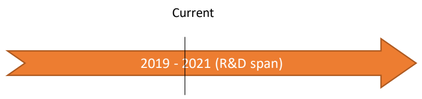
Country	Institute	Category	Related programs (with short summary)	Target / Goal Outcome	Lead person / Organization	Partnership (if any)	Related information
Italy	ENEA	Production	Project: "Fotovoltaico ad alta efficienza" Operating Agreement with for Research on the Electric System, funded by Italian Ministry of Economic Development for research on photovolatics- 	- Development of high-efficiency solar cells: silicon heterojunction solar cells, perovskite/silicon or kesterite/silicon tandem solar cell. - Innovative materials for PV applications (perobskite and graphene), - Development of device architectures and PV systems for BIPV and agriPV (spectrally selective thin film solar cells and greenhouses with innovative PV glasses); - Development of innovative PV modules.	Dr. Paola Delli Veneri , ENEA	（Domestic) - ENEA, - University "Sapienza" of Rome, - University "Tor Vergata" of Rome, - University "Federico II" of Naples, - University of Milano-Bicocca, - Polytechnic of Bari, - University of Torino.	
Italy	ENEA	Production	AMPERE project: Automated photovoltaic cell and Module industrial Production to regain and secure European Renewable Energy market. (H2020 , LCE-09-2016, Innovation Action). 	- 200 MWp/year fully automated HJT cell and module manufacturing line in ENEL GP (Catania-Italy); - reduced LCOE; - efficiency >23 % on solar cell and >20 % on PV module; - Development of innovative equipment and highly automated systems for PV industrial manufacturing line; - Development of module LCA	Claudio Colletti - ENEL GP (Italy)	（Domestic): - ENEA - Research Institute, - ENEL GP-Indusrty - RISE Technology - SME - CNR - CONSIGLIO NAZIONALE DELLE RICERCHE - Research Institute, （International）: - CSEM. CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE - Research Institute - Switzerland - CEA: Commissariat à l'Énergie Atomique et aux Energies Alternatives - Research Institute - France - MEYER BURGER -Indusrty-Switzerland - EPFL: Ecole Polytechnique Federale de Lausanne - University and Research Institute - Switzerland - NORSUN AS-Indusrty -Norway - ENVIRONMENTAL RESOURCES MANAGEMENT LIMITED - Industry - United Kingdom - JONAS & REDMANN AUTOMATIONSTECHNIK GMBH - Indusry - Germany - SEMILAB FELVEZETO FIZIKAI LABORATORIUM RESZVENYTARSASAG - SME- Ungary - FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.- Research Institute - Germany	www.ampere-h2020.eu
Italy	ENEA	Production	CUSTOM-ART project: DISRUPTIVE KESTERITES-BASED THIN FILM TECHNOLOGIES CUSTOMISED FOR CHALLENGING ARCHITECTURAL AND ACTIVE URBAN FURNITURE APPLICATIONS (H2020, LC-SC3-RES-9-2020, Innovation Action) 	- Efficiency > 20% on solar cell and >16% on modules; - Development of PV modules with lifetme oer 35 years to be used in BIPV/ PIPV; - reduced production costs (< 75 euro/m2),	Alejandro Perez-Rodriguezl, IREC, Spain	（Domestic) ENEA - Research Institute, • ECOR, ECO RECYCLING SrL , SME, Italia （International） • IREC - FUNDACIÓ INSTITUT DE RECERCA EN ENERGIA DE CATALUNYA - Research Institute - Spain • TALT, TALLINNA TEHNIKAULIKOOL t - University - Estonia • IMEC, INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM- Research Institute - Belgium • EMPA, EIDGENOESSISCHE MATERIALPRUEFUNGS- UND FORSCHUNGSANSTALT- Research Institute - Switzerland • UOL, CARL VON OSSIETZKY UNIVERSITAET OLDENBURG - University- Germany • HZB, HELMHOLTZ-ZENTRUM BERLIN FÜR MATERIALIEN UND ENERGIE GMBH - Research Institute - Germany; • OBU, OXFORD BROOKES , University, UK; • IPC, CENTRE TECHNIQUE INDUSTRIEL DE LA PLASTURGIE ET DES COMPOSITES - Research Institute- France; • UU, UPPSALA UNIVERSITET - University - Sweden: • CRYS, CRYSTALSOL OU -SME-Estonia; • IMRA, IMRA EUROPE SAS - SME-France; • AYESA, ADVANCED TECHNOLOGIES SA- Industry-Spain; • SUN, SUNPLUGGED - SOLARE ENERGIESYSTEME GMBH - SME - Austria; • RESC, RESCOLL - SME- France; • KWS, Kunststoffverarbeitung Schiestl GesmbH -SME- Austria	
Italy	ENEA	Production	MINERVA project "Materiali Innovativi, tecnologie e processi per prodotti a valore aggiunto - funded by Italian Ministry of Economic Development/ Development 	-Implementation of materials and innovative processes in the production of silicon-based PV modules to optimize their performance. -Development of bifacial silicon heterojunction solar cells; -Development of Advanced Proces Control and Manufacturing Execution Systems.	Cosimo Gerardi, Enel (Italy)	（Domestic): - ENEA - Research Institute. （International）: - ENEL GP-Indusrty - RISE Technology - SME - CNR - CONSIGLIO NAZIONALE DELLE RICERCHE - Research Institute,	

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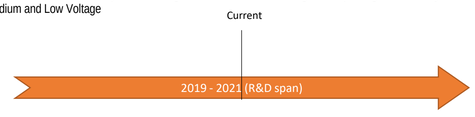
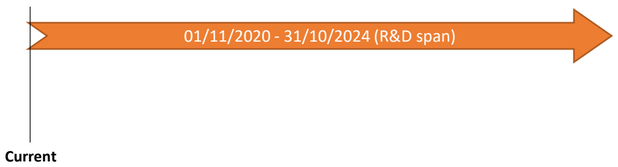
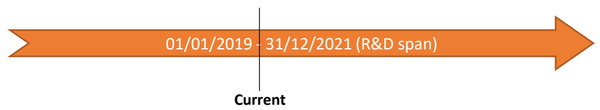
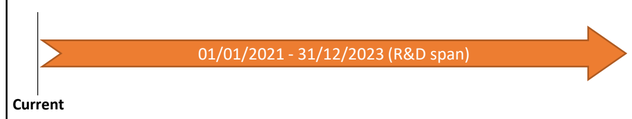
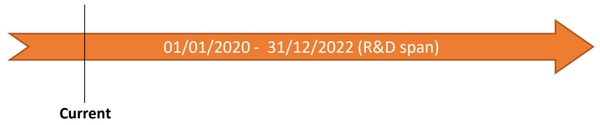
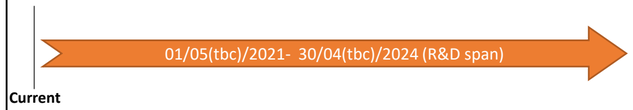
