



ALTECH  
**cerenergy**<sup>®</sup>  
Sodium Chloride Solid State Batteries

CERENERGY<sup>®</sup>-GridPack-Factory for Sodium  
Chloride Solid State Batteries

**GREEN BOND FRAMEWORK**



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# 1. INTRODUCTION

Altech Batteries GmbH is a joint venture company formed between the Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. and Altech Energy Holdings GmbH for the commercialisation of a novel Sodium Chloride Solid State Battery for stationary use that is 100% safe environmentally friendly, has a larger than 15 years service life and does not require any external thermal management such as cooling or heating. This Altech battery is trademarked as CERENERGY® and with 1MWh GridPack containerised battery system, primarily intended for large scale grid applications and industrial use. Once production capacity for the battery has been increased to Giga scale, it is the intention to enter the consumer market with smaller battery systems for 60kWh Grid Pack, 12kWh Module or less.

The Fraunhofer Gesellschaft, based in Germany, is the world's leading organisation for application-oriented research. With its focus on future-oriented key technologies and the utilisation of results in business and industry, it plays a central role in elevating innovative processes into the industry. Founded in 1949, the organisation currently operates 76 institutes and research facilities in Germany with 30,800 employees an annual research budget of more than EUR 3 billion.

Altech's stake in the project company Altech Batteries GmbH is held via Altech Energy Holdings GmbH, by Altech Batteries Ltd. (75%) listed on the Australian Stock Exchange and Altech Advanced Materials AG (25%) listed on the German Stock Exchange in Frankfurt am Main.

At Altech Group the purpose is to revolutionise energy storage and battery materials in order to support the energy transition from a fossil fuel carbon-based economy to a renewable energy economy.

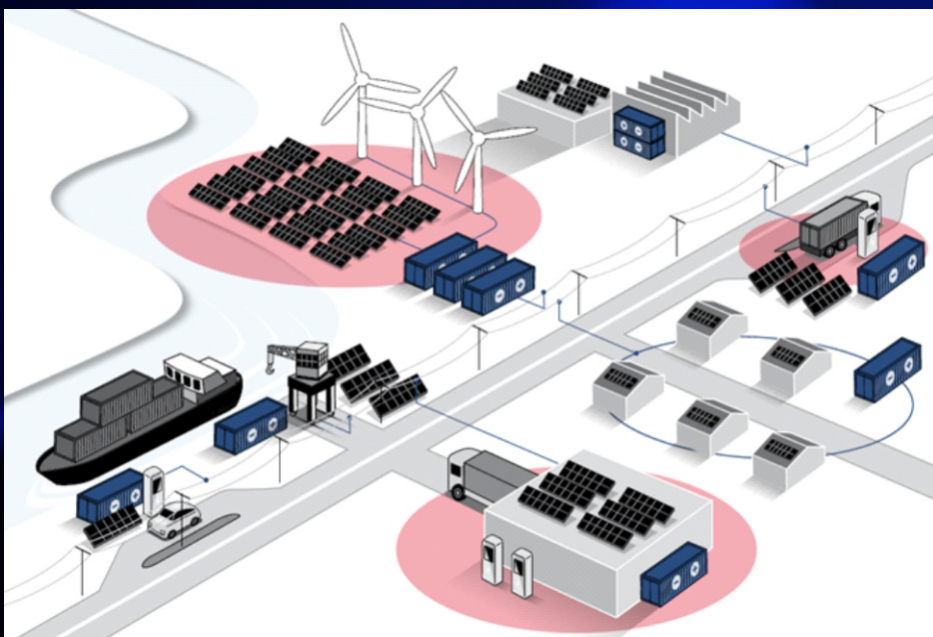


Figure 1: Schematic Energy Transition Concept (Source: Altech)

## 2. STRATEGY AND RATIONALE

Altech Batteries GmbH, a jointly owned subsidiary of Altech Batteries Limited (Perth, Australia), Altech Advanced Materials AG (Frankfurt, Germany) and Fraunhofer Gesellschaft für angewandte Forschung e.V. (Munich, Germany), is aiming to become a leading producer of sustainable and environmentally friendly large scale CERENERGY® Sodium Chloride Solid State Batteries through the construction of a fully automated, state of the art 120 MWh first line production plant followed by GWh production scale up at Altechs property in Schwarze Pumpe Industrial Park, Saxony, Germany.

