S&P Global
Ratings

Powered by Shades of Green

An S&P Global Second Party Opinion (SPO) includes S&P Global Ratings' opinion on whether the documentation of a sustainable finance instrument, framework, or program, or a financing transaction aligns with certain third-party published sustainable finance principles. Certain SPOs may also provide our opinion on how the issuer's most material sustainability factors are addressed by the financing. An SPO provides a point-in-time opinion, reflecting the information provided to us at the time the SPO was created and published, and is not surveilled. We assume no obligation to update or supplement the SPO to reflect any facts or circumstances that may come to our attention in the future. An SPO is not a credit rating, and does not consider credit quality or factor into our credit ratings. See Analytical Approach: Second Party Opinions.

Second Party Opinion

Altech Batteries GmbH Green Bond Framework

Dec. 13, 2024

Location: Germany **Sector:** Batteries

Primary contact

Tim Axtmann
Oslo
+47 94 15 70 46
tim.axtmann
@spglobal.com

Alignment With Principles

Aligned = ✓ Conceptually aligned = ○ Not aligned = ✕

✓ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)

See Alignment Assessment for more detail.

Dark green

Activities that correspond to the long-term vision of a low-carbon climate resilient future.

Our Shades of Green Analytical Approach >

Strengths

Batteries are a crucial enabling technology in the climate transition and Altech Batteries GmbH's CERENERGY battery is expected to have comparatively low emissions. According to the framework, the battery has expected emissions of around 14 kgCO2/kWh capacity (scope 1, 2, and 3) and will be produced using renewable electricity and without fossil fuels. By way of comparison, the IIVL Swedish Environmental Research Institute has found an estimated range of 61-106 kg CO2/kWh cradle-to-gate emissions for lithium-ion batteries (NMC chemistry) for vehicles.

The CERENERGY battery does not require lithium or cobalt inputs. Lithium and cobalt are scarce resources, and their extraction and processing is typically emissions intensive and entails substantial environmental risks, which may increase further given expected growth in demand.

Weaknesses

No weaknesses to report.

Areas to watch

The CERENERGY battery uses various mined and processed raw materials which introduce environmental risks. The battery's key materials are sodium, alumina, and nickel, extraction and processing of which entails risks such as habitat and biodiversity risk, including potential deforestation. The issuer seeks to mitigate such risks through, for example, the use of recycled nickel, the battery's recyclability, and engaging suppliers with robust ESG approaches, with such issues considered in supplier selection.

Scope 3 emissions are not yet fully calculated. According to the issuer, the capacity figure for scope 3 emissions--about 10 kgCO2/kWh--derives from data provided by, and discussions with, large suppliers, transportation emissions, and conservative estimates for more minor suppliers. The issuer will publish updated emissions figures once scope 3 calculations are complete.

Eligible Green Projects Assessment Summary

Altech Batteries GmbH will allocate all net proceeds under the framework to finance the construction of its CERENERGY battery plant in Saxony, Germany. None of the proceeds will be used for refinancing.

Overall Shades of Green assessment

Based on the project category shades of green detailed below, and consideration of environmental ambitions reflected in Altech Batteries GmbH's Green Bond Framework, we assess the framework Dark green.

Eligible projects under the issuer's green bond framework are assessed based on their environmental benefits and risks, using Shades of Green methodology.

Activities that correspond to the long-term vision of a low-carbon climate resilient future.

Our Shades of Green Analytical Approach >

Construction of a battery manufacturing plant	**Dark green**
The construction of Altech Batteries GmbH's sodium chloride, solid state CERENERGY battery plant in Saxony, Germany.	

See Analysis Of Eligible Projects for more detail.

Issuer Sustainability Context

This section provides an analysis of the issuer's sustainability management and the embeddedness of the financing framework within its overall strategy.

Company Description

Altech Batteries GmbH is a German, limited-liability company established to commercialize a sodium chloride, solid state battery technology known as CERENERGY. The company is a joint venture between Altech Energy Holdings GmbH, which controls 75%, and the Fraunhofer-Gesellschaft, a German research institute which controls 25%.

