



**GLOBAL
BATTERY
ALLIANCE**

BATTERIES POWERING
SUSTAINABLE DEVELOPMENT

2022 ANNUAL IMPACT REPORT

Table of Contents

Letter from the Supervisory Council Co-Chairs	1
2022 Year in Review	3
Our Global Battery Alliance Ten Guiding Principles	5
About the Global Battery Alliance	6
GBA Values	7
2022 Highlights	8
What We Do	11
GBA Flagship: Battery Passport	13
Building Consensus and Achieving Results	17
Critical Minerals Advisory Group	18
Energy Access and Circularity	21
Stakeholder Engagement	23
Events and Interactions	24
Our Governance	28
Our Growing Membership	30
Selected Membership Voices	32
GBA Media Coverage 2022	34
The GBA in Academic Research	36
Consolidated Financial Statements	39
GBA Future Outlook	40

Reflecting on our partnership – five years on

The Co-Chairs of the Global Battery Alliance Supervisory Council

The seeds for the Global Battery Alliance were planted during a conversation around a coffee table at the World Economic Forum in 2017. Realising the pivotal role batteries were to play for the energy transition, the founding members of the GBA which included mining and chemical companies, automotive OEMs, international organisations, and NGOs, concluded that the only way to ensure the responsible scaling of global industry, to meet the 2015 Paris Agreement targets on climate change, was by making the Sustainable Development Goals of the transportation and power sectors, both tangible and measurable. The founding members agreed that global battery industry must become truly accountable, if we are to realise an equitable and fair energy transition.

Since 2017, the GBA has sought to promote multistakeholder collaboration and unprecedented collective action across the battery value chain. Fast forward five years, as co-chairs of the Alliance, we are incredibly proud to see how, what started as a conversation between a handful of people, has grown into a vibrant Alliance of over 150 members, spanning the value chain, and the wider battery eco-system.

Central to the rationale and ethos of the GBA is the notion that so much more can be achieved by working together. Instead of a purely emissions-based focus, our vastly broader approach encompassing the “Just Transition” includes a wide range of socio-economic issues, such as eliminating child labour and safeguarding human rights. We have captured these commitments in our [ten guiding principles](#), which our Members seek to implement together. By design, the GBA’s Board of Directors includes representatives from across the value chain, from NGOs to OEM manufacturers, research institutions to miners. Broad and inclusive consensus matters, both in the quality of our decision-making, and the Alliance’s long-term societal impact.

What fills us with a special sense of pride, is witnessing how we have turned our principles into action and real impact. Our [Vision for a sustainable battery value chain 2030](#), first conceptualised the idea of a battery passport - a digital twin of a physical battery - to bring transparency and accountability to battery value chains, and to measure, monitor and mitigate sustainability impacts across the value chain. Not only has this concept become a central pillar of the EU Battery Regulation (which entered into force in 2023). In addition, through working in partnership with key stakeholders, we have been able to show that a battery passport can be implemented in practice, by delivering pilots in 2022, and launching the [world’s first Battery Passport Proof of Concept](#), in January 2023.

At the GBA, we seek practical, consensus-based, solutions to the pressing questions facing the battery sector, for instance:

- As the world demands more and more raw materials to build and fuel sustainable energy and energy use, what about the miners producing those critical battery minerals, are their human rights consistently safeguarded? In turn, are local communities benefiting from hosting mining operations?



Martin Brudermüller
CEO BASF
Co-Chair



Benedikt Sobotka
CEO Eurasian Resources Group
Co-Chair

- Are OEM manufacturers implementing the correct safeguards to ensure battery production takes place in accordance with international ESG policies and frameworks? Are manufacturers doing their share to address the root causes of child labour in at-risk jurisdictions?
- How do we ensure that consumers are positively influenced by a batteries low carbon footprint? How do we encourage greater ESG awareness within global markets?

No single organisation, nor any alliance of organisations, can solve the Just Transition jigsaw alone. But we can do our bit. For the Battery Passport, this has meant jointly defining what 'good' sustainability performance should look like, initially captured in the [Greenhouse Gas Rulebook](#) designed to calculate the battery carbon footprint, and the [Child Labour](#) and [Human Rights](#) Index, which provide companies with the tools to address the root causes of child labour, and human rights issues in their supply chain.

Working hand-in-hand with our internal and external partners, between 2020-2022, the GBA's [Cobalt Action Partnership](#) leveraged the convening power of the GBA to catalyse consensus around a [framework for responsibly sourced artisanal cobalt](#), including a global consultation ranging from China to the Democratic Republic of Congo (DRC), Europe to North America.

Furthermore, we are committed to addressing challenges in the recycling and re-use of batteries at their end of life, including sustainable recycling of lead-acid batteries, the sustainable sourcing of critical minerals, their onward traceability, and trustworthy reporting to potential end-users, enabling their informed purchase decisions. Simply put, consumers are unlikely to select a battery based on sustainability impacts if they are unconvinced of the underpinning claims in the first place. In fact, consumers are more likely to trust performance metrics and measurements if these have been jointly shaped and decided upon in genuine multistakeholder partnership and collaboration, which we seek to encourage across the Alliance, through our cross-sector working groups, and Governance Steering Committees.

As we reflect on the past five years of partnership, we are conscious that we are still at the beginning of the journey, with many challenges yet to be resolved and much work still ahead of us. Nevertheless, we move forward with confidence and faith in the Alliance's ability to catalyse common goals and collective action.

Martin Bruder Muller
CEO BASF
Co-Chair

Benedikt Sobotka
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2022 Year in Review

Inga Petersen, Executive Director

The global energy transition presents challenges on an unprecedented scale – it requires us to fundamentally rethink and redesign almost every element of modern life, including how we move people and goods, how we build and power our cities, our factories, our homes and how we make, reuse, and recycle products. To enable these transformational shifts, we are currently witnessing the astonishingly fast growth of an entirely new battery industry, focused on EV batteries and battery energy storage solutions. While the Global Battery Alliance's [vision in 2019](#) had forecast a ten-fold growth of the value chain by 2030, these numbers have been outpaced by an even faster uptake of electric vehicles, battery energy storage solutions (BESS) and battery powered consumer goods. Our [updated vision report](#), co-published with McKinsey in January 2023 forecasts that the entire lithium-ion battery value chain, from mining through recycling, could grow by over 30 percent annually from 2022 to 2030, when it would reach a value of more than \$400 billion and a market size of 4.7 TWh.

This acceleration has significant environmental, social and governance impacts along the value chain, especially considering the related expansion of mining activities to meet the critical mineral requirements for the battery industry. To make the green energy transition a truly sustainable and just transition, guardrails need to be put in place from the outset that ensure that the costs and benefits of the transition are distributed in an equitable manner across the global value chain. For the Global Battery Alliance, the first step to mainstream these sustainability considerations into the battery industry is to bring transparency and accountability into the value, which is what we seek to do with the Battery Passport.

2022 was a truly pivotal year for the GBA as it saw not only the incorporation of the Alliance as an independent not-for-profit association in Belgium, but we were also able to meet the first set of foundational milestones for the battery passport. This included the publication of the first version of the Greenhouse Gas rulebook to calculate the battery carbon footprint in a harmonized, accurate, verifiable, and comparable manner. We also defined the child labour and human rights indices, defining performance expectations for companies aiming to address the root causes of child labour and human rights issues in their supply chains. Given the complexity of implementing the Battery Passport concept in practice, our members contributed countless hours of expert time to deliver three separate battery passport pilots allowing us to launch the world's first Battery Passport proof of concept in January 2023. In the summer of 2022, we were also able to conclude the GBA's role in facilitating consensus around a framework for responsibly sourced artisanal cobalt in the Democratic Republic of Congo. The GBA supported the Responsible Minerals Initiative (RMI) hosted delivery of a series of restitution workshops in the DRC, officially bringing the global stakeholder consultation hosted by the GBA's Cobalt Action Partnership to a close.

The ability to meet these key milestones has been anchored in the diversity of our members who are united by a collective commitment to create a lasting positive



Inga Petersen
Executive Director
Global Battery Alliance



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impact on the battery value chain. In 2022, after two years of virtual collaboration we were finally able to bring our members together face to face to confirm our vision and re-commit to its delivery. Our meetings and interactions in 2022 included technical workshops to build consensus on the first version of the Greenhouse Gas Rulebook and the Child Labour and Human Rights Index, a leadership meeting of the Supervisory Council and the Board of Directors generously hosted by Martin Bruder Müller at BASF in Forst, Germany and our first in-person Annual General Meeting hosted by the World Economic Forum in Geneva, bringing together over 100 members.

In a world which appears ever more divided, the Global Battery Alliance provides a rare, politically impartial, pre-competitive space in which the incredibly diverse set of actors engaged in the battery value chain can convene to raise and address shared challenges and realize opportunities to make battery value chains more sustainable.

Leading the Global Battery Alliance at such a pivotal time for both the organisation and the wider battery ecosystem is an exceptional privilege and I am thankful for the trust placed in me by our members. To reinforce the message by our Supervisory Council co-chairs, the work of the GBA is only just beginning and our doors are open to any actor ready to support the realization of our vision.



Inga Petersen
Executive Director
Global Battery Alliance



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Our Global Battery Alliance Ten Guiding Principles

The GBA's vision of sustainable, responsible and circular value chains has been captured in our Ten Guiding Principles, which we seek to operationalize through our various activities and programmes. The principles were first adopted by 42 organisations on 23 January 2020¹, and have now endorsed by all 150+ GBA members and supporters continuing to guide the work of the Alliance.



Establish a circular battery value chain as a major driver to achieve the Paris Agreement

1. Maximizing the productivity of batteries in their first life
2. Enabling a productive and safe second life use
3. Ensuring the circular recovery of battery materials



Establish a low carbon economy in the value chain, create new jobs and additional economic value

4. Disclosing and progressively decreasing greenhouse gas emissions
5. Prioritizing energy efficiency measures and substantially increase the use of renewable energy as a source of power and heat when available
6. Fostering battery-enabled renewable energy integration and access with a focus on developing countries
7. Supporting high quality job creation and skills development



Safeguard human rights and economic development consistent with the UN Sustainable Development Goals

8. Immediately and urgently eliminating child and forced labour, strengthening communities and respecting the human rights of those employed by the value chain
9. Fostering protection of public health and the environment, minimizing and remediating the impact from pollution in the value chain
10. Supporting responsible trade and anti corruption practices, local value creation and economic diversification

¹ <https://www.globalbattery.org/media/publications/gba-10-guiding-principles.pdf>

About the Global Battery Alliance

The vision of the GBA is to foster a fully sustainable battery chain by the year 2030 – one that is circular, both socially and environmentally responsible, and just. Founded in 2017 at the World Economic Forum (WEF), the GBA's 10 Principles were codified in 2020, and the Alliance became independent from the WEF in 2021 (the year of our “GBA Charter”², with secretariat staff provided by member organisation the Responsible Business Alliance, and fully independent in 2022.