Altech Batteries GmbH follows and complies with international recognised environmental standards and practices including the Equator Principles<sup>1</sup> and

International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability. Altech has developed an Environmental Management System (EMS) in accordance with ISO 14001, which will be implemented upon start of construction and includes beside others a stringent management and monitoring program for air emissions, waste water emissions, solid wastes, dust and noise. In addition, Altech has developed Health and Safety, and Labour management plans, which follow the IFC EHS Guidelines and International Labour Organisation (ILO) Core Labour Standards.

This Green Bond Framework is based on the International Capital Markets Association (ICMA) Green Bond Principles (GBP), 2021 version. Additionally, this Green Bond Framework considers the EU Taxonomy Regulation where applicable. As the green bond market evolves, Altech's Framework may be revised or updated to stay aligned with changing expectations, best market practices, and the regulatory landscape in Germany and the EU.

As part of the Altech management team's commitment to environmental policy and management, bi-annual management reviews shall be undertaken to ensure environmental audits have been completed and actions addressed, any environmental incidents have been reported and investigated, and all monitoring and statutory reporting obligations have been completed. The management review team shall consist of the top management including the Managing Director, Operations Manager, and Environment and Health & Safety Manager and shall be reported on a regular basis to the supervisory board of the parent companies as well as in the annual report

On the basis of the novel CERENERGY® technology and its inherent environmental advantages from simple local supply chains, noncritical battery materials, low CO2 footprint production process to life cycle circular economy, the green bond framework provides Altech with transparency and builds investor confidence by detailing how funds will be used specifically for this environmentally sustainable CERENERGY® battery project in Saxony, Germany. It ensures that Altech complies with recognised standards like the Green Bond Principles and maintains its integrity for the green bond market. The framework outlines the

environmental objectives and expected benefits, providing clear communication to stakeholders and establishing a foundation for accountability through regular reporting and third-party audits. This approach helps Altech attract investors who prioritise environmental, social, and governance (ESG) criteria, potentially leading to more favourable financing terms. Furthermore, issuing green bonds under this framework enhances Altech's reputation and aligns its financial activities with its commitment to sustainability and environmental stewardship.

Altech considers the issuance of a Green Bond as part of its project financing structure. An offer letter was issued by Pareto Securities to provide a substantial part of the overall project funding required for the CERENERGY® project.

<sup>1</sup> <https://equator-principles.com/>

<sup>2</sup> [https://www.ifc.org/wps/wcm/connect/Topics\\_Ext\\_Content/IFC\\_External\\_Corporate\\_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards/](https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards/)

<sup>3</sup> [https://www.ifc.org/wps/wcm/connect/Topics\\_Ext\\_Content/IFC\\_External\\_Corporate\\_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/](https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/)

<sup>4</sup> <https://www.ilo.org/global/standards/introduction-to-international-labour-standards/conventions-and-recommendations/lang-en/index.htm>

<sup>5,6</sup> <https://www.icmagroup.org/assets/documents/Sustainable-finance/2022-updates/Green-Bond-Principles-June-2022-060623.pdf>

## THE STRUCTURE OF THE GREEN BOND FRAMEWORK

The Altech Batteries GmbH Green Bond Framework meets the four pillars of the Green Bond Principles (GBP).

- Use of proceeds
- Project evaluation and selection process
- Management of proceeds
- Reporting

To ensure alignment with international standards, Altech Batteries has assigned S&P Global Ratings for a Second Opinion Report.

Altech is convinced that its CERENERGY® Sodium Chloride Solid State Battery plant will provide a very positive impact in alignment to several sustainability goals and guidelines. Key Aspects of the project are outlined in the following.