Altech Energy Holdings GmbH is, in turn, held by Altech Batteries Ltd, an Australia-listed company which controls 75%, and Altech Advanced Materials AG, a Frankfurt-listed company which controls 25%. In addition to the CERENERGY battery project, these companies hold an interest in a project relating to an alumina-coated silicon anode material for batteries, also at the commercialization stage.

Material Sustainability Factors

Climate transition risk

Batteries are considered crucial particularly to the transition of the automotive and power sectors. Electric vehicles are the primary drivers of battery demand, with battery sales for electric vehicles at around 750 gigawatt hours (GWh) in 2023 (IEA data). In the power sector, for example, batteries can support the integration of variable renewable energy sources, with storage

capacity additions doubling in 2023 to around 90 GWh (IEA). Lithium-based batteries are the dominant battery chemistry in such applications, though increased development of alternative chemistries and solid-state batteries is expected (IPCC). Battery manufacturers nonetheless face risks if decarbonization of the automotive and power sectors is slower than anticipated, for example car manufacturers missing electric vehicle targets. Increasingly strained demand for raw material inputs is also a risk. Battery production, furthermore, is typically emissions intensive, arising from high-heat and chemical-based processes and raw mineral mining and processing, among other factors.

Physical climate risk

While fixed assets such as manufacturing plants are exposed to changing and more volatile weather, battery manufacturers' most material physical climate risks are typically located in supply chains. Many key raw material inputs are mined and therefore especially exposed to changing local weather conditions and are often located in areas particularly vulnerable to climate change, for example lithium extraction in water-scarce areas. Given the volume of different inputs, raw materials need to be sourced from a broad range of jurisdictions. At the same time, several specific inputs (including rare earth elements) are only found in a handful of jurisdictions--this adds to the complexity of battery manufacturers' physical climate risk exposure.

Biodiversity and resource use

In battery manufacturing, biodiversity and resource use risks are especially material in raw material mining, extraction, and processing and can relate to, for example, land use change, water use and contamination, and waste generation. Such risks are particularly well documented in lithium and cobalt supply chains, and also arise in respect of inputs for other battery chemistries, such as nickel and bauxite. Biodiversity and resource use risks can also arise from the construction of production facilities and from resources use at such facilities (such as process water), as well as at end of life. Reuse and recycling of batteries can contribute to reducing biodiversity and resource use risks.

Issuer And Context Analysis

Through its framework, Altech Batteries GmbH seeks to contribute to reducing emissions associated with battery manufacturing and--via the use of its batteries--to the transition of the power and industrial sectors. The CERENERGY project will nonetheless introduce some climate transition risk, notwithstanding the technologies and measures the issuer has adopted in respect of emissions, as well as potential physical and biodiversity risks, especially in the supply chain. While the CERENERGY project does not directly reduce or alter the climate and environmental risks relating to Altech Batteries group's other project, it can be considered to diversify exposure to such risks, particularly because the CERENERGY battery does not use lithium or cobalt.

Altech Batteries group's projects seek to support the transition of the automotive, power, and industrial sectors and to demonstrate direct-emissions reductions. The first project relates to the development of alumina-coated silicon anode material for batteries. According to Altech Batteries group's analysis, the coating allows for a 2.5x improvement in battery capacity per gram of anode material and a 52% reduction in emissions per unit of capacity. The second project relates to the CERENERGY sodium chloride battery (the focus of the green bond framework considered in this Second Party Opinion), expected to be used primarily in the industrial and power sectors. The production process will use only renewable energy and no fossil fuels (except potentially as a backup power system in case of emergency), contributing to expected production emissions of around 14 kgCO_2/kWh capacity (scope 1, 2, and 3). By way of comparison, a 2019 paper from by the IVL Swedish Environmental Research Institute found an estimated range of 61-106 kg CO_2/kWh cradle-to-gate emissions for lithium-ion batteries (NMC chemistry) for vehicles, depending mainly on the electricity mix.

