed on PQ analysers and smart meters will enable adaptive anomaly detection, replacing static thresholds with dynamic condition assessment. Validated and demonstrated framework for a scalable traffic-light system supports proactive grid management aligned with the Swiss Energy Strategy 2050 and provides a basis for future standardisation.

CALL TOPIC 4: CONVERTER-DRIVEN END-USE EQUIPMENT FOR GRID SUPPORT

Title:	**CoSMiC – Control and Stability of Community Microgrids with Grid-Forming Inverters**
Main applicant:	Haute École d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD), Yverdon, Prof. Dr. Daniel Siemaszko
Project duration:	01.10.2026 – 30.09.2029
Abstract:	The rapid deployment of photovoltaic generation is fundamentally altering power-system dynamics in Switzerland, with reduced inertia and growing reliance on power-electronics-based resources that challenge stability, power quality, and resilience. CoSMiC addresses these challenges by developing, analysing, and experimentally validating stability informed secondary and tertiary control for converter-driven end-use equipment coordinated within community microgrids. Building on the SFOE-funded FORMIDABLE project (validated primary grid-forming control), CoSMiC combines representative grid and converter modelling, adapted stability criteria, and real-time simulation with real-scale laboratory implementation to quantify system impacts. Both grid-connected and islanded operations are addressed to enable autonomous operation, seamless reconnection, and provision of ancillary services (frequency support and virtual inertia). The outcome is a stability-informed control framework and deployment-ready guidelines that support grid operators, technology providers, and public authorities in integrating higher shares of renewables without disproportionate grid reinforcement, thereby contributing to a secure, sustainable, and resilient Swiss electricity system.

CALL TOPIC 5: POWER ELECTRONICS

Title:	**InSYNC – Wide-Bandgap Inverter for Synchronous Machines**
Main applicant:	Fachhochschule Nordwestschweiz (FHNW), Windisch, Prof. Dr. Nicola Schulz
Project duration:	01.01.2027 – 31.12.2029
Abstract:	While wide bandgap (WBG) based inverters have significantly improved the efficiency of drive systems with asynchronous motor (ASM), further gains with ASM are limited. As a step forward in efficient drive technology, this project develops a compact, fully PCB-based WBG “flying capacitor” inverter for driving high-efficiency synchronous machines for stationary and mobile applications. The proposed approach combines WBG semiconductors, high switching frequency up to 100 kHz, multilevel topology, and highly efficient synchronous motor to achieve further improvements in system efficiency. Novel hardware concepts, including top-side cooled semiconductors and PCB-integrated coreless Hall current sensors, enable a 50–100 kW inverter suitable for close machine integration. The system will be characterized according to IEC 61800-9-1 and benchmarked against state-of-the-art 2-level and multilevel SiC drives. By quantifying realistic efficiency gains and global energy-saving potentials, the project contributes to evidence-based efficiency strategies aligned with the Swiss Energy Strategy 2050.

CALL TOPIC 6: DIGITALIZATION

Title:	**KI-VN-CH – AI in the Swiss Distribution Grid – Analysis & Outlook**
Main applicant:	Swisspower AG, Bern, Patrick Frey
Project duration:	01.08.2026 – 31.12.2027
Abstract:	The Swiss electricity system is undergoing a period of profound transformation that is placing new demands on the planning, operation and management of distribution grids. Artificial intelligence (AI) offers promising approaches for increased efficiency, flexibility, and resilience, but has so far only been used sporadically and unsystematically in Swiss distribution grids. The goal of this project is to create a structured and robust decision-making framework for the strategic deployment of AI in Swiss distribution grids by systematically identifying, evaluating, and prioritizing existing and potential AI use cases in close collaboration with distribution system operators and scientific partners. Based on the most promising use cases, concrete and implementation-oriented perspectives will be developed for further research as well as pilot and demonstration projects.

Title:	**PRISM – Physics-informed Reasoning and Interpretable System-level Multi-agent intelligence for power systems**
Main applicant:	École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Prof. Dr. Olga Fink
Project duration:	01.10.2026 – 30.09.2029
Abstract:	Rising complexity in renewable energy systems necessitates AI that evolves from "black-box" prediction toward reliable reasoning and action. This project develops a physics- and causality-informed framework for agentic AI, bridging machine learning with physical models to create transparent decision-support tools for planners and operators. We investigate how AI augments human expertise and coordinates decentralized actors across multi-objective environments. Through a prototype-first approach, five use cases span policy, transmission, and distribution: knowledge extraction, accelerated reliability assessment, real-time operator support, privacy-preserving utility collaboration, and coordinated resource control via multi-agent reinforcement learning. The primary outcomes are a Swiss Energy AI roadmap and a scalable framework for trustworthy, explainable, and actionable AI in power systems.