## 2.1 ENVIRONMENTAL IMPACT OF CERENERGY®

The CERENERGY® Sodium Chloride Solid State Battery only consists of common Salt, Alumina and some Nickel derivatives sourced from re-cycled Nickel. CERENERGY® battery cells have a self-forming anode and do not contain any Cobalt, Copper, Graphite or Lithium. In contrast, Lithium-Ion batteries always require critical materials in certain variations subject to cell chemistry, NMC, LFP and others, even Sodium-Ion batteries do so. Cobalt, Lithium, Graphite, Copper are not only expensive raw materials with long and critical supply chains, but pose environmental and ethical risks.



The CERENERGY® battery required raw material Sodium is a most common mineral and Alumina from Silica or Quartz is readily available. Re-processed Nickel is available and presently sourced from England. All other goods and materials required are sourced locally. This adds a significant business and price security for CERENERGY® battery production and permits a substantial lower CO2 footprint of the battery, which is a significant advantage for the end-user. In contrast, for Lithium-Ion battery production, complex supply chain structures are required to source Cobalt from the Republic of Congo, Lithium and Graphite from China or Copper from Chile.

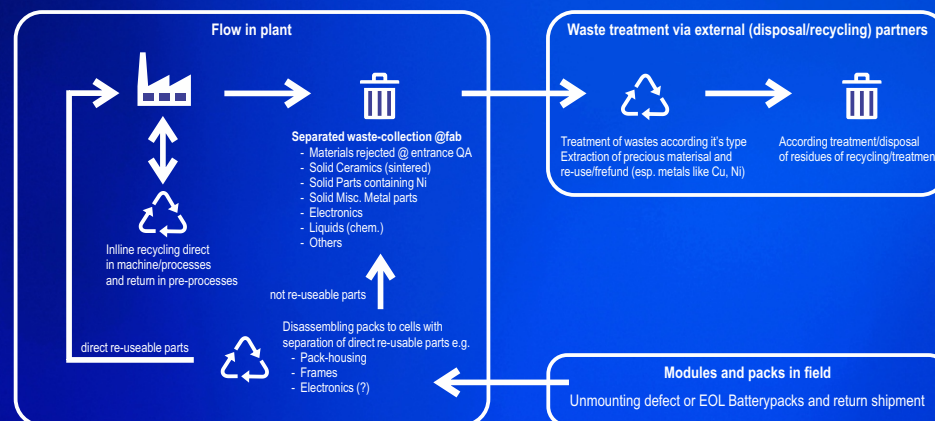
The CERENERGY® Sodium Chloride Solid State batteries being entirely safe and none-hazardous can be installed anywhere without restriction. It does not require a safety radius, blast area or protection, no gas detection or fire suppression systems. It is therefore that large CERENERGY® battery systems can be deployed in many applications and locations, where other battery types are prohibited. This is in public areas, hospitals, gas stations, shopping malls, dangerous industrial operations, augmented EV fast charge station and many more. For the same reason it is possible and permissible without restriction or any adverse effect to stack CERENERGY® Grid Pack up to five high, place them next to each other or in line. Considering the value of space in populated public or industrial areas, this is a great advantage.



## 2.2 RECYCLING AND WASTE TREATMENT

Due to the battery chemistry, its advanced production process and the materials used it is possible to source all raw materials and semifinished products in Europe, mainly Germany. No environmentally hazardous substances are required, and their problematic extraction is therewith eliminated. Short delivery routes and simple material extraction in locations with comprehensive governance are key parameters of CERENERGY® batteries being a sustainable product. The planned

delivery and distribution logistics by rail adds to the reduction of the CO<sub>2</sub> footprint. In addition, the production plant is designed to operate 24/7 with renewable energy and without the use of gas.



Due to an impending shortage of battery materials driven by planned production volumes (e.g., 23 million EVs in the EU) and potential supply chain constraints, maximising the recycling and reutilisation of materials is crucial. However, Lithium-Ion battery recycling is hazardous, energy intensive and a complex mechanical and chemical process. Contrary to Lithium-Ion batteries CERENERGY® battery recycling is safe and simple.