In 2022, the GBA legally incorporated in Belgium as a not-for-profit organisation, directly recruited key staff, including: a new Executive Director, Inga Petersen; and a new Head of Operations and Member Engagement, Yana Goretaya. Anna Pienaar led the Alliance into 2022 as Executive Director until March 2022. During the Annual General Meeting in November 2022, the members elected a new Board of Directors and voted for, in equal number, both Corporate and Non-Corporate GBA Board representation.

A year of very high impact, in 2022 the GBA published a series of foundational ESG rulebooks specifying the guardrails for a sustainable battery value chain, grew our membership by over one third, and completed three major Battery Passport pilots, leveraging a combined, substantial, market share of industrial sectors from minesite to road-ready EVs, to launch the world's first proof-of-concept Battery Passport in January 2023. The vitality of our cross-sectoral Alliance is built on mutual respect and an unrelenting commitment to reach our destination: achieving a fully sustainable battery value chain by the year 2030. To do this we firmly tether our decision-making and actions on our shared 10 Principles and leverage the benefits of our diversity of members' perspectives and expertise through novel approaches to consensus-building that reaches results that all participants can accept.

2022 was a year of impact and of institutional capacity building, including key staff appointments and gaining incorporation as an independent organisation. The sequencing of GBA workstreams through 2022 reflects that steady process of increased organisational capacity.

² <https://www.globalbattery.org/media/publications/gba-charter.pdf>

GBA Values

According to the GBA Charter, endorsed by all members upon joining, the following Values will guide the Alliance:

- (a) **Innovation** – promote and demonstrate innovative value chain partnerships in support of inclusive and sustainable economies;
- (b) **Respect** – promote equity and dignity of the human being as defined by the United Nation’s Guiding Principles and the GBA Principles;
- (c) **Common good** – act in good faith, in full compliance with any applicable laws and regulations and promote practices that are impartial – transcending the singular interest of individuals or organizations;
- (d) **Collaboration** – promote inclusivity, collaboration and partnership, both within the Alliance, as well as with those individuals and organizations external to the Alliance whose purpose and vision are aligned with the Alliance’s Purpose and Vision;
- (e) **Impact** – achieve results that are proportionate to the collective resources, capacity, and leverage of the Alliance and its Members;
- (f) **Transparency, accountability, integrity** – promote transparency, accountability and integrity in the Alliance’s actions, membership and funding; and
- (g) **Long-term sustainable value creation** – promote socioeconomic development in 4 Global Battery Alliance Charter accordance with the Sustainable Development Goals set by the United Nations.

2022 Highlights

JANUARY



- Development of the Battery Passport theory of change: How can the Battery Passport drive the rapid scaling of sustainable, responsible and circular battery value chains?³

FEBRUARY



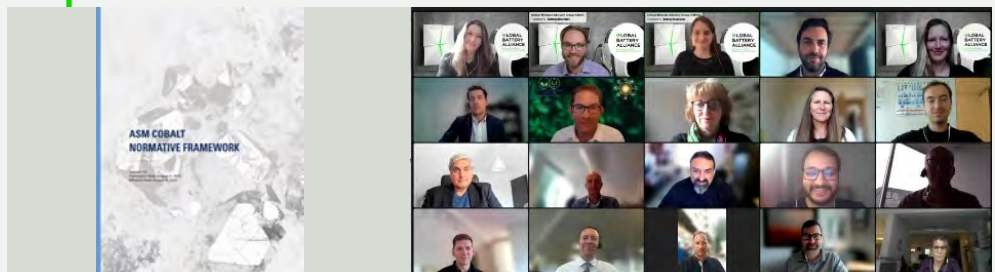
- Memorandum of Understanding signed with the Responsible Minerals Initiative (RMI) to implement outcomes of Cobalt Action Partnership.

MAY



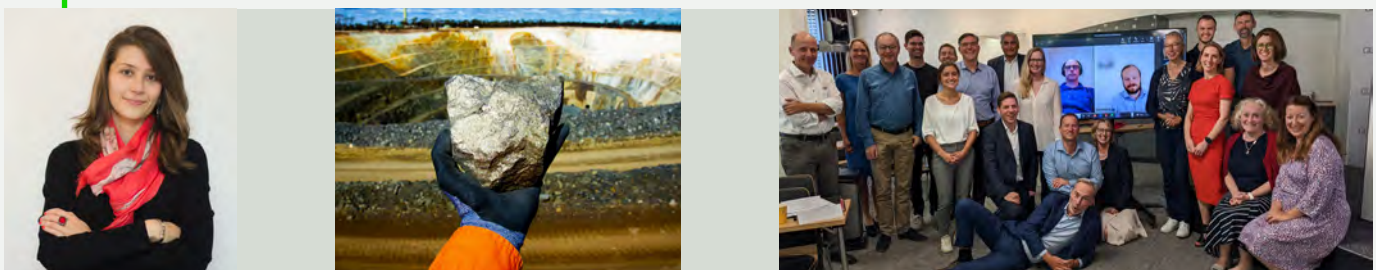
- Legal incorporation in Belgium as independent not-for-profit completed.
- Executive Director recruited.

JULY



- Support to a series of restitution workshops on the "Artisanal Cobalt Framework"⁴ in Democratic Republic of Congo (DRC).
- Launch of the new Critical Minerals Advisory Group (CMAG) expanding the GBA's focus to all battery critical minerals and geographies.

AUGUST

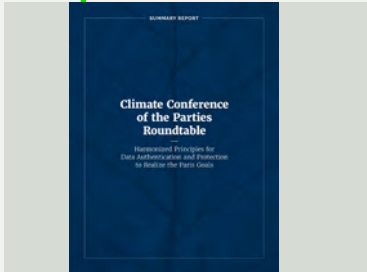


- Recruitment of head of operations and member engagement.
- Critical Minerals Advisory Group dialogue series to define the space for impact for the GBA on critical minerals.
- In person Technical Workshops of Working Groups in Zug, Switzerland leading to consensus on version one of the Greenhouse Gas rulebook.

³ <https://www.youtube.com/watch?v=-9xHRXSAN9I>

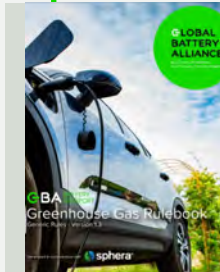
⁴ Implemented by the Responsible Minerals Initiative: https://www.responsiblemineralsinitiative.org/media/docs/ASM%20Cobalt%20Criteria_English_June2022.pdf

SEPTEMBER



Summary report on Data Governance principles co-published.

OCTOBER



“Greenhouse Gas (GHG) Rulebook for Battery Passport”⁵ published, directly implementing two of the 10 Principles: #4; and #9.

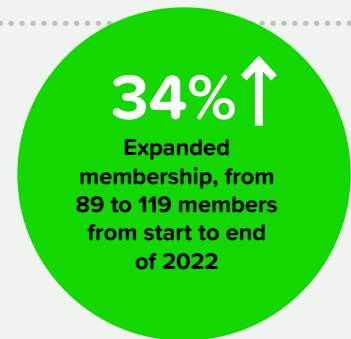


Leadership Meeting of the Supervisory Council and the Board of Directors, hosted by BASF.

NOVEMBER



Hosted the Annual General Meeting (AGM) in Geneva with over 100 participants, elected new Board of Directors



DECEMBER



“Human Rights Index”⁶ and “Child Labour Index”⁷, also referred to as “Rulebooks”, for Battery Passport, published together with the combined “Background & Glossary”⁸ directly implementing principle #8

Three Battery Passport proof of concept pilots⁹ completed in December 2022.

“Battery 2030: Resilient, sustainable and circular”¹⁰ (co-authored): widely consulted on with our membership in 2022 and published in January 2023, updating the GBA’s 2019 WEF Insight Report “A vision for a sustainable battery value chain in 2030.”¹¹

⁵ <https://www.globalbattery.org/media/publications/gba-rulebook-v1.5-master.pdf>

⁶ <https://www.globalbattery.org/media/publications/gba-humanrightsindex-v1rev2.pdf>

⁷ <https://www.globalbattery.org/media/publications/gba-childlaborindex-v1rev2.pdf>

⁸ <https://www.globalbattery.org/media/publications/backgroundandglossary-rev1.pdf>

⁹ <https://www.globalbattery.org/action-platforms-menu/pilot-test/>

¹⁰ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-2030-resilient-sustainable-and-circular>

¹¹ https://www3.weforum.org/docs/WEF_A_Vision_for_a_Sustainable_Battery_Value_Chain_in_2030_Report.pdf

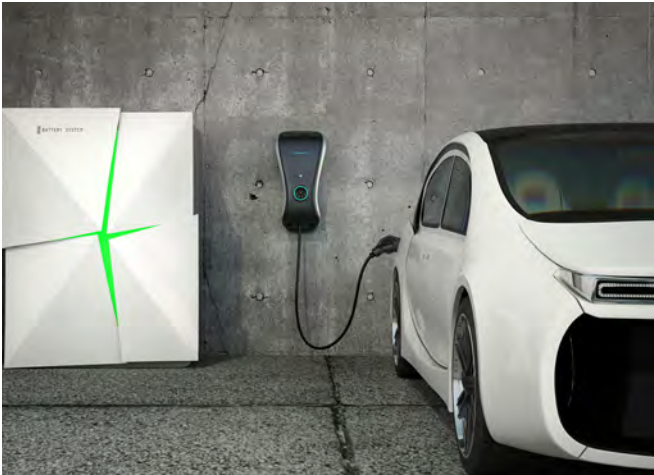


What We Do

The GBA operates multiple workstreams, called Action Partnerships.

Our 2022 workstreams have been planned, executed, and completed to support the GBA's flagship projects, in particular our high-impact Battery Passport workstream, which was developed with the support, involvement, and input of over 100 private and public organisations. First-of-its-kind, it aims to do nothing less than deliver transparency to the entire battery supply chain and create globally applicable sustainability performance expectations for batteries.

In 2022 we concluded our engagement on the Cobalt Action Partnership (CAP) with the signing of a Memorandum of Understanding with the Responsible Minerals Initiative (RMI) and launched a scoping phase for the Critical Minerals Advisory Group (CMAG), building on the engagement and outcomes of the CAP, while expanding the scope to all critical minerals and all geographies. The GBA also maintained a third workstream on Energy Access and Circularity consisting of scoping and research activities only, considering the limited team capacity and the overriding priority to deliver against Battery Passport objectives.





