European Commission

State of play: May 2025

INNOVATION FUND
projects in Spain

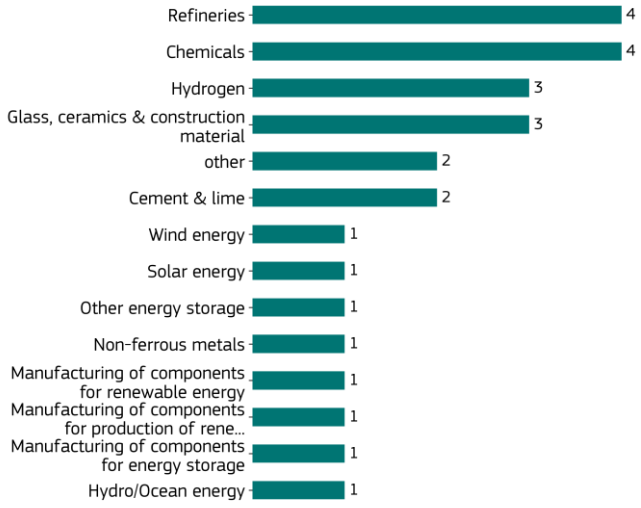
Funded by revenues from the EU Emissions Trading System (EU ETS), the Innovation Fund aims to encourage companies and public authorities to invest in cutting-edge low-carbon technologies with significant potential for reducing greenhouse gas (GHG) emissions in the European Economic Area (EEA). The Fund awards projects through calls for proposals and auctions[1].

Innovation Fund Calls

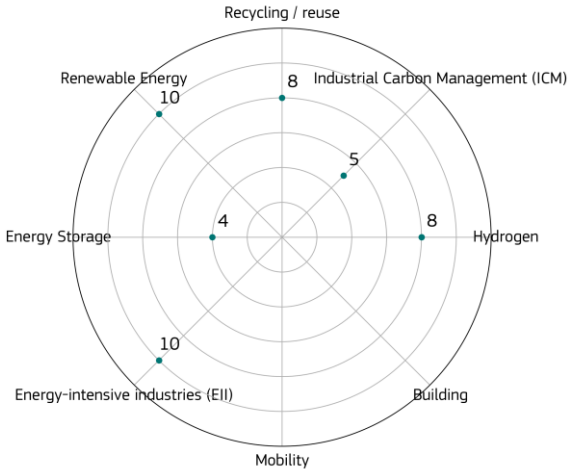
Currently, the Innovation Fund supports 26 project(s) (partially or fully)[2] implemented in Spain with a total grant amount of EUR 1.2 billion. Their cumulative capital expenditure (CAPEX) is approximately EUR 5.8 billion.

These projects contribute to decarbonising European industries. Over their first ten years of operation, they are expected to reduce GHG emissions by 71,311,673 t CO_2 equivalent.

Projects per sector
Number of projects



Technology pathways[3] in the country
Number of projects



[1] *The figures presented are only for ongoing funded projects. Information on closed or terminated projects is only included under the funded projects table (when applicable). For definitions of ongoing, closed, and terminated projects, check the glossary on the last page of this document.*

[2] *"Partially" refers to projects located in multiple locations. For projects in multiple locations, the budget and GHG abatement have been attributed to the main country of implementation chosen by the project. See table below "List of awarded Innovation Fund projects" for detailed information.*

[3] *A project can choose multiple climate mitigation pathways and, therefore, have multiple technology pathways.*

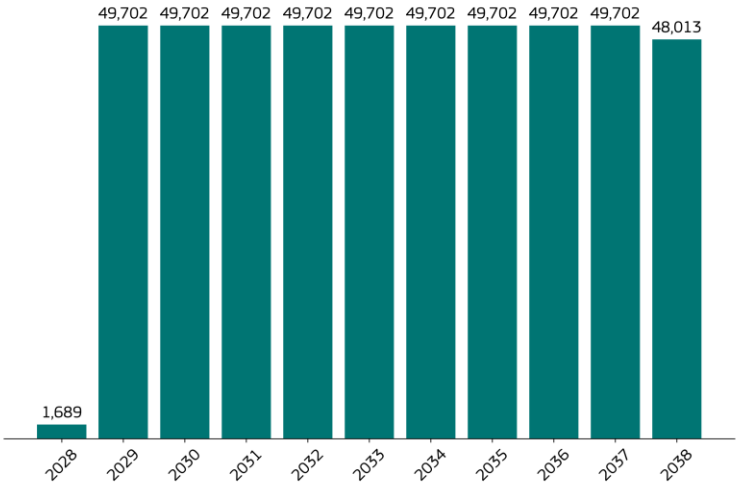
Innovation Fund Auctions

Currently, the Innovation Fund supports 2 project(s) in Spain, contributing to the decarbonisation of European industries. In the first ten years of operation, they are expected to reduce GHG emissions by 3,399,493 t CO_2 equivalent[4].

The total Innovation Fund support through competitive bidding in Spain is of EUR 238.6 million.

Expected renewable/RFNBO[5] hydrogen production per year

in tonnes



[4] *The total expected GHG emission reduction is automatically calculated based on project data and parameters provided.*

[5] *RFNBO: Renewable Fuels of Non-Biological Origin.*

Awarded Innovation Fund projects in Spain

Net-zero technology projects

Acronym[6]	Title	Topic	Sector	Starting date	Participants	Expected GHG emission avoidance (t CO_2e)	Innovation Fund grant (EUR million)
CO2-FrAMed	CO2-Free Agriculture for the Mediterranean region	InnovFund-SSC-2020-single-stage	Solar energy	01/01/2022	AGR | CO2-SPV | RAA | QPV | UPM | ISF | ISF | ADG | FENACORE | Cingral	17,702	4.4
W4W	Waga 4 World	InnovFund-SSC-2020-single-stage	Refineries	01/01/2022	SOFIWAGA ESPAÑA | WAGA ENERGY SA	14,202	2.5
SKFOAAS	SKF RECONDOIL AS A SERVICE	InnovFund-SSC-2020-single-stage	Refineries	01/04/2021	RECONDOIL | SKF	15,293	1.6
GREENMOTRIL	Development and operation of a GREEN energy community in the port of MOTRIL	InnovFund-SSC-2020-single-stage	Other energy storage	01/01/2022	APM | CUERVA | SIEMENS | GEV	29,152	4.3
AGGREGACO2	Fabrication of CO2 negative AGGREGAtes based on disruptive accelerated carbonation processes fuelled by carbon capture in refineries	InnovFund-SSC-2020-single-stage	Glass, ceramics construction material	01/04/2021	OCO INT | REPSOL | REPSOL PETROLEO | PETRONOR | OCO TECH | ALBA	28,364	3.2
ECOPLANTA	Reduction of CO2 emissions in methanol production from municipal non-recyclable waste	InnovFund-LSC-2020-two-stage-2	Chemicals	01/11/2021	Ecoplanta	3,444,269	106.4
CIRQLAR	Low temperature heat recovery for industrial use by heat pumps	InnovFund-2021-SSC	other	01/04/2023	REPSOL | RP | RANK	59,497	2.2
CLYNGAS	Substitution of petroleum coke in the cement industry by synthesis gas (syngas) generated from gasification of stabilised RDF	InnovFund-2021-SSC	Cement lime	01/08/2023	CEMEX	406,960	4.4
SustainSea	Reducing maritime transport CO2 emissions using wind	InnovFund-2021-SSC	Wind energy	01/07/2023	bound4blue	46,789	4.1
HOPE	High-efficient Onshore PV module production in Europe	InnovFund-2022-LSC-03-MANUFACTURING	Manufacturing of components for production of renewable energy or energy storage	01/01/2024	MBI	17,080,051	200.0
BBRT	BASF Battery Recycling Tarragona	InnovFund-2022-LSC-	Non-ferrous metals	01/01/2024	BASF Corp | BASF SA |	2,257,326	100.0

[6] *Project with multiple implementation locations (in italics): the expected GHG emission avoidance and Innovation Fund grant refer to the entire project total, not the part in this country. This data is not included in the aggregated data for the country as presented above under 'Innovation Fund Calls'.*