To address the recycling requirement and therewith the overall product cycle economy Altech has developed a recycling process/plant to recover 100% of all materials used. This process begins with the collection of all materials from the initial production step, followed by separation along the technological process chain, and recycling based on their processing status. The recycling concept requires mechanical processing without any smelting process, use of chemical or environmentally harmful substances and permits simple magnetic separation for the nickel, of which 97% are recoverable.

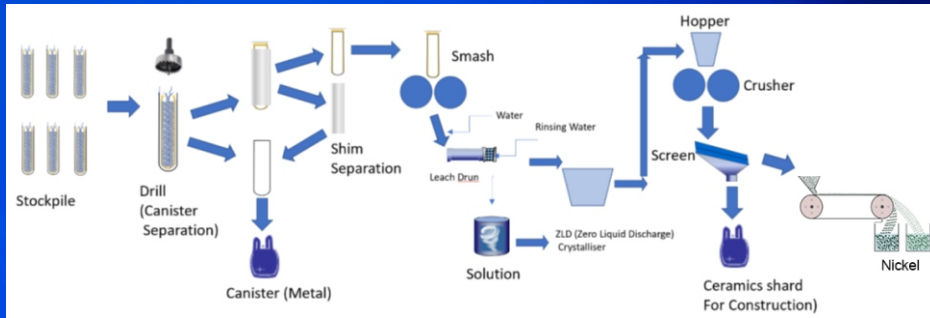


Figure 2: CERENERGY® Recycling Process Showcase (Source: Altech)

## 2.3 ALTECH'S RESPONSIBILITY

Altech is yet to conduct corporate-level Greenhouse Gas (GHG) inventory across the entire business entity in line with the GHG Protocol Corporate Accounting and Reporting Standard. Due to Altech's size and minimal level of activity as a start-up, Altech have not yet created a GHG emissions inventory and set any science-based reduction targets. Altech plans to understand its GHG inventory as part of the various financing and development stages of its projects. In addition, the aim is to comply with German and European environmental regulations, as well as international standards such as the Equator Principles and IFC Performance Standards on Environmental and Social Sustainability. This disclosure shall be updated when the projects progress further and we conduct the appropriate GHG inventory assessments. Altech is committed to reducing our GHG emissions in line with industry standards and best practices. We believe that our efforts to reduce emissions will not only benefit the environment but will also support our long-term business success and create value for our stakeholders.

Further, Altech takes responsibility for an alignment of all its projects according to SDG, EU Taxonomy, and ICMA standards.



Figure 3: Sustainable Development Goals (Source: UN)

## 3. USE OF PROCEEDS

Altech undertakes to use proceeds of the Green Bond or any source only for this project at project company level, Altech batteries GmbH in compliance, with the strong environmental benefits and its implemented control mechanisms.

Net proceeds for Altech Batteries GmbH will be exclusively used to finance the construction of Altech's Sodium Chloride Solid State CERENERGY® Battery plant in Saxony, Germany, with no other investments eligible under this framework. The plant will use 100% of local sourced renewable energy as source of electricity. Altech's plant design includes state-of-the-art process equipment and best

available techniques (BATs) for emissions management to ensure compliance with, and exceed, local environmental regulations and IFC Environmental Guidelines. Altech Batteries GmbH as issuer of this Green Bond Framework is a special purpose vehicle of the Altech Group to realise the CERENERGY® Battery Project.

Net proceeds will not be used for re-financing reasons.

## CERENERGY® TECHNOLOGY BENEFITS

Sodium Chloride Solid State CERENERGY® Batteries from Altech provide a durable, safe, and high-performing alternative for Battery Energy Storage Systems (BESS). The stationary battery does not require any peripherals such as HVAC, fans, fire alarms or extinguishing systems since the battery can be operated in any temperature range and causes no hazards from fire or explosions. The ability of being stacked and being shipped even fully charged is unique. Due to the material composition, CERENERGY® battery production can be supported almost everywhere through local supply chains and provides a decoupling from global supply chain for critical materials such as graphite, lithium, cobalt or copper. This decoupling permits not only technical security, but commercial independence and prevents any potential blackmail through leading Asian or Chinese material suppliers.