Italy	ENEA	Smart Grid	Interplan/ INTEgrated opeRation PLAnning tool towards the Pan-European Network to support the EU in reaching the expected low-carbon targets, while maintaining network security (Horizon 2020-Secure Clean and Efficient Energy-RIA) 	Design and development of an integrated operation planning tool towards the Pan-European Network	Dr. Graditi/ENEA	- ENEA (Italy) - Research Institute; - AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH (Austria) Private research organization; - European Distributed Energy Resources Laboratories e.V. (Germany) - Research Organization; - UNIVERSITY OF CYPRUS (Cyprus) - University; - FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany) - Research Centre; - INSTYTUT ENERGETYKI (Poland) - Research Institute	https://interplan-project.eu/
Italy	ENEA	Smart Grid	eNeuron / Development of innovative approaches and methodologies to design and manage energy communities through the optimal use of multiple energy vectors characterized by high complementarity (H2020-LC-SC3-2018-2019-2020 / H2020-LC-SC3-2020-EC-ES-SCC - IA) 	Development of an innovative tools for the design and the operation of Local Energy Communities integrating distributed generation and multiple energy carriers at different scales	Dr. Di Somma/ENEA	- ENEA (Italy) - Research Institute - UNIVERSITY OF CYPRUS (Cyprus) - University; - INSTYTUT ENERGETYKI - (Poland) - Research Institute; - FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA (Spain) - Research Organization - SINTEF ENERGI AS (Norway) - institute for applied research; - FUNDACION TECNALIA RESEARCH & INNOVATION (Spain) - Research Organization - EPRI EUROPE DAC (Ireland) - Research Institute - UNIVERSITA POLITECNICA DELLE MARCHE (Italy) - University - UNIVERSIDAD POLITECNICA DE MADRID (Spain) - University - ENEA OPERATOR SP ZOO (Poland) - Renewables & Environment Company - SKAGERAK NETT AS (Norway) - Company - LABELEC - ESTUDOS, DESENVOLVIMENTO E ACTIVIDADES LABORATORIALS SA (Portugal) - Company - ENEIDA WIRELESS & SENSORS SA (Portugal) - Company - MINISTERIO DA DEFESA NACIONAL (Portugal) - MIASTO BYDGOSZCZ (Poland) - European Distributed Energy Resources Laboratories e.V. (Germany) - FONDAZIONE ICONS (Italy)	
Italy	ENEA	Smart Grid	Ambience / methodologies for extending the concept of energy performance contracting for active building and making the model available and attractive to a wider range of building typologies (Horizon 2020 - Secure Clean and Efficient Energy - CSA) 	i) Define new Energy Performance Contracts that embed the Active Building EPC concept and favours the provision of integrated energy and non-energy services; ii) develop methodologies for extending the concept of energy performance contracting for active building and making the model available and attractive to a wider range of building typologies	Dr. Caerts/VITO	- ENEA - Research Institute; - VITO - VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. (Belgium) - Research Institute; - ASOCIACION IK4 RESEARCH ALLIANCE (Spain) - Private Research Organization ; - INESC TEC (Portugal) - Private Research Institute; - ENERGINVEST (Belgium) - Private Firm; - CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA (Portugal) - Private Firm; - BUILDINGS PERFORMANCE INSTITUTE EUROPE (Belgium) - Research Organization;	http://ambience-project.eu/
Italy	ENEA	Smart Grid	ComESto / creation of an Energy Storage Community integrating distributed generation and storage systems at different scales by managing all the resources as a whole to increase the potential benefits for the different actors involved. Funded by PON - Italian Ministry of Education, Universities and Research within the "Energy" strategic area. 	Creation of an Energy Storage Community integrating distributed generation and storage systems at different scales by managing all the resources as a whole to increase the potential benefits for the different actors involved.	Dr. Tegas/E-Distribuzione	- ENEA (Italy) - Research Institute; - E-Distribuzione SpA (Italy) - Distribution System Operator; - ENEL ITALIA Srl (Italy) - Energy Company; - EVOLVERE SpA (Italy) - Energy Company; - Distretto Tecnologico High Tech SCARL -(Italy) Technological Organization ; - Fondazione Bruno Kessler (Italy) - Research Organization; - Green Energy Storage Srl (Italy) - Energy Company; - GREENENERGY SpA (Italy) - Energy Company; -OCIMA Srl (Italy) - Private Company; -SPINTEL Srl (Italy) - Private Company; - TEN PROJECT Srl (Italy) - Private Company; -TELECOM ITALIA SpA (Italy) - Telecommunications Company; - Università degli Studi della Calabria (Italy) - University; - Università degli Studi di Siena (Italy) - University; - Università Politecnica delle Marche (Italy) - University	http://www.comesto.eu/
	ENEA	Smart Grid	National Fund for Electric System Research (RdS – Ricerca di Sistema) / Methodologies and tools for evaluating and improving the reliability of AC/DC hybrid grids in Medium and Low Voltage 	Defining and development of methodologies and tools for analysing and increasing the reliability of hybrid DC –AC integrated distribution networks, both at medium and low voltage	Dr. Valenti/ENEA	- ENEA (Italy) - Research Institute; - Università di Palermo (Italy) - University; - Politecnico di Milano (Italy) - University; - Università di Pisa (Italy) - University	