Acronym[6]	Title	Topic	Sector	Starting date	Participants	Expected GHG emission avoidance (t CO_2e)	Innovation Fund grant (EUR million)
		03-MANUFACTURING			BASF SE | BSW | BBMR Spain | BASF ESPANOLA | BASF Oy		
T-HYNET	TARRAGONA NETWORK HYDROGEN	InnovFund-2022-LSC-02-INDUSTRY-ELEC-H2	Hydrogen	01/04/2023	THYNET | RIT	1,378,161	62.5
ASTURIAS H2 VALLEY	ASTURIAS H2 VALLEY	InnovFund-2022-LSC-02-INDUSTRY-ELEC-H2	Hydrogen	01/01/2024	ABOÑO | EDPR PT PO | EDPE | EDPR	1,329,786	18.1
SEAWORTHY	Sustainable dispatchable Energy enabled by wAve-Wind OffshoRe plaTforms with onboard Hydrogen	InnovFund-2022-LSC-04-PILOTS	Hydro/Ocean energy	01/01/2024	FPP | FPP C	25,557	26.0
GREEN MEIGA	Green Methanol in Galicia	InnovFund-2022-LSC-02-INDUSTRY-ELEC-H2	Chemicals	01/10/2023	FORESA | IBERCLIEN	2,901,078	122.9
TRISKELION	Green Methanol manufacturing from CO2	InnovFund-2022-LSC-02-INDUSTRY-ELEC-H2	Refineries	01/01/2024	Forestal	860,282	48.8
GREENH2LAROBLA	GREEN H2 PRODUCTION AT LA ROBLA	InnovFund-2022-LSC-02-INDUSTRY-ELEC-H2	Hydrogen	01/07/2024	ENAGAS | NATURGY | ROBLA HUB	1,997,094	42.4
LuGaZ	Local manUre and agri-food waste treatment for bioGAs and biofertiliZers production from Zero waste and circular economy perspective	InnovFund-2022-SSC	Refineries	01/06/2024	Leche Río | AGROAMB | NORVENTO | Medrar MIO	51,604	4.5
ERACLITUS	Expanding the Range of Clinker Substitutes. Designing a Sustainable Future for Cement Sector	InnovFund-2022-SSC	Cement lime	01/07/2024	CRUZ	413,396	4.5
MODUS	MicrOwave Depolymerization UpScaling: Production of recycled PET and polyester from difficult to recycle waste of packaging and textiles through an innovative microwave depolymerization technology	INNOVFUND-2023-NZT-GENERAL-LSP	Chemicals	01/04/2025	INTECSA | GR3N | MODUS | DINSA	1,223,325	35.0
MOD4PV	GIGAWATT SCALE ASSEMBLY PLANT OF DISRUPTIVE TECHNOLOGY PV MODULES	INNOVFUND-2023-NZT-MANUFACTURING	Manufacturing of components for renewable energy	01/01/2025	TRINA LUX | TRINA SOLAR DE	11,862,842	87.8
CT Quarry	Circular Technology Quarry: Providing green materials for more sustainable construction	INNOVFUND-2023-NZT-GENERAL-MSP	Glass, ceramics construction material	01/02/2025	CRD | CoGlo | CoIn | COMA | CoGreen	1,043,594	36.7
TarraCO2-Storage	TarraCO2, the reduction of CO2 emissions through geological storage, a catalyst of the CO2 market	INNOVFUND-2023-NZT-GENERAL-LSP	other	01/04/2025	REXSA	19,996,123	205.1
GAIA	Green Ammonia in Asturias	INNOVFUND-2023-NZT-GENERAL-LSP	Chemicals	01/04/2025	EDP | FERTIBERIA | FERCOP	2,844,716	75.2

Acronym[6]	Title	Topic	Sector	Starting date	Participants	Expected GHG emission avoidance (t CO_2e)	Innovation Fund grant (EUR million)
neFO	Norvento Enerxía Factory Zero - Factory of Equipment for Energy Generation and Storage	INNOVFUND-2023-NZT-MANUFACTURING	Manufacturing of components for energy storage	01/11/2024	NORVENTO | NNFA | NEDP | NING	1,865,053	27.6
FELIX	First total ELectrification In large-scale luXury glass production	INNOVFUND-2023-NZT-GENERAL-SSP	Glass, ceramics construction material	01/04/2025	Bormioli Luigi | Bormioli Rocco	119,458	5.5

Projects selected through auctions

Acronym	Title	Topic	Starting date	Participants	Product	Volume (kilotonnes)	Expected GHG emission avoidance (t CO_2e)	Innovation Fund grant (EUR million)
Catalina	Catalina	InnovFund-2023-AUC-RFNBO-Hydrogen	01/10/2024	RENATO	Renewable hydrogen	480	3,284,000	230.5
HYSENCIA	Large-scale solar to RFNBO hydrogen production plant in Aragón, Spain, for industrial and mobility applications	InnovFund-2023-AUC-RFNBO-Hydrogen	01/10/2024	ANGUS	Renewable hydrogen	17	115,493	8.1

Participants from Spain in projects implemented in other country/countries

Acronym	Title	Topic	Country(ies) of implementation	Participants	Sector	Expected GHG emission avoidance (t CO_2e)	Innovation Fund grant (EUR million)
Listlawelbattcool	Light and structural laser welded battery cooler	InnovFund-2021-SSC	CZ	Val | Valeo Térmico | Valeo Žebrák	Manufacturing of components for production of renewable energy or energy storage	223,570	3.7
NEXTFLOAT PLUS	Next Generation Integrated Floating Wind Optimized for Deep Waters	InnovFund-2022-LSC-04-PILOTS	FR	X1 WIND | TECHNIP FRANCE | NF SPV	Wind energy	35,675	13.4
WINDPL	Sustainable manufacturing facility for XXL offshore wind towers	INNOVFUND-2023-NZT-MANUFACTURING	PL	Windar Polska | WINDAR REN	Manufacturing of components for renewable energy	2,466,464	17.3

Project overview

Acronym	Title	Abstract
CO2-FrAMed	CO2-Free Agriculture for the Mediterranean region	The CO2-FrAMed project will build approximately 12 stand-alone large-power photovoltaic irrigation systems (PVI) that do not require back-up batteries and significantly reduce risks related to the integrity of the water distribution infrastructure. This solution is a suitable alternative to conventional electric and diesel-based pumping systems. It brings environmental benefits in terms of CO2 emission reduction and economic benefits in terms of lower costs for farmers. Overall, the project will reduce reference emissions by 100% and farmers will benefit from zero-carbon irrigation at a competitive price. Innovation in the technology and in the way to finance it The project's innovative elements are threefold: a new technology, an advanced monitoring system and an innovative financing model. (1) The PVI technology was developed within Horizon 2020 to solve the intermittency problem of photovoltaic power sources. Intermittency can cause overvoltage and water hammers, which can seriously damage the irrigation infrastructure and dramatically reduce its lifetime. The PVI technology allows for the integration of the hydraulic components, the PV generators, and the frequency converters and it guarantees that the pressure remains always within optimal operational values. Such a solution avoids the need to use expensive backup batteries. (2) The advanced monitoring and automated analysis of key system parameters is a breakthrough in the farming sector, also enabling fault detection, diagnosis and reporting for high performance of the large-power PVI systems. (3) The innovative business model proposed for the project builds on the work of the H2020 ResFarm project, which developed a framework to ease the access of on-farm renewable energy sources to capital market funding. The business model of CO2-FrAMed is based on the commercialization of PV electricity through a pool of power purchase agreements (PPAs) totaling 7.35 MW capacity. The model also enables the reduction of financing costs of the PVI projects, by showing that they qualify as collateral for high-quality financial instruments (green bonds). Multiple technical, environmental and economic benefits for the farmers The project will deploy zero-carbon irrigation systems, avoiding 17 700 tCO2e during the first 10 years of operation, which corresponds to 100% of the reference emission, while also tackling many of the technical, economic, and administrative challenges faced by farmers. The project aims to demonstrate that PVIs are well suited for medium-large irrigation applications. They can replace conventional electric (grid connected or using batteries as back-up) and diesel-based pumping systems and can work as stand-alone installations without the need for batteries or a connection to the grid. Introduction of advanced monitoring and analysis features will ensure optimal performance, minimise operational expenses, and reduce the cost of the electricity paid by the farmers. The project will also have a positive impact on circular economy by reducing the consumption of water in the farming sector by up to 30% without increasing GHG emissions. The pooled PPA approach significantly reduces financial and transaction costs for the PVI installations and prevents Operations Maintenance costs and burdens from falling on farmers. In addition, the project will have a significant impact on agricultural activities in the region, contributing to a substantial increase in agricultural production. High scale-up potential in the irrigation sector worldwide The potential for expanding the project on site and transferring the technology to other sites with similar conditions is very high. The availability of a cost-effective 100% renewable and independent energy solution for irrigation systems opens sizeable opportunities worldwide, particularly in locations lacking a reliable electric grid. The introduction of concepts and practices from the securitization industry into the ori
W4W	Waga 4 World	Over 10 million Nm3/h of methane is lost in landfills worldwide. This is a major waste of renewable energy and a significant source of GHG emissions. WAGA ENERGY has developed the WAGABOX unit, a breakthrough technology enabling recovery of landfill gas as grid-compliant biomethane. Since 2017, the company has been deploying this solution in France through a build, own, operate and maintain business model: WAGA ENERGY purchases landfill gas from landfill operators and sells compliant biomethane to energy utilities, thanks to a feed-in tariff. The WAGABOX solution has a double impact in terms of fighting climate change: it incentivises landfill operators to recover their gas, which contributes to significantly reduce fugitive methane emissions; and it produces clean, local renewable gas that can substitute common fossil natural gas. Ten WAGABOX units are operational in France. They supply around 35,000 households, avoiding 45,000 tons of eqCO2 emissions per year.