GBA Flagship: Battery Passport

The GBA's Battery Passport programme is directed at a clear target: bringing transparency to, and accountability for, all salient risks and ESG impacts across the battery value chain through the development of a digital product passport, to an EV battery, including provenance data on the raw materials, technical parameters of the battery and ESG reporting against GBA battery passport sustainability performance expectations.

The premise of the Battery Passport is that of or one of ethical consumers demanding verifiable proof that the battery they are purchasing as part of their EV meets or exceeds their ESG expectations.

The GBA was the first to conceptualise the Battery Passport in the 2019 Insight Report: “A Vision for a Sustainable Battery Chain in 2030,”¹². Moreover, the EU Battery Regulation (“Regulation of the European Parliament and of the Council Concerning Batteries and Waste Batteries”) of June 2023¹³ mandates, within the European Union, compliance with “battery passport” requirements. This builds on the European Commissions 2020 proposal¹⁴ which directly mentions both the GBA Battery Passport and the 2019 Vision Report.

A key impact of 2022 for the GBA was the successful implementation of three Battery Passport Pilots, demonstrating the proof of concept. For the pilots, the data was used to create three differentiated scores: one for GHG emissions; another concerning human rights due diligence; and a third regarding child labour due diligence. These Pilots represent the start of a long and iterative journey of development and are solely proofs-of-concept.

As such, they represent a positive and encouraging milestone in the development of the GBA's aspirational BP Programme.

In 2022 those ESG foundations were established through our first set of agreed ESG metrics, allowing us this year (2023) to sequentially develop a second phase of performance indicators, with a further phase to follow in 2024.

The data is collected by creating a digital twin of the battery that follows it through each step of its creation. This starts with the mining process through the manufacturing stages to the battery's transportation to its final destination. It also includes the battery's end-use, disposal and recycling process. Data collection is undertaken by the Track & Trace delivery partners, informed by the GBA-co-authored 2022 report (see below), “Climate Conference of the Parties Roundtable: Harmonized Principles for Data Authentication and Protection to Realize the Paris Goals.”¹⁵

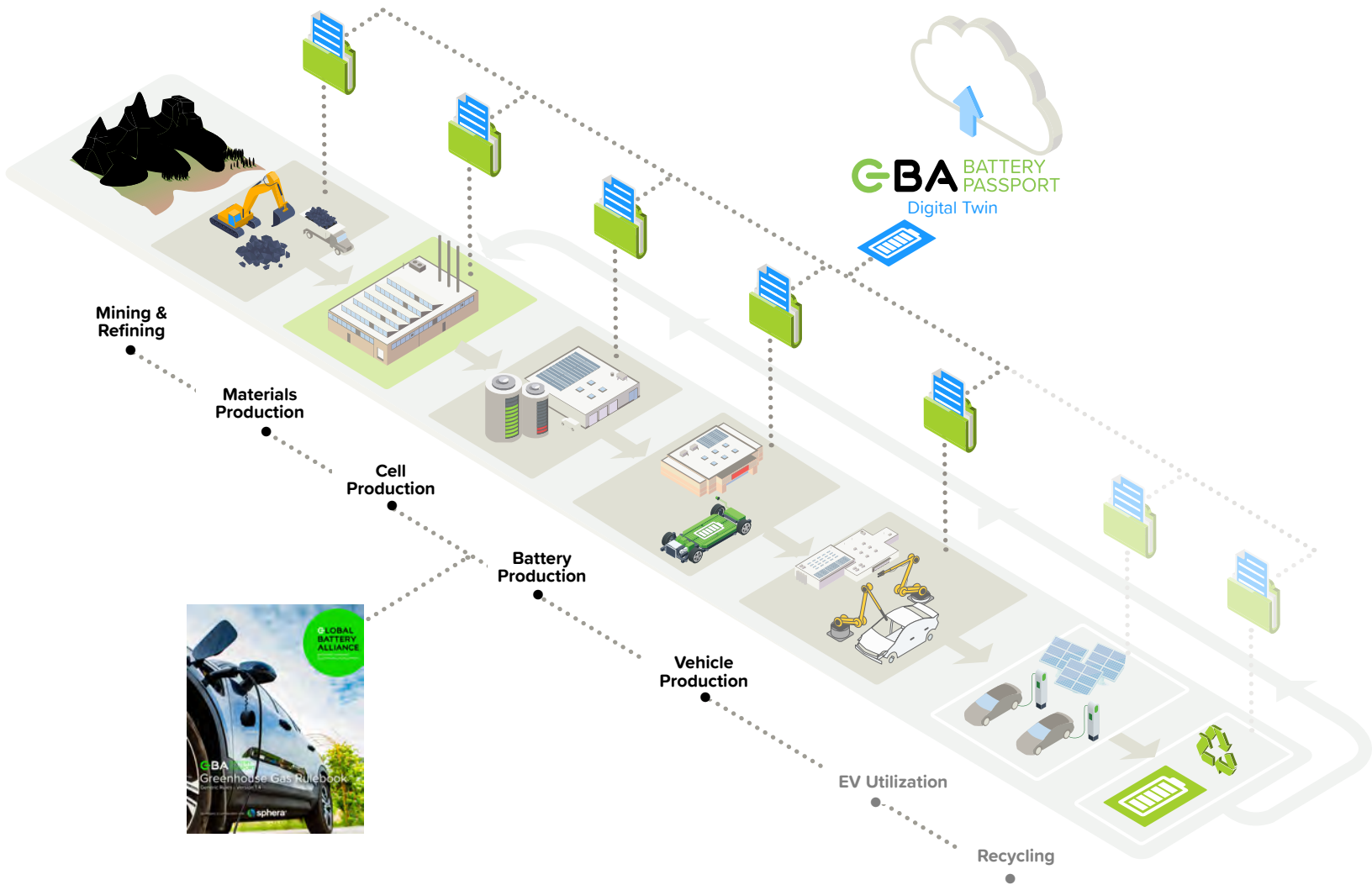
The purpose is to create a system where companies involved in the supply chain will be motivated by market forces to engage in activities that produce positive

¹² https://www3.weforum.org/docs/WEF_A_Vision_for_a_Sustainable_Battery_Value_Chain_in_2030_Report.pdf

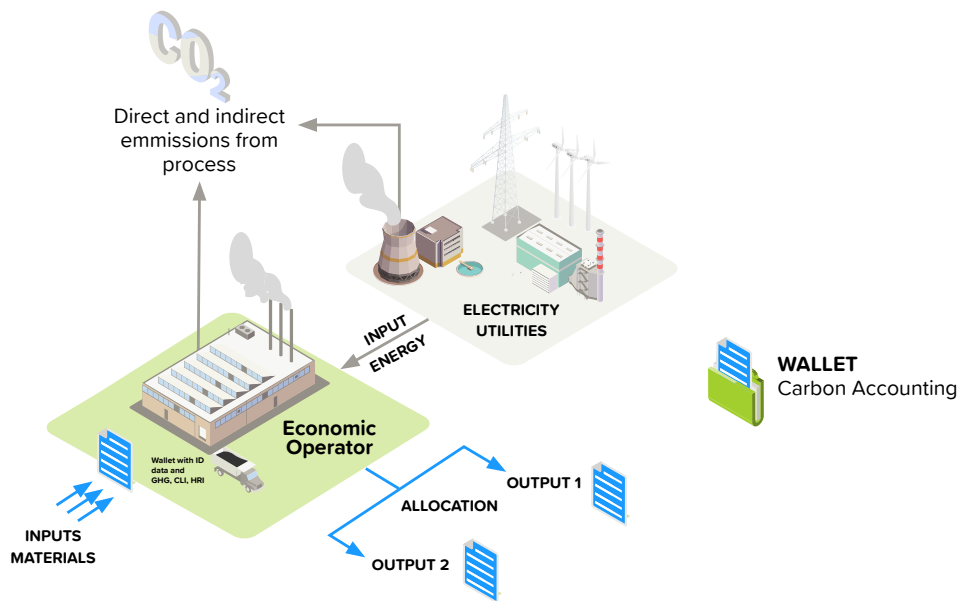
¹³ <https://data.consilium.europa.eu/doc/document/PE-2-2023-INIT/en/pdf>

¹⁴ https://eur-lex.europa.eu/resource.html?uri=cellar:4b5d88a6-3ad8-11eb-b27b-01aa75ed71a1.0001.02/DOC_1&format=PDF

¹⁵ <https://www.globalbattery.org/media/publications/ans-427-tec-cop-roundtable.pdf>



The Greenhouse Gas Rulebook guides each economic operator to calculate his own contribution to greenhouse gas emissions on a comparable basis. The emissions of a battery will be consolidated by adding all individual contributions of those involved in its manufacturing chain and recorded in the battery passport.



scores. The short-term goal is to influence the actions and motivations of companies based on these commercial incentives alone. Data utilised at this proof-of-concept stage is self-reported, realistic rather than “real” – with the purpose to establish a successful proof of concept. The development of data assurance and verification guidance is planned for phase two of the battery passport programme, launched in 2023. The three BP Pilots successfully developed in 2022 by the GBA demonstrate achievement at this proof-of-concept stage, representing the start of our BP journey with the development of a minimum viable product as the next major milestone.

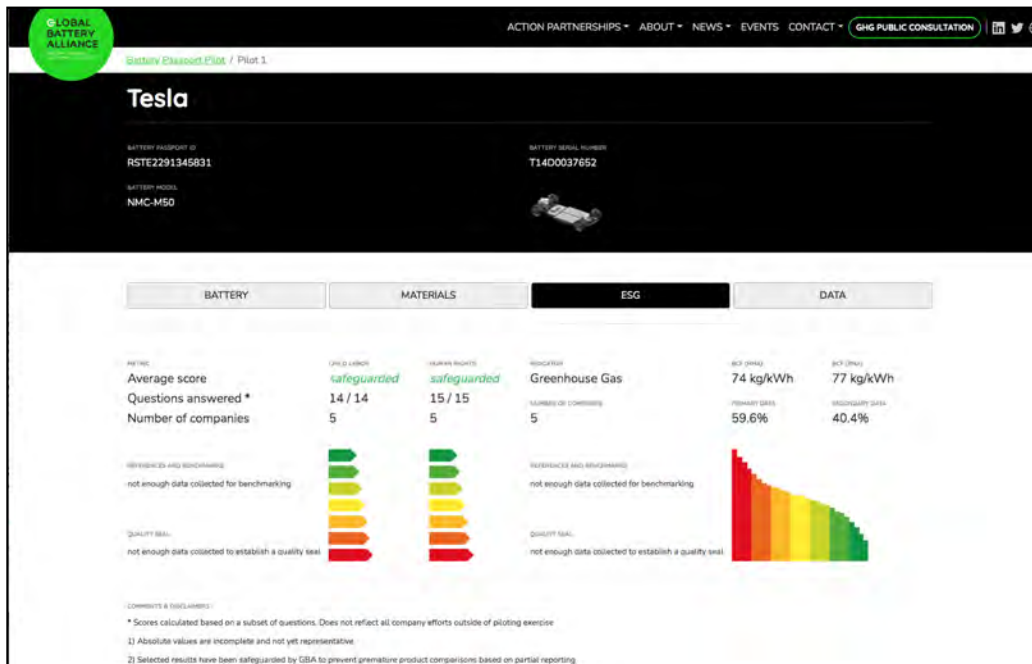
The long-term goal is to implement fully sustainable, responsible and circular value chains, as evidenced by performance data from the battery passport and independently validated by the GBA quality seal. This will require validation and auditing of the data, which by that time would be comprehensive and “real”, not merely representative and “realistic.” The culmination of the BP Programme would be a widely-adopted and quality assured system where every part of the battery’s supply chain is monitored, and data concerning all applicable sustainability metrics is collected.

