Questions	No Significant negative impact?	Substantive justification
1. Climate change mitigation: Is the activity expected to lead to significant GHG emissions?	No	The activity is not expected to lead to significant greenhouse gas (GHG) emissions. Spiral Hydrogen's manufacturing facility will employ best practices and energy-efficient technologies to minimize GHG emissions throughout the production process. The facility will utilize electricity from renewable sources, advanced manufacturing equipment, and process optimizations to reduce energy consumption. Compliance with the European Union's life-cycle GHG emissions savings requirement remains a priority. We ensure that the units emit less than the 3 t CO_2e per ton of hydrogen threshold over their lifespan as per ISO 14067:2018 standards. Over the two-decade lifespan of each unit, the production of green hydrogen displaces the use of fossil fuels or conventionally produced (grey) hydrogen, leading to substantial GHG emissions reductions. Each unit is estimated to prevent the emission of approximately 89.6 t CO_2e based on the hydrogen production rate of 1 kg per day and the displacement of fossil fuel use or conventional hydrogen production methods. While the emissions avoided per unit are modest, the cumulative impact of deploying multiple units contributes significantly to climate change mitigation. Additionally, the units could be deployed in remote or off-grid locations, further supporting the transition to renewable energy sources and reducing dependence on fossil fuels. Therefore, the activity does not have a significant negative impact on climate change

		mitigation but instead supports efforts to reduce GHG emissions.
2. Climate change adaptation: Is the activity expected to lead to an increased adverse impact of the current climate and the expected future climate, on the measure itself or on people, nature or assets?	No	The activity is not expected to lead to an increased adverse impact of the current climate and the expected future climate on the activity itself or on people, nature, or assets. Spiral Hydrogen will conduct a thorough climate risk and vulnerability assessment to identify potential climate-related risks, including extreme weather events, temperature extremes, and flooding. Heating, ventilation, and air conditioning (HVAC) systems within the manufacturing facility will be set up to operate efficiently across a broad range of temperatures, ensuring optimal conditions for manufacturing processes under varying climate scenarios. The hydrogen production units, integrated into wooden wind turbines, are designed to be resilient to climate variations and extreme weather events. The use of spruce wood provides flexibility and strength, allowing the turbines to withstand high winds and structural stresses associated with extreme weather conditions. Critical components involved in hydrogen production are housed securely within the turbine structure and are made from corrosion-resistant materials to handle humidity and temperature fluctuations. The units remain operational across a wide temperature range from -20 °C to 50 °C, ensuring reliable performance in diverse climates. Sealing and gasket systems are employed to protect components from dust, moisture in tough weather conditions. Adaptation measures should include real-time monitoring of environmental conditions, allowing for proactive maintenance and operational adjustments in response to climate variations. Contingency plans and emergency response protocols will be established to address potential

		climate-related incidents thus protecting personnel and assets. By incorporating these comprehensive measures, Spiral Hydrogen ensures that its activities are resilient to climate change, avoiding any significant negative impacts related to climate change adaptation.
3. Sustainable use and protection of **water and marine resources:** Is the activity expected to be detrimental: • to the good status or the good ecological potential of bodies of water, including surface water and groundwater; or • to the good environmental status of marine waters?	No	The activity is not expected to be detrimental to the good status or ecological potential of bodies of water, including surface water and groundwater, nor to the good environmental status of marine waters. The hydrogen production units operate using a closed-loop water system that recycles water used in the electrolysis process. Advanced purification systems are in place to ensure that all water is reused, effectively eliminating wastewater discharge into the environment. Water will be sourced responsibly, with minimal withdrawal from local supplies, and operations are designed to avoid areas experiencing water scarcity or stress. Within the manufacturing facility, water usage will be optimized to reduce consumption through technologies like water-efficient cooling systems. Any wastewater generated will be treated onsite using advanced treatment systems that remove contaminants, ensuring that the water meets or exceeds regulatory standards before being reused or safely discharged. Strict protocols will be implemented to prevent accidental spills or leaks of chemicals and materials that could contaminate water bodies. The activity will comply with all relevant environmental regulations related to water protection, ensuring no negative impact on water quality or aquatic ecosystems. By managing water use responsibly and preventing pollution, Spiral Hydrogen avoids