Acronym	Title	Abstract
		By recovering a waste management by-product, the WAGABOX unit solution provides the most cost-competitive biomethane in France (since the feed-in tariff for landfill gas upgrading is 40% lower than for anaerobic digestion plants). Existing units purify 600 Nm3/h and produce biomethane for an average price of 75€/MWh. However, to deploy this innovation worldwide, WAGA ENERGY must sell biomethane on a merchant basis, as most countries do not offer public incentives for biomethane. A target selling price of 42-48€/MWh must be achieved to be able to sign long-term purchase agreements with energy utilities or traders. Consequently, a next-generation WAGABOX unit adapted to local regulations with higher capacity, higher performance, and lower manufacturing and operating costs is mandatory to sustain worldwide deployment. The W4W project aims to complete the development of this specific next-generation of WAGABOX unit and move it from TRL7 to TRL8 before starting a broad international roll-out of the solution.
SKFOAAS	SKF RECONDOIL AS A SERVICE	The current project proposes to install and operate the first-of-a-kind Stand-alone DST processing plant in the facilities of SKF located in Tudela (Navarra, Spain). The proposed solution aims at closing the loop in the use of industrial oils, allowing to use the same oil in the same application several times after a certified purification process. A win for both industry and the environment. The only issue standing in the way of this process is technology, as current solutions till now had not reached a level where the same oil could be re-used within the same system after a quick and efficient remanufacturing process. This project proposes a processing plant based on the patented SKF Double Separation Technology (DST), which allows purifying waste oil to more than 99% and, therefore, returning oil to an incredibly high-grade for usage and reducing the need to change oil frequently. This project will be a flagship DST that will count with a treatment capacity between 1,000 and 6,000 m3/year depending on the viscosity of the oils treated. The process will be semi-automatic and will require the execution of a 2.7M? CAPEX. The project implementation will face 3 phases: Financial close and preparation (April 21), Construction / installations works and commissioning (2021), Operation and Monitoring (2022-2031). In the last phase, the plant expects to treat up to 20million litres of used oil, avoiding 15.292,52 tCO2e within 10 years of operation. Thus, it is worth to mention that this innovation and targets are aligned with the EU's industrial strategy to introduce circularity in new areas and sector to reduce consumption of raw materials, waste generation and GHG emissions. In particular, by keeping more oil within the cycle, this technology really does offer something new to the world: the possibility of a future where oil demand decreases to a trickle and instead real and nigh-perpetual usage of oil in industry practices.
GREENMOTRIL	Development and operation of a GREEN energy community in the port of MOTRIL	GREENMOTRIL aims to demonstrate the technical, environmental and economic benefits of implementing a smart self-managed energy community entirely powered by renewable energy in the port of Motril. This approach will allow this port to become the first seaport in Europe able to work completely off-grid thanks to deployment of a 2,5 MW PV plant, a storage system of 4 MWh with grid-forming capacities and frequency supply, an innovative microgrid management system, a communication system based on edge multi-protocol concentrators and a robust cybersecurity framework. GREENMOTRIL will enable the yearly integration of 6,300 MWh of renewable energy in the port, achieving a GHG reduction of 29,135 tonnes of CO2 equivalent over ten years of operation associated to the daily activity of the industries located in the port and the ships connected to the Onshore Power Supply. This approach ensures the participation of the end users in the community management providing flexibility services through demand response schemes. This will allow a high replication potential of GREENMOTRIL concept and solutions not only in the European seaport sector (counting with 340 commercial ports) but also in other energy communities. The project is thus fully aligned with the EU commitment to fighting climate change by shifting to a climate-neutral economy with net-zero greenhouse gas emissions by 2050. The project is coordinated by CUERVA, a Distribution System Operator (DSO) very active on the generation, operation and commercialization of renewable energy with large experience in R European projects, in a consortium with APM, the owner of port facilities, and General Electric, a worldwide reference company in the digitalization and automatization of micro-grids.
AGGREGACO2	Fabrication of CO2 negative AGGREGAtes based on disruptive accelerated carbonation processes fuelled by carbon capture in refineries	AGGREGACO2 project targets the aggregates industry for a revolution through the successful commercial deployment of a sustainable aggregate as a solid alternative of conventional aggregates not fully environment-friendly. The AGGREGACO2 proposes a FOAK innovation through the introduction of CO2 captured of refinery processes in an Accelerated Carbonation Technology (ACT), that revalorise Air Pollution Control residues (APCr), which are hazardous residue nowadays stored after treatment, for the fabrication of carbon negative aggregates. The AGGREGACO2 project will demonstrate the industrial feasibility and cost-effectiveness of the first carbon negative aggregate that can compete face-to-face in the market while reduce drastically the GHG emissions emitted by refineries, the carbon footprint of the fuels and APCr in landfills. ALBA and OCO INT together with the Repsol Group, will become the first companies in the world in introducing industrial ACT processes perfectly connected with refinery plants, paving the way towards the transformation of the traditional oil gas plants in places where fabricate derivative sustainable products with high added- value. This joint research produced attractive

Acronym	Title	Abstract
		and promising results at high TRL-levels that make the AGGREGACO2 industrial concept profitable at mass fabrication level. A perfect symbiosis scenario is achievable because the ACT process can be 100% fuelled using the CO2 captured in a refinery as resource. Therefore, the main objective of the project is to design, implement and validate the first commercial production plant of carbon negative aggregates (in EU) with a capacity of 56,000 Tn/years, with adequate stability (>7,000 h) and capable to revalorise 22,000 Tn APCr/year and use 2,200 Tn CO2 captured. This project will avoid 2,836.44 TonCO2eq/year (i.e. 28,364 TonCO2eq considering 10 years of project operation) and, besides that, REPSOL will produce around 400 Ton/year of low carbon hydrogen.
ECOPLANTA	Reduction of CO2 emissions in methanol production from municipal non-recyclable waste	The ECOPLANTA project will revolutionise municipal solid waste (MSW) management by using non-recyclable materials rejected by sorting centers to produce circular chemicals and advanced biofuels. The project will deliver a first-of-a-kind commercial plant for the European market, using waste that would otherwise end up in landfill. Located in a petrochemical complex in El Morell, near the port of Tarragona in Spain, the production site will produce 237 kt/y of methanol, and thereby recover 70% of the carbon present in the non-recyclable materials. The methanol produced will displace fossil-based chemicals and fuels. Based on the IF methodology, the project will achieve 3.4 Mt CO2eq of GHG emissions reductions over the first ten years of operation.
CIRQLAR	Low temperature heat recovery for industrial use by heat pumps	The CIRQLAR project will enable the recovery of low-temperature waste heat at around 100°C and its upgrading to 150°C by using heat pumps. Newly developed concepts and technologies will be integrated in a unique waste heat recovery solution, that will abate 100% of greenhouse gas (GHG) emissions during its first ten years of operation, compared to the reference scenario. This new unit will be integrated in the real production environment of A Coruña Refinery in Spain and will be the first step in an ambitious plan to replicate the concept in other refineries and other intensive-energy industries. The CIRQLAR project will be the first of its kind in Europe and will be used to pave the way for other similar facilities. The project will produce up to 4 megawatt (MW) of usable heat in the form of steam, through the recovery of 3 MW of low-temperature waste heat from a symbiotic production ecosystem. The project will reduce the energy consumption of the processing unit by 24%, increasing its energy efficiency and flexibility, while also reducing the GHG emissions associated with heat production. The system will use industrial heat pumps and the available waste heat to electrify the process. The electrification will reduce natural gas combustion and therefore abate 0.059 million tonnes of CO2 equivalent of GHG emissions. CIRQLAR will overcome the main barriers to uptake that have been faced by low-temperature heat recovery technology, such as the optimisation of the thermodynamic cycle, the reliability of the machines working in severe conditions, and its integration into an energy network. This will be driven by the technologies' main advantages: emission reduction potential compared to existing options, efficiency of heat recovery and the expanded operability and flexibility of the system. CIRQLAR is a first-of-a-kind technological concept that combines a set of innovative strategies and key integrated enabling technologies. These innovations and technologies will be developed and deployed at industrial scale, to exploit the Heat Circularity concept, in a cost-efficient and technologically viable manner. The development of each technological component will advance the current state-of-the-art, increasing the energy efficiency in the project site, whilst also allowing CIRQLAR to contribute to the fight against climate change. The project will exploit a concept that could potentially apply to any energy-intensive industry. This will allow key industrial sectors to offer their products and services in a more efficient and sustainable way to consumers whilst reducing their external energy cost dependence. CIRQLAR will reinforce the EU industry value chain of waste heat recovery and heat pumps, providing a cost-competitive technology to the market. It will deliver more sustainable processes with lower emissions, which will respond to today's environmental challenges, while also reducing consumption and dependence on natural gas throughout the EU.
CLYNGAS	Substitution of petroleum coke in the cement industry by synthesis gas (syngas) generated from gasification of stabilised RDF	CLYNGAS aims to produce high-added-value synthesis gas (syngas) by means of a gasification process. The gasification uses a combination of waste residues from other industrial processes as a feedstock. The proposed technology will expand the opportunities to use refuse-derived fuel in the cement sector. It will increase fossil fuels substitution, achieving a relative greenhouse gas (GHG) emission avoidance of 8%, whilst ensuring a stable process and high-quality production in CEMEX´s cement plant in Alicante (Spain). This project is a relevant part of the CEMEX "Future in Action" strategy and roadmap to achieve net carbon neutrality by 2050. CLYNGAS is a first-of-a-kind project, with replicability in the cement sector at the global scale. The proposed technology allows the cement industry to use waste and by-products from other industrial processes to replace fossil fuels and natural raw materials. This constitutes a critical component in the transition of the cement industry towards a low-carbon economy. One of the key elements in CEMEX's roadmap for carbon neutrality is the substantial substitution of fossil fuels with refuse-derived fuel (RDF) with high biomass content. However, certain characteristics of these fuels such as humidity, calorific value, and composition can often limit their use. The CLYNGAS project provides an innovative and reliable solution to direct RDF burning. The proposed technology transforms RDF into syngas, which is then fed into the main burner of a clinker kiln. This ensures a stable production, which maintains the strict process quality requirements.

