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Project acronym	Project title	Project abstract	Funding organisation	Involved countries	Project lead
AGRO-SOFC	Sector coupling with SOFC technology in the agro-industry	The agro-industry represents one of the greatest energy consumers, which makes a significant contribution to environmentally hazardous emissions and is thus seen as an important need-owner. To increase the resilience as well as to expand renewables in the agro-industry and the overall energy system, AGRO-SOFC proposes application of solid oxide fuel cells (SOFC), which are able to convert chemical energy of fuel directly into electrical energy, in a highly efficient and environmentally friendly manner. SOFCs are highly efficient both under partial and full load, and capable to be used in an island mode. Additionally, improved system efficiency will significantly decrease food costs. An SOFC system for generation of electricity and heat coupled with agro sector will be demonstrated and optimized within this project. The software for optimization of individual system components as well as in-operando optimization of system components will be a further contribution of this project.	**FFG** - Austrian Research Promotion Agency **CDTI** - Centro para el Desarrollo Tecnológico Industrial, E.P.E.	Austria Spain	4ward Energy Research GmbH (4ER)
ANM4L	Active Network Management for All	ANM4L aims at demonstrating how innovative active network management (ANM) solutions can increase the integration of renewable energy sources (RES) in electricity distribution networks. ANM solutions will consider both management of active and reactive power to avoid overload situations, maintain voltages within limits, minimize the need of RES curtailment, and enable further RES uptake even when the theoretical design limit of the network has been reached. Core RDI activities are the development of 1) active network management methods for local energy systems 2) business models to provide decision support for market players and 3) an integrated toolbox to support the planning and operation of the distribution system, considering the developed ANM methods and business models. The toolbox, methods and business models for ANM will be demonstrated in Sweden and Hungary. The project will also prepare solutions and recommendations for replication in other local and regional energy systems.	**PtJ** - Forschungszentrum Juelich GmbH **NKFI Hivatal** - Nemzeti Kutatási Fejlesztési és Innovációs Hivatal **SWEA** - Swedish Energy Agency	Germany Hungary Sweden	RISE Research Institute of Sweden AB
BEYOND	BEYOND: Blockchain based ElectricitY trading for the integration Of National and Decentralized local markets	The project BEYOND is based on a local energy system approach with a strong focus on the participation of all stakeholders. To this end, BEYOND will demonstrate market designs for the integration of local 'smart grids' into centralized grids (transmission system). Blockchain technologies will open new paradigms to design costumer sized business models for the integration of local energy and flexibility markets based on Peer-to-Peer (P2P) and aggregated trading. Current and future market-regulatory frameworks to incentivize the local trading will be tested. A special focus lies on: the integration of distributed generation, the rules for local electricity prices, grid services, and the inclusion of digitalization tools to facilitate local trading in the integration to wholesale markets. To reach TRL 6-7, BEYOND will validate and demonstrate local market designs in four real-life pilots in three different countries.	**FFG** - Austrian Research Promotion Agency / KLIEN - Climate and Energy Fund, **SEAI** - Sustainable Energy Authority of Ireland, **RCN** - Research Council of Norway (Forskingsrådet), **CDTI** - Centro para el Desarrollo Tecnológico Industrial, E.P.E.	Austria Ireland Norway Spain	Norwegian University of Science and Techno-logy