Country	Institute	Category	Related programs (with short summary)	Target / Goal Outcome	Lead person / Organization	Partnership (if any)	Related information
Italy	ENEA	Energy Storage	Accordo di Programma ENEA MiSE, funded by Italian Ministry of Economic Development 2019 - 2021 (R&D span)	The research program intends to pursue the entire battery value chain, from the development of new battery materials to new battery systems.	Dr. Prosini/ENEA	(Domestic) ENEA, University Sapienza of Rome, University of Camerino, University of Bologna, University Federico II of Naples, Politecnico of Turin….	https://www.enea.it/it/Ricerca_sviluppo/lenergia/ricerca-di-sistema-elettrico
Italy	ENEA	Energy Storage	3beLiEVe project: (H2020 - RIA - Research and Innovation Action). 2020 - 2022 (R&D span)	Strengthen the position of the European batteryand automotive industry in the future xEV market by delivering the next generation of battery cells, designed and made in Europe, for the electrified vehicles market of 2025 and beyond. The project will deliver 250 cells of generation 3b in total and two demonstrator battery packs at TRL 6 / MRL 8. These aim at demonstrating the 3beLiEVe technology performance for applications in light duty (i.e. passenger cars, freight vehicles) and commercial vehicles (i.e. city buses and trucks) in fully electric/plug-in hybrid (BEV/PHEV) configurations.	Ganev Boshidar/AIT (Austria)	（Domestic): - ENEA - Research Institute. - Centro Ricerche FIAT - Sovema Group SPA （International): - AIT Austrian Institute of Technology GmbH (Austria) - Vrije Universiteit Brussel (Belgium) - DSM Engineering Plastics (The Netherlands) - Insplorion AB (Sweden) - Solvay SA (Belgium) - Valeo Systemes Thermiques SAS (France) - Valeo Klimasysteme GmbH (Germany) - CIC Energigune (Spain) - Rheinisch-Westfälische Technische Hochschule Aachen (Germany) - Custom Cells Itzehoe GmbH (Germany) - Fraunhofer-Gesellschaft IISB (Germany) - NXP Semiconductors (France) - Haldor Topsoe (Denmark) - Elkem (Sweden)	https://www.3believe.eu
Italy	ENEA	Energy Storage	BATTERY2030PLUS project: (H2020 - CSA - Coordination and supporting Action). 2020 - 2022 (R&D span)	coordinate and monitor the research activities contributing to the large-scale research initiative on Future Battery Technologies, BATTERY 2030+. The project, coordinated by University of Uppsala (Sweden) will update continuously the BATTERY 2030+ roadmap, contributing to competence building and strengthening the battery community by facilitating communication, dialogue and cooperation on cross-cutting topics.	Kristina Edstrom/Uppsala University (Sweden)	（Domestic): - ENEA - Research Institute. - Politecnic of Turin （International): - Uppsala University - Sweden - RECHARGE Advanced Rechargeable and Lithium Batteries Association (represented by EC Consulting) – Belgium - CNRS Centre National de la Recherche Scientifique CNRS (also representing ALISTORE-ERI and RS2E) - France - CEA: Commissariat à l'Énergie Atomique et aux Energies Alternatives - Research Institute – France - EMIRI Energy Materials Industrial Research Initiative AISBL – Belgium - EASE European Association for Storage of Energy – Belgium - Forschungszentrum Juelich GMBH – Germany - FRAUNHOFER Gesellschaft zur Foerderung der Angewandten Forschung E.V. – Germany - KIT Karlsruher Institut fuer Technologie – Germany - Kemijski Institut (also representing ALISTORE-ERI) – Slovenia - Sintef AS - Norway - DTU: Danmarks Tekniske Universitet - University – Denmark - VUB Vrije Universiteit Brussel – MOBI Research Group – Belgium - Westfaelische Wilhelms Universitaet Muenster - Germany - Warsaw University of Technology – Poland - AIT Austrian Institute of Technology GmbH – Austria - CIC energiGUNE Energy cooperative research centre - Spain - Swiss Federal Laboratories for Materials Science and Technology - Switzerland - TUD: Technische Universiteit Delft -University - Netherlands - AALTO University - Finland	https://battery2030.eu

Country	Institute	Category	Related programs (with short summary)	Target / Goal Outcome	Lead person / Organization	Partnership (if any)	Related information
Italy	ENEA	Concentrated Solar Energy	IN-POWER / Developing high efficient concentrated solar power architecture through the development of advanced materials solution to increase overall efficiency wihile decreasing the energy production cost (HORIZON 2020 - NMBP - IA) Current 2017 - 2020 (R&D span)	i) Increase 3 times standard thermal storage capacity by novel materials. ii) Reduce 4 times the land use compared to current parabolic trough collector. iii) Bring levelized cost of electricity below 0.10€/kWh beyond 2020	Dr. Della / LEITAT	(Domestic) - ENEA – Research Institute; – Kolzer - Industry; (International) – CEA (France) – Research Institute; – LEITAT (Spain) –Private Copany; – Votteler (Germany) – Industry; – Geocad H2V SL (Spain) – Private Company; – Fertiberia (Spain) – Industry; – Nematia Technologies (Spain) –Private Company; – Magtel (Spain) – Private Company; – IK4 teknoker (Spain) – Research Institute. ●● field test, ▲▲ modeling,	http://in-power-project.eu/