Acronym	Title	Abstract
		As a result of this process, a significant reduction in absolute GHG emissions is achieved, estimated at 406 960 tonnes CO2 equivalent over the first ten years of the project's lifetime. In addition, CLYNGAS contributes to the circular economy by reusing waste that contains energy potential, and avoiding its disposal in landfills. The integration of CLYNGAS in the Alicante cement plant takes advantage of existing infrastructure, thus minimising the use of new natural resources in the gasifier construction process. The project contributes to climate objectives at the global, European (EU Green Deal and EU Policies and Regulations), national (Energy Transition Regulations, Strategic Agendas and Roadmap), regional (Regulations of the Valencian Community on Climate Change, Strategic Agenda and Integrated Plans) and local (Waste Management Plan of the Province of Alicante) levels.
SustainSea	Reducing maritime transport CO2 emissions using wind	The SustainSea project will deploy bound4blue's innovative rigid wind sail system in maritime transport. The system will use wind energy to reduce fuel use and GHG emissions in the sector. Within the project, the wind propulsion system developed by Bound 4 Blue will be integrated into five large cargo vessels operating, mainly, in EU waters. In accordance with the REPowerEU and EUGreenDeal, this will have a significant impact on reducing dependence on fossil fuels and external suppliers, whilst also creating positive environmental impact by reducing relative greenhouse gas (GHG) emissions by 91% compared to the reference scenario. Pollution derived from maritime shipping activities has profound implications for air and water quality and marine biodiversity. Therefore, there is a clear need for new disruptive technologies to address these issues. The main objective of this project is to carry out five large-scale installations of eSAIL® systems in different ship types. This will reduce GHG emissions by 14 037 tonnes CO2 equivalent for the first three years of operation, increasing to 46 789 tonnes CO2 equivalent over the first ten years. The main challenges are around: (i) scaling up the technology to larger sizes, while remaining fully functional; and, (ii) adapting the technology to cover the main market segments in the European shipping industry. Over recent years, both the IMO (International Maritime Organization) and the EU developed a new regulatory framework on maritime pollution. These regulations are forcing ship owners and charterers to use less polluting fuels and move to emission saving technologies, with the global goal of reaching a high degree of decarbonisation of the shipping industry by 2050. This project is focused on energy efficiency of the European shipping industry, being fully aligned with the latest IMO regulations (such as the Sulphur Cap, EEDI/EEXI or the CII (Carbon Intensity Indicator)) and with EU policies (such as FuelEU and the general framework of the EUGreenDeal). The inclusion of maritime transport in the EU Emission Trading System further strengthens the importance of moving towards CO2 abating processes and technologies in this sector. In addition to generating employment for local suppliers, this project will support the EU regional economy, as it has the potential to generate a new value chain in the wind energy sector. As an example, the main suppliers for the structural parts of the sails are wind energy systems manufacturing companies from Spain. This project will position bound4blue as a global leader of wind-assisted propulsion, which will result in the increased competitiveness of this sector in the EU, generating impacts in future job creation and enhance the European value chain.
HOPE	High-efficient Onshore PV module production in Europe	The objective of the HOPE project is to establish an additional 3.5 gigawatt (GW) annual production capacity of high-performance Photovoltaic (PV) cells and modules in Europe, to strengthen European supply chains and energy independence. A cell and a module manufacturing facility will be set up in Germany, while an additional module manufacturing facility will be established in Spain. HOPE will introduce the next generation heterojunction technology (HJT), HJT 2.0; with this innovation, enabling the production of longer-lasting, higher-efficient, cutting-edge PV modules. HJT 2.0 modules also have a significant cost advantage for investors and operators. HOPE will supply the modules to build hundreds of new PV power parks in Europe. This project will reduce greenhouse gas (GHG) emissions by 99.9% compared to the reference scenario. In the HOPE project, the HJT 2.0 technology will be introduced to drive HJT-cell based modules to maximum efficiency, leveraging significant advantages in the efficiency of solar cells. With the HOPE project, Meyer Burger will implement a set of major innovations based on a revolutionary production concept, comprising cell and module manufacturing, materials, and smart factory design. HJT 2.0 is based on proprietary technologies and will overcome prevailing but outdated technologies like "passivated emitter and rear cell" (PERC) in the PV market. An absolute greenhouse gas (GHG) emission avoidance of 17 million tonnes CO2 equivalent is expected. This has been calculated based on the proportional contribution that modules have in a PV power park, alongside other components such as inverters and installations. The total energy generated by the modules is equivalent to twice of the annual electricity consumption of the city Berlin. Additionally, the PV modules will be produced with low emissions, significantly reducing the overall carbon footprint of the PV industry. HOPE will contribute to strengthening European strategic sovereignty in the PV value chain. The innovations in the product and process design will contribute to increased resource

Acronym	Title	Abstract
		efficiency in Europe, and the associated new renewable energy generation capacity will be indispensable for the European Green Deal. Nearly 1,400 new jobs will be directly generated by the project. Additionally, the job-multiplier of PV-based electricity generation is the largest among renewable technologies, with 2,200 indirect jobs that can be attributed to the project (e.g. at suppliers or linked to installing and operating the power parks). The regional economies will benefit both from local sourcing as well as from the availability of locally produced PV components.
BBRT	BASF Battery Recycling Tarragona	BBRT aims to install and operate a plant for the recycling of black mass from end-of-life batteries and battery manufacturing production scrap. The plant will have the capacity to process recycling feedstock equivalent to roughly 120 000 tonnes of end-of-life batteries per year, and will recover nickel, cobalt, lithium, copper, and manganese at high yields. The project will thus be able to provide the EU battery industry with locally and sustainably produced raw materials. Compared to primary metals extracted via mining, BBRT will be able to reduce greenhouse gas (GHG) emissions of the produced metals by 58%. Electric vehicle batteries require several raw materials such as lithium, nickel, cobalt, manganese and graphite. Extracting these materials has a significant carbon footprint. BBRT's specific objective is a first-of-its-kind commercial battery recycling process on an industrial scale, producing secondary raw materials that can be fed back into the circular battery material loop and re-used for battery production. The technological process is comprised of two steps: the pyrolysis step as pre-treatment and the hydrometallurgical refining step for metal extraction. Using this process, the plant can recover valuable metal salts with a special focus on lithium to be used as battery-grade raw materials for producing new batteries. BBRT expects to save 2.4 million tonnes of GHG emissions during its first ten years of operation compared to metal production from mining. This reduction equals the emissions caused by the yearly electricity consumption of 3.5 million European households. Batteries are the heart of every electric vehicle. BBRT aims to produce them in the most sustainable way, establish a competitive battery recycling industry in Europe and contribute to reducing the dependency of the battery industry on imports of raw materials like nickel, cobalt, and lithium. Its production process will fulfil the upcoming EU Battery Regulation requirements regarding recycling efficiencies and enable the fulfillment of the recycled content requirements for lithium-ion batteries. BBRT will be implemented at BASF's site in Tarragona, Spain, in one of the largest chemical complexes in southern Europe. The investments in Tarragona will support establishing a battery value chain in Spain and bring around 200 direct new jobs to the area. It will lay the foundations for further expanding the capacity for battery recycling in Europe and advancing the technology to cope with the increasing volumes of batteries to be recycled in the future.
T-HYNET	TARRAGONA NETWORK HYDROGEN	The T-HYNET project's main objective is to deploy a first-of-a-kind European large scale, 150 megawatt (MW) capacity, alkaline electrolyser at "REPSOL Petróleo" site in the Tarragona's industrial area. The plant is planned to operate continuously and is expected to produce 2.7 tonnes of renewable hydrogen per hour. The plant will generate renewable hydrogen and oxygen to be used by local off-takers. It is planned that this project will achieve a99.99% relative GHG emissions when compared with the reference scenario. The T-Hynet project will integrate four key innovative elements: (i) A 150MW electrolyser producing hydrogen from renewable sources. This will represent a breakthrough in alkaline technology in terms of larger stacks and modules, as well as higher operating pressure and efficiency; (ii) Digital tools directed to electrolyser performance optimisation and monitoring; (iii) Oxygen integration leading to its complete reuse for local industrial applications; and (iv) Increased water use efficiency (minimizing water discharge and maximizing water recovery). It is expected that the project will have absolute greenhouse gas emissions avoidance of almost 1.4 million tonnes of CO2 equivalent over the first ten years of operation. The project will contribute to the European Hydrogen Strategy, supporting the deployment of domestic hydrogen production in the European Union. It will also contribute to the objectives of the REPowerEU strategy, particularly by helping reduce fossil fuel consumption in industry and transport. The project will include technological developments in the electrolysis plant and digital tools to ensure a smart management of the electrolyser. This will reduce the cost of renewable hydrogen production, increasing the competitiveness of the product and boosting its use and implementation in the entire value chain. The deployment of the electrolyser will enhance renewable hydrogen industrial production, presenting a cleaner, cost-effective alternative to fossil fuels for local off-takers. The location of the project is also highly relevant for supporting the uptake of a hydrogen ecosystem in the challenging industrialisation roadmap for Spain and Europe. The project is expected to have a positive socio-economic impact in the region. The economic benefits will impact technology providers, manufacturers of hydrogen production plants and their components; commercial industries in areas of maintenance and operation, mobility end users, and research centres, etc. It is expected to create more than 900 direct jobs and more than 1 100 indirect and induced jobs during the construction stages. By engaging with local stakeholders and off-takers, the project will develop a synergistic industrial network that will create a baseline for a deep decarbonisation transformation. This will kick-start an ambitious scalability plan to be implemented in Tarragona and beyond.
ASTURIAS H2	ASTURIAS H2 VALLEY	The Asturias H2 Valley project consists of a first-of-a-kind Power-to-Hydrogen Hub to produce and supply renewable hydrogen, with the overall objective to decarbonise the economy of