Battery Passport Pilots:

The BP Pilots consisted of three separate pilots that were implemented in quarter three of 2022. Together, they demonstrated first-of-its-kind, proof-of-concept validity. Member-led, each of the participating OEMs, including Audi and Tesla, mobilized their respective value chain partners from cradle to gate (mine to OEM), including cell makers CATL, LG Energy Solution and Samsung SDI (who subsequently joined the GBA as members), who collectively account for over 50% of all global EV battery production and 67% of EV original equipment manufacturers (OEM) market share in the United States.

The three BP pilots produced a wealth of information and provided us, and our members, the ability and momentum to achieve much more in the years to come. This includes broadening our reporting across more ESG measures, transitioning from information produced by companies self-reporting to using independent data collection, ensuring greater consistency in the usage of social metrics between different data collectors, and extending the reporting range to include end-use and circularity/reuse and recycling. That achievement was built on the solid foundations of the Rulebooks for Battery Passport and members’ inputs into both the Pilots and those Rulebooks, e.g., explicitly articulated by the June 2022 Consensus for GHG Rulebook





Illustrative pilot results

Finalisation, as agreed by our members through the utilisation of the GBA Consensus Way.

The results of these three pilots were used to inform the development of the ongoing Battery Passport 2.0 Programme, priorities and affiliated work packages and the key learnings were captured in the Battery Passport pilot report¹⁶. Data from the pilots yielded a wealth of information and considerations that the GBA, its members and partners will use in 2023 and beyond in refining both the underpinning rule books and the design of future BP Programme pilots, including the central importance of data governance (including data collection and management standards, disclosure, assurance and verification). Strengthening data governance is key for enhanced levels of third-party monitoring and assurance in each subsequent iteration of piloted delivery. The exact nature of these challenges and the issues that must be addressed only became evident due to these three 2022 substantive pilot studies.

Affiliated Initiatives

Collaborating with the rapidly evolving battery passport ecosystem, GBA acts as an affiliated member of the Battery Pass consortium, an industry-led consortium that receives funding from the German Federal Ministry for Economic Affairs and Climate Action by resolution of the German Bundestag under grant agreement No. BZF335.¹⁷ The 2023 iteration, version 1.5, of the GHG Rulebook¹⁸ was developed in partnership with Battery Pass, notably with respect to extending the coverage of that Rulebook to also cover end-of-life topics, in particular battery recycling and reuse.

GBA is also a member of the CIRPASS consortium¹⁹ dedicated to researching and developing guidance related to the implementation of digital product passport requirements in the EU for batteries, electronics and textiles.

¹⁶ <https://www.globalbattery.org/media/pilot/documents/gba-bp-pilot-master.pdf>

¹⁷ https://www.ipk.fraunhofer.de/content/dam/ipk/IPK_Hauptseite/dokumente/medieninformationen/pr-press-release-battery-pass-launching-2022.pdf

¹⁸ <https://www.globalbattery.org/media/publications/gba-rulebook-v1.5-master.pdf>

¹⁹ <https://cirpassproject.eu/>

Building Consensus and Achieving Results

Coalescing and leveraging this power for good requires consensus-based strategic decision-making. 2022 was not just a year of delivery for the GBA, it was also one of innovation, whereby we discovered and implemented novel solutions, notably in the case of inclusive and effective consensus-building. In a series of four online workshops from May to June 2022 and in-person in Barr, Switzerland, in September 2022 we applied, for the first time, the GBA Consensus Way, based on the neutral Systemic Consensing (SK Principle[®]) facilitation process, to the deliberations of the Greenhouse Gas Working Group. Rather than creating winners and losers through traditional majority voting processes, the GBA Consensus way works to reduce resistance and builds the broadest possible consensus within diverse group settings. Our use of the neutrally facilitated GBA Consensus Way of next-level quality decision making, led us to finalise, and launch on-time, the text of the Greenhouse Gas Rulebook,²⁰ a text built on the solid foundations of broad respectful consultation across the participating membership of the Alliance. Since then, we have leveraged the GBA Consensus Way in decision making processes across the GBA from the board level to the Working Groups. The Greenhouse Gas Rulebook underpins a core and central part of the GBA Battery Passport Programme: while building on the Greenhouse Gas protocol, ISO and other standards, it sets out a comprehensive framework to calculate the battery carbon footprint to identify and address emissions hotspots across the value chain and ultimately to allow products to compete based on their carbon footprint. Securing consensus, in spite of opposing views on selected technical issues, on this Rulebook is one of the greatest positive outcomes of the GBA in 2022. The consensus building process engaged a diverse group of corporate and non-corporate stakeholders including prominent NGOs dedicated to cleaner transport.

“All multi-stakeholder organisations should anticipate how they will make difficult decisions once the available time for less-structured consensus-building has expired. In rolling out the GBA Consensus Way, it was exciting for everyone to see how it rapidly changed people’s behaviour within the working group, allowing the group to make difficult group decisions on time.” Johannes Drielsma, facilitator of the Greenhouse Gas working group

²⁰ <https://www.globalbattery.org/media/publications/gba-rulebook-v1.5-master.pdf>



Critical Minerals Advisory Group

From mid-2022 onwards, this workstream was (and is) delivered through the GBA's new, and cross-sectoral, Critical Minerals Advisory Group. CMAG launched with a mandate to shine a light on the first part of any sustainable battery's journey: from mineral reserve to mined production.

CMAG was launched further to the successful completion of the GBA's Action Partnership with sole-focus on cobalt, implementing the decision to expand the GBA's focus to all minerals critical to battery production, not just cobalt. CMAG's work was showcased in a dedicated Breakout Session of the GBA's 2022 AGM.

Per GBA's planned approach to workstream sequencing, in the period to mid-2022 the workstream was delivered by the Cobalt Action Partnership, the work of which supported the launch of the "Artisanal Cobalt Framework,"²¹ building on an extensive stakeholder

consultation²² supported by the GBA with independent third parties, including Resolve. As detailed by the terms of a Memorandum of Understanding with the GBA, from 2022, the Responsible Minerals Initiative is implementing the work of this framework, focussed on the Democratic Republic of the Congo (DRC).

CMAG launched in July 2022, building on the completed Cobalt Action Partnership. It benefited in 2022 from the participation of over 45 different GBA member organisations and 78 individuals and engaged in four consultations run by the GBA between August 2022 and

²¹ https://www.responsiblemineralsinitiative.org/media/docs/ASM%20Cobalt%20Criteria_English_June2022.pdf

²² <https://www.globalbattery.org/media/publications/report-from-stakeholder-consultations-on-the-asm-cobalt-esg-management-framework-english.pdf>

March 2023. CMAG focuses on knowledge exchange, global collaboration, and sharing of insights; public-private dialogue; and focusing on identifying opportunities for harmonized standard and policy levers to scale sustainable battery value chains at the global level.

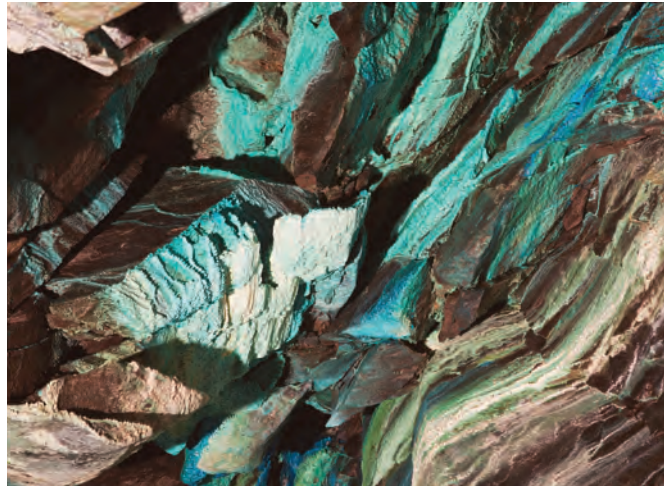
In line with that new role for CMAG, its strategic outlook for 2023 is already clear: leading the way in systematically consulting across the Alliance membership, boosting levels of engagement, and connecting across our cross-sectoral partnership so that we collectively chart our path forward in a politically impartial space for a truly sustainable battery value chain.

This workstream delivers on GBA 10 Principles #s 7, 8 and 9, as follows:

- 1. #7** – “Supporting high-quality job creation and skills development”, principle underpinning our global consultation on the Artisanal Cobalt Framework²³ and the spatial economic development analysis of the forward-looking “Battery 2030: Resilient, sustainable and circular” report²⁴ (January 2023) co-authored in late 2022 with McKinsey.
- 2. #8** – “Immediately and urgently eliminating child and forced labour, strengthening communities and respecting the human rights of those employed by the value chain”, per the “Human Rights Index”²⁵ and “Child Labour Index”²⁶.
- 3. #9** – “Fostering protection of public health and the environment, minimising and remediating the impact from pollution in the value chain”, per the GBA “GHG Rulebook for Battery Passport” launched in October 2022²⁷.



CMAG's strategic outlook for 2023 is already clear: leading the way in systematically consulting across the Alliance membership, boosting levels of engagement, and connecting across our cross-sectoral partnership so that we collectively chart our path forward in a politically impartial space for a truly sustainable battery value chain.



