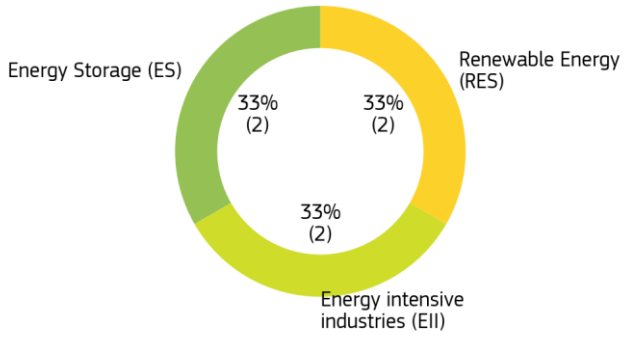
European Commission

Innovation Fund Programme

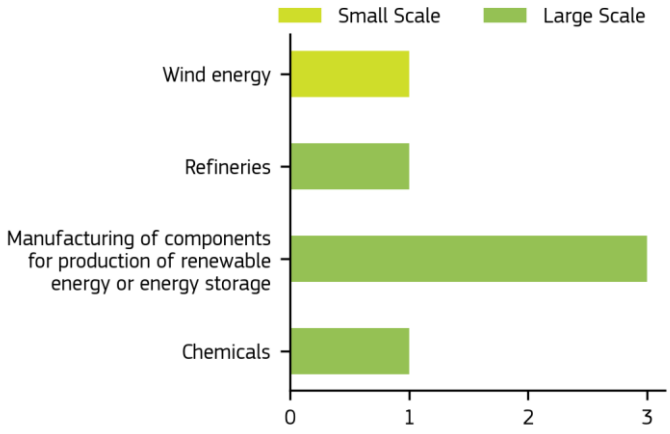
Overview of ongoing projects in Norway

Funded by the revenue of the EU Emissions Trading System, the Innovation Fund's goal is to help businesses investing in innovative low-carbon technologies with significant GHG emissions reduction potential.
The Innovation Fund currently supports **6 projects** located in Norway, which will contribute to the decarbonisation of European industries with a total expected GHG emission reduction of **43.8 Mt CO_2 equivalent in the first 10 years of operation.**
The total **Innovation Fund grant in Norway is of EUR 490.7 million**, out of the **total relevant costs of EUR 1.0 billion**, as defined in Art 5 of the Delegated Regulation 2019/856 on the Innovation Fund[1].

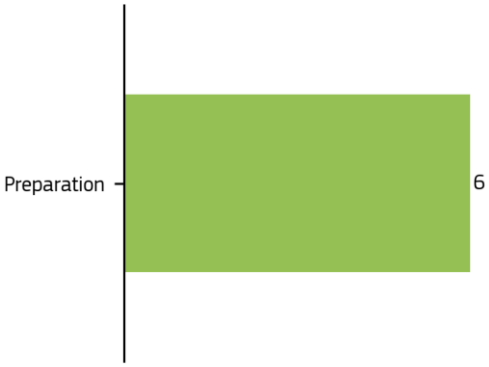
Projects per category
Number of projects and percentage of the total



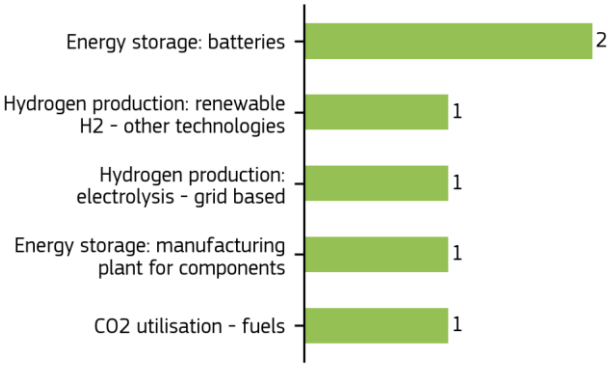
Projects per sector
Number of Small and Large-Scale projects



Projects per phase[2]
Number of projects



Top 5 technology pathways[3]
Number of projects



[1] *OJ L 140, 28.5.2019, p. 9.*
[2] *Preparation means the period before financial close is reached; construction means the period between financial close and entry into operation; operation means that the construction is finished and the project has already started production.*
[3] *Projects may employ several technological pathways, only the top 5 per country are kept in the graph.*
State of play: 18/06/2024