Acronym	Title	Abstract
VALLEY		the region of Asturias, Spain. The project aims to develop a renewable hydrogen plant with 150 megawatts (MW) of electrolysis capacity by repurposing the site of Aboño's existing coal power plant, aiming to achieve 99.98% relative greenhouse gas emission avoidance compared to the reference scenario. The project will demonstrate the viability of a fully integrated hydrogen production and distribution process, optimised on the availability of renewable energy (wind and solar) and on demand from off-takers from multiple sectors. A project of this scale has not been demonstrated before. In the process of the gradual phasing-out of the coal power plant, the hydrogen plant will repurpose the existing installations and infrastructure to 1) lower the initial investment costs, 2) reduce the environmental impact (as it is not necessary to install new electricity supply infrastructures, process and cooling water supply systems or effluents treatment plant and network, among others) and 3) reduce administrative processing and permitting times. The project will not only increase circularity, but also provide an industrial-size technical demonstration for projects at other sites in transition to emulate. Moreover, the project will avoid consuming around 650 gigawatt hours (GWh) of fossil fuels every year, the equivalent of the annual emissions of more than 45 000 Spanish households. Overall, the project plans to avoid absolute greenhouse gas emissions of 1.3 million tonnes of CO2 equivalent over the first ten years of operation. Through many of its planned activities, the project will strongly contribute to several EU and national climate related strategies and goals, such as the European Green Deal, EU Hydrogen Strategy, Circular Economy Action Plan, and REPowerEU, while following the Just Transition principles. Achieving 150MW of electrolysis will also directly contribute to the European goals of deploying electrolysis capacity to produce renewable hydrogen. With a strong alignment with the Just Transition principles, it is estimated that the project will generate 55 direct jobs during its implementation, each with high added value, thus contributing to the maintenance of employment and the reconversion of currently declining industries in the region. In addition, in the construction phase more than 400 direct jobs are expected to be generated. The project will benefit the off-takers by reducing their consumption of fossil fuels. It will also contribute to a positive trade balance by reducing imports of coal and natural gas, and will strengthen the position of the region in the fast-growing hydrogen market, through the participation of local companies across its value chain.
SEAWORTHY	Sustainable dispatchable Energy enabled by wAve-Wind OffshoRe plaTforms with onboard Hydrogen	SEAWORTHY is a commercial-scale demonstration of a first-of-a-kind technology that is capable of supplying clean dispatchable offshore power from wind, waves and hydrogen (H2). The project will pave the way for the commercial roll-out of this technology, which will revolutionise the offshore Power-to-X market by providing clean and cost-effective dispatchable power to offshore, off-grid and coastal weak-grid applications (e.g. islands), which currently rely on fossil fuels. This demonstrator technology, P-Demo, integrates a 4.3 megawatt (MW) Wind Turbine Generator (WTG), a 0.8 MW Wave Energy Converter (WEC) system and a H2 system consisting of a 1 MW electrolyser, 48 MWh of energy storage and a 1.2 MW fuel cell. P-Demo will be the world's first wind-wave-H2 unit and it will be deployed in PLOCAN's test site in Spain. It will deliver 11.05 Gigawatt hours (GWh) per year of renewable electricity to the grid, avoiding a total of 25 557 tonnes of CO2 equivalent during its first 10 years of operation, with a 100% relative greenhouse gas (GHG) emission avoidance. These key innovative features of the project allow for a maximised uptake of wind and wave resources, increasing power quality, output capacity per unit and output consistency over time. At the same time, the project integrates H2 production systems, including electrolysers, a higher energy storage capacity (up to 300 MWh) and fuel cells, for the provision of truly dispatchable renewable power. These features in turn minimise the total investment per megawatt, through shared infrastructure (mooring, platform, and grid infrastructure) for the three technologies in a single unit, as well as manufacturing materials and techniques from the shipbuilding value chain that enable scaled series production and economies of scale. In terms of policy priorities, the technology contributes directly to the EU Strategy on Offshore Renewable Energy, as well as to the longer term climate neutrality objectives. Moreover, REPowerEU recognizes that energy storage plays a key role to end external dependence on fossil fuels by ensuring security of supply and supporting renewables integration. Furthermore, the technological design allows a variety of manufacturing and assembly options, easing the use of different facility types and a distributed European supply chain. From a social perspective, this provides opportunities for a high degree of local content and job creation, even in geographical areas lacking a strong marine industry and where a suitable value chain can scale gradually.
GREEN MEIGA	Green Methanol in Galicia	GREEN MEIGA, located in Begonte, Galicia (Spain), aims to deploy innovative and integrated technological approaches, clustered in an unique integrated plant. The proposed approach will achieve three key outcomes: enhanced production performance, improved operational flexibility, and competitive production costs. GREEN MEIGA plans to reach 157% relative greenhouse gas (GHG) emissions avoidance compared to the reference scenario.

Acronym	Title	Abstract
		The GREEN MEIGA project will develop novel concepts and technologies. They will be clustered in a unique integrated system and business case that will allow the production of 100 000 tonnes per year (t/y) of e-methanol and will avoid 2.9 million tonnes of CO2 equivalent during the first ten years of operation. The project will integrate (i) an innovative hybridised H2 production system including an alkaline Proton Exchange Membrane (PEM), a Solid Oxide Electrolyser Cell (SOEC) and Co-SOEC systems, (ii) an integrated self-sustainable e-methanol production system, and (iii) an advanced CO2-capture system integrating enzyme-based and direct air capture technologies. The cost-efficient production of e-methanol is essential for the chemical sector's decarbonisation pathway, contributing to the European goal of reaching climate neutrality by 2050. The project will also contribute to the goals of the REPowerEU Plan of reducing fossil fuel consumption in industry and transport. As methanol is an important feedstock in the chemical industry, the on-site production of e-methanol can reduce GHG emissions, stimulate local economies and reduce the EU's current fossil fuel dependency (cost efficiency ratio, lower than today's carbon price). GREEN MEIGA will design a strategic plan to deploy the project concept in the future and mobilise investments in e-methanol production. The selected location is a representative scenario, being the first milestone of an ambitious scalability plan to replicate the concept in additional sites. The project will contribute to the development and decarbonisation of the value chain, both in the wood industry and in the energy sector in Galicia. GREEN MEIGA provides solidity and sustainability to the economic model and social and territorial cohesion, as it will contribute to the creation of green jobs in Galicia, planning to create up to 426 jobs during the operation stage and around 6 000 jobs during the construction stage.
TRISKELION	Green Methanol manufacturing from CO2	TRISKELION: Green Methanol manufacturing from CO2 The TRISKELION project will build an innovative e-Methanol production plant in Mugardos (Galicia, Spain). This renewable product will be synthesised in an innovative single reactor from CO2 (captured from the flue gas of a combined heat and power plant), and renewable hydrogen (produced from electrolyses). The relative greenhouse gas (GHG) emission avoidance is estimated to around 137%compared to the reference scenario. The innovation of the project comes from the combination of different technologies with different degrees of technological maturity. The proposed capacity is significantly larger than any demonstration project in Europe, and will increase the System Readiness Level (SRL) and Technology Readiness Levels (TRL) of the plant, enabling it to reach a commercial level that allows its replication in different sectors. The system has been designed to produce 40 000 tonnes per year of e-Methanol. It will also recover 59 643 tonnes per year of liquefied green oxygen from the electrolysers, that will be later purified and liquified to ensure it is valuable. Electricity from renewable sources, through Power Purchased Agreements (PPAs), will be supplied to the entire system ensuring renewable and continuous power source during the 8 000 hours/year of operation. The excess water stream generated in the e-Methanol distillation will be reused directly in the electrolyser, minimising the total water quantity required. The project will avoid approximately 860 282 tonnes of CO2 equivalent of absolute GHG emissions during the first ten years of operation. This project will develop solutions and products (e-Methanol and renewable oxygen) to be deployed in the market, integrating different technologies and systems, and avoiding the use of fossil-based raw materials by using secure (in time) and stable (in quality) renewable energy sources. In addition, the project will maximise energy integration throughout various process units. TRISKELION will contribute to the European objectives set down in the REPowerEU communication, particularly by producing a synthetic fuel, e-Methanol, that will reduce fossil fuel consumption in industry and transport. The project will also have relevant regional socioeconomic impacts, creating 35 direct jobs and 70 indirect jobs, with a potential for scalability and replicability of the technology.
GREENH2LAROBLA	GREEN H2 PRODUCTION AT LA ROBLA	GREENH2LAROBLA envisages the commissioning of one of the largest, renewably powered green hydrogen production plants in Europe to be located on the site of the former coal-fired thermal power plant in La Robla (León). This green hydrogen will be produced by an electrolyser with a capacity of 280 megawatts (MW), leading to an annual production of up to 40,200 tonnes of renewable hydrogen with 100% relative greenhouse gas (GHG) emission avoidance compared to the reference scenario. As one of the first large-scale projects for renewable hydrogen production, GREENH2LAROBLA puts forward an innovative energy system framework with zero emissions, to be deployed at an industrial scale comprising of clean power generation, electrolytic hydrogen production, management of power and hydrogen loads, and the comprehensive operational strategy for the entire system. The green hydrogen production will be mostly destined for industrial use and will be transported via a national hydrogen backbone (primary national hydrogen pipes system). The project will be powered by solar photovoltaic plants in nearby municipalities and through Power Purchase Agreements (PPAs). This will ensure a constant supply of renewable energy to the electrolyser that should work steadily and continuously, avoiding production fluctuations.