Italy	ENEA	Concentrated Solar Energy	ORC_PLUS / Organic Rankine Cycle - Prototype Link to Unit Storage. The aim is to develop an optimized combination of innovative Thermal Energy Storage-TES, small CSP plant, and ORC system to produce electricity from solar siurce (Horizon 2020 - Energy - IA) Current 2015 - 2019 (R&D span)	i) Develope an innovative Thermal Energy Storage system which is optimised for CSP plants in the scale of 1-5 MWe ii) improve the dispatchability (production on demand) and number of hours of production, regardless of sunlight availability, of an existing small CSP plant coupled with an ORC system (located in a desert area).	Dr. Gaggioli / ENEA	(Domestic): – ENEA – Research Institute: – Enerray – Industry; – Laterizi Gambettola srl – Industry; (International): – Euronovia (France) – Industry; – FZK Fraunhofer (Germany) – Research Institute; – IRESEN (Morocco) –Research Institute; – Energygune (Spain) – Research Institute. ●● field test, ▲▲ modeling	https://www.orc-plus.eu/
Italy	ENEA	Concentrated Solar Energy	SFERA III / Solar Facilities for the European Research Area - Third Phase (HORIZON 2020 - ERI - RIA) Current 2019 - 2022 (R&D span)	Contribute to ensure the long-term sustainability of the European advanced solar laboratories, supporting Europe as a global leader in solar research infrastructures. Those activities include (i) networking activities to further develop the cooperation between the research infrastructures, the scientific community, industries and other stakeholders; (ii) transnational access activities aiming at providing access to all European researchers from both academia and industry to singular scientific and technological solar research infrastructures; and (iii) joint research activities whose sole purpose is to improve the integrated services provided by the infrastructure.	Dr. Sanchez / CIEMAT	(Domestic) ENEA – Research Institute; (International): - ESTELA EUROPEAN SOLAR THERMAL ELECTRICITY ASSOCIATION (Belgium) – Association; – THE CYPRUS INSTITUTE (Cyprus) – Research Institute; – EURONOVIA (France) – Private Company; – CEA (France) – Research Institute; – CNRS (France) – Research Institute; – Fraunhofer ISE (Germany) –Research Institute; – DLR (Germany) – Research Institute; – LNEG (Portugal) – Research Institute; – Evora University (Portugal) – University; – Almeira University (Spain) – University; – IMDEA (Spain) – Research Institute; – CIEMAT (Spain) – Research Institute; – ETH (Switzerland) – Research Institute; – Middle East Technical university (Turkey) – University ●● field test, ▲▲ modeling, ■■ standard,	https://sfera3.sollab.eu/
Italy	ENEA	Concentrated Solar Energy	RESLAG / Turning waste into value. Current 2016 - 2019 (R&D span)	Valorise the steel slag that is currently not being recycled (right now it is partially landfilled and partially stored in the steel factories) and reuse it as a raw material for 4 innovative applications that contribute to a circular economy in the steel sector with an additional cross-sectorial approach. These applications are demonstrated at pilot level and led by end-user industries.	Dr. Palomo / CIC Energigune	(Domestic): - ENEA Research Institute; – Life Cycle Enginering – Company (International): – CIC Energigune (Spain) – Research Institute; – Arcelor Mittal (Spain) – Industry; – IK4 AZTTERLAN (Spain) – Research Institute; – Imperial College (United Kingdom) – University; – Friedrich Alexander University Erlangen (Germany) – University; – Optimum Cement (France) – Industry; – CEA (France) – Research Institute; – Technical Research Centre of Finland (Finland) – Research Institute; – GE (France) – Private Company; – Fraunhofer Society, Project Group for Resource Strategy and Recycling Technologies (Germany) – Research Institute; – Moroccan Agency for Solar Energy MASEN (Morocco) – National Agency. ●● field test, ▲▲ modeling	http://www.reslag.eu/
Italy	ENEA	Nextowert	NEXTOWER / Introduction of a set of innovative materials to boost the performance of atmospheric air-based concentrated solar power (CSP) systems to make them commercially viable. (Horizon 2020 - NMBP - IA) Current 2017 - 2021 (R&D span)	i) optimize bulk and joining materials for durability at the component level, to achieve 25 years of maintenance-free continued service of the receiver and maximum thermodynamic efficiency at the system level ii) achievement of a new generation of materials allowing for virtually maintenance free operations and increased working temperature	Dr. Rinald/ENEA	(Domestic): – ENEA – Research Institute; – CALEF – Organization; – Certimac – Certification company; – Walter Tosto – Industry; – University Sapienza – University; – University of Torino – University; (International): – Warrant Group (Belgium) – Private Company; – LiqTech International (Denmark) – Industry; – SilTronix Silicon Technologies (France) – Industry; – ICCRAM (Spain) – Research Institute; – Sandvik (Sweden) – Industry; – CIEMAT (Spain) – Research Institute; – Fundacion ICAMCyL (Spain) – Organization; – R2M SOLUTION SPAIN (Sain) – Private Company; – Spanish Association for Standardization(Spain) Organization; – KTH (Sweden) – University; – EngiCer (Switzerland) – Priate Company; – Greenway CSP (Turkey) – Private Company; – University of Oxford (UK) – Univeristy	