### 1. Environmentally friendly raw materials

The CERENERGY® Sodium Chloride Solid State battery only consists of common Salt, Alumina and some Nickel derivatives sourced from re-cycled Nickel. CERENERGY® battery cells have a self-forming anode and do not contain any Cobalt, Copper, Graphite or Lithium. In contrary Lithium-Ion batteries always require critical materials in certain variations subject to cell chemistry, NMC, LFP and others, even Sodium-Ion batteries do so. Cobalt, Lithium, Graphite, Copper are not only expensive raw materials but pose supply chain and ethical risks.

### 2. Local Supply Chains

The raw material Sodium, required for CERENERGY® Sodium Chloride Solid State battery, is a most common mineral and Alumina from Silica or Quartz is readily available. Re-processed Nickel is sourced from England. All other goods and materials required are sourced locally. This adds a significant business and price security for CERENERGY® battery production and permits a substantial lower CO<sub>2</sub> footprint of the battery, which is a significant advantage for the end-user.

### 3. Durability

The CERENERGY® Sodium Chloride Solid State battery do not age in terms of capacity, they do not degrade and have no loss of active material during its service life. Principle reason being that the battery does not have an anode but forms and dissolves the anode during charge and discharge, which is entirely reversible. During charge  $\text{Ni} + 2\text{NaCl}$  form  $\text{NiCl}_2 + 2\text{Na}$  (yellow) and the discharge vice versa were again  $\text{Ni} + 2\text{NaCl}$  is formed (grey). This is a significant commercial advantage as the full cycle capacity is maintained throughout the service life. This stability has been proven beyond any doubt. In contrary it is a known fact that Lithium-Ion batteries age and degrade through time due to many different chemical and electrochemical processes taking place during operation, and more so stressed operation of fast charge/discharge or multiple cycles during 24h and was again proven during the above-mentioned test program by ITP Renewables<sup>7</sup>.

### 4. Safety

The CERENERGY® Sodium Chloride Solid State battery does not contain any flammable materials only Salt, Ceramic and some Nickel and therefore contains no materials that could catch fire, nor burn. In contrary it is common knowledge that there are no 100% safe Lithium-Ion batteries. Lithium-Ion batteries contain flammable electrolyte and separators beside the fact that it generates Oxygen from the cathode which renders any Lithium-Ion battery fire practically inextinguishable. Lithium-Ion batteries do have thermal runaway, catching fire and can explode.

<sup>7</sup> Public Report 11. Lithium-Ion Battery Testing 2021" chapter 6.3 Phase 3 Capacity Test Results, Fig. 19, P22 by ITP Renewables, Level 1, 19-23 Moore Street, Turner ACT 2612, Australia, Email: info@itpau.com.au

## CERENERGY® GHG EMISSION – BASIS OF DESIGN

Altech's plant design was estimated in accordance with the German Federal Emission Control Act (BImSchG), formally known as the Act on Protection against Harmful Environmental Impacts from Air Pollution, Noise, Vibration, and Similar Processes, is a key component of environmental law. Its purpose is to protect humans, animals, plants, soil, water, the atmosphere, as well as cultural and other material assets from harmful environmental impacts. The Act aims to prevent, avoid, and minimise harmful effects caused by emissions to air, water, and soil. In addressing Scope 1 and 2 emissions, Altech has achieved a benchmark of 4.07 kgCO<sub>2</sub>eq per kWh produced, with an annual energy consumption of 20,500,000 kWh. This results in annual CO<sub>2</sub> emissions of 492,000 kg, achieved by exclusively utilising renewable energy and transitioning processes to electric power. Altech's CERENERGY® Battery Plant is designed to achieve Scope 3 emissions significantly below 10 kgCO<sub>2</sub>eq per kWh produced across the entire production value chain, including grinding, mixing, milling, compacting, sintering, and assembly processes. This estimate is based on already available data from key suppliers, with some sub-supplier data still pending. Scope 3 emission calculations will be published once all necessary information is available. Altech's objective is to mitigate all fossil fuel powered processes by employing special technology such as the special design electric plasma tunnel kiln operated with renewable electricity only. By having implemented this electrical tunnel kiln instead of a common gas-powered tunnel kiln, Altech is able to save more than 740 tCO<sub>2</sub>eq/year.

