FIRST CALL FOR LARGE-SCALE PROJECTS

LIST OF PROPOSALS PRE-SELECTED FOR A GRANT[i]

Project acronym and proposal title	Location	Coordinator and other participants	Project description
Kairos-at-C Kairos-at-C, Building strong momentum for massive decarbonisation in the EU through a unique end to end CCS project	**Belgium, Netherlands Norway**	**Coordinator**: Air Liquide Large Industry SA **Other participants**: BASF Antwerpen NV	Kairos@C will develop a complete carbon, capture and storage (CCS) value chain that will avoid ca. 14.2 Mt CO_2 over the first 10 years of operation. Kairos@C will initiate a cross-border CCS value chain and kick-start the Antwerp@C project, which is developing a multi-modal transport infrastructure for CO_2 in the port of Antwerp. Kairos@C will deploy pioneering technologies in each building block of the CCS value chain: • The large-scale CO_2 capture layout will be a first-of-its-kind multi-feed scheme, which optimises and integrates CO_2 capture and purification from 5 different production units: 2 hydrogen plants, 2 ethylene oxide plants, and 1 ammonia plant. • Kairos@C will use the services of the Antwerp@C consortium, which is developing a multi-modal infrastructure to transport CO_2 to multiple permanent storage sites around the North Sea. A first-of-its-kind energy efficient liquefaction technology will be deployed. • First-of-its-kind liquid CO_2 vessels will be engineered and constructed in the project timeframe for transport to the storage sites. • The CO_2 storage will take place in storage sites in the North Sea (Norway, the Netherlands and/or in the UK).
TANGO ITaliAN PV Giga factOry	**Italy**	**Coordinator:** Enel Green Power Italia Srl	TANGO will develop an industrial-scale pilot line for the manufacture of innovative and high-quality bifacial heterojunction (B-HJT) photovoltaic (PV) cells. The innovative bifacial heterojunction technology ensures higher performance with respect to conventional modules, thanks to the intrinsic characteristics of the advanced bi-facial structure that allows for the maximization of energy production while minimizing the cost of electricity (LCOE) in utility scale installations. Furthermore, the project aims at enabling the application of the Tandem structure to B-HJT solar cells, in order to overcome the limit imposed by silicon bound to its band gap. The project will scale up production from 200 MW/y to 3 GW/y of B-HJT photovoltaic modules in a factory in Catania, Italy. The solar energy yield from the produced and installed photovoltaic modules will avoid up to 21 Mt CO_2 emissions over the first ten years of operation. TANGO will foster the European technology leadership in next generation of PV modules and cells with a positive impact on the whole PV value chain while providing a substantial social impact at regional, national, and European level.

BECCS@STHLM Bio-Energy Carbon Capture and Storage (BECCS) at the existing Combined Heat and Power-plant KVV8 at Värtaverket, Stockholm, Sweden	**Sweden**	**Coordinator:** Stockholm Exergi	BECCS@STHLM will create a full-scale Bio-Energy Carbon Capture and Storage facility at its existing heat and power biomass plant in Stockholm. The combination of the CO_2 capture with heat recovery will make the process more efficient. BECCS@STHLM will capture and store large quantities of biogenic CO_2 with a potential to avoid ca. 7.8 Mt CO_2 over the first 10 years of operation. The project will be a catalyst for net carbon removals which will become an increasingly important instrument to reach climate neutrality. The project will participate in and promote a new market for negative emissions and contribute to the establishment of all the necessary links in a CCS value chain in Northern Europe, including transport by ship of the CO_2 for storage to Norway. The project will not only create direct jobs locally but will also act as a springboard for many more new, green jobs throughout the technical and commercial parts of the value chain outside Stockholm and Sweden.
K6 K6 Program	**France**	**Coordinator:** EQIOM **Other participants:** Air Liquide France Industries **Associated Partner:** VDZ	K6 will reduce CO_2 emissions through implementation of a range of technological initiatives and innovations at the Lumbres cement plant. The project aims to maximise the usage of biomass-containing and other alternative fuels and to take advantage of already-decarbonated raw materials. A novel industrial-scale combination of an oxy-fuel kiln with carbon capture that replaces the existing wet kilns, will result in capturing of over 90% of the remaining CO_2. This CO_2 will be transported by train and ship for storage in North Sea sites or utilized in products of concrete, resulting in an avoidance of 8.1 Mt CO_2eq emissions over the first ten years of operation. Integration of the K6 Program within the nearby port of Dunkirk fosters the development of the port as a future European CO_2 hub.
ECOPLANTA Reduction of CO2 emissions in methanol production from municipal non-recyclable waste	**Spain**	**Coordinator:** ECOPLANTA MOLECULAR RECYCLING SOLUTIONS S.L.	ECOPLANTA aims to convert non-recyclable fractions of municipal solid waste to chemicals and biofuels. ECOPLANTA will produce 237 kt/y of methanol in a facility on a petrochemical complex near the port of Tarragona, Spain and thereby recover 70% of the carbon present in the municipal solid waste (MSW), achieving 3.5 Mt CO_2eq of emissions reductions over the first 10 years of operation. By displacing fossil fuels used for chemical and fuel production with methanol from MSW that would otherwise end up in landfills or be incinerated for energy, ECOPLANTA offers a clear pathway for the industry to drastically cut emissions in power generation, overland transportation, shipping and chemical industries.

HYBRIT demonstration Swedish large-scale steel value chain demonstration of Hydrogen Breakthrough Iron-making Technology	**Sweden**	**Coordinator:** Hybrit Development AB **Other participants:** SSAB EMEA AB Luossavaara-Kiirunuavaara Aktiebolag **Associated Partner:** Vattenfall AB	HYBRIT (Hydrogen Breakthrough Ironmaking Technology) will replace coal-based blast furnaces with direct hydrogen-based reduction technology. HYBRIT will demonstrate a complete industrial value chain for hydrogen-based iron and steelmaking. The project will produce approximately 1.2 Mt crude steel annually, representing 25% of Sweden's production. This will reduce greenhouse gas emissions by 14.3 Mt CO_2 over the first 10 years of operation. A new facility will be established for first-of-a-kind hydrogen-based direct reduction, with 500 MW fossil-free electrolysis in Gällivare. Furthermore, two blast furnaces are replaced by an electric furnace in Oxelösund. HYBRIT will moreover show the viability of technologies needed to melt hydrogen-reduced iron into crude steel. The project will thus lead the way to a full energy transition of the ore-based steel production as access to renewable energy increases.
SHARC Sustainable Hydrogen and Recovery of Carbon	**Finland**	**Coordinator:** Neste Oyj	SHARC – Sustainable Hydrogen and Recovery of Carbon – will reduce emissions at the Porvoo refinery, Finland by moving from grey hydrogen towards green hydrogen through the introduction of electrolysis facilities and blue hydrogen by application of carbon capture and storage (CCS). Hydrogen is essential in the production processes of transportation fuels, so the green and blue hydrogen will reduce the carbon intensity of these fuels. SHARC will also scale the production of green hydrogen to help make it a viable transportation fuel itself. Through this transition SHARC will save more than 4 Mt CO_2 in the first 10 years of operation. The novel water electrolysis technology applied by SHARC has a capacity of 50 MW. This, combined with CCS will maximise the environmental impact and the development of a strong supply chain from the refinery, by ship to storage site and will lay the foundation for a European hub for renewable hydrogen and CO_2 utilisation.

[i] The information provided is subject to the conclusion of an individual grant agreement between the project applicant and CINEA.