At the same time, the projects remain exposed to a certain amount of transition risk. Synthetic silicon, a key input in its alumina coating, for example, depends on fossil fuel-based inputs and the projects are exposed to sizable emissions in the raw material supply chain. The alumina coating project is, moreover, indirectly exposed to the typically higher emitting lithium (battery)

sector, though the CERENBERGY project can be considered to diversify this exposure given that it does not rely on lithium chemistries.

Altech's plants and supply chains will be exposed to physical climate risk. Altech has increasingly integrated physical risk considerations into its operations. It mentions that physical risk is embedded into its risk assessment frameworks and strategic planning processes, while, according to Altech Batteries group, it aligns public reporting with frameworks such as that of the Task Force on Climate-Related Financial Disclosures. Risk assessments extend to the supply chain. Physical risk is also considered for facilities, for example Altech Batteries GmbH considers potential exposure to extreme weather and the robustness of local infrastructure in site selection for the CERENERGY project.

Altech Batteries group's projects rely on various mined, extracted, and processed raw materials, which introduces biodiversity and resource use risks. An example is the silicon in its alumina coating, which derives from mined quartz, while the CERENERGY project requires mined bauxite and nickel. Such risks also exist indirectly, such as in respect of the coating's exposure to the lithium (battery) sector. According to Altech Batteries group, it only engages with suppliers with robust ESG approaches--such issues are considered and screened for in supplier selection, for example via questionnaires and in discussions- and it also deploys implementation/monitoring tools. The issuer's use of recycled nickel in its CERENERGY batteries and the recyclability of these batteries also contribute to the management of such risks.

Alignment Assessment

This section provides an analysis of the framework's alignment to Green Bond principles.

Alignment With Principles

Aligned = ✓ Conceptually aligned = O Not aligned = ✕

✓ Green Bond Principles, ICMA, 2021 (with June 2022 Appendix 1)

✓ Use of proceeds

We assess the framework's only eligible project--the construction of CERENERGY battery plant--as having a green shade. Please refer to the Analysis Of Eligible Projects section for more information on our analysis of the environmental benefits of the expected use of proceeds.

Net proceeds will finance only capital expenditure and refinancing is not eligible.

✓ Process for project evaluation and selection

The framework contains only one, pre-selected eligible project. In evaluating the CERENERGY project, the issuer carried out a "detailed feasibility study," which includes an assessment of social and environmental risks, as well as an "expert risk workshop" to identify, review, and assign preventative action to potential risks.

✓ Management of proceeds

The issuer is a special purpose vehicle and proceeds under the framework will be placed in an escrow account in its name. The issuer's CFO will track payments made in respect of the eligible project from the account. Unallocated proceeds will be placed in low-risk, interest bearing deposits, in line with the issuer's liquidity management policy.

✓ Reporting

The issuer will make public an annual "green investor report" until all outstanding bonds mature. This will include information on the allocation of proceeds and the impacts of the eligible green project.

Allocation reporting will include the amounts allocated/unallocated, as well as progress and details of the eligible project. The framework includes example impact indicators such as energy consumption per kWh produced, and CO2 emissions reductions and savings. In respect of the latter, according to the issuer, this will entail benchmarking against other producers of sodium-based batteries, as well as lithium-based technologies.

Altech Batteries GmbH commits in the framework to an external audit of its green bond reporting, as well as a third-party review and audit of the data used, and calculations included in its impact reporting.

Analysis Of Eligible Projects

This section provides details of our analysis of eligible projects, based on their environmental benefits and risks, using the Shades of Green methodology.

Overall Shades of Green assessment

Based on the project category shades of green detailed below, the expected allocation of proceeds, and consideration of environmental ambitions reflected in Altech Batteries GmbH's framework, we assess the framework Dark green.

Activities that correspond to the long-term vision of a low-carbon climate resilient future.

Our Shades of Green Analytical Approach >

Green project categories

Construction of a battery manufacturing plant

Assessment	Description
Dark green	The construction of Altech Batteries GmbH's sodium chloride, solid state CERENERGY battery plant in Saxony, Germany.

