

### **Written evidence submitted by Circular**

Circular is a UK founded technology business that enables companies globally to gain visibility into their most critical supply chains as well as prove and improve their ESG performance. We offer a managed software solution that customers use to track the raw materials used within their manufacturing and recycling supply chains in order to demonstrate responsible sourcing and sustainability.

We are leaders in ESG traceability, with a particular focus on EV battery materials to support the energy transition. Currently we are the only proven technology solution available to track high risk and high human impact and are already tracking the provenance of materials such as cobalt, mica, nickel, copper and interior materials including leather and recycled plastics. We track the actual raw material itself, as it changes state within manufacturing processes and not the paperwork as a proxy for the materials. Our mission is to make the world's most complex supply chains more transparent to help prevent the exploitation of people and our planet.

The reason for submitting evidence is that we have deep expertise and experience in the EV batteries space. We are already working alongside Tech Nation in their Net Zero Programme, are members of the CMA, the Global Blockchain Business Council, and contributing to Climate Tech Policy with The Coalition for a Digital Economy (Coade) and working group members of the Manufacturing Made Smarter initiative. We are therefore heavily involved through various avenues as part of achieving net-zero.

Our key observations are that capturing data through implementing traceability solutions such as Circular's within supply chains is critical. Supply chains are global and complex. They are also huge emitters of GHG emissions, often lacking in transparency for raw materials and product sourcing. Without knowing the provenance of goods or materials, it is difficult to ensure social and environmental standards are effectively applied across complex and global supply chains. This traceability data enables organisations to make informed decisions to reduce their carbon footprint and drive improvements with suppliers in countries whose governments are not driving the same level of change.

However, data availability and usability are the main hurdles to efficient use and reuse of scarce material at the same time as reducing GHG emissions, which we are overcoming in the supply chains we serve.

I am Veera Johnson, the co-founder of Circular, and would like to be considered for a place on the oral evidence list and would be free to provide more detail to the inquiry if necessary.

### **What contribution could battery electric vehicles make to achieving net zero by 2050?**

The full transition to electric vehicles (EV's) has been acknowledged as one of the most important actions to achieve the UK's Net Zero target - requiring all vehicles must be fossil fuel free by 2050. However, this is only part of the of the Net Zero picture. Consideration needs to be given to the full lifecycle of EV's:

1. The embedded carbon footprint associated with the manufacture of EV's
2. The responsible sourcing and provenance of rare earth and other high-risk materials involved in producing EV's
3. Transparency and traceability across the EV supply chain for its manufacture, in-life use and end-of-life recycling or second life use (circular economy).

Current studies show that even when an EV is only charged with electricity from renewable sources, it can take 50,000km of use before the EV's total embedded carbon footprint reaches parity with that of an internal combustion engine (ICE) car - before starting to become more CO<sub>2</sub> efficient with use.<sup>1</sup> This is because the embedded supply chain carbon footprint of an EV, at the end of the production line, is significantly higher than that of an ICE - with a major contributor to this being EV battery. Specifically, the carbon emissions associated with sourcing and supply of rare earth materials for battery production - mining, transportation, processing and manufacturer. Not to mention the environmental and human impact these activities can have - requiring responsible sourcing.

The key challenge to truly achieving net zero with EV's is also how efficiently and effectively the EV supply chain can reduce its carbon footprint. The World Economic Forum report in January 2021 - "Net-Zero Challenge: The supply chain opportunity" identifies the opportunity that lies in the supply chain. And that the most cited barrier preventing supply chain sustainability is a lack of transparency.

Transparency and visibility of actual energy usage and carbon emissions from suppliers at each production step in the end-to-end supply chain, enables better decision making on sourcing better for sustainability and to monitor CO<sub>2</sub> abatement initiatives. Therefore, to manage and improve their footprint, first supply chain participants must be able to identify and prove current emissions using dynamic carbon tracking data which calculates both the attributed and inherited emissions at each stage of the supply chain - Scope 1, scope 2 and inherited scope 3 emissions. We are already seeing some of the benefits that this could deliver and in driving responsible decision making right down to the particular manufacturing processes/parts of the supply chains that pinpoint where changes can be made to introduce new innovations to reduce emissions.

It is essential that the supply chain also focus on sourcing critical raw materials in a secure, sustainable manner to support battery manufacturing and battery recycling to realise the net zero-carbon ambition. Without knowing the provenance of goods or materials, it is difficult to ensure social and environmental standards are effectively applied across complex and global commodity supply chains.

Addressing net zero requires engagement of the full ecosystem of supply chain participants, to create a net-zero supply chain, not just parts of it, particularly in countries where climate action is not high on the agenda. Whilst the pioneers/ early adopters are starting their journeys in this agenda, there needs to be a sustained effort to educate businesses on their role in participating in this drive and how they can contribute. This needs to become a movement! And not just a nice to have.