²³ https://www.responsiblemineralsinitiative.org/media/docs/ASM%20Cobalt%20Criteria_English_June2022.pdf

²⁴ <https://www.globalbattery.org/media/publications/battery-2030-resilient-sustainable-and-circular.pdf>

²⁵ <https://www.globalbattery.org/media/publications/gba-humanrightsindex-v1rev2.pdf>

²⁶ <https://www.globalbattery.org/media/publications/gba-childlaborindex-v1rev2.pdf>

²⁷ <https://www.globalbattery.org/media/publications/gba-rulebook-v1.5-master.pdf>



Energy Access and Circularity

For this workstream we completed, in 2020 and 2021, a series of three White Papers: “Consequences of a Mobile Future” (2020); “Closing the Loop on Energy Access in Africa” (2021); and “A Framework for the Safe and Efficient Global Movement of Batteries” (2021).

GBA Principle #3 is “Ensuring the circular recovery of battery materials.” Our October 2022 AGM included both: a presentation by GBA member Pure Earth on Lead Acid battery recycling; and a Breakout Session on Circularity in Battery Value Chains.

Per 2022/23 GBA membership consultations, the key to overcoming the primary obstacles to scaling the sustainable battery value chains includes harmonising public policy and regulation of battery circularity and recycling, including transport and transboundary movements. This conclusion is confirmed in the “Battery 2030: Resilient, sustainable and circular vision”²⁸ report, developed in 2022 and jointly published by the GBA and McKinsey in early 2023.

Our commitment to this workstream is undimmed, and as our capacity continues to grow, we look forward to building further on this work.



The key to overcoming the primary obstacles to scaling the sustainable battery value chains includes harmonising public policy and regulation of battery circularity and recycling, including transport and transboundary movements.

²⁸ <https://www.globalbattery.org/media/publications/battery-2030-resilient-sustainable-and-circular.pdf>



Stakeholder Engagement

The success of the GBA's activities depends on effective and inclusive engagement of our diverse internal stakeholders, including private industry, non-profit organisations and government agencies.

For the Battery Passport to succeed, it is essential to strike a balance between the ambition to realize the GBA's vision of sustainable, responsible and circular battery value chains while at the same time creating a manageable reporting burden for companies to lower the entry barrier for participation. This is especially important because, since the Battery Passport is not mandatory, buy-in from the private sector is essential for it to be operative.

At the same time, for the BP programme to be capable of providing positive incentives for companies that engage in activities that reduce GHG emissions and have a positive impact on society, the BP programme must earn environmentally and socially conscious consumers (private individuals and organisations alike). Throughout our work in proof-of-concept piloting work in 2022, the GBA was clear about which stage each of the BP Pilots had reached, what they had achieved, and

what work remains to be done. The key takeaways are that by the end of 2022 we: reached proof-of-concept stage, with minimum viable product our next target; relied on self-reported, rather than externally verified, data; and that only a fraction of selected battery minerals were reported on in each BP Pilot.

The GBA's sense of purpose is built on the solid foundations of trust that we have built up amongst our members and wider stakeholders. Broad and deep stakeholder trust and credibility in who we are and what we do are essential prerequisites, for the GBA to gain the necessary traction for our work. In 2022, our piloted BP Pilots demonstrated the trust and credibility benefits of making product claims clear, specific and reliable. In 2023, we will evolve the BP further, including the critical field of determining principles and practices for data governance, ensuring that claims are substantiated, evidence based and independently verifiable.



Broad and deep stakeholder trust and credibility in who we are and what we do are essential prerequisites, for the GBA to gain the necessary traction for our work.

Events and Interactions

Leadership Meeting

In 2022, the GBA Supervisory Council was boosted through the addition of both Robin Zeng, founder and chairman of CATL, and Inger Andersen, Executive Director of United Nations Environment Programme (UNEP), expanding its scope with respect to both world-leading EV battery development and manufacture across sites in both the EU and China, and concerted global action on international sustainable development, respectively.



Together, the Supervisory Council and the GBA Board of Directors, held a joint Leadership Summit, which was hosted by BASF in Forst, Germany, in October 2022. At the meeting, the Supervisory Council and the Board of Directors convened for the first time in person to take stock of the status of the Alliance, review and confirm strategic priorities and give essential guidance related to the implementation and launch of the battery Passport proof of concept pilots. A battery themed dinner rounded off this special occasion hosted by Martin Brudermüller, CEO of BASF.



The Annual General Meeting

In November 2022, hosted at the headquarters of the World Economic Forum in Cologne, Switzerland, the GBA held its inaugural AGM as a fully independent organisation. Over 100 individual delegates attended this highly participatory event taking full part in sessions such as GBA Highlights and Outlook, GBA vision and mission in a rapidly changing industry landscape, BP piloting working group, Evolving Battery and Critical Minerals Policy Landscape and the Role of the GBA breakout session, Circularity in Battery Value Chains and BP Deep Dive breakout sessions and CMAG Member Dialogue Series presentation. GBA members Umicore and Resolve/ Regeneration generously sponsored an evening networking reception with the theme of 'Innovation in battery supply chains: Accelerating the energy transition through innovative approaches from mining to recycling.'



As part of the closing plenary of the AGM, the membership elected a new Board of Directors, effective from April 2023 to December 2024, and both individually and collectively reflected upon prioritisation for GBA delivery moving forwards, including the need for consensus and shared vision. The GBA Secretariat collated this feedback and directly applied it in the GBA's updated 2030 draft *Battery 2030: Resilient, sustainable and circular report* developed in 2022 and jointly authored by the GBA and McKinsey through late 2022, and published three months after the 2022 AGM in January 2023.





Our Governance

The operational work of the GBA is undertaken by its Secretariat. Whilst in the establishment phase, the Secretariat was hosted by the Responsible Business Alliance (2021-2022) with gradually increasing independent Secretariat capacity and staff. The GBA is governed by our Charter²⁹ and now hosts an independent Secretariat.

The GBA's Board of Directors, including via its four member Executive Committee (see below), provides strategic oversight and agenda-setting for the organisation, both regarding its professional Secretariat and the work of its members, for example, through the GBA's dedicated working and advisory groups.

Elections to the Board of Directors occurred at the AGM of the GBA. Executive Committee membership is accorded to the elected Chair, Vice-Chair and Treasurer of the GBA, as nominated by the board.



²⁹ <https://www.globalbattery.org/media/publications/gba-charter.pdf>

In November 2022, the following Board was elected to serve from April 2023 to December 2024, exactly balanced between ten corporate and ten non-corporate organisations:

Jihye Choi LG Energy Solution	Ferdinand Maubrey Tesla	Greg Radford International Institute for Sustainable Development
Stephen D'Esposito RESOLVE / Regeneration <i>Vice-Chair & Executive Committee member</i>	Andrew McCartor Pure Earth	Thorsten Pinkepank BASF
Gillian Davidson ERG <i>Chair & Executive Committee member</i>	Susannah McLaren Cobalt Institute	Mathy Stanislaus Drexel University
Kristin Hughes World Economic Forum	Peter Möckel International Finance Corporation, World Bank Group	Kurt Vandeputte Umicore <i>Treasurer & Executive Committee member</i>
Anna Krutikov Glencore	Hege Marie Norheim FREYR Battery	Katja Suhr GIZ
Georg Leutert IndustriALL Global Union	Julia Poliscanova Transport & Environment	Liu Ziyu CATL
	Jennifer Peyser Responsible Business Alliance	Simon Thibault Investissement Québec

The GBA Board of Directors Executive Committee consists of the three members listed above, plus the past Board Chair, Guy Ethier, Senior Vice President, Umicore.

The GBA's highest level governance body is the Supervisory Council, which champions the work of the GBA externally and, rather than exercising a decision-making mandate itself, provides high-level strategic advice. Its membership in 2022 consisted of seven longstanding members (Atle Høie, Mathias Miedreich, Caroline Anstey, Martin Brudermüller, Gim Huay Neo, Jeremy Weir, and Benedikt Sobotka); plus two new members, Robin Zeng and Inger Andersen. Further details are provided in the table below.

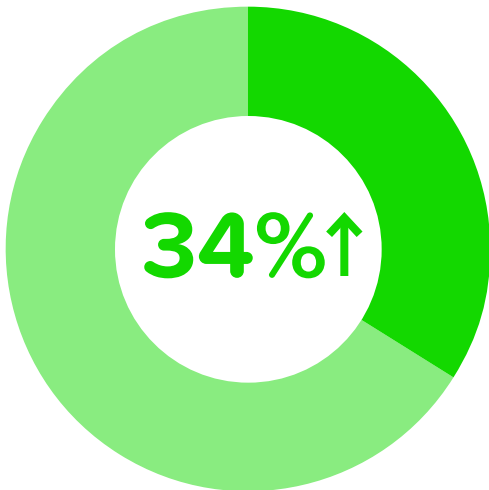
Inger Andersen Executive Director, UNEP	Mathias Miedreich CEO, Umicore	Benedikt Sobotka CEO, ERG <i>Co-Chair</i>
Martin Brudermüller, CEO, BASF <i>Co-Chair</i>	Gim Huay Neo Managing Board, Head of Centre for Nature and Climate, WEF	Jeremy Weir Executive Chairman and CEO, Trafigura
Atle Høie General Secretary, IndustriALL	Caroline Anstey President and CEO, Pact	Robin Zeng Chairman, CATL

Lastly, the GBA's activities are delivered through the work of GBA secretariat and, in 2022 the Project Management Office staffed with secondees from BASF and ERG and guided by the Steering Committee, with equal representation (again) from both corporate and non-corporate members of the GBA.

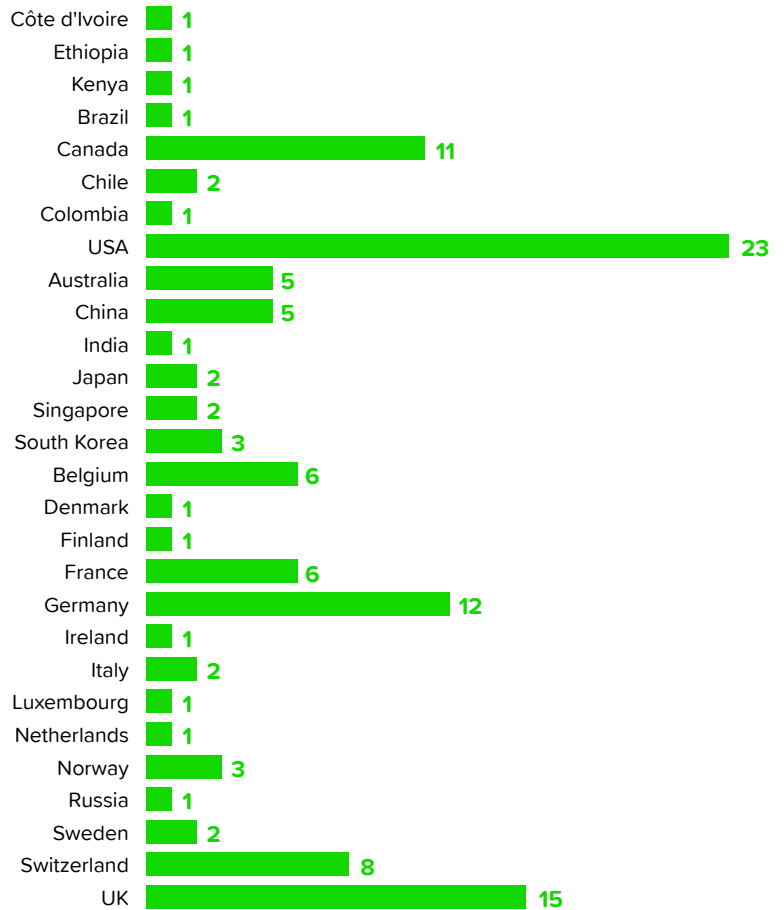
Our Growing Membership

Our members are the driving force of the Alliance and we were encouraged to see our membership grow by over 30% over the course of 2022. At the same time, to deliver on our mandate of a global Alliance, we seek to grow our membership further in 2023 and beyond, placing special emphasis on growing representation of the global South, including engagement with governments in producing countries.