Italy	ENEA	Project 1.9 - Solar Thermal	Accordo di Programma ENEA MiSE, funded by Italian Ministry of Economic Development/ Project 1.9 - Solar Thermal 2019 - 2020 (R&D span)	Development and testing of: i) new components; ii) new Heat Transfer Fluids; iii) innovative Thermal Energy Storage systems; iv) new solutions for process heat	Dr. Giaconia/ENEA	(Domestic): – ENEA – Research Institute; – Sapienza University of Rome – University; – University of Perugia – University; – Politecnico Milano – University; – Politecnico Torino – University; – Tor Vergata University – University; – Campus Biomedico – University – University of Palermo – University ●● field test, ▲▲ modeling	

Country	Institute	Category	Related programs (with short summary)	Target / Goal Outcome	Lead person / Organization	Partnership (if any)	Related information
Italy	ENEA	Production	Accordo di Programma ENEA MISE, funded by Italian Ministry of Economic Development/ Development of innovative hydrogen production technologies based on electrochemical and thermochemical routes Current 2019 - 2021 (R&D spam)	i) Feasibility study and experimental testing of a modified S-I thermochemical cycle for hydrogen production from water-splitting. ii) experimental investigation into innovative concepts of membrane reformers for hydrogen production from biogas. iii) development of catalysts and components for anion exchange membrane electrolyzers. iv) development of materials solutions and optimized configuration of molten carbonate steam electrolysis	Dr. Turchetti/ENEA	\ (Domestic) ENEA, University Sapienza of Rome, University of Salerno	https://www.enea.it/it/Ricerca_sviluppo/tecnologia/ricerca-di-sistema-elettrico
Italy	ENEA	Production/Utilization	BALANCE project: Development of reversible high temperature electrolisers to support the integration of wind and solar energy with the electricity grid. (H2020 - ECRA - Research and Innovation Action). Current 2017 - 2019 (R&D spam)	i) Realisation of a sufficiently mature European Reversible Solid Oxide Cell (ReSOC) technology. ii) Demonstration of ReSOC system (6 kWe) for grid balancing services and flexible methanation process. iii) Development of ReSOC module components: air and fuel electrode, interconnect and coating, stack design, cell and stack manufacturing. iv) Market analysis for fuels and power, business cases and life cycle analysis	Olivier Thomann/VTT (Finland)	\ (Domestic) - ENEA - Research Institute. \ (International) : - VTT: Teknologian tutkimuskeskus - Research Institute - Finland - CEA : Commissariat à l'Energie Atomique et aux Energies Alternatives - Research Institute - France - DTU: Danmarks Tekniske Universitet - University - Denmark - IEN: Instytut Energetyki- Research Institute - Poland - EPFL: Ecole Polytechnique Federale de Lausanne - University and Research Institute - Switzerland - TUD: Technische Universiteit Delft -University - Netherlands - UoB: University of Birmingham - University - United Kingdom	https://www.balance-project.org/
Italy	ENEA	Production/Utilization	AD ASTRA: Definition and development of Accelerated Stress Testing (AST) protocols for Solid Oxide Cells (SOC) for Power to X (P2X) and Combined Heat and Power (CHP) applications. (H2020 - FCH - Research and Innovation Action). Current 2019 - 2021 (R&D spam)	i) Establishment of an enhanced, multidimensional Failure Mode and Effects Analysis (FMEA) matrix for SOC stacks tested in the field. ii) Development of AST protocols that address realistic failure modes of critical SOC stack components in 2 application profiles: power-to-X (P2X) and combined heat and power (CHP). iii) Target AST durations should be under 3000 hours and represent real-world stack operations of up to 40,000 h. iv) Implementing degradation mechanisms stochastically into performance models, in order to predict Remaining Useful Life (RUL) in real-time. v) Define a generalized methodology for the definition of ASTs and predictive models for any suitably selected fuel cell/electrolyser stack component	Stephen. John. McPhail (ENEA)	\ (Domestic) ENEA - Research Institute, University of Genova, University of Salerno, SOLIDpower - Industry \ (International): • CEA, Commissariat à l'Energie Atomique et aux Energies Alternatives - Research Institute - France • DTU, Danmarks Tekniske Universitet - University - Denmark • EIFER, European Institute for Energy Research - Research Institute - Germany • EPFL, Ecole Politechnique Federale de Lausanne - University - Switzerland • IEES, Institute of Electrochemistry and Energy Systems - Research Institute - Bulgaria • SUNFIRE - Industry - Germany	https://www.ad-astra.eu/