CLUE	Concepts, Planning, Demonstration and Replication of Local User-friendly Energy Communities	CLUE will acquire knowledge on optimized design, planning and operation of Local Energy Communities (LECs) and will develop a tool kit for planning and operation as key elements for successful replication and upscaling of LECs. Research and development will be executed on technologies with the focus on flexibilities and sector coupling for LEC energy systems, on services by developing business models and recommendations on improved regulatory framework and on stakeholder involvement by partnering with developers and service providers and integrating consumer, prosumer, and organizer of LECs in a living-lab concept. CLUE is executed by leading European research institutes, industry, and local partners, working together in five demo sites in four countries. By implementing and testing different technological and market solutions and executing a cross-country analysis, CLUE is able to develop optimized LEC solutions in dependency on country and site-specific framework conditions.	**FFG** - Austrian Research Promotion Agency, **PtJ** - Forschungs-zentrum Juelich GmbH, **SCOTENT** - Scottish Enterprise **SWEA** - Swedish Energy Agency	Austria Germany Scotland Sweden	AIT Austrian Institute of Technol-ogy GmbH
DiGriFlex	Real-Time Distribution Grid Control and Flexibility Provision under Uncertainties	In this project we propose and validate effective forecasting and optimal control algorithms to ensure efficient and secure operation of low voltage distribution grids, as well as flexibility provision from distribution grids toward upstream grids, under uncertainties. A two-levels rolling optimization framework to ensure optimal and secure operation of distribution grids under uncertainties will be developed and experimentally validated. The first level deals with prescheduling of controllable resources in a time ahead basis, whereas the second level deals with real time online scheduling of all the controllable resources. Moreover, an appropriate forecasting system will be developed to provide day-ahead and near real-time forecast of uncertain parameters, in accordance with the optimization framework. Finally, we validate the proposed methodology and demonstrate its effectiveness under realistic uncertainty sources (e.g., PV power generation), for a low voltage distribution grid.	**MIUR** - Ministry of Education, Universities and Research **SFOE** - Swiss Federal Office of Energy	Italy Switzerland	HEIG-VD/IESE

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DISTRHEAT	Digital Intelligent and Scalable conTrol for Renewables in HEAting neTworks	The aim of the project is to demonstrate and test in real operating environment the Model Predictive Control (MPC) applied to District Heating and Cooling networks (DHC). Two different test sites will be addressed. MPC will be demonstrated in (i) a medium-size DHC for the fulfillment of thermal demand in the service sector in Italy and in (ii) a large-size DHC for the fulfillment of thermal demand in the residential sector in Sweden. The project will not only deal with technology topics, it will also analyze the social and economic impact of the proposed technology and address the potential barriers and opportunities to its diffusion. The project partnership involves two need-owners (Siram by Veolia and Mälarenergi), two research institutions (Center for Energy and Environment of the University of Parma and School of Business, Society and Engineering of the Mälardalen University) and a technology provider (First Control Systems AB).	**MIUR** - Ministry of Education, Universities and Research **SWEA** - Swedish Energy Agency	Italy Sweden	Università degli Studi di Parma
EPC4SES	EPC based Digital Building Twins for Smart Energy Systems	Data acquired as input data for calculating energy performance of buildings in the mandatory EPC-schemes is a valuable source - both for model-based and sector spanning planning of future SES and for model predictive grid/network control on a local/regional level. EPC4SES is a project taking the diverging landscape of EPC in Europe, adding utility to EPC and thus introducing a new way for convergence and improvement of EPC quality. The project will co-develop applications with stakeholders, whilst securing privacy by design pairing building data. The best-ranked model-based prediction applications will be implemented as research prototypes using real data from the three pilot regions Andalucía, Berlin and Salzburg/Vienna, to quantify impacts and effort when erecting virtual twins of building pairs or quarters. All results and new ideas for supporting decarbonisation via virtual storage and interoperable smart energy systems will be fed back into the ERANET scientific community.	**FFG** - Austrian Research Promotion Agency, **PtJ** -Forschungs-zentrum Juelich GmbH **RCN** - Research Council of Norway **CDTI** - Centro para el Desarrollo Tecnológico Industrial, E.P.E.	Austria Germany Norway Spain	effiziente.st Energie- und Umweltcon sulting e.U.