Analytical considerations

- We assess the project category as Dark green, primarily reflecting the importance of battery storage in the transition of the power and industrial sectors, the contribution to the development of alternative, lithium- and cobalt-free batteries, and the CERENEGY battery's comparatively low expected emissions and fossil-free direct production process.
- The CERENERGY battery is a solid state, sodium chloride battery. While lithium-based batteries are expected to continue as the dominant battery technology going forward, sodium-based batteries are anticipated to play an increasing role, particularly in the stationary storage market. In the IEA's STEPS scenario, for example, sodium-based batteries account for around 10% of annual capacity additions by 2030. Shifts to sodium-based batteries are expected because they require no critical mineral/metal inputs such as lithium or cobalt, for example the primary materials in the CERENERGY battery are sodium, alumina, and (recycled) nickel derivatives. Nonetheless, solid state, sodium-based batteries remain an emerging technology, with less extensive academic literature into their environmental performance compared with lithium-based equivalents.
- According to the framework, the CERENERGY battery has expected emissions of around 14 kgCO2/kWh capacity (scope 1, 2, and 3). According to the framework, scope 1 and 2 emissions are 4.07 kgCO2/kWh capacity. Scope 3 emissions, on the other hand, have not yet been fully calculated. According to the issuer, the capacity figure for scope 3 emissions of about 10 kgCO2/kWh derives from data provided by, and discussions with, large suppliers, transportation emissions, and conservative estimates for more minor suppliers. Altech Batteries GmbH will publish updated emissions figures once scope 3 calculations are complete. By way of comparison, a 2019 paper from by the IVL Swedish Environmental Research Institute found an estimated range of 61-106 kg CO2/kWh cradle-to-gate emissions for lithium-ion batteries (NMC chemistry) for vehicles, depending mainly on the electricity mix.
- The entire CERENERGY direct production process will be powered by renewable energy--Altech Batteries GmbH has entered a power purchase agreement for the direct provision of solar energy, complemented by on-site solar installations. Fossil fuels are not used in direct production, though there is a possibility fossil fuels are used as a backup power system in case of emergency.
- The CERENERGY battery contains raw materials that entail environmental risks during mining and processing, namely alumina from bauxite, nickel, and sodium. According to the issuer, it only engages with suppliers with robust ESG approaches: such issues are considered and screened for in supplier selection and it also deploys

implementation/monitoring tools. Altech Batteries GmbH uses recycled nickel in its batteries, and 97% of the nickel is recoverable in its recycling process, contributing to lower exposure to environmental risks. Bauxite, nickel, and sodium are also comparatively abundant compared with lithium and cobalt, key inputs in lithium-based batteries. The lithium and cobalt sectors are particularly exposed to environmental risk, and expected increases in demand could result in even higher environmental pressures.

- According to Altech Batteries GmbH, the CERENEGY battery is fully recoverable/recyclable, including for direct re-use of parts in CERENERGY batteries, for example nickel, or for use in other industries, for example ceramics to be used in the construction industry. The use of recycled materials reduces emissions from material inputs and reduces ongoing exposure to environmental risks associated with their mining and processing. Recycling of the CERENERGY battery will take place at the plant and is carried out via mechanical--rather than chemical--recycling methods, which typically entail lower emissions and energy use.
- Altech Batteries GmbH foresees large demand from industry for the CERENERGY battery. This could, in particular, relate to the use of batteries in industrial micro grids, or to support systems in data centers, logistics centers, and hospitals. It also considers heavy industry, such as steel and chemicals as potential end users. The use of batteries in industry contributes to the transition if they support or facilitate decarbonization and electrification efforts, rather than, for example, power-cost optimization. The issuer furthermore foresees grid storage as a large use of the CERENERGY battery, whether co-located with renewable assets or directly integrated into transmission networks. Such use of batteries is crucial for the integration of variable renewable energy sources (including for backup or peak load) and demand management, as well as for supporting grid reliability and stability, though can also be used for other purposes, for example purely for price arbitrage.
- The issuer screened the CERENERGY battery plant and supporting infrastructure (e.g. roads and power supply) for physical climate risks. Consideration of physical risk also extends to its supply chain, for example in its supplier risk assessments and consideration of potential disruption to supply chain logistics.