Acronym	Title	Abstract
		The project stands out for its size (280 MW), pioneering the integration of renewable hydrogen into the industry and contributing to learning economies to improve the scalability and cost-effectiveness of renewable hydrogen. Furthermore, the use of a hydrogen duct serves as a storage solution as well as to enhance grid flexibility and accommodate a mix of uses. This will facilitate replicability by offering the potential for other operators and future users to directly connect to the hydrogen backbone. The project aligns with established strategic EU plans such as the European Green Deal, EU Hydrogen Strategy, REPowerEU, the Delegated Acts under the Renewable Energy Directive for the production of renewable fuels from non-biological origin (RFNBO), the priorities of the Spanish Hydrogen Roadmap, National Just Transition Strategy, and the Spanish National Integrated Energy and Climate Plan (NECP) 2021-2030. The GREENH2LAROBLA project is framed within the Just Transition Agreement of the Montaña Central Leonesa-La Robla region and seeks to minimise the economic and social impact of the decommissioning of the thermal power plant and contribute to the development of a green and low-carbon economy in the region. GREENH2LAROBLA is projected to create 279 jobs (direct, indirect, and induced) and contribute 14.3 million euro in Gross Added Value (GAV) to just transition municipalites during the project's construction phase. From a strategic perspective, the project will enhance the region's development in the rapidly expanding hydrogen market throughout its entire value chain by involving local stakeholders.
LuGaZ	Local manUre and agri-food waste treatment for bioGAs and biofertiliZers production from Zero waste and circular economy perspective	LuGaZ aims to create a sustainable zero-waste facility that manages organic and non-hazardous wastes generated primarily in the dairy sector value chain, and to create the opportunity for other agri-food industries in the area to manage their residues. The project proposes an ambitious facility that combines a biogas plant with an innovative low scale upgrading system, a liquid treatment of digestate for water recovery at low cost, and a solid treatment for fertiliser production across industrial symbiosis. Nearly 55,000 tonnes/year of residues will be collected in the facility to generate biogas containing methane which will be captured, cleaned, upgraded, and injected into the natural gas grid. The digestate will be separated into a solid fraction to generate a stabilised organic fertiliser for the primary sector to compensate for the manure sent to the LuGaZ plant, and a liquid fraction which will be treated to recover reusable water in industrial applications. The relative greenhouse gas (GHG) emissions avoidance due to LuGaZ operations during the first 10 years amount to around 85%. LuGaZ goes beyond the commercial and technological state-of-the-art, bringing to the table a first-of-a-kind combination of waste treatment technologies for the agri-food production value chain: · OPTIBLENDER: A specialised software for the online control of anaerobic digestion that ensures the stability and quality of the digestate produced through co-digestion mixtures optimisation. · NIDUP: An upgrading system specifically designed for small-scale applications and is highly competitive due to its low operational costs, capability of coping with high hydrogen sulphite (H2S) concentrations, and potential to minimise reagents/consumable's needs. · DEPURGAN/AQUATEC: A low-cost solution for liquid treatment based on an electrocoagulation all-in-one solution. LuGaZ contributes to achieving European climate neutrality by 2050 by producing high-quality biomethane to be directly injected into the natural gas grid. LuGaZ combines waste management with renewable energy production, which, with biogas and the reduction of Methane emissions from open manure storage and landfills, helps make treatment affordable and energy efficient. It is also possible to obtain an added value product (fertiliser) and preserve natural resources through water recovery. LuGaZ has a potential to scale-up by increasing the size of individual integrating technologies (higher volumes of agri-food waste streams to be treated), replicating the Zero residue plant in new areas at Galician and Spanish level and applying this throughout in Europe. LuGaZ's innovative integrated scheme will play an essential role in the dynamisation of the primary sector by creating employment in rural areas, while actively participating in creating an innovative regional model of circular economy based on waste to energy principles. Additionally, it offers a practical waste treatment solution for rural areas, reducing transport costs and carbon footprint.
ERACLITUS	Expanding the Range of Clinker Substitutes. Designing a Sustainable Future for Cement Sector	The ERACLITUS project pioneers sustainable cement production by introducing two new Supplementary Cementitious Materials (SCMs). These materials align with four fundamental pillars: achieving a zero-carbon dioxide (CO2) footprint, leveraging traditional SCM benefits, employing sustainable technologies, and emphasising the strategic importance of new low-carbon SCMs. The project aims to dramatically reduce the carbon footprint up to 55% relative greenhouse gas (GHG) emission reduction, with the innovative materials enabling the production of new cement with only 20% clinker. The innovation showcased in both new SCM products extends beyond the current state-of-the-art by transforming cement production. The SCMs represent a paradigm shift, utilising a