Italy	ENEA	Utilization	qSOFC: reduction of production costs and improvement of the production process quality for high temperature fuel cell systems (H2020 - FCH - Research and Innovation Action) Current 2017 - 2019 (R&D spam)	i) Reduction of stack cost down to 1000 €/kW at 10 MW/year production volume ii) Demonstration of stack cost-reduction potential to 500 €/kW at mass-production (2000 MW/year) iii) Reduction of cell manufacturing cost down to 400 €/kW at 10 MW/year production volume iv) Demonstration of cell cost-reduction potential to 200 €/kW at mass-production (2000 MW/year) v) Increase production yield in all parts of stack manufacturing value chain to above 95% by automation and quality assurance vi) Development and validation of cell- and interconnect quality assurance methods which are independent of stack manufacturer or stack design	Markus Rautanen, VTT (Finland)	\ (Domestic) - ENEA - Research Institute. \ (International): - VTT: Teknologian tutkimuskeskus - Research Institute - Finland - Elringklinger - Industry - Germany - Elcogen OY - Industry - Finland - Elcogen AS - Industry - Estonia - Hailiu Tech Multilayer Ceramics - Industry - Netherlands -MaKo Maschinenbau GmbH - Industry - Germany - Sandvik Materials Technology - Industry - Sweden	http://www.qsofc.eu/
Italy	ENEA	Utilization	WASTE2WATTS / use of biogas and syngas (from biomass) for small SOFC CHP integrated modules (5-50 kW). (H2020 - FCH2 - Research and Innovation Action) Current 2019 - 2021 (R&D spam)	i) Consider 3 bio-waste sources (farms, local OFMSW, landfill) and establish their SOFC-CHP potential (kWe-size ranges, units). ii) Select, develop and test adapted cleaning methods and sorbent materials to deliver a fuel such that SOFC SoA performance degradation is not affected. iii) Select catalysts specific for dry- (CO2) and mixed (CO2/H2O/air) CH4-reforming, and test them with relevant gas mixtures and potential residual trace pollutants. Evaluate their catalytic sorbent potential, i.e. protecting the SOFC stack from pollution at no added cost. iv) Test SOFC cells and stacks performance from 2 SOFC manufacturers and suppliers on dilute and other relevant. v) Study biogas-SOFC thermal integration Apply advanced system optimization tools .Target net system electrical efficiency is 55%. vi) Cost and environmental assessment for a projected SOFC production line of 25 MWe/yr, against the target of <3500€/kWe. Perform a techno-economic optimization, and a life cycle assessment (LCA). Evaluate the market potential for biogas-SOFC CHP. vii) Run a Proof-of-Concept test with a SOLIDpower BlueGen-2 (6 kWe) with the project's cleaning solution hardware on this site.	Jan Van Herle, EPFL (Switzerland)	\ (Domestic) ENEA - Research Institute, SOLIDpower - Industry, BIOKOMP - Industry, Politecnico di Torino - University \ (International): - EPFL, Ecole Politechnique Federale de Lausanne - Research Institute - Switzerland - CEA, Commissariat à l'Energie Atomique et aux Energies Alternatives - Research Institute - France. - SUNFIRE - Industry - Germany - Axsi Energy - Industry - France - Paul Scherrer Institut - Research Institute - Switzerland - EREP - Industry - Switzerland	https://waste2watts-project.net/
Italy	ENEA	Utilization	BLAZE / coupling BFB gasifier with SOFC modules for CHP applications (H2020 - LC - SC3 - Research and Innovation Action) Current 2019 - 2021 (R&D spam)	i) Improving the global reliability and system efficiency of a BFB gasifier combined with hot syngas cleaning & conditioning (exploiting UNIQUE and UNIfHY technologies applied to the EQTEC gasifiers) in order to directly deliver a SOFC compatible syngas, avoiding inefficient cold gas cleaning and expensive Air Separation Unit. ii) Using an industrial SOFC system that will be safe and efficiently thermally and chemically integrated with the gasifier system.Achieve at the same time the highest resource efficiency and the highest overall and electrical conversion performance of the small to medium biomass CHP plant configurations, reducing overall costs of investments and operation. iii) Operating in power modulation and with the possibility of leading only a portion of the product gas from the gasifier through the gas cleaning unit to the SOFC system. iv) Lab scale (few 100 W) and real scale (100 kWth) tests with a system prototype will achieve at the end of the project a TRL of 5.	Enrico Bocci, Università degli Studi Guglielmo Marconi (Italy)	\ (Domestic) ENEA - Research Institute, Università degli Studi Guglielmo Marconi - University, Università degli studi de l'Aquila - University, Walter Tosto, Industry. \ (International): - HTCeramix, Industry - Switzerland - EPFL, Ecole Polytechnique Federale Lausanne - University - Switzerland - HyGear, Industry - Netherlands - VERTECH GROUP - Industry - France - EUBIA, European Biomass Association - Non - Profit Association - EQTEC Iberia L.S. - Industry - Spain	https://www.blazeproject.eu/