List of ongoing Innovation Fund projects in Norway

Acronym	Title	Sector	Start date	Project phase	Beneficiaries	Innovation Fund grant (EUR million)	Expected GHG emission avoidance (t CO2eq)
Large Scale						**487.4**	**43,818,858**
E-fuel Pilot	Innovative and cost-efficient production process for Power-to-Liquid using industrial off-gases	Refineries	01/01/2024	Preparation	NELF	40.0	228,163
ELAN	Upscaling Vianode innovative synthetic graphite production technology for a responsible electrification of Europe	Manufacturing of components for production of renewable energy or energy storage	01/01/2024	Preparation	Elkem | Altor | HEI | VIANODE	90.0	7,275,691
GAP	FFI Holmaneset -Green Ammonia Production to fill the GAP in Europe's energy supply-	Chemicals	01/01/2024	Preparation	FFI-NOR | FMG	203.8	3,531,568
Giga Arctic	Building a European future for clean batteries to accelerate the renewable energy transition	Manufacturing of components for production of renewable energy or energy storage	01/01/2024	Preparation	FREYR (FBN) | FREYR FBG	100.0	27,847,298
SunRISE	NorSun AS: Resource efficient and highly innovative n-type mono-Silicon wafers for Europe.	Manufacturing of components for production of renewable energy or energy storage	01/04/2023	Preparation	NORSUN AS	53.6	4,936,138
Small Scale						**3.4**	**8,135**
NAWEP	Norse Airborne Wind Energy Project	Wind energy	01/01/2022	Preparation	KITEMILL | NAWEP AS	3.4	8,135

Project overview

Acronym	Title	Description
E-fuel Pilot	Innovative and cost-efficient production process for Power-to-Liquid using industrial off-gases	The objective of the E-Fuel Pilot project is to set up and operate a first-in-kind plant for synthetic fuel production at Herøya, Norway. The key innovation is the Power-to-energy (P2X) e-fuel production process provided by Nordic Electrofuel AS (NELF), a breakthrough in flexibility, reliability, and simplicity. The P2X process will also be very energy efficient with carbon utilisation at close to 100%. The carbon source is the blast furnace waste gas from a local Ferro/Silicon-Manganese plant. The carbon capture and use (CCU) based process will use reversed water gas shift and Fischer-Tropsch technology to produce 8 000 tonnes/year of synthetic hydrocarbons (syncrude). A relative greenhouse gas (GHG) emission avoidance above 99% is expected, compared with the reference scenario. The plant will convert blast furnace gas directly to e-fuel, at lower cost (CAPEX and OPEX) and higher efficiencies compared with current state-of-the-art projects. As well as sourcing carbon from blast furnace waste gases, the project process is also suitable for other CO/CO2 sources, such as metal and cement production or waste incineration. A patented solution to achieve increased cost efficiency (named POX-rWGS), will also be tested, which includes a new gas-gas syngas cooler that allows higher recovery of heat. The E-Fuel Pilot project will demonstrate the technical and economic feasibility of the concept, paving the way for a future full-scale plant. The refined syncrude products will be used to replace fossil-based products in the aviation and other hard-to-abate sectors. The products can be used in existing engines and infrastructure without any modifications. Additionally, other benefits will be derived during use. For example, kerosene from syncrude has a clean combustion which significantly reduces particulate emissions, contributing to reducing cirrus clouds which are severe for global warming. The project plans to avoid 228 163 tonnes of CO2 equivalent of absolute emissions in the first 10 years of operation. The E-Fuel Pilot will contribute to the overall objective of the REPowerEU goal of reducing fossil fuel consumption in industry and transport sectors. It will contribute to the decarbonisation of the aviation and maritime sectors, in line with the policy objectives of the REfuelEU Aviation and FuelEU Maritime initiatives, as well as other national goals. The project will also have relevant socio-economic impact at regional level. The E-fuel Pilot project will contribute to creating 270 direct jobs and an estimate of 700 indirect jobs, including engineering activities. The next possible step is an “accelerator” plant with significantly increased production volume and further innovations.
ELAN	Upscaling Vianode innovative synthetic graphite production technology for a responsible electrification of Europe	Project ELAN will fill the supply/demand gap for anode materials, for the growing number of European battery cell manufacturers. The project will supply premium quality synthetic graphite anode materials that are produced in the cleanest possible way. It will bring an innovative and highly energy-efficient graphitization technology to commercial scale, for the responsible electrification of Europe. ELAN will produce anode materials for electric vehicle batteries with 100% relative greenhouse gas (GHG) emission avoidance compared to the reference scenario. Project ELAN will bring a unique graphitization technology to commercial scale, setting a new global standard in the production of synthetic graphite anode materials. The ELAN technology uses closed furnaces to produce synthetic graphite, suitable for battery anodes, in an energy- and material-efficient process. This drastically reduces the emissions resulting from anode manufacturing. It will be the first time a closed-controlled atmosphere furnace technology will be demonstrated for synthetic anode graphite production at a large scale. In absolute terms, project ELAN will contribute to avoiding over 7 million tonnes of CO2 equivalent of greenhouse gas emissions over the first ten years of operation. The anode materials produced by this project will power about 846 000 electric vehicles per year. The project will supply key materials, to scale the emerging EU battery value chain, building European industrial leadership and contributing to the strategic autonomy of the continent. It further addresses resource constraints and environmental impact, by developing a clean graphitization process and a circular value chain to increase battery recycling. It therefore contributes to the Green Deal objectives, the Net Zero Industry Act, the Clean Battery Directive and the Just Transition objectives of the European Union. The project will lead to the creation of up to 700 jobs, plus up to an additional 4 000 during the construction phase. ELAN will also contribute to attracting top international talent across the manufacturing and recycling process. It will engage with universities and research institutes to share and co-create knowledge, as well as build competencies in battery materials. The project will also create value for the local economy, through increased demand in the local supplier network and labor market, development and sharing of infrastructure, and building key competencies in the value chain.
GAP	FFI Holmaneset -Green Ammonia Production to fill the GAP in Europe’s energy supply-	FFI Holmaneset – Green Ammonia Production to fill the GAP in Europe’s energy supply The GAP project will lead the way in green ammonia (NH3) production for Europe with a large-scale production plant in Norway. Using renewable energy from the Norwegian transmission grid, electrolysis will be used to produce approximately 226 kilotonnes per year (kt/yr) of liquid green ammonia. First production is targeted for 2027 and the green ammonia will be shipped to domestic and European markets. Relative greenhouse gas (GHG) emission avoidance is expected to be 100% compared to the reference scenario. The project presents a significant opportunity to contribute to Europe’s mission to transition to a clean energy economy, creating one of the first green ammonia value chains in Europe and kick starting the green ammonia market. Expanding the deployment of existing technologies to a commercial installation will shift the economics of green hydrogen and ammonia production towards a sustainable pathway. Whilst there is strong demand for green hydrogen derivatives such as ammonia, the price gap with fossil alternatives means that the technology has not yet reached a scale and maturity where it can compete. This project seeks to bridge that gap to help propel the value chain onto a viable footing. The 300 megawatt (MW) Holmaneset plant will run a 280MW alkaline water electrolysis (AWE) using hydropower and water. The total expected production of green ammonia during operation