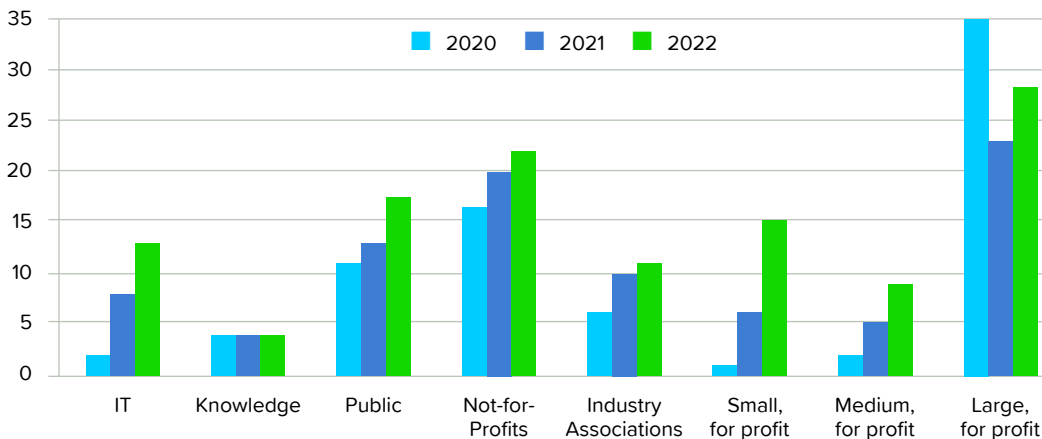
NET INCREASE IN GBA MEMBERSHIP



GBA MEMBERSHIP BY COUNTRY



MEMBER CATEGORIES



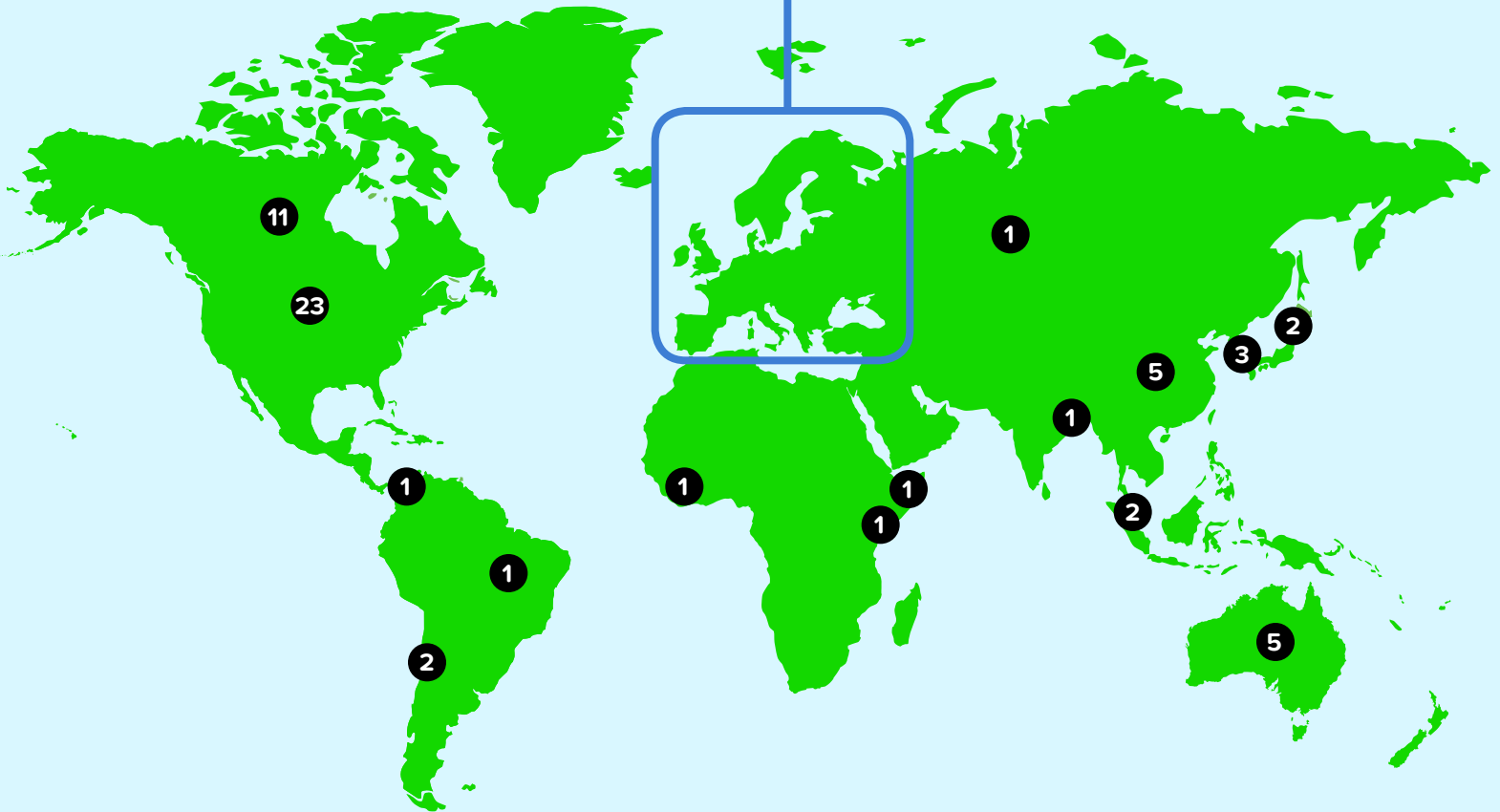
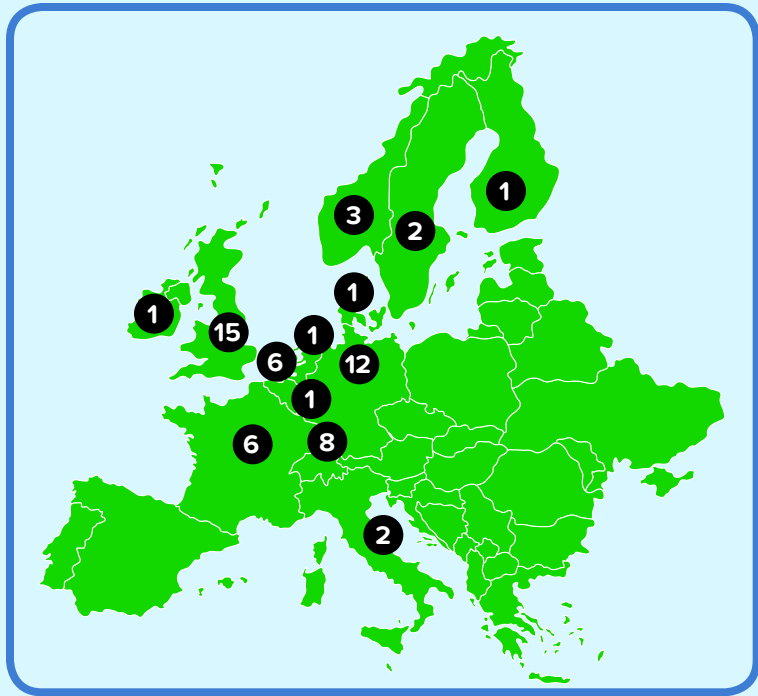
TOTAL MEMBERSHIP

2020: 77

2021: 89

2022: 119

GBA GEOGRAPHICAL COVERAGE



1 Number of GBA members

Selected Membership Voices

On the occasion of the launch of the Battery Passport proof-of-concept in Davos on January 18th 2023, we gathered the following reactions from selected members³⁰:

“To achieve the Paris Climate Agreement, multiple stakeholders like governments, industry, academia, and NGO’s need to work hand in hand. The Global Battery Alliance (GBA) brings together these actors to foster a sustainable, responsible and circular battery economy. The GBA targets to safeguard the environment, respect human rights, and economic development in line with the UN Sustainable Development Goals. The battery passport represents a very important achievement in this regard. It demonstrates how the GBA collaboration provides transparency for optimizing operations across the battery ecosystem. At BASF, sustainability is firmly anchored in our corporate strategy. Therefore, we are proud to be a founding partner of the GBA. We are supporting the GBA and the battery passport to stay frontrunners in sustainability in the automotive industry.”

Martin Bruder Müller, CEO BASF

“The Government of Canada welcomes this milestone achievement for the Global Battery Alliance’s Battery Passport. We support strong multi-stakeholder efforts that promote responsible and sustainable global battery supply chains, including membership in the Sustainable Critical Mineral Alliance launched by Canada last month. Canada looks forward to continued collaboration with the GBA and its partners.”

The Honourable Jonathan Wilkinson, Canada’s Minister of Natural Resources

“The launch of the Battery Passport proof of concept is a major milestone on the road to creating a truly verifiable digital twin of a battery. The GBA’s Battery Passport is the first and only passport to be developed by stakeholders spanning the entire battery value chain, making it the standard bearer for battery transparency. Our attention will now turn to benchmarking Battery Passport data and issuing quality seals based on sustainability performance to provide a trusted source of data to end consumers, guiding purchasing decisions and triggering improvement actions across the value chain.”

Benedikt Sobotka, Co-Chair of the Global Battery Alliance and CEO of Eurasian Resources Group, founding member of the GBA

“The Battery Passport proof-of-concept presented today is a very impressive first tangible result of the GBA, which my ministry has been supporting since 2019. The Battery Passport is a pivotal embodiment of the digital and green “twin transition” – it utilises the digital world to facilitate the decarbonisation of the real world and to promote circularity. We believe that global progress in green technologies is most efficient when we rely on globally compatible standards and a level playing field to minimize frictions between different markets in the industries we need to transform. Therefore, GBA’s work as an international actor is so important.”