Italy	ENEA	Utilization	INNOSOFC: development, validation and demonstration of a 50kW high efficiency cogeneration system based on high temperature fuel cells Current 2015 - 2019 (R&D spam)	i) Design and manufacturing of a 50 kW SOFC system with 60% electrical and 85% total efficiency ii) System and components enabling for a lifetime of 30000 hours and two-years continuous operation without planned shut-downs. iii) System efficiency and life-time validation according to IEC standards in 3000 hours demonstration iv) At least 30% reduction in system costs, below 4000 €/kW v) 2000 €/kW stack costs vi) Stack life-time and performance validation in 10000 hours test vii) Identification of most promising end-users and applications for stationary SOFC systems viii) Efficient all-European SOFC value chain from component manufacturers to end-users ix) Boost market penetration of stationary fuel cell products and services	Olli Himanen, VTT (Finland)	\ (Domestic) - ENEA - Research Institute. \ (International) : - VTT: Teknologian tutkimuskeskus - Research Institute - Finland - Elringklinger - Industry - Germany - Elcogen OY - Industry - Finland - Convion OY - Industry - Finland - Forschungszentrum Jülich GmbH - Research Institute - Germany - Energy Matters - Netherlands	http://www.innosofc.eu/
Italy	ENEA	Utilization	SO-FREE: development of a fully future-ready solid oxide fuel cell (SOFC)-based system for combined heat and power (CHP) generation. (H2020 - FCH2 - Research and Innovation Action) Current 2021 - 2023 (R&D spam)	i) In-depth understanding of the effects of variable fuel compositions – considering mixtures of natural gas, biogas and hydrogen – on the operation of SOFC stacks integrated in a combined heat and power (CHP) system ii) Optimisation of anode off-gas recirculation for the complete avoidance of fuel pre-reforming allowing to reach system CAPEX targeted by the 2024 FCH JU multi-annual work programme (MAWP) values iii) Development of a standardised stack module-system interface for full interchangeability of SOFC stack modules in any application-ready system iv) Demonstration of two 5-kWe-class systems for 9 months and >6000 operating hours each, proving efficient (>48% electrical), low-degradation (<1%/kh) and constant (>90% availability) operation in flexi-fuel conditions, each integrating both of two radically different SOFC stack technologies v) Pre-certification of the developed prototype system according to applicable EU and international directives and regulation vi) Operation in actual, residential CHP-generating environment to demonstrate decrease of CO2 emissions through flexi-fuel operation. vii) Assessment and quantification of the residential SOFC-CHP market at global level, after which a	Stephen John McPhail (ENEA)	\ (Domestic) - ENEA - Research Institute, Università degli Studi Guglielmo Marconi - University, I.C.I CALDAE SPA - Industry \ (International) : - AVL List GmbH - Industry - Austria - Elcogen OY - Industry - Finland - Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung E.V. - Research Institute - Germany - Instytut Energetyki - Research Institute - Poland - Kiwa Nederland BV - Netherlands - PGE Polska Grupa Energetyczna SA - Industry - Poland	TO BE DEFINED
Italy	ENEA	Utilization	REACTT: realize a Monitoring, Diagnostic, Prognostic and Control Tool (MDPC) for SOE and rSOC stacks and systems. (H2020 - FCH2 - Research and Innovation Action) 2021 - 2023 (R&D spam)	i) Improved durability, reliability and maintainability of SOE and rSOC stacks by developing innovative algorithms for diagnostics and prognostics of their remaining useful life. ii) Advanced control strategy with self-optimizing and fault-tolerant features iii) Hardware module for implementation of the monitoring, diagnostics, prognostics and control iv) Characterization of stacks and systems in SOE and rSOC nominal and faulty conditions and validation of the product prototype	Dani Juričić, IJS (Slovenia)	\ (Domestic): - ENEA - Research Institute, Università degli Studi di Salerno - University, Bitron S.p.A. - Industry \ (International): - Institut Jožef Stefan - Research Institute - Slovenia - Commissariat à l'Energie Atomique et aux Energies Alternatives - Research Institute - France - Ecole Polytechnique Fédérale de Lausanne - University - Switzerland - SOLIDpower S.A. - Industry - Switzerland - VTT: Teknologian tutkimuskeskus - Research Institute - Finland	TO BE DEFINED
Italy	ENEA	Utilization	PROMETEO aims at producing green hydrogen from renewable heat & power sources by high temperature electrolysis in areas of low electricity prices associated to photovoltaic or wind. 2021 - 2023 (R&D spam)	i) Optimizing the integration of the SOE at system level to cope with intermittent heat and power sources and best valorise inexpensive electricity (e.g. by PV or wind) ii) Developing dedicated solar steam generators with heat storage to buffer the intermittent nature of solar heat and minimize thermal cycling of the SOE in variable operation, considering customized solutions derived from previous experience and developments in the CSP field (i.e. use of inorganic salts and integrated heat exchangers); iii) Develop a fully-integrated system at the prototype level (at least 25 kWe electrolyzer with at least 15 kg/day hydrogen production capacity) combined with RES and validated in a relevant environment (TRL 5), to be tested for at least 1,000 hours iv) developing optimized operational models to manage transients, start-up and stand-by operation thanks to the above-mentioned prototype; v) system scale-up and industrial exploitation roadmapping, considering cases of practical interest under different scenarios carried out by industrial	Alberto Giaconia (ENEA)	\ (Domestic): - ENEA - Research Institute, Fondazione Bruno Kessler - Research Institute, SNAM S.p.A. - Industry, NextChem Srl - Industry \ (International) : - Capital Energy S.L. - Industry - Spain - SOLIDpower S.A. - Industry - Switzerland - Fundación IMDEA Energía - Research Institute - Spain - Ecole Polytechnique Federale de Lausanne - University - Switzerland - Stamicarbon B.V. - Industry - Netherlands	TO BE DEFINED