S&P Global Ratings' Shades of Green

Assessments	Dark green	Medium green	Light green	Yellow	Orange	Red
Description	Activities that correspond to the long-term vision of an LCCR future.	Activities that represent significant steps toward an LCCR future but will require further improvements to be long-term LCCR solutions.	Activities representing transition steps in the near-term that avoid emissions lock-in but do not represent long-term LCCR solutions.	Activities that do not have a material impact on the transition to an LCCR future, or, Activities that have some potential inconsistency with the transition to an LCCR future, albeit tempered by existing transition measures.	Activities that are not currently consistent with the transition to an LCCR future. These include activities with moderate potential for emissions lock-in and risk of stranded assets.	Activities that are inconsistent with, and likely to impede, the transition required to achieve the long-term LCCR future. These activities have the highest emissions intensity, with the most potential for emissions lock-in and risk of stranded assets.
Example projects	Solar power plants	Energy efficient buildings	Hybrid road vehicles	Health care services	Conventional steel production	New oil exploration

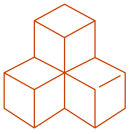
Note: For us to consider use of proceeds aligned with ICMA Principles for a green project, we require project categories directly funded by the financing to be assigned one of the three green Shades.

LCCR--Low-carbon climate resilient. An LCCR future is a future aligned with the Paris Agreement; where the global average temperature increase is held below 2 degrees Celsius (2 C), with efforts to limit it to 1.5 C, above pre-industrial levels, while building resilience to the adverse impact of climate change and achieving sustainable outcomes across both climate and non-climate environmental objectives. Long term and near term--For the purpose of this analysis, we consider the long term to be beyond the middle of the 21st century and the near term to be within the next decade. Emissions lock-in--Where an activity delays or prevents the transition to low-carbon alternatives by perpetuating assets or processes (often fossil fuel use and its corresponding greenhouse gas emissions) that are not aligned with, or cannot adapt to, an LCCR future. Stranded assets--Assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities (as defined by the University of Oxford).

Mapping To The U.N.'s Sustainable Development Goals

Where the Financing documentation references the Sustainable Development Goals (SDGs), we consider which SDGs it contributes to. We compare the activities funded by the Financing to the International Capital Markets Association (ICMA) SDG mapping and outline the intended linkages within our SPO analysis. Our assessment of SDG mapping does not impact our alignment opinion.

This framework intends to contribute to the following SDGs:

Use of proceeds	SDGs			
Construction of a battery manufacturing plant				
	7. Affordable and clean energy	**9. Industry, innovation and infrastructure**	**12. Responsible consumption and production**	**13. Climate action**

The eligible project categories link to these SDGs in the ICMA mapping.

Related Research

- Analytical Approach: Second Party Opinions: Use of Proceeds, July 27, 2023
- FAQ: Applying Our Integrated Analytical Approach for Use-of-Proceeds Second Party Opinions, July 27, 2023
- Analytical Approach: Shades of Green Assessments, July 27, 2023
- S&P Global Ratings ESG Materiality Maps, July 20, 2022

Analytical Contacts

Primary contact

Tim Axtmann
Oslo
+47 94 15 70 46
tim.axtmann
@spglobal.com

Secondary contact

Kristina Alnes
Oslo
+47 94 15 31 14
kristina.alnes
@spglobal.com

Standard & Poor's Financial Services LLC or its affiliates (collectively, S&P) receives compensation for the provision of the Second Party Opinions product (Product). S&P may also receive compensation for rating the transactions covered by the Product or for rating the issuer of the transactions covered by the Product. The purchaser of the Product may be the issuer.