EVA	Optimization of regional infrastructures for the transition to Electric and Connected Autonomous Vehicles - EVA	The EVA project aims to find innovative solutions to coordinate the territorial infrastructures required for the emerging mainstream technologies in road mobility: Electric Vehicles (EVs) and Connected and Autonomous Vehicles (CAVs). In a local and regional European context, that aims to a decentralized renewable energy system, the EVA project will explore and assess how: (i)future diffusion of CAVs would affect urban planning and design, particularly under a sharing economy framework (SAV); (ii) management of peaks in power demand, due to a wide diffusion of electric mobility in the smart grid system, by exploiting vehicle-to-grid (V2G) and vehicle-to-home (V2H) power strategies as well as accounting for a decentralized renewable energy production system; (iii) optimize the EVs charging stations infrastructures bypassing investment in fast obsolescing ones; (iv) define new business models; and (v) define guidelines to support the regional institutions.	**FFG** - Austrian Research Promotion Agency **MIUR** - Ministry of Education, Universities and Research **SIA** - Innosuisse - Schweizerische Agentur for Innovationsförderung	Austria Italy Switzerland	SUPSI ISAAC
EV-CHIP	Electric Vehicles Charging Platform for Community Demand Response Aggregators	Wide-scale electrification of private transport will have a profound impact on the operation of the power grid, representing a challenge both for distribution system operators and large commercial energy users such as universities, hospitals, business parks and shopping centres. The project will explore the potential for an aggregated electric vehicle (EV) charging optimisation in a campus/shared facility leveraging a rich set of data resources for building energy consumption, vehicle operation and parking and wholesale electricity pricing. Researchers will apply a suite of modelling approaches to predict how centrally-optimised EV charging could provide suitable charging volumes at competitive rates for drivers while balancing facility-level electricity requirements and minimising grid impacts. Controllable EV charging, integrated with building energy management, can balance facility-wide energy consumption by unlocking the inherent flexibility associated with battery-operated cars.	**SEAI** - Sustainable Energy Authority of Ireland **MIUR** - Ministry of Education, Universities and Research	Italy Ireland	University College Dublin
Flexi-Sync	Flexi-Sync: Flexible Energy System Integration using Concept development, demonstration and replication	Renewable energy sources (RES) are needed for sustainable energy systems. There is an emerging problem of mismatch between weather dependent, electricity production and variable demand. One way to manage the mismatch is to maximize the short term and long term flexibility of existing infrastructure in district heating and cooling (flagship 2, action A4-IA2-1.3 and A4-IA2-1.4), hereafter district energy. Doing so, the use of RES and the flexibility and resilience of local energy systems are increased. To enable district energy systems to act as a component in balancing the electrical grid, Flexi-Sync (flexible and synchronized energy systems) strengthens local and regional energy systems by optimizing the flexibility of the heating/cooling sector. The most cost efficient (from the point of view of technical systems) and climate resilient solutions for local stakehoders will be identified. A new service to allow for optimized flexibility is developed, based on an existing platform.	**FFG** - Austrian Research Promotion Agency, **PtJ** - Forschungszentrum Juelich GmbH, **SWEA** - Swedish Energy Agency, **CDTI** - Centro para el Desarrollo Tecnológico Industrial, E.P.E.	Austria Germany Spain Sweden	IVL

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FLexSUS	Flexibility for Smart Urban Energy Systems	FlexSUS gears municipalities towards reaching their sustainability goals and EU's desire for Positive Energy Districts in developing a decision support platform that represents the local energy systems within the citys urban infrastructures.The proposed platform integrates regulatory challenges (existing and anticipated ones) into energy planning that is localised at city level and within districts of each partner city. The cities define the sustainability targets and guide the development of the tool to the needs of the administration and their citizens. Sustainability targets are not restricted only to CO2 reduction but also cover an array of socio-economic, behavioural and cultural elements that make make modern cities so challenging for energy planning applications. To address these challenges, the platform is open source and open access, designed to facilitate actions for systems integration and support the uptake of RES including city planners at every step of the process.	**IFD -** Innovation Fund Denmark **NWO -** Netherlands Organisation for Scientific Research **SWEA -** Swedish Energy Agency	Denmark The Netherlands Sweden	Technical University of Denmark