Dr. Robert Habeck, German Minister for Economic Affairs and Climate Action

“More sustainable batteries are vital to our efforts to responsibly and successfully shape the shift towards e-mobility. We have been committed to the development of the Battery Passport from the very beginning in 2017. Now, the proof of concept shows that even complex value chains can become transparent – an important step in making battery production more environmentally and socially compatible and strengthening the circular economy. Going forward, we hope many other organizations, regulators and industry players will join to make the Battery Passport a real shared global standard.”

Markus Duesmann, Chairman of the Board of Management of AUDI AG, which represents Volkswagen AG as lead brand in the project

“The Battery Passport will raise standards to achieve truly clean e-mobility. For Umicore, its proof-of-concept launch at the World Economic Forum in Davos is a milestone towards creating traceability and accountability at each EV battery supply chain stage. As an industrial pioneer in rechargeable battery materials and battery recycling and as a founding member of the Global Battery Alliance, Umicore is one of the staunchest drivers and co-developers of the Battery Passport. Transparency on a battery’s lifecycle enables consumers, companies and regulators to make well-informed choices, propelling decarbonized electric driving. This makes the Battery Passport key to reducing climate change.”

Mathias Miedreich, CEO of Umicore, Founding Member of the GBA.

³⁰ January 18th 2023 press release: <https://www.globalbattery.org/press-releases/global-battery-alliance-launches-world%E2%80%99s-first-battery-passport-proof-of-concept/>

“As a cleantech leader, Canada supports the Global Battery Alliance’s Battery Passport in contributing to a cleaner and greener economy. Today’s announcement sets a positive path forward in the growth of the cleantech sector, which will benefit businesses and people around the world. As we transition to a net-zero future and strive to limit the carbon output of our supply chains, Canada will work with industry on a global scale to advance the sustainable and responsible production of EV batteries and vehicle manufacturing.”

Mary Ng, *Canada’s Minister of International Trade, Export Promotion, Small Business and Economic Development*

“The exponential growth in the demand for rechargeable batteries and interdependence across global battery value chain stresses the urgent need for greater transparency and assurance in the battery value chain. By providing end-users with key information about a battery’s material provenance, manufacturing history and ESG performance, the Battery Passport will serve as an important instrument for improving sustainability of business. Committed to creating a sustainable battery ecosystem and paving the “Sustainable Way,” LG Energy Solution welcomes more opportunities to leverage the convening power of the Global Battery Alliance and to work with multi-stakeholders to make a rigorous and standardized framework to trace and measure the progress across global battery value chain.”

Mr. Bangsoo Lee, *President / Chief Risk Officer of LG Energy Solution*

“The Green Finance Institute welcomes the launch of the Global Battery Alliance’s Battery Passport proof-of-concept. For the green transition to be successful, it is essential for investors to have transparency on the sustainability of supply chains. By allowing a record to be kept of an individual battery’s constituent parts, battery passports make it possible for financiers to verify their investments in the supply chain as being ESG compliant, mitigating the risk of greenwashing. The Green Finance Institute is delighted to be supporting the important and innovative work of the Global Battery Alliance, to bring battery passports to market.”

Dr. Rhian-Mari Thomas OBE, *CEO of the Green Finance Institute.*

“Batteries are the new oil, but to avoid the mistakes of the oil age we must ensure batteries are produced sustainably, their materials sourced responsibly, and the entire supply chain is circular. Transport & Environment has supported GBA’s work from the outset to cement sustainability and responsible sourcing into the global battery industry. The launch of the Battery Passport marks a key milestone on that journey. It will enable transparent disclosure of key sustainability and human rights data, thus improving transparency and trust across the supply chain.”

Julia Poliscanova, *T&E’s Senior Director for E-mobility*

“The battery supply chain is complex and we welcome the indices as a means to ensure that violations of human rights don’t go undetected. The rights of the workers along this increasingly important value chain need to be respected. Workers’ rights are human rights.”

Atle Høie, *IndustriALL Global Union General Secretary*

“The demand for the critical minerals and metals needed for the energy and green transition is expected to grow exponentially over the next two decades. This needs to become an opportunity to build more sustainable, circular, and responsible value chains for all those products which are essential to the transition. UNEP welcomes the launch of the Battery Passport proof of concept, which will be instrumental in increasing our capacity to understand and manage climate, pollution, biodiversity, and social impacts along the full lifecycle of the battery.”

Elisa Tonda, *Chief, Resources and Markets Branch, Economy Division, United Nations Environment Programme*

“The Battery Passport is an important stepping stone towards fully sustainable supply chains. Transparency about where battery inputs come from not only helps to inform customers but more importantly improves working conditions in developing countries. GIZ strongly supports this aim and is therefore also a strong supporter of the GBA.”

Katja Suhr, *Head of Global Program on Circular Economy, GIZ GmbH*

GBA Media Coverage 2022

Global Battery Alliance Media Presence 2022

“Global Battery Alliance (“GBA”), [...] launched its Human Rights Index and Child Labour Index for the Battery Passport, ahead of Human Rights Day on 10th December.”

“The indices are the world's first frameworks to measure and score the efforts of any company or product specific to the battery value chain towards supporting the elimination of child labour and respecting human rights.”

Yahoo! Finance: [Launch of Human Rights and Child Labour Indices for Battery Passport](#)
8 Dec. 2022

The Sociable

[Digital ID, battery passports planned for electric vehicles: WEF-founded Global Battery Alliance](#)
3 Nov 2022

The Manufacturer

[Everledger partners with Ford on pilot project to improve battery recycling](#)
26 Oct 2022

Energy Digital

[Germany Battery Pass to create EU standards](#)
26 Apr 2022

Smart Energy International

[Standard for EV battery ‘state of health’](#)
7 Jun 2022

Freethink

[Your house could become a rechargeable cement battery. Here’s how.](#)
8 Nov 2022

Electrek

[Tesla, Quebec, LG, and others work on new ‘battery passport’](#)
28 Nov 2022

CleanTechnica

[Tesla Visited The DRC & Argentina For Environmental & Societal Risk Assessments](#)
8 May 2022

Automotive World

[A Battery Passport can create a circular economy for EVs](#)
11 Nov 2022

Mining Review Africa

[Cobalt Institute: Championing responsible mining in the DRC](#)
10 Jun 2022

Namibia Economist

[Three ways the circular economy is vital for the energy transition](#)
4 Mar 2022

Energy Post

[Gravity Batteries: any nation can do it at scale using rocks](#)
27 Jul 2022

The Manufacturer

[Electric cars and sustainability](#)
23 Aug 2022

Supply Chain Digital

[Responsible & circular battery supply chain ‘net zero must’](#)
28 Dec 2022

Innovation News Network

[How cobalt is powering the conversion to green technologies](#)
18 Aug 2022

Green Car Congress

LCA finds EMN high-purity manganese products have lower carbon footprint than incumbent industry
8 Dec 2022

The Northern Miner

Multi-stakeholder collaboration needed
15 Jun 2022

S&P Global

INTERVIEW: On responsible cobalt from DRC
30 May 2022

Consultancy.uk

Circular strategies could cut automotive industry emissions by two-thirds
5 Dec 2022

Supply & Demand Chain Executive

Industrial lithium-ion batteries and the Battery Passport
20 Apr 2022

Mother Jones

Forced Labor, Child Miners, Payment in Drugs—Clean Energy
1 Dec 2022

Forbes

Blockchain Helps Luxury Retailers Prove Provenance and Sustainability Claims
26 Jan 2022

Menafn

Future Minerals Forum:
12 Jan 2022

Stockhead

The Ethical Investor: ESG funds are quietly buying oil and gas stocks to chase return
22 Jul 2022

The European Sting

How does the war in Ukraine affect oil prices?
4 Mar 2022

TechHQ

Why the Battery Passport will matter for electric cars
4 Jan 2022

EURACTIV.com

Will Europe's new battery regulation give it pole position?
2 Nov 2022

Energy News

Opinion: Tackling problems of carbon emissions through electric vehicles to achieve COP 27 goals
12 Dec 2022

CleanTechnica

Federal Tax Credit Rules For Electric Cars Delayed Until March
22 Dec 2022

Mining Review Africa

ERG in Africa-Planting the seeds for a greener DRC
22 Nov 2022

Forbes

Capitalism Will Save The Planet: The Business Case For Sustainability
8 Dec 2022

Canary Media

Why we need to recycle clean energy technologies
13 Jun 2022

Canadian Mining Journal

Quebec's Nouveau Monde, a Canadian model for vertical integration and sustainability
4 Oct 2022

Eco-Business

Climate-positive, high-tech metals are polluting Earth, but there are solutions
17 Mar 2022

Institutional Investor

An ESG Framework for Extractive Industries
27 Oct 2022

Automotive World

World EV Day: Renewed efforts needed to put EVs
9 Sept 2022

Institutional Investor

An ESG Framework for Extractive Industries
27 Oct 2022

The GBA in Academic Research

Academic Research and The GBA in 2022

Kaikkonen, Harri, Mari Kivinen, Quentin Dehaine, Jussi Pokki, Toni Eerola, Martina Bertelli, and Patrick Friedrichs. "Traceability methods for cobalt, lithium, and graphite production in battery supply chains." *Geological Survey of Finland* (2022). p. 34 https://tupa.gtk.fi/raportti/arkisto/20_2022.pdf

"In relation to many other initiatives surrounding the battery supply chains, GBA has a major advantage of including a wide variety of companies and organizations, from mining to OEMs. It also has a wide public organization backing with the support of the WEF. This lends significant credibility to GBA as a guiding factor in driving sustainability and traceability in the battery sector."

Thelen, Adam, Xiaoge Zhang, Olga Fink, Yan Lu, Sayan Ghosh, Byeng D. Youn, Michael D. Todd, Sankaran Mahadevan, Chao Hu, and Zhen Hu. "A comprehensive review of digital twin—part 2: roles of uncertainty quantification and optimization, a battery digital twin, and perspectives." *Structural and multidisciplinary optimization* 66, no. 1 (2023). p. 36 <https://doi.org/10.1007/s00158-022-03410-x> [Published online: 6 December 2022]

"An emerging and attractive alternative to rapid physical testing in a battery repurposing plant is the concept of Battery Passport, [...] We believe that the value of digital twins to battery repurposing is far greater than what has been realized."