Acronym	Title	Abstract
		unique blend of technological operations in SCM production. This approach goes beyond traditional methods and contributes to the circular economy by incorporating industrial, mining, and agroforestry waste as raw materials. Biomass as the sole fuel in the production process further aligns with sustainability goals. The disruptive technology not only focuses on emission reduction but also aims to influence European cement regulations to embrace eco-friendly cement types. The ERACLITUS project contributes significantly to key policy areas by championing a zero CO2 footprint in cement manufacturing. Its strategic emphasis on sustainable technologies aligns with broader European sustainability goals. Beyond emission reduction, the project seeks to influence European cement regulations and foster a regulatory environment conducive to cutting-edge and eco-friendly cement production. The implementation of the new materials not only revolutionises cement production but can also positively impact the local and regional economy, job creation, business clusters, and value chains. The scalable nature of the technology indicates potential efficiency gains and cost reductions, thus contributing to the resilience of the EU economy. The technology's licensable design across Europe emphasises the project's commitment to widespread adoption and amplification of its positive impact, both environmentally and economically.
Catalina	Catalina	The use of renewable hydrogen as an alternative to fossil fuels will play an important role in the EU's transition towards climate neutrality by 2050, and the achievement of the objectives set forth in the REPowerEU plan. The Catalina project will be developed by the company CI ETF I Renato Ptx Holdco, S.L.U. (RENATO). The shareholders of RENATO are Copenhagen Infrastructure Partners (CIP) and Enagás Renovable S.A. (EGR). The Catalina project will install a 500MW of electrolyser (technology chosen still being defined), together with 1.2 gigawatts (GW) of directly connected renewable generation (614 MW onshore wind and 571 MW of solar). This installation will be able to produce 480,000 tons of renewable hydrogen during its first 10 years of operation. The project will be located in Aragon, Spain, and aims to be a 'hydrogen industrial hub' in the Andorra region, with potential relevant positive impact on job creation for this rural area. The project will supply its renewable hydrogen for green ammonia production, which will be used to produce green and sustainable fertiliser thereby replacing imported grey ammonia, and help decarbonise the agricultural sector. Furthermore, the Catalina project has the potential to also supply RFNBO hydrogen to a major petrochemical plant providing an innovative off-take structure with multiple off-takers from different sectors. This project contributes to the European Hydrogen Bank's goal of making 10 million tonnes of domestically produced renewable hydrogen in Europe available by 2030.
HYSENCIA	Large-scale solar to RFNBO hydrogen production plant in Aragón, Spain, for industrial and mobility applications	The use of renewable hydrogen as an alternative to fossil fuels and feedstocks will play an important role in the EU's transition towards climate neutrality by 2050, and the achievement of the objectives set forth in the REPowerEU plan. HYSENCIA project will be developed by ANGUS ENTERPRISE S.L., a Special Purpose Vehicle (SPV) 100% owned by DH2 ENERGY ESPAÑA S.L. The HYSENCIA project will produce renewable hydrogen categorised as renewable fuels of non-biological origin (RFNBO) through electrolysis with a pressurized alkaline electrolyser with a planned installed capacity of 35 megawatt electric (MWe). A pressurized alkaline electrolyser was selected for its rapid response to any fluctuations in electrical intensity or power. This selection aims to minimize stack degradation and allows to mitigate operation fails and production stops. The plant will operate for 30 years and will be able to produce on average 1,689 tonnes of RFNBO hydrogen per year, during its first 10 years of operation. The project will source its renewable energy supply via a nearby 49 Megawatt-peak (MWp) captive solar photovoltaic panel (PV) plant. The PV plant, fully dedicated for the production of renewable hydrogen, will generate an annual average amount of 99 gigawatt-hour (GWh) renewable electricity during its first 10 years of operation. Because HYSENCIA's electrolyser will be powered solely from this PV plant, 100% of the energy used will comply with the additionality, temporal and geographical correlation requirements established by the Delegated Act (EU) 2023/1184 to produce hydrogen categorised as RFNBO. Situated in Aragon, Spain, a prominent logistics and industrial hub, the HYSENCIA project is positioned at the junction of major transportation routes connecting the centre, north and East of Spain, and southern France. The project coordinator is planning to have a strong combination of industrial and mobility sector off-takers. For example, the industrial off-taker is expected to be a local food industrial company and the mobility off-takers local transport and logistic companies. This project contributes to the European Hydrogen Bank's goal of making 10 million tonnes of domestically produced renewable hydrogen in Europe available by 2030.
MODUS	MicrOwave Depolymerization UpScaling: Production of recycled PET and polyester from difficult to recycle waste of packaging and	The project aims to recycle currently non-recyclable materials, focusing on forms of Polyethylene Terephthalate (PET) waste. The project targets PET used in packaging and textiles, commonly called polyester. The waste streams processed by MODUS, currently not handled by mechanical recycling technologies, will be transformed into products that meet the quality standards of virgin materials derived from fossil resources. To achieve this goal, the project will establish a first-of-a-kind chemical recycling plant based on its innovative Microwave-Assisted Depolymerisation (MADE) technology. MODUS will achieve a greenhouse gas (GHG) emission avoidance of 100% compared to the reference scenario. The MADE technology breaks down PET molecules into their basic building blocks, or monomers, recovering them in a chemically pure form identical to oil-derived raw materials used for conventional virgin PET production. By recombining these monomers, MODUS will recycle up to 43 800 tonnes of plastic and textile waste annually, producing 35 000 tonnes of high-

Acronym	Title	Abstract
	textiles through an innovative microwave depolymerization technology	quality recycled PET and polyester (cPET) annually. The monomers obtained through MADE and subsequent polymerisation are the same as those from oil, allowing cPET to show the same quality and properties as virgin PET (vPET), in contrast to mechanical recycled PET (rPET), which is a downgraded product. While there are other depolymerisation technologies at the pilot stage, MODUS will be the first industrial plant to deploy this technology commercially, achieving over 120 000 tonnes of CO2 emissions avoidance per year. MODUS will significantly contribute to key European policy targets in the circular economy. Recycling materials that would otherwise remain unrecycled will help Spain meet the European recycling rate targets set to take effect in 2025 (and increase over time). Additionally, MODUS will provide practical solutions for extended producer responsibility schemes concerning packaging and textile waste, particularly by efficiently recycling mixtures of textile fibres containing polyester. The project will create 100 direct and 300 indirect jobs. It will also foster the formation of new clusters in the region, promoting collaboration among businesses, research institutions, and local communities. Furthermore, it will encourage high-quality circular products, reduce reliance on crude oil, and decrease dependence on raw materials from non-EU countries. The project's MADE technology has significant potential for replication and scaling throughout Europe, potentially achieving full circularity in the PET and polyester value chains.
MOD4PV	GIGAWATT SCALE ASSEMBLY PLANT OF DISRUPTIVE TECHNOLOGY PV MODULES	MOD4PV aims to set new solar photovoltaic (PV) module production standards with an innovative PV module assembly plant in Extremadura, Spain. Targeting an annual production capacity of over 1.5 GWp, the project will rely on advanced heterojunction technology (HJT), which features higher efficiencies and energy yields than conventional PV technologies. The modern facility will have two dedicated production lines optimised to ensure high yield and consistent quality. This will allow MOD4PV to meet the growing demand for locally produced, high-quality, affordable PV modules. The project will deliver a relative greenhouse gas (GHG) emission avoidance of 100% compared to the reference scenario. The project will apply a novel technology platform developed by TRINA to assemble competitive PV modules. The platform covers the entire assembly process, from cell cutting to better frame designs, and will integrate HJT coupled with an advanced solar cell silicon design (182x210mm). By optimising material use and lowering logistics costs, the project could achieve economies of scale and thus reach a high level of efficiency with lower costs. With a capacity factor of 19.40% for utility installations and 16.55% for non-utility applications, the project can generate over 2 800 GWh of renewable electricity annually, equivalent to powering nearly one million average households in Spain. Focusing on renewable energy, high-yield solar generation, and circular design, the project has significant cross-industry applications, particularly for sectors seeking to reduce emissions through electrification. In line with European energy policies and net-zero targets, MOD4PV strengthens the PV industry by reducing energy dependency and contributing to renewable energy targets. By combining Trina's established manufacturing expertise with its customer network, the project will enable an accelerated deployment of PV integration, promoting low-emission energy solutions and thus supporting the European Green Deal. With the current worldwide disparity in solar production levels, large-scale GW production facilities such as the one proposed by MOD4PV contribute to increasing Europe's competitiveness and improving its energy security. The project will significantly impact the local and regional economy by supporting the expansion of PV industry clusters and strengthening the entire PV value chain. MOD4PV's plant will also benefit raw material suppliers and related industries by fostering local production of PV components such as glass and aluminium. The plant is expected to create around 250 indirect jobs during construction and another 560 during operational phases.
CT Quarry	Circular Technology Quarry: Providing green materials for more sustainable construction	CT Quarry aims to build a first-of-its-kind, industrial-scale plant to recycle industrial waste and sustainably produce secondary raw materials for Europe's construction, glass, and ceramic sectors, with a special focus on agglomerated stone manufacturing industries. By doing so, the project expects to reduce greenhouse gas (GHG) emissions by an estimated 62% compared to the reference scenario. The project introduces a groundbreaking approach to valorise waste from agglomerated stone industry into new high value materials that will serve as components of final products. The new CT Quarry's process will upcycle over 100,000 tonnes of industrial sludge annually from COSENTINO production and will yield more than 247,000 tonnes per year of secondary raw materials. CT Quarry will also integrate renewable fuels, electrification, and heat recovery into the new process. Thus, the project represents a leap from technology demonstration to full-scale industrialisation. The project's scalable decarbonisation approach can be replicated with glass, ceramics, and other construction materials, influencing industrial practices well beyond its own footprint. CT Quarry is expected to achieve an absolute GHG emissions reduction of over one million tonnes of CO2 over its first ten years of operation. CT Quarry supports the Circular Economy Action Plan and the Critical Raw Materials strategy by reducing reliance on finite resources and diverting waste from landfills. By creating innovative secondary raw materials, the project supports Europe's resilience, strategic autonomy, energy independence, and circular practices, all in line with the Net Zero Industry Act. Additionally, CT Quarry will implement stringent health and safety standards, offering a crystalline silica-free production environment that addresses occupational health risks in