Acronym	Title	Description
		is expected to exceed 1 125 000 tonnes, resulting in a total expected greenhouse gas emission avoidance of more than 1.7 million tonnes CO2 equivalent. As this project will demonstrate, ammonia is not only a versatile fuel, but also an energy carrier for long distance transport of hydrogen. The project directly contributes to the REPowerEU target for an increase in the renewable share for hydrogen used in industry. Establishing a large, integrated green hydrogen and ammonia production facility and related value chain will help many EU industries enhance their competitiveness on their path to net zero. The project will also support the fast transition to climate neutrality as set out in the EU's Green Deal Industrial Plan. The production facilities will contribute to increased employment in the small community of Svelgen in Bremanger, Western Norway, with an estimate of 35-70 jobs directly linked to operation. There will also be indirect employment opportunities through the contracting of local suppliers. In addition, the region has the potential for future ammonia offtake, with a strong maritime industry, ship building, supply bases and shipping companies. The oxygen emitted from the production process is also suitable for use by the fish farming industry in the region.
Giga Arctic	Building a European future for clean batteries to accelerate the renewable energy transition	Giga Arctic aims to establish a state-of-the-art lithium-ion battery giga factory with an annual capacity of 29 gigawatt hours (GWh) in Mo I Rana, Norway. The factory will use a unique cell manufacturing technology that does not require binders and hence reduces the number of manufacturing steps. Giga Arctic battery cells will be deployed in energy storage systems, which are key to providing stability and flexibility in green energy systems that are built on renewable energy sources. The project is expected to lead to a 100% relative greenhouse gas (GHG) emission avoidance compared to the reference scenario. Giga Arctic introduces a leap forward in battery manufacturing efficiency, combining a novel battery cell manufacturing technology with a bespoke, state-of-the-art production facility. It will deploy 24M's cell manufacturing technology currently tested at pilot scale, to produce premium batteries at significantly reduced cost and with equally reduced footprint. The core innovation is a battery structure which eliminates the use of binder and solvents in the production process and subsequently eliminates the need for a drying process. The process reduces the use of non-active materials by allowing thicker electrodes than conventional technologies. This reduces energy consumption, investment cost (CAPEX), factory footprint and material input compared to current state-of-the-art processes. With a capacity of 29GWh, Giga Arctic will avoid 27.8 million tonnes of CO2 equivalent absolute GHG emission avoidance over the first ten years of operation. The project contributes to key energy, climate and industrial policy objectives by enabling the uptake of clean and efficient (in terms of energy and resources) battery manufacturing capabilities in Europe. The project accelerates the establishment of a European battery value chain, contributing to strategic autonomy objectives and European technology leadership on battery cell manufacturing. The project also drives the development of a clean battery value chain by boosting energy efficiency, circularity and responsible sourcing. As a key impact, Giga Arctic supports the deployment of renewables and the green transition by providing novel, cost-efficient, high-performing energy storage solutions. Giga Arctic establishes a Nordic-centric supply chain for batteries and advance battery recycling through partnerships in the value chain. Giga Arctic is expected to play a significant role at the local level, by providing new employment opportunities. Over 1200 jobs will be created in the Nordland region, and five times more jobs will be indirectly created in the upstream value chain. New knowledge and competences on battery technologies will be built in Europe, to further accelerate the transition of the continent. Giga Arctic opens the doors to future investments in innovative battery technologies. Further expansions to the project site are to be expected, as well as new gigafactories in Europe using 24M's technology.