Olabi, A. G., Tabbi Wilberforce, Enas Taha Sayed, Ahmed G. Abo-Khalil, Hussein M. Maghrabie, Khaled Elsaid, and Mohammad Ali Abdelkareem. "Battery energy storage systems and SWOT (strengths, weakness, opportunities, and threats) analysis of batteries in power transmission." *Energy* 254 (2022): 123987. p. 26 <https://doi.org/10.1016/j.energy.2022.123987>

"[M]any of the standards in the proposed EU battery regulation are also key elements of the Global Battery Alliance's Battery Passport, which intends to build a digital twin for each battery manufactured."

To, Jenny. *The EU-CEAP impacts on developing countries: An analysis of the plastic packaging, electric vehicles and batteries sectors*. No. 12/2022. IDOS Discussion Paper, 2022. p. 31 <https://doi.org/10.23661/idp12.2022>

"The white paper by the World Economic Forum and the Global Battery Alliance (2021) is the first to suggest establishing a Framework for Safe and Efficient Global Movement of Batteries with circularity principles."

Bridge, Gavin, and Erika Faigen. "Towards the lithium-ion battery production network: Thinking beyond mineral supply chains." *Energy Research & Social Science* 89 (2022): 102659. p. 13 <https://doi.org/10.1016/j.erss.2022.102659>

"[S]upernational initiatives (such as the Global Battery Alliance's battery passport, a programme to make the entire value chain transparent and provide a battery benchmarking framework for validating and tracking progress [...] indicate the capacity of regulation to drive new business models and organisational alliances around material provenance and the circular economy."

Gebhardt, Maximilian, Janina Beck, Matthias Kopyto, and Alexander Spieske. "Determining requirements and challenges for a sustainable and circular electric vehicle battery supply chain: A mixed-methods approach." *Sustainable Production and Consumption* 33 (2022): 203-217. Pp. 214-215 <https://doi.org/10.1016/j.spc.2022.06.024>

"[A]ssociations such as the Global Battery Alliance [...] are already working on LIB [...] to enable more efficient, transparent, and reliable information exchange. This increased transparency would allow tracking, identification, and data sharing regarding LIBs throughout their lifecycle (Baars et al., 2021) and thereby overcome many of the cross-tier barriers identified in this study."

Meegoda, Jay N., Sarvagna Malladi, and Isabel C. Zayas. "End-of-Life Management of Electric Vehicle Lithium-Ion Batteries in the United States." *Clean Technologies* 4, no. 4 (2022): 1162-1174. p. 1170 <https://doi.org/10.3390/cleantechnol4040071>

"The Battery Passport is a solution to improve the traceability of batteries. It will be used by the EU and is supported by the current Canadian and US administrations."

Additional Academic Research that Discusses or cites the Global Battery Alliance

Gebhardt, Maximilian, Matthias Kopyto, Hendrik Birkel, and Evi Hartmann. "Industry 4.0 technologies as enablers of collaboration in circular supply chains: a systematic literature review." *International Journal of Production Research* 60, no. 23 (2022): 6967-6995. <https://doi.org/10.1080/00207543.2021.1999521>

Berger, Katharina, Josef-Peter Schöggel, and Rupert J. Baumgartner. "Digital battery passports to enable circular and sustainable value chains: Conceptualization and use cases." *Journal of Cleaner Production* 353 (2022): 131492. <https://doi.org/10.1016/j.jclepro.2022.131492>

Bastida, Ana Elizabeth. "The case for global cooperation concerning the sustainable management of mining and minerals." In *Routledge Handbook of the Extractive Industries and Sustainable Development*, pp. 191-207. Routledge, 2022. <https://www.researchgate.net/publication/361484695>

Miao, Youping, Lili Liu, Yuping Zhang, Quanyin Tan, and Jinhui Li. "An overview of global power lithium-ion batteries and associated critical metal recycling." *Journal of Hazardous Materials* 425 (2022): 127900. <https://doi.org/10.1016/j.jhazmat.2021.127900>

Deberdt, Raphael, and Philippe Le Billon. "The green transition in context—cobalt responsible sourcing for battery manufacturing." *Society & Natural Resources* 35, no. 7 (2022): 784-803. <https://doi.org/10.1080/08941920.2022.2049410>

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Consolidated Financial Statements

The GBA ended 2022 in good financial and operational health. Following incorporation in Belgium and the recruitment of a dedicated Head of Operations and Member Engagement, the collection of membership fees was optimized, mitigating previous delays. In view of preceding cash flow constraints, the Secretariat is pursuing a deliberate strategy of progressively building cash reserves to deliver on obligations and ensure continuity in programme delivery. With a new core team in place, the GBA is focused on enhancing financial and organisational governance and scoping opportunities for third party funding in addition to membership fees.

Statement of Consolidated Activities 2022

USD\$

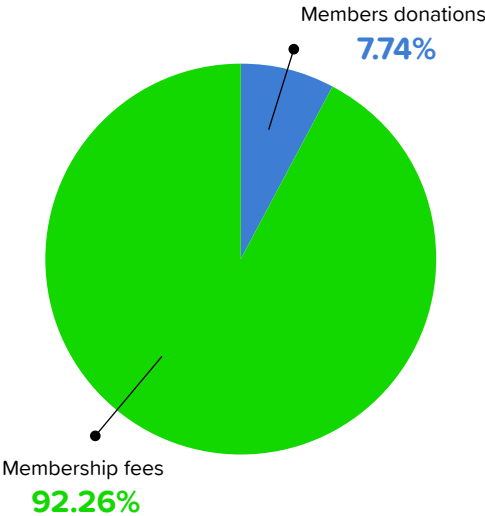
REVENUE	
Membership fees	\$ 2,136,547.08
Member donations	\$ 179,193.65
Total revenues	\$ 2,315,740.73

OPERATING COSTS	
Secretariat overhead	\$ 98,935.04
Staffing	\$ 342,935.86
Subtotal operating costs	\$ 441,870.90

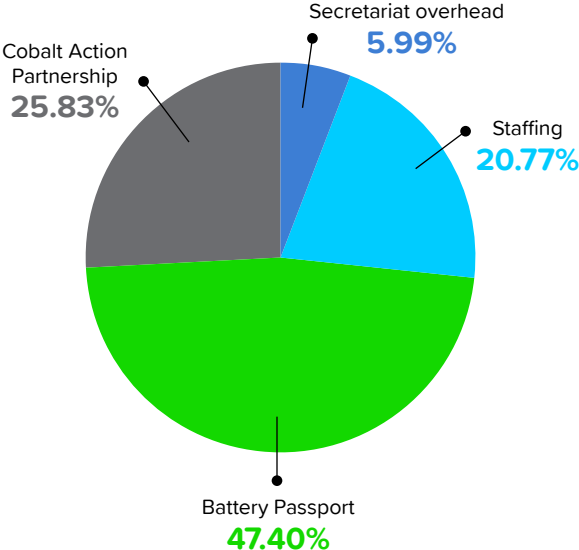
PROJECT EXPENSES	
Battery Passport	\$ 782,584.32
Cobalt Action Partnership	\$ 426,444.69
Subtotal project expenses	\$ 1,209,029.01
Subtotal all expenses	\$ 1,650,899.91

Ending net assets (cash carry over)	\$ 664,840.82
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Operating Revenue



Operating Costs



GBA Future Outlook

As we look to 2023 and beyond, the Battery Passport will undoubtedly remain the central pillar of the GBA programme of work with the Battery Passport 2.0 officially launched in July 2023. The second phase includes the development of key sustainability performance expectations for wave two prioritized indicators, elaborating and refining the GBA's battery passport concept, developing the GBA quality seal and the underlying scoring logic as well as advancing critical questions related to data governance and continued piloting.

Building on and going beyond the battery passport, the GBA's vision has, from the outset, targeted 2030 as a key deadline for our delivery: by then, we are committed to creating a fully sustainable battery value chain. In 2019, alongside McKinsey, we set out that ambition in the jointly authored document "*A vision for a sustainable battery value chain in 2030*". In 2022 we worked in close partnership with McKinsey once more, updating that vision in a new publication, published in January 2023 and with inputs directly drawn from our All-Members AGM of October 2022, "*Battery 2030: Resilient, sustainable, and circular*". The document sets out key ESG value chain challenges, including with respect to sustainability threats, e.g., illegal battery disposal, violations of indigenous communities' rights, and tax evasion. Economic and industrialization challenges are highly salient too, in insights rightly credited in the document to GBA members.

The document contributes to charting a path for the GBA by clearly illustrating future areas of work in order to close the gap towards achieving that 2030 sustainable battery chain.

A higher and higher percentage of mined lithium is destined for battery-related applications, up from 60% at the date of publication to an expected 95% by 2030, with the overall size of the lithium-ion battery chain increasing by 30% *annually* between 2022 and 2030, reaching a value of \$400bn and a size of 4.7TWh, in stark contrast to the 2019 estimated figure for 2030 of 2.6TWh. Hence, the market is growing far faster than previously anticipated, implying a commensurate increase in the scale of the sustainability challenge to be met too.

For the GBA as explicitly a *global* Alliance, the challenges of regionalisation and localisation are real too. Jurisdictions, whether national, subnational or supranational (e.g., the EU), are in active competition for EV and OEM jobs, if not always the mining operations that provide the necessary raw materials. Manufacturers, pursuant to resilience of their own supply chain in the context of likely constrained markets for raw materials, are aware of the benefits of clustering different parts of the supply chain in close geographical proximity, in both reducing levels of cost and risks of supply interruption. The GBA highlighted an outlook for 2030 whereby each (global) region "will cover over 90 percent of local cell demand, over 80 percent of local active material demand, and over 60 percent of refined materials demand", with high recycling rates, e.g., the 80 percent specified by the EU, further enhancing levels of regional self-sufficiency and resilience. There is a substantial and vital role, looking forwards, for the GBA to coalesce stakeholders across different world regions, across the supply chain, in government, and in civil society, to meet the global challenge of EV battery sustainability globally, such that all world regions benefit together from sustainable battery value chain promises delivered.

In 2022, the successful application of the GBA Consensus Way made possible the on-time launch of the Greenhouse Gas Rulebook. The support for the drafting decisions for this Rulebook reflects the internal facilitation and consensus building *modus operandi* of the GBA Consensus Way. Looking forward to 2023, this same consensus way has been applied to high level decision making processes, including during a leadership strategy retreat in March 2023.

CMAG will also play a central and key role as we build membership consensus for future concerted action, driving forward to meet our 2030 objective of a sustainable battery value chain: this advisory group will take the lead in pan-Alliance consultation regarding the obstacles, and the opportunities to overcome such pitfalls, that we must traverse together. Building on the global nature of our WEF genesis, our collective vision and shared values, and the international application of our tangible added value, we are confident that we can and will do so.





**GLOBAL
BATTERY
ALLIANCE**

BATTERIES POWERING
SUSTAINABLE DEVELOPMENT

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