Acronym	Title	Abstract
		manufacturing, construction, and other sectors. This initiative directly supports the European Green Deal's objective of creating toxic-free, sustainable products for green buildings and infrastructure. Located in the Valle del Almanzora area (Almería, Spain), CT Quarry will drive local economic growth in a region facing demographic challenges. The project will create new direct and indirect jobs in waste management, high-tech manufacturing, and construction. It aims to establish a new industrial hub that combines raw material production with circular economy principles, creating a reference for a sustainable and circular industry for Europe.
TarraCO2-Storage	TarraCO2, the reduction of CO2 emissions through geological storage, a catalyst of the CO2 market	TarraCO2-Storage aims to unlock 54 million tonnes (Mt) of CO2 storage capacity for hard-to-abate industries in North-Eastern Spain. Enabling a safe, efficient and scalable method for permanent CO2 storage representing an unparalleled opportunity for industrial decarbonisation projects in Southern Europe. At a planned rate of 2 million tonnes per annum (Mtpa) of CO2 equivalent, TarraCO2-storage capacity will help reduce hard-to-abate emissions in the region by 30%. Recognised by the European Union, carbon capture, utilisation and storage (CCUS) is both an enabler for industrial decarbonisation and a technology that complements European efforts to reduce CO2 emissions further and go carbon negative. Located 45 km offshore of Tarragona, the potential for underground CO2 storage offered by TarraCO2-Storage is significant. The project will boost the development of a CCUS ecosystem in an area where sectors such as cement and chemical producers emit more than 6 Mtpa of hard-to-abate emissions only within a 120 km radius around the Tarragona industrial hub. The project will involve deploying innovative technologies focusing on robust seismicity monitoring protocols, such as a combined network of ocean bottom seismometers (OBS), distributed acoustic sensing (DAS) and operational optimisation tools for reservoir management. Other innovations include offshore operation of CO2 storage and interoperability of transport and storage. If successfully implemented, TarraCO2-Storage's solutions could be replicated and serve as a business model for other projects, contributing to the Spanish emissions reduction plan. The project will extensively engage with the local population to demonstrate its positive impacts and benefits. By achieving its objective of storing 2 Mtpa of CO2 equivalent per annum, the project will also significantly contribute to reducing hard-to-abate emissions in the region while creating quality jobs and supporting the preservation of industrial activity. TarraCO2-Storage has the potential to become a catalyst for developing a global CO2-Hub for CO2 with different origins, as well as the production of zero-emission synthetic fuels and carbon removals.
GAIA	Green Ammonia in Asturias	The project aims to become the first European industrial ammonia plant entirely based on renewable hydrogen and power. GAIA uses cutting-edge technologies to produce green ammonia and nitrogen, such as an innovative Haber-Bosch process and air separation units, allowing it to adapt to the flexible renewable profile of green hydrogen generation. At the same time, a 12-megawatt (MW) solid oxide electrolyser cell (SOEC) will produce green hydrogen using waste heat from the ammonia unit. The project will produce approximately 180 000 tonnes of green ammonia annually in Avilés, Spain. The ammonia will be used to produce low-carbon fertiliser and potentially as a maritime fuel. A relative greenhouse gas (GHG) emission reduction of almost 100% is estimated compared to the reference scenario (all the ammonia consumed in the fertiliser plant is of fossil origin). GAIA will be a pioneer in the advancement of green ammonia production, offering significant potential for scalability and operational flexibility, as well as incorporating variable load operation modes of the Haber-Bosch system. It will also contribute to environmental sustainability by integrating a 12 MW SOEC technology, a hygroscopic cycle technology (HCT) refrigeration system and treated water reuse. The first-of-a-kind facility will showcase sustainable practices in producing green ammonia and contribute towards the decarbonisation of fertiliser production. GAIA will achieve an absolute GHG emission avoidance of 2.8 million tonnes of CO2e during its first ten years of operation. GAIA will contribute to the European Green Deal's goals. Producing green ammonia reduces Europe's GHG emissions and enhances the use of renewable energy in the industry. Produced domestically, green ammonia also contributes to Europe's energy independence, reducing its reliance on imported fossil fuels and enhancing energy security. GAIA's alignment with circular economy principles and sustainable transition, will support food security through decarbonised fertiliser production, fostering a competitive European green ammonia market. The project will contribute to the region's economic growth by stimulating local employment with new qualified job opportunities and strengthening social cohesion. The project has been designed considering the whole supply and value chain and its potential in terms of scalability and replicability. It will showcase the technology commercially, setting a precedent for sustainable practices in green ammonia production. GAIA's implementation will offer valuable insights for broader adoption and other ammonia producers looking to decarbonise their operations while enhancing the farming sector's resilience.
neFO	Norvento Enerxía Factory Zero - Factory of	The project will be key in developing and manufacturing end-to-end products for wind generation and energy storage to meet Europe's growing demand for renewable energy solutions. It will build a cutting-edge factory in Lugo, Spain, producing wind turbines with advanced battery storage equipment and modern energy converters that can be seamlessly integrated into a

Acronym	Title	Abstract
	Equipment for Energy Generation and Storage	single, efficient system. Compared to the reference scenario, the project will completely avoid greenhouse gas emissions. neFO's factory represents a significant leap forward in manufacturing wind energy components and renewable energy systems. It will assemble certified products (direct drive wind turbines, modular battery storage systems and flexible water cooled energy converters) that surpass current commercial and technological benchmarks. The products target amongst others, the re-powering of existing on shore wind farms, since they allow the re-use of the existing foundations. The project will offer solutions using locally manufactured components, enabling energy self-sufficiency and increasing Europe's access to a supply of net-zero technologies. The plant will be 100% powered by renewable energy, initially sourced from on-site solar panels and energy storage units through net-zero systems. The project will avoid the annual emission of 187 000 tonnes of CO2 from start-up, which translates into 1.8 million tonnes of CO2 reduced in its first ten years of operation, the equivalent of planting 180 million trees. neFO responds to the energy sector's demands to make renewable energy more competitive and ensure the leading edge in technological advancement supported by the European Green Deal, which includes scaling up Europe's manufacturing capacity for net-zero technologies under the Green Deal Industrial Plan. neFO's resilient business model embraces product innovation, circular economy principles, and a localised supply chain. The new facility will follow the latest sustainable building standards, reflecting neFO's commitment to minimising its environmental footprint. neFO is a catalyst for economic growth and competitiveness, particularly in Lugo and Galicia (Spain). Between 2024 and 2027, it will create 303 direct high-value-added jobs. It will also generate approximately 237 indirect jobs in related industries. neFO will have a multiplier effect on the local and regional economy, potentially increasing production by x10 in the long term. This will strengthen the value chain and increase local suppliers' sourcing. The flexibility in production will allow neFO to meet market demands with an infrastructure designed to scale operations. Additionally, costs will be reduced through large-scale production, process improvement and R, making products more cost-effective and efficient.
FELIX	First total ELectrification In large-scale luXury glass production	The project, led by Bormioli Rocco SAU, aims to decarbonise the production of perfumery glass in the Azuqueca industrial area (Spain) thanks to the full electrification of the existing natural gas-fired furnace. Once converted, the "F2" furnace will be the largest electric furnace for glass in the beauty sector. Moreover, the project will build cullet glass-conserving post-consumer recycling (PCR) silos. This will enhance circularity and reduce the need for additional feedstocks, including critical raw materials. The project plans to reach 56% relative greenhouse gas (GHG) emission avoidance compared to the reference scenario, thus significantly reducing the climate impacts in a hard-to-abate industry such as the glass sector. FELIX is innovative in its technological aspects thanks to its 100% electrification of the glass melting process. The main limitation of electric furnaces in the glass industry is the scale-up to large dimensions, a barrier that the project will overcome thanks to the enhanced efficiency of the furnace, made possible by its novel hexagonal design and the integration of the PCR glass approach. Electrification will completely replace fossil fuel combustion during melting, which is this industry's primary source of emissions. Additionally, using PCR glass, which lacks carbon content, will further contribute to avoiding CO2 emissions, making glass recycling a key decarbonisation option. The project is expected to prevent 0.119 million tonnes of CO2 equivalent of absolute GHG emissions over its first ten years of operation. FELIX will demonstrate a key decarbonisation pathway for the glass sector and contribute to achieving the European Green Deal and REPowerEU targets. The project positively impacts the local economy by adding value and enhancing supply chain sustainability. The glass sector is significant in the regional economy, as the PCR will be supplied by local facilities, and other major players work in the same area. The project's electrification solutions for large-scale applications have a high replicability potential in similar facilities. Moreover, FELIX will promote reskilling and the development of new know-how in operating large-scale electric furnaces, which will be further expanded and developed, contributing to workforce adaptability and creating expertise in an evolving industry.

Terminated projects

Acronym	Title	Topic	Participants	Sector	Innovation Fund grant requested (EUR million)

Acronym	Title	Topic	Participants	Sector	Innovation Fund grant requested (EUR million)
SUN2HY	FIRST SMALL-SCALE DEPLOYMENT (FSD) OF A PRE-COMMERCIAL PLANT BASED ON PHOTOELECTROCATALYTIC TECHNOLOGY FOR HYDROGEN PRODUCTION	InnovFund-SSC-2020-single-stage	ENAGAS | REPSOL | SUN2HY	Hydrogen	4.5
HYVALUE	Novel upcycling production process based on an innovative circular business model for urban waste streams valorisation for the generation of high quality H2.	InnovFund-SSC-2020-single-stage	TUBSG | TUBINN | NOVARGI | TBX SA | ECOLOGY	Hydrogen	4.5

GLOSSARY

Ongoing project: a project with a signed Grant Agreement currently under implementation.

Closed project: a project with a signed Grant Agreement that is formally completed.

Terminated project: a project with a signed Grant Agreement that was terminated during implementation.