NAWEP	Norse Airborne Wind Energy Project	The project, known as the Norse Airborne Wind Energy Project (NAWEP), will see KML As build and operate one of the World's first Airborne Wind Energy (AWE) Arrays to be located in Norway. AWE is a new form of wind energy that has moved from nascent academic research through from the mid 1980s through to significant demonstration of viable commercial demonstration systems at TRL7 in the last five years, seeing major investment in the sector from utilities and oil and gas majors. KML propose to build and operate an onshore array of at least 12 off the 100kW KM2 devices generating a combined 1.2MW. Whilst this array is producing significantly less than the typical 3MW to 5MW rating of a single commercial onshore Horizontal Axis Wind Turbine (HAWT), the project is a significant step forward for the sector. The project will allow KML to accrue 500,000 operating hours of AWE technology within 5 years to demonstrate real world reliability and maintainability. In this period the array will be operated on a commercial basis generating revenue. This is an essential objective to allow AWE to compete on an investment risk basis with HAWT technology for full scale commercial deployment. KML has spent several months selecting an appropriate site with minimal impact on the natural and human environment and in a location that will have minimal impact on aviation navigation. The selected site falls within an EU recognised and funded drone development corridor known as Green Fly Way (www.greenflyway.se) that crosses the border between Norway and Sweden. AWE operates at higher altitudes than HAWT, and typically has to comply with EASA aviation regulations for UAVs and have minimal impact on aircraft navigation. This site selection overcomes these hurdles for an early demonstration project. Building on the success of this project, KML will continue to scale the technology to ultimately compete with HAWT offering a product with a cost of energy circa 50% lower than HAWT and a carbon footprint which is 80% lower.
SunRISE	NorSun AS: Resource efficient and highly innovative n-type mono-Silicon wafers for Europe.	The project aims to build a new manufacturing factory with an ingot and wafer production capacity of 3 gigawatt (GW). NorSun's n-type wafers are used in highly efficient solar photovoltaic (PV) cells to produce renewable electricity, contributing to the reshoring of the European PV value chain in line with EU policy objectives. By deploying innovative and state-of-the art technology including high levels of automation and artificial intelligence (AI), the project will reduce manufacturing costs by more than 50% compared with the existing plant in Norway. Ingot pulling will be optimised to increase the yield and productivity while producing the market leading M10 and G12 wafer formats. Progressive reductions in diamond saw wire thickness allow for thinner wafers (up to 100µm) and reduce the loss of silicon by 20%. Furthermore, renewable sources (hydroelectric) are used to supply energy to the production processes. Through these measures, the CO2 equivalent intensity per wafer is reduced by more than 50% compared with the current Chinese average. The project enables the deployment of PV modules to produce renewable electricity, which replaces fossil energy sources. Under conservative estimations, the project will thus reduce emissions by a minimum of 4.9 million tonnes CO2 equivalent over the first ten years of operation, which is more than what 630 000 average EU households emit in a year (according to data from the German greenhouse gas (GHG) Registry).

Acronym	Title	Description
		By producing ingots and wafers, the project covers critical elements in the PV supply chain that will be relocated to the EU. Hence, SunRISE advances climate action and helps to secure European energy independence amid increased geopolitical risks to the current supply chains. NorSun has a mature business case and strategic customer partnerships; the 3 gigawatt (GW) production output is already committed with letters of intent with two leading European cell and module manufacturers. The project will create around 300 additional jobs and help contribute to the broader rebuilding of the European solar supply chain and labour upskilling, including sourcing increasingly from European partners over time. By continuously improving the ingot pulling and wafer cutting processes, NorSun expects to achieve even greater levels of efficiency, reducing production costs and environmental impacts while improving its competitiveness. The experience gathered during large-scale industrial manufacturing will be built upon in further expansion plans and by the wider industry, helping to create a mature PV value chain in Europe and a more sustainable future.