Italy	ENEA	Utilization	H2 DEMO VALLEY: realization, at CR ENEA Casaccia, of a multifunctional platform to create a hydrogen ecosystem. 2021 - 2023 (R&D spam)	i) Hydrogen production from RES (green H2) and from fossil fuel with CCS (blue H2) ii) Hydrogen injection into the methane pipeline, at variable % iii) Metering and analysis composition iv) Hydrogen utilization: mobility (transport inside the center), energy (cogeneration through the use of fuel cells, residential heat production through the use of boilers operating with H2 / CH4 or pure H2 mixtures)	Stephen MCPhail/Paolo Deiana (ENEA)	\ (Domestic) - ENEA - Research Institute, - Several National Industries (to be defined)	TO BE DEFINED

Country	Institute	Category	Related programs (with short summary)	Target / Goal Outcome	Lead person / Organization	Partnership (if any)	Related information
Italy	ENEA	CCUS	GICO - Gasification integrated with carbon capture and valorisation - Grant n. 101006656 - Call H2020-LC-SC3-2018-2019-2020 	ENEA will get insights in plasma technologies and proof-of-concepts will be tested at TRL5 for the valorization of CO2 captured in sorption-enhanced gasification processes of biomass wastes.	Dr Bocci / University of Marconi	(1) Università degli Studi telematica Guglielmo Marconi/USGM/Res; (2) Italian National Agency for New Technologies, Energy and Sustainable Economic Development/ENEA/Res; (3) Fundación Tecnalia Research & Innovation/TECNALIA/Res; (4) ICI caldaie/ICI/LE; (5) Eindhoven University of Technology/TUE/Res; (6) Agencia Estatal Consejo Superior de Investigaciones Científicas/CSIC/Res;	TO BE DEFINED
Italy	ENEA	CCUS	SFERO - Systems for Flexible Energy via the Reuse of carbOn 	This project, funded by the System Research by the Ministry of Economic Development, proposes the study of plasma-assisted catalytic systems for the enhancement of CO2 and the production of drop-in renewable fuels.	Dr Stefano Stendardo / ENEA	(1) Italian National Agency for New Technologies, Energy and Sustainable Economic Development/ENEA/Res; (2) Università degli Studi dell'Aquila; (3) Politecnico di Torino; (4) Università degli Studi di Roma "Sapienza"; (5) Università degli Studi di Roma 3.	TO BE DEFINED
Italy	ENEA	CCUS	SISAL - Si and Al slag valorisation via CO2 reuse. Grant n. 20255 - EIT RawMaterials - Area D2 acceleration - Segment D2.2 Upscaling 	This is a project funded within the European Institute of Innovation and Technologies (EIT) RawMaterials platform, a CO2 capture process will be studied for the recovery of silicon and aluminum from industrial waste.	Dr. Gabriella Tranell / NTNU	(1) BNW Energy; (2) Italian National Agency for New Technologies, Energy and Sustainable Economic Development/ENEA/Res; (3) Eikem AS technology Kristiansand; (4) Enalos Research and development (5) Fraunhofer-Desellschaft zur Foederung der angewandten Forschung; (6) Mytilineos Holdings S.A. (7) National Technical University of Athens; (8) Noewegian University of Science and Technology; (9) Rheinisch-Westfaelische Technische Hochschule Aachen; (10) SiQAl; (11) Walter Tosto	TO BE DEFINED
Italy	ENEA	CCUS	ECCSELERATE - Accelerating user access, growing the membership and positioning inyternbationally to ensure long-term sustainability - Grant n. 871143 - Call H2020-INFRADEV-2018-2020 	ENEA will offer high quality scientific and technological support and performance in the field of carbon capture and reuse technologies	Dr Volker Rohling / ECCSEL ERIC	(1) Eccsel European Research Infrastructure Consortium; (2) Istituto Nazionale Di Oceanografia E Di Geofisica Sperimentale; (3) Sintef Energi AS; (4) United Kingdom Research And Innovation; (5) Bureau De Recherches Geologiques Et Minieres; (6) Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek TNO;	TO BE DEFINED
Italy	ENEA	CCUS	ChemPGM - Chemistry of Platinum Group Metals - Grant n. 101007669 - Call H2020-MSCA-RISE-2020 	ENEA in this project financed in the H2020 has the objective to study the reuse of exhausted materials as advanced catalytic systems for the valorization of CO2 and the production of H2	Dr. Iakovos Giakoumis / Monolithos	(1) Monolithos; (2) Agenzia Nazionale Per Le Nuove Tecnologie, L'energia E Lo Sviluppo Economico Sostenibile; (3) Y.S. Cypriot Catalysts Limited; (4) Lomartov Srl; (5) Universite De Liege; (6) University Of Cape Town; (7) Institute of Catalysis, Bulgarian Academy of Sciences	TO BE DEFINED