HEATflex	HEATflex	The overall aim is to develop a common technical and economic strategy to increase the competitiveness of CHP and district heating plants by providing HEAT flexibility through the following 2 approaches, that are linked to each other: - Centralised generated heat flexibility: CHP + direct linked heat pumps - Decentralised generated heat flexibility: Heat prosumers through a new developed heat substation + direct linked heat pumps will be used. Therefore different scenarios should be investigated with focus to the participating countries DK and AT concerning: suitable operation conditions at different places; size, type and interfaces of required components; controlling of the whole system and communication between, business models and good practice examples all over Europe. Expected results for heat flexibility based on the new EU RES-Directive: Technical and economic strategy , Practical guideline, Toolbox for the implementation, planning and engineering, Good practice examples	**FFG -** Austrian Research Promotion Agency **IFD -** Innovation Fund Denmark	Austria Denmark	PlanEnergi
HONOR	Holistic flexibility market integration of cross sectoral energy sources	The project aims at development and evaluation of a trans-regional flexibility market mechanism, integrating cross-sectoral energy flexibility at a community-wide level. The specific developments include a market mechanism for grid flexibility, industrial grade supervision solutions, data-driven state monitoring applications and cyber-security assessments. In order to develop a tailor made as well as replicable solution, community stakeholders will be involved through co-creation activities as well as stakeholder networks from Norway, Germany and Denmark. Complementing the economic and risk evaluation, simulation studies of flexibility operations and cyber-security assessments, the operation of control systems algorithms and the online monitoring and detection solutions will be implemented as demonstration in a relevant environment (TRL 6). The sector-coupling market mechanism will be implemented and demonstrated in an operational environment in Wunsiedel (Germany) (TRL 7).	**IFD -** Innovation Fund Denmark, **PtJ -** Forschungszentrum Juelich GmbH, **RCN -** Research Council of Norway, SWEA - Swedish Energy Agency	Denmark Germany Norway Sweden	TU Dortmund University
MultiportGrid	Cross-Sectoral Energy Control through Interconnected Microgrids by Multiport Converter	The local distribution grids have been facing not only technical, but also economic and regulatory challenges, because of the increased integration of renewable generation and electrification of vehicles. The traditional solutions to the grid expansion, e.g. to build an additional power line, are utility-centered solutions, i.e. the distribution grid operators (DSOs) are the only party being involved to tackle grid issues. This has to be changed! The DSOs have to engage grid users together with technology providers in order to develop innovative solutions, which should not only tackle one problem, but to overcome several problems in a cost-efficient way. This project aims to develop a holistic solution to optimally control cross-sectoral energy flow between different energy carries and demands within the electricity, transport and heat sector, assisted by developing an innovative multiport converter with innovative energy storage solutions by a multidisciplinary team.	**MIUR -** Ministry of Education, Universities and Research **CDTI -** Centro para el Desarrollo Tecnológico Industrial, E.P.E. **SWEA -** Swedish Energy Agency	Italy Spain Sweden	Chalmers University of Techno-logy
PIGergy	PIGergy: A novel means of unleashing the energy potential of pig waste.	The project consortia present PIGergy a project which aims to develop and validate innovative solutions to treat agricultural (pig/swine) waste, significantly reduce greenhouse gas emissions and to produce an energy system to contribute to a sustainable, low carbon, and climate-friendly economy. The project aspires to close the loop in the swine industry, recycling the bio-waste produced in pig farms through novel pathways of treatment and subsequent renewable energy generation.The project focuses on Ireland and Italy where collectively there were over 10 million pigs in 2016 (Eurostat, 2018). In Ireland alone, almost 3 million tonnes of liquid pig manure is produced on an annual basis. Currently, most of the pig manure produced is land spread, a practice which leads to pressures in terms of sufficiently available land area and the possibility of pollution of surface and ground waters. A viable, sustainable solution for treatment and energy production is urgently required.	**SEA I -** Sustainable Energy Authority of Ireland **MIUR -** Ministry of Education, Universities and Research	Ireland Italy	GlasPort Bio