		significant negative impacts on water and marine resources.
4. Transition to a circular economy, including waste prevention and recycling: Is the activity expected to: • lead to a significant increase in the generation, incineration or disposal of waste, with the exception of the incineration of non-recyclable hazardous waste; or • lead to significant inefficiencies in the direct or indirect use of any natural resource at any stage of its life cycle which are not minimized by adequate measures; or • cause significant and long-term harm to the environment in respect to the circular economy?	No	The activity is not expected to lead to significant inefficiencies in the direct or indirect use of natural resources at any stage of its life cycle, nor does it lead to a significant increase in the generation, incineration, or disposal of waste. It does not cause significant and long-term harm to the environment with respect to the circular economy. Spiral Hydrogen prioritizes resource efficiency by optimizing material use in design and engineering efforts, minimizing material usage without compromising product performance. The use of high-quality, durable materials extends the product lifespan, reducing the need for replacements and conserving resources. Advanced manufacturing techniques, such as precision machining and additive manufacturing, will be used to reduce waste generation during production. All waste will be carefully segregated at the source, with recyclable materials like metals collected separately and sent to certified recycling facilities. Hazardous waste, if any, will be handled by licensed waste management companies, ensuring safe disposal and full compliance with environmental regulations. Metals used in the units, including nickel, iron, and copper, are fully recyclable. Spiral Hydrogen will provide detailed guidelines to customers on recycling these materials at the end of the unit's life and partners with metal recycling companies to facilitate efficient collection and recycling processes. The company ensures that metals from decommissioned units are recovered and reintroduced into the production cycle, reducing the demand for virgin materials and minimizing environmental impact. The use of polymers and composites, which are more challenging to recycle, is minimized

		wherever possible. Guidance will be provided to clients on the responsible disposal of these materials. Units are designed for easy disassembly, allowing components to be separated for recycling or reuse. The ability to upgrade components extends the unit's lifespan and reduces the need for new materials. By focusing on resource efficiency, waste minimization, and effective recycling, the activity avoids significant inefficiencies and prevents long-term environmental harm, supporting the transition to a circular economy.
5. Pollution prevention and control: Is the activity expected to lead to a significant increase in the emissions of pollutants into air, water or land?	No	The activity is not expected to lead to a significant increase in the emissions of pollutants into air, water, or land. The manufacturing facility will employ high-efficiency particulate air (HEPA) filters and activated carbon filters to capture dust and volatile organic compounds (VOCs), preventing their release into the atmosphere. Wastewater treatment systems will be installed to remove contaminants such as heavy metals and chemicals before water is reused or safely discharged, ensuring compliance with environmental standards. Spill containment measures and proper storage of materials will be in place to prevent soil contamination. By selecting alkaline electrolyser technology that does not require materials with polluting extraction or processing methods—such as platinum and iridium for PEM electrolysers—the potential for pollution is inherently reduced. The use of hazardous chemicals is minimized, and when their use is necessary, strict protocols will be followed to prevent any environmental release. An ISO 14001-compliant environmental management system will be in operation, ensuring continuous monitoring and improvement of environmental performance. Emissions will be

		maintained within or below the levels associated with the best available techniques (BAT) for the industry. Regular environmental audits will be conducted to identify potential sources of pollution, and corrective actions are implemented promptly. Hazardous waste will be collected and disposed of by licensed waste management companies, adhering to all regulatory requirements to prevent environmental contamination. Oils, solvents, and other process materials will be recycled or regenerated whenever possible, reducing the need for disposal and minimizing environmental impact. Through these comprehensive pollution prevention and control measures, Spiral Hydrogen effectively avoids significant increases in pollutant emissions and prevents negative environmental impacts.
6. Protection and restoration of biodiversity and ecosystems: Is the activity expected to be: • significantly detrimental to the good condition and resilience of ecosystems; or • detrimental to the conservation status of habitats and species, including those of Union interest?	No	The activity is not expected to be significantly detrimental to the good condition and resilience of ecosystems or to the conservation status of habitats and species, including those of Union interest. The manufacturing facility will be located within an established industrial zone, away from protected areas, critical habitats, or regions of high biodiversity value. The establishment and operation of the facility will not involve the conversion of natural habitats or deforestation. Suppliers are required to adhere to strict environmental and social standards that protect biodiversity. This includes responsible mining practices that minimize habitat disturbance and promote land rehabilitation. Spiral Hydrogen will maintain traceability of key materials to ensure they are sourced from areas where biodiversity is not threatened. Operational measures will be in place to prevent accidental releases of pollutants that could harm local ecosystems, including

		robust spill prevention and emergency response plans. Engagement with local communities and stakeholders will ensure that any concerns related to biodiversity are identified and addressed promptly. By implementing these actions, the activity avoids significant negative impacts on biodiversity and ecosystems, ensuring the protection and resilience of natural habitats and species.
SUMMARY ASSESSMENT: Please sum up whether or not the activity has a significant negative impact in the given six criteria. Also, point out areas with a positive impact.	Spiral Hydrogen's activity does not have a significant negative impact on any of the six environmental criteria. The company's operations are designed to avoid significant harm while contributing positively to environmental objectives, aligning with the European Union's sustainability goals. Regarding climate change mitigation, the activity is shown to lead to significant positive impact. By producing green hydrogen using renewable energy sources and energy-efficient manufacturing practices, Spiral Hydrogen significantly reduces GHG emissions compared to conventional hydrogen production methods. Each unit prevents approximately 89.6 metric tons of CO_2e emissions over its 20-year lifespan compared to its own emissions of less than 3 metric tons of CO_2e over the same period, contributing positively to climate change mitigation efforts.	