### **How well is Government policy aligned with high-level commitment for growth of battery electric vehicles to support its net zero ambition?**

Supply chains are global so whilst action in the UK is key to driving change, global perspectives need to be included, particularly in the EU, US and Asia.

The EU Battery Regulation, published in December 2020, replaces the current Batteries Directive (2006) and aims to make batteries a true enabler of the green transition by minimising both their carbon and social footprints. It is intended to apply from 1st January 2022. The new Regulation covers the entire lifecycle of the battery, from natural resources, through to mining & processing, battery manufacturing, primary use EV, end of life, recycling and/or battery refurbishments and second life.

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<sup>1</sup> [Life cycle assessment - Carbon footprint of Polestar 2](#)

The same drivers or imperatives are not present in the UK. Depending on what becomes EU legislation, this may also limit EV / EV Battery export market opportunities from the UK to the EU.

Whilst there is legislation through the EU Conflicts Minerals Regulations which came into force in January 2021, Europe (Germany) are much further ahead in moving towards enforcing the regulations.

Policy / R&D is needed to create consistency of ESG standards that are common across suppliers will support them in working towards the collective goal of achieving net-zero. In addition, clarity on alignment with the UN SDGs will support this.

Every critical mineral process is unique and therefore policy should highlight this and not take a 'one size fits all' approach.

### **Are the UK supply chain opportunities around supply of batteries and power electronics, machines and drive supply chain clear?**

Opportunity for the UK to focus more on carbon tracking, including transportation/logistics which is a large contributor to the overall supply chains footprint are not clear. They split across a whole range of organisations and there is no concerted drive to learn from industry or support for SME's that are delivering these innovations. The Manufacturing Made Smarter call for Bids for the creation of Innovation hubs to set up and disseminate technologies linking SME innovation to enable smarter and purpose driven sustainability in manufacturing supply chains is a good start, but on its own is not enough.

The digitalisation of supply chains means data and insights are becoming available which have never existed before, and these can provide regulatory compliance and resource security. However, there needs to be a faster ramp of capturing this data, aggregating it and using it to empower more action.

In the drive for digitisation there needs to be a conscious integration of sustainability goals and objectives within organisations with supply chain management such that ESG benefits, which have largely been incidental to date are intentional. Businesses need guidance and support on how to achieve this.

More clarity is also required on low-carbon alternatives for supply chain participants, including how to make informed decisions on low carbon routes through the upstream supply chain.

### **What natural advantages in terms of access to raw materials, renewable energy supply, technological readiness, IP or other competitive advantage does the UK have to encourage development of battery manufacture in the UK?**

Climate change and ESG is high on the UKs agenda and therefore can develop legislation and provide investment.

The UK has a long history of leadership in advancing universal values on human rights and environmental protection so can lead on ESG standards. But this is not well articulated or disseminated within the communities of SMEs; OEMS and Academia on how we can maintain this lead and more importantly how this lead could be turbo-charged!

In addition, the progression in technological advances that use data to enable sustainable manufacturing and recycling is growing. With the right focus and investment these technologies can be used as a building block to encourage growth in EV Batteries.

There is also a strong investor landscape focused on ESG, driving high expectations from corporates to address net-zero challenges, but this funding is not directed towards those IP innovations. There is no focus on the future of the battery and its materials. We are pioneering with a number of clients the Battery Passport for the re-use of all of the materials used in the manufacture of batteries, such that we can trace the recovery of those materials and their re-use as they go into their second life. To enhance the retention of materials in the UK, this needs to be a common goal, particularly as the drive for energy transition will make the use of batteries for the storage of power more important including in homes.

### **What action is needed to support investment and establishment of UK gigafactories?**

Investment into sustainable mineral extraction to avoid emissions including from transportation and logistics

Sponsoring organisations, or lead organisations to adopt traceability platforms and require them to demonstrate good practice such that they are beacons of change that others will follow.

R&D into EV battery recycling to avoid the re-use and recycling becoming less attractive from an economic standpoint and increasing landfill.

Upskilling the future workforce, focus on universities.

### **What should the Government do to ensure that gigafactories have a safe, reliable power supply which meets net zero requirements?**

Increased investment into renewable energy is required to support decrease in non-renewable sources and increased manufacturing.

Require them/mandate them to demonstrate the provenance of the raw materials used in their supply chains, including annual operating license reviews with clear hurdles that they need to demonstrate their compliance.

### **What action is needed to support growth of associated power electronics, machines and drive supply chain, including securing supply of raw materials and material processing?**

Encouraging the use of traceability and carbon tracking to prove the source and footprints of the supply chain so manufacturers can make informed decisions to choose lower emitting routes

We recommend the use of blockchain-enabled platform solutions like Circular, to connect all participants in these vital and complex supply chains to digitally track the physical flow of critical materials from source to manufacture in order to provide an immutable record of provenance, activity, compliance and identified anomalies.