The Product is not a credit rating, and does not consider credit quality or factor into our credit ratings. The Product does not consider, state or imply the likelihood of completion of any projects covered by a given financing, or the completion of a proposed financing. The Product encompasses Use of Proceeds Second Party Opinions and Sustainability-Linked Second Party Opinions. An S&P Global Use of Proceeds Second Party Opinion provides an opinion on an issuer's sustainable finance instrument, program, or framework, and considers the financing in the context of the issuer's most material sustainability factors, the issuer's management of additional sustainability factors relevant to the sustainable financing, and provides an opinion regarding alignment with certain third-party published sustainable finance principles ("Principles"). An S&P Global Ratings Sustainability-Linked Second Party Opinion considers features of a financing transaction and/or financing framework and provides an opinion regarding alignment with relevant Principles. For a list of the Principles addressed by the Product, see the Analytical Approach, available at www.spglobal.com. The Product is a statement of opinion and is neither a verification nor a certification. The Product is a point in time evaluation reflecting the information provided to us at the time that the Product was created and published, and is not surveilled. The Product is not a research report and is not intended as such. S&P's credit ratings, opinions, analyses, rating acknowledgment decisions, any views reflected in the Product and the output of the Product are not investment advice, recommendations regarding credit decisions, recommendations to purchase, hold, or sell any securities or to make any investment decisions, an offer to buy or sell or the solicitation of an offer to buy or sell any security, endorsements of the suitability of any security, endorsements of the accuracy of any data or conclusions provided in the Product, or independent verification of any information relied upon in the credit rating process. The Product and any associated presentations do not take into account any user's financial objectives, financial situation, needs or means, and should not be relied upon by users for making any investment decisions. The output of the Product is not a substitute for a user's independent judgment and expertise. The output of the Product is not professional financial, tax or legal advice, and users should obtain independent, professional advice as it is determined necessary by users.

While S&P has obtained information from sources it believes to be reliable, S&P does not perform an audit and undertakes no duty of due diligence or independent verification of any information it receives.

S&P and any third-party providers, as well as their directors, officers, shareholders, employees, or agents (collectively S&P Parties) do not guarantee the accuracy, completeness, timeliness, or availability of the Product. S&P Parties are not responsible for any errors or omissions (negligent or otherwise), regardless of the cause, for reliance of use of information in the Product, or for the security or maintenance of any information transmitted via the Internet, or for the accuracy of the information in the Product. The Product is provided on an "AS IS" basis. S&P PARTIES MAKE NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDED BUT NOT LIMITED TO, THE ACCURACY, RESULTS, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT, OR FOR THE SECURITY OF THE WEBSITE FROM WHICH THE PRODUCT IS ACCESSED. S&P Parties have no responsibility to maintain or update the Product or to supply any corrections, updates, or releases in connection therewith. S&P Parties have no liability for the accuracy, timeliness, reliability, performance, continued availability, completeness or delays, omissions, or interruptions in the delivery of the Product.

To the extent permitted by law, in no event shall the S&P Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs or losses caused by negligence, loss of data, cost of substitute materials, cost of capital, or claims of any third party) in connection with any use of the Product even if advised of the possibility of such damages.

S&P maintains a separation between commercial and analytic activities. S&P keeps certain activities of its business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain business units of S&P may have information that is not available to other S&P business units. S&P has established policies and procedures to maintain the confidentiality of certain nonpublic information received in connection with each analytical process.

For PRC only: Any "Second Party Opinions " or "assessment" assigned by S&P Global Ratings: (a) does not constitute a credit rating, rating, sustainable financing framework verification, assessment, certification or evaluation as required under any relevant PRC laws or regulations, and (b) cannot be included in any offering memorandum, circular, prospectus, registration documents or any other document submitted to PRC authorities or to otherwise satisfy any PRC regulatory purposes; and (c) is not intended for use within the PRC for any purpose which is not permitted under relevant PRC laws or regulations. For the purpose of this section, "PRC" refers to the mainland of the People's Republic of China, excluding Hong Kong, Macau and Taiwan.

For India only: Any "Second Party Opinions" or "assessments" assigned by S&P Global Ratings to issuers or securities listed in the Indian securities market are not intended to be and shall not be relied upon or used by any users located in India.