By using only locally generated renewable energy Altech was able to further lower its CO<sub>2</sub> emissions by more than 7,000 tCO<sub>2</sub>eq per year.

Source	Production plant demand	kgCO <sub>2</sub> eq/kWh	Resulting CO <sub>2</sub>
Fossil	20,500,000 kWh/a	0.370	7,585,000 kgCO <sub>2</sub>
Renewable	20,500,000 kWh/a	0.024	492,000 kgCO <sub>2</sub>
<b>Reduction by using renewables</b>			<b>7,093,000 kgCO<sub>2</sub></b>






Sodium Chloride Batteries will have a significantly less amount of CO<sub>2</sub>eq/kWh over their lifetime. *Depending on the scenario, the GHG emissions of the NaNiCl<sub>2</sub> battery amount to 9.1 – 22.7 gCO<sub>2</sub>eq/kWh discharged and consumed, compared to 31.3 g CO<sub>2</sub>eq for lithium-ion and 122.1 g CO<sub>2</sub>eq for lead-acid batteries<sup>8</sup>.*

Furthermore, a closed water cycle covering the entire production process has been developed in which up to 90% of the process water used can be reused. The remaining wastewater is treated by the local supplier (ASG Spremberg GmbH) and discharged into public waters after treatment and filtration in accordance with the prevailing legal and environmental requirements.

The following activities are excluded in all categories without exception:

- Coal
- Nuclear
- Landfill expansion

<sup>8</sup> Life Cycle Assessment of Sodium-Nickel-Chloride Batteries, Nikolic et al., University of Bochum, 2023

Green Project Category	Eligibility GBP Criteria	Altech's Responsibility	SDG
Climate change adaption	... including efforts to make infrastructure more resilient to impacts of climate change, as well as information support systems, such as climate observation and early warning systems	Altech holistic goal is to provide sustainable, recyclable, and affordable Grid Storage Batteries call BESS (Battery Energy Storage System) to increase the usage and efficiency of generated Renewables.	 
Renewable energy	... including production, transmission, appliances and products	The CERENERGY® project is exclusively developed to provide sustainable, durable, non-hazardous large-scale grid storage batteries to the market, by using local supply chains and state-of-the-art productions techniques to support the energy transition from fossil energy source to renewable energy sources.	 
Pollution prevention and control	... including reduction of air emissions, greenhouse gas control, soil remediation, waste prevention, waste reduction, waste recycling and energy/emission-efficient waste to energy	So as to ensure a successful comprehensive energy transition, it is of essence to provide sustainable, non-hazardous grid storage batteries with a minimal carbon footprint. Altech aims to establish its production with less than 10 kgCO <sub>2</sub> eq/kWh of storage capacity produce the greenest battery available today.	



# 4. PROCESS FOR PROJECT EVALUATION AND SELECTION

Altech's overarching goal is to mitigate climate change and enhance the efficient utilisation of renewable energy by delivering sustainable, affordable, and safe technologies. Across all projects, Altech prioritises minimising environmental impact in all operations. Additionally, all production facilities are designed to maximise sustainability and operate exclusively on renewable energy, where feasible.

The project evaluation process ensures alignment with Green Project categories and is overseen by the management. Once projects are identified, they require review and approval by the Altech Board of Directors before proceeding.

Altech Batteries GmbH selected the developed industrial park, Schwarze Pumpe in Saxony Germany as a most beneficial site for the construction of the CERENERGY® Battery production plant. The evaluation process for development of the battery production plant includes a detailed feasibility study completed in Q1/2024. All preliminary development work and the Detailed Feasibility Study (DFS) have been commissioned and approved by the Altech Board of Directors.

Altech considered various factors for selecting production processes, technologies, and capable contractors, including compliance with German and EU taxonomies, ICMA Green Bond Principles (GBP), IFC Performance Standards on Environmental and Social Sustainability, and the Equator Principles.

During the DFS an expert risk workshop with engineers, designers, safety managers, Altech management, and experts of key suppliers were held in order to identify and review each risk item and assign a consequence, exposure and probability ranking and preventive action.