R2EC	Regional Renewable Energy Cells	The project R2EC aims at developing a scalable system for decentralized, interacting energy cells with a high concentration of local renewable energy generation such as from photovoltaic (PV) systems, storage element as well as high electric use like e-heating and e-vehicles. This system aims at maximizing the use of renewable generated energy at the local and regional level through intelligent interaction of generation, storage and consumption. Also, the system will optimize the interaction on the local level with other energy cells, and thus improve the local energy use. Investigations are also to be made concerning the overall system optimization and resilience, as well as the market participation through aggregation and blockchain use. The main objectives of R2EC are (1) creation of a simulation model / implementation concept, (2) further development of hardware and software needed for the system and the (3) prototypical application of system components in the energy cells.	**FFG -** Austrian Research Promotion Agency **SPW -** Service Public de Wallonie **RCN -** Research Council of Norway	Austria Belgium (Wallonia) Norway	FH Technikum Wien

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REDAP	Regional Energy Demand Analysis Portal (REDAP)	Europes energy challenge, caused by its over-reliance on fossil fuels, is compounded by the complexity behind the process of planning for renewable energy infrastructure and the lack of expertise for the analysis of urban energy demand. The purpose of this transnational innovation is to provide actionable insights, clarity and direction to the energy system decision-makers in order to accelerate the rollout of Smart Energy Systems (SES). To do so, we aim to automate, improve and replicate in other European regions a proven Irish energy demand analysis system which was designed for the Dublin region. The Regional Energy Demand Analysis Portal (REDAP) project deliverable will be developed and standardised in collaboration with multidisciplinary partners in Sweden and Austria. It will combine powerful technology, authoritative data, established processes and an advanced mobility energy analysis methodology. We will turn the current energy challenge into a digital opportunity for reform.	**FFG** - Austrian Research Promotion Agency **SEAI** - Sustainable Energy Authority of Ireland **SWEA** - Swedish Energy Agency	Austria Ireland Sweden	Spatial Outlook Ltd.
REgions	Ancillary services of regions with high shares of renewable energies for regional and European markets	REgions will enable fluctuating renewable energies (RES) to further support the energy system on several levels: regional, interregional and the European markets. RES, mostly grid connected at lower voltage levels, can help stabilizing the regional grid if intelligently operated. In addition, RES can also contribute to the stability of the higher-level grids, e.g. by intelligently rescheduling their balancing bids in the event of re-dispatch. REgions will analyse how RES can support the stabilisation of the energy system by improving traditional Virtual Power Plants (VPPs) to include also regional and interregional services and further improve the participation on the markets. Therefore, the whole tool-chain of the VPP will be enhanced in REgions as well as the interaction of different VPPs on regional and interregional level: nowcasting of PV, price forecasts (intraday, imbalance, redispatch) as well as the probability of grid accurances (re-dispatch, congestion, voltage, balancing).	**FFG** - Austrian Research Promotion Agency **ADEME** - Agence De l'Environnement et de la Maîtrise de l'Energie **PtJ** -Forschungszentrum Juelich GmbH	Austria France Germany	AIT Austrian Institute of Techno-logy
SIES2022	Smart Integrated Energy Systems 2022:Enhanced Virtual Power Plant VPP+ Energy Pool Integration for Local and Regional Resilience	SIES2022 will support transition to a decentralised multi-sector and multi-energy vector, low CO2 Smart Integrated Energy System (SIES) by development of a Digital Energy Utility Management Service (DEUMS). DEUMS will provide solutions and establish routes-to-market for need-owners and businesses. An existing digital Virtual Power Plant (VPP) platform will be adapted into an Enhanced Virtual Power Plant (VPP+) development, demonstration, and test centre (SIES2022 Centre) capable of managing the interface between local and regional energy systems and markets. SIES2022 will develop and demonstrate: need-owner engagement, business and technical processes for VPP+ deployment; trading and technical algorithms; cross-sector applications; a Powershift module; and modelling to support optimum design of future systems. Outputs will be shared through solutions-libraries, roadmaps, and investment-ready roadmaps for distributed Knowledge Communities and Energy Pools.	**SCOTENT** - Scottish Enterprise **CDTI** - Centro para el Desarrollo Tecnológico Industrial, E.P.E. **TÜBITAK** - The Scientific and Technological Research Council of Turkey	Scotland Spain Turkey	Strathclyde University