Premiums can then be charged for materials with strong ESG credentials, due to increase in demand

**The Government has announced £1 billion of funding to support the electrification of UK vehicles and their supply chains. Is this figure sufficient?**

This investment level is similar to what has previously been committed in France and Germany and while it sets a good foundation, more will be required in relation to areas outside the gigafactories and their supply chains. Areas that will require investment to incentivise education, authority planning, and energy will be of particular importance to assist in developing this sector and ramping up to production quickly so that the UK is well positioned to take advantage of the demand and attract further inward investment in the automotive and related sectors.

**The £1 billion Net Zero Innovation Portfolio will focus on research into low carbon technologies. What proportion of this funding should be directed towards battery electric vehicle research? What areas should ARIA target in distributing funding for high-risk, high-reward research into battery electric vehicles?**

Low carbon technologies are crucial in providing alternatives, however, to truly understand the overall CO<sub>2</sub> impact of the supply chain embedded and inherited carbon needs to be tracked. We recommend that this investment is split as follows:

Research challenges to identify existing innovations – 10%

Collaborations to develop new low carbon technologies – 15%

Paid Pilots and Proof of Concept deployment – 25%

The Battery Passport – the future re-use of recovered materials – 25%

Incentives – grants application programme to drive good behaviour within companies – that achieve or show achievement towards a set of clearly set objectives are ‘rewarded’ with one-off grants and are show-cased globally.

This should enable UK companies to lead the way in showcasing how a supply chain that is also designed for sustainability can be good for business as well.

**What steps should be taken to ensure the UK workforce has the necessary skills to staff gigafactories and their supporting supply chains?**

The workforce requirements to staff giga factories comprise of two broad groupings.

Firstly, the majority will be technicians/operators with operators carrying out most of the manual effort in operations that cannot be automated and technicians ensuring smooth operations of tooling and equipment for the operators. This workforce cohort can be obtained from manufacturing industries such as food/beverage/pharma and construction engineering, but some thought and funding should be allocated to developing and explaining on UK Gov’s Apprenticeship scheme to create a sub-category tailored to the battery industry due to likelihood of enhanced training required on potential hazardous material. As this is a new industry to the UK landscape and due to the nature of the work being predisposed to on-the-job training, it is ideally suited to the apprenticeship model. Collaboration with the education sector is recommended.

Secondly, the remainder of the workforce in non-administrative roles will be highly skilled in nature and demand higher levels of education from all aspects of engineering (i.e. electric,

systems, thermal, battery, process, quality), it is imperative that programs are developed with centres of excellence in universities across the UK third level sector.

**What measures should the Government take to ensure that minerals for battery electric vehicles are sourced in a responsible way?**

Require/regulate/mandate organisation with a set of requirements to demonstrate how and where their materials have been sourced, through the use of reliable, dynamic solutions (not paper audits which are inherent with major problems) and that they have done so in such a way that they can demonstrate no use of child labour or have infringed human rights issues and the extent of the environmental impact.

The scope of responsible sourcing has to be holistic and end-to-end - not simply where minerals have originated from, also, how it is processed and transformed throughout the supply chain - ensuring and proving that only minerals and materials of known provenance has been used with no mixing or co-mingling of materials with unknown or unverified provenance.

Set a gold standard of using technology, that is block chain enabled, to track the provenance of critical minerals and the attributed CO2 along the supply chain

**What action can Government take to support growth of secondary markets to extend lifetime use of EV batteries?**

The Government should require any secondary user of recovered or recycled battery materials demonstrate the source of their batteries and the buyer/manufacture to whom they have traded the battery materials.

In addition, Government should require the 'battery passport' to be a key component of their reporting requirements. This provides a dynamic record which covers the entire lifecycle of the battery, from natural resources, through to mining & processing, battery manufacturing, primary use EV, end of life, recycling and/or battery refurbishments and second life.

**What steps should be taken to ensure that EV batteries are recycled at the end of their lives and not simply sent to landfill?**

Investment into circular economy models for re-use in the UK by providing a range of business incentives such as tax breaks. For example, incentivising new business models such as the leasing of the EV battery - which could make EV's more affordable in the first instance, and also ensure that the EV battery is returned to the economic operator who will have the responsibility and incentives to recycle responsibly or re-purpose for second life use.

Alternatively, as a condition of planning and operating a Gigafactory, mandating the operators to implement an auditable traceability solution for end of life. This promotes collaboration with the giga factories, their customers and onto repurpose operations and recyclers.

The battery recycling industry is developing quickly and operations are coming on stream in countries across the globe. Furthermore, it is in the interests of the UK Gov to promote recycling of batteries as a means of supply back into the Gigafactory supply chains and thereby localising the supply chain to a greater extent.