The following Risk areas were discussed and mitigated:

- Social Impact
- Health & Safety
- Environment

Green Project Category	Eligibility GBP Criteria	Altech's Responsibility	SDG
Sustainable water and wastewater management	... including sustainable infrastructure for clean and/or drinking water, wastewater treatment, sustainable urban drainage systems and river training and other forms of flooding mitigation	Altech values water as a critical resource and is committed to transparency in reporting its consumption. Currently, water use is minimal across projects, but future disclosures will include updates as necessary. Altech plans to implement water management systems to enhance efficiency, minimise waste, and ensure compliance with relevant regulations, including regular monitoring and reporting.	
Energy efficiency	... such as in new and refurbished buildings, energy storage, district heating, smart grids, appliances and products	Altech uses state-of-the-art equipment and specific design process technologies in order to minimise the carbon footprint as much as possible. Therefore, common processes which originally were run with fossil fuels such as gas, were redeveloped to be powered by Renewables i.e. tunnel kilns.	 
Circle economy adapted products, production technologies and processes	... such as the design and introduction of reusable, recyclable and refurbished materials, components; circular tools and services	To maximise circular economies Altech qualified local suppliers as well as recycling steps after each several production steps. That enables the usage of waste material by enriching raw materials where possible. Next to that the overall recycling takes place on Altech site, where all materials can be dismantled and reused, since CERENERGY® is not using dangerous materials.	
Green buildings	... that meet regional, national or internationally recognised standards or certifications for environmental performance	In cooperation with Altech's contractors it was possible to lower the required space of building by 12%. The combined use of a heat pump systems and the utilisation of process waste heat means that no external energy sources are required. It is still planned to equip sealed areas with PV systems such as car parks.	

- Production and Market
- Financials
- Legal & Compliance
- Ownership change and loss of key personnel

## 5. MANAGEMENT OF PROCEEDS

The net proceeds from Altech's Green Bonds will be dedicated solely to financing the Altech Batteries GmbH CERENERGY<sup>®</sup> battery production plant in Saxony, Germany. The Green Bond proceeds are placed in an Escrow Account with a nominated bank. The Escrow Account will be a bank account setup in Altech's name. Any proceeds not yet allocated to eligible assets will be placed in short-term investments, managed by the Chief Financial Officer (CFO) under the oversight of the Altech Board of Directors, in line with Altech's liquidity management policy.

The managements of proceeds will be externally verified by an auditing company chosen by the Green Bond Issuer.

## 6. REPORTING

Transparency, reporting, and verification of impacts are essential for investors to track the implementation of green finance programs. Clear procedures for reporting and disclosure are crucial to assure stakeholders that these investments contribute to a sustainable and climate-friendly future.

The environmental impact of the CERENERGY<sup>®</sup> plant will be monitored annually and disclosed in a Green Investor Report until the bond matures. This reporting will cover project details, progress, all allocated proceeds, any unallocated proceeds, and specific impact indicators such as:

- Annual CO<sub>2</sub> reduction
- Annual CO<sub>2</sub> savings (including Scope 1 and 2 emissions, Scope 3 emissions as soon as possible)
- Energy consumption per kWh produced

Additionally, Altech tracks other indicators, including natural gas, diesel, and electricity consumption. Emission reductions will be benchmarked against traditional bauxite/alkoxide processing routes, with overall emissions and energy consumption reported per kWh produced.

The annual report on the CERENERGY<sup>®</sup> plant's environmental footprint will be reviewed and approved by the Altech Management team and an external auditor before being shared with investors. The site Environmental Officer will handle data collection, calculations, and reporting. The methodology used will be disclosed in the investor report.

Altech has also committed to engaging a third party to review and audit the data and calculations in the impact report. This report and the third-party review will be made available on Altech's website.

## 7. EXTERNAL VERIFICATION

Altech has appointed S&P Global Ratings for reviewing its Green Bond Framework and its alignments according to the ICMA principles for Green Bonds. S&P Global Ratings opinion report will be published on Altech's website and is accessible for everyone at any time.



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