SONDER	SONDER - Service Optimization of Novel Distributed Energy Regions	Local and regional energy systems are expected to become essential partners for distribution system operators and significant contributors to energy system stability. Typically, power peaks can be buffered by the grid, but the unpredictable nature of renewable energy sources, the unexploited efficiency of gas, electricity, and biofuels in operating buildings, and electric vehicles concurrencies lead to unknown correlations. There are no strategies available for communities to manage distributed energy resources, help optimizing local efficiency, pool, orchestrate, and command flexibilities in an increasingly digital world, and offer that flexibility on the markets. Building on existing knowledge of national and regional projects, together with stakeholders in NGOs, industry, and ESCOs, we investigate novel services for communities to generate, consume, provide demand response, and storage in a pan-European setting, including smart cities, residential, industrial, and data center users.	**FFG** - Austrian Research Promotion Agency **SWEA** - Swedish Energy Agency	Austria Sweden Switzerland	Institute of Computer Techno-logy - TU Wien
SuperP2G	Synergies Utilising renewable Power REgionally by means of Power To Gas	Integration of energy vectors is key to ensure cost-efficient inclusion of renewable energy. P2G contributes to the overall efficiency and balancing of the energy system with energy storage and transfer of green energy to end use sectors. Currently, regional commercial P2G-projects have not yet emerged. SuperP2G will ensure that P2G solutions approach commercial implementation by contributing to 1) technical optimisation and system integration, 2) market access and uptake, as well as for 3) development of solutions for adoption. SuperP2G interconnects leading P2G initiatives in five countries, ensuring joint learning. Each national project focuses on different challenges, where researchers team up with local need-owners to co-create solutions. SuperP2G focuses on improving existing tools including open access, as well as develop a new open tool based on the OptiFlow and H2IndexII tools. This is supplemented with analysis of regulation and markets, as well as stakeholder involvement.	**FFG** - Austrian Research Promotion Agency, **IFD** - Innovation Fund Denmark, **PtJ** - Forschungs-zentrum Juelich GmbH, **NWO** - Netherlands Organisation for Scientific Research, **MIUR** - Ministry of Education, Universities and Research	Austria Denmark Germany The Netherlands Italy	Technical University of Denmark (DTU), MAN, SYS

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TOP-UP	TOP-UP: TOP-down energy projects as catalysators for bottom-UP local energy initiatives.	TOP-UP studies how TOP-down initiated heat networks can play a central role in integrated regional energy systems, and investigates how these top-down actions can empower bottom-UP participation among local actors and sectors, as to achieve the regions ambitious energy targets. TOP-UP incorporates expertise in modelling, automation, social sciences and practice to optimize regional energy systems. It focuses on the integration of heat and electricity networks, and identifies and fosters optimal levels of local actor/sector participation. TOP-UP aims to satisfy actors/sectors needs and preferences, and to optimize regional energy system performance. TOP-UP develops tailored solutions for the Groningen (NL) and Copenhagen (DK) energy systems - which prioritize changes to their heat networks due to unique regional challenges - and studies how these solutions can be scaled and customized to other regions, making best use of local renewables and reducing the dependency on fossil fuels.	**IFD** - Innovation Fund Denmark **NWO** - Netherlands Organisation for Scientific Research	Denmark The Netherlands	University of Groningen - Environmental Psycho-logy (UG-EP)
ZEHTC	Zero emission hydrogen turbine center	A zero emission hydrogen turbine center demonstrator plant will be realized in order to reduce the waste of power in load banks during gas turbine workshop tests. Part of this power will be used to produce hydrogen via electrolysis, for use in subsequent tests mixed into the turbine fuel (natural gas), and part of the power can be stored in batteries or used for heating. Hydrogen production from the weekly gas turbine tests will be complemented production from solar panels installation. A smart micro grid will stabilize and optimize the operation of the energy system. The plant will be used for promoting hydrogen solutions to customers and communities world-wide. The hydrogen production will also offer the possibility to make further research and development tests of the low NOx turbines with hydrogen as fuel. A goal is to be able to operate gas turbines on 100% hydrogen fuel, which would make it possible for gas turbine owners globally to operate their turbines with zero CO2 emission.	**MIUR** - Ministry of Education, Universities and Research **SWEA** - Swedish Energy Agency	Italy Sweden	Siemens Industrial Turbomachi nery AB, SIT

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