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BETTING ON BATTERIES: POWERING THE CLEAN ENERGY TRANSITION

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With increasing global demand for batteries to power the clean energy transition, the opportunities and risks are multiplying. New technology, new markets and new deals, including those associated with mineral extraction, human rights and the supply chain, regulatory changes and the race to find funding are giving rise to a number of issues for businesses to grapple with. In this extract from a recent seminar, our international team considers the implications for the automotive sector, which is predicted to make up to 90% of future demand for batteries, as well as renewable energy generation, energy storage and beyond.

The growing demand for batteries poses significant risk

Demand for batteries is rapidly increasing – the UK has banned sales of non-hybrid internal combustion engine cars from 2030 and the EU has approved legislation that will ensure that all new cars sold from 2035 will run either on batteries or e-fuels. "We are at the beginning of a revolution and the demand for battery metals is expected to increase significantly in the coming years to power the electrification of tens of millions of electric vehicles, as well as to provide vital electricity storage capacity to help balance our power grids as they become increasingly reliant on intermittent renewable power generation," says London-based Partner James Pay. However, to meet this demand for electric vehicle (EV) batteries and energy storage batteries we will need a huge quantity of battery metals as well as a significant increase in processing capacity to produce the complex chemicals required to manufacture efficient EV batteries and the manufacturing capacity to produce the batteries themselves. The production and refining of these materials has a significant carbon footprint that needs to be addressed.

The International Energy Agency (IEA) predicts that we need a 600% increase in the production of lithium by 2030 to be on course to achieve net zero by 2050, with a staggering US$360-450 billion of investment needed by 2030 in energy transition metals (including nickel and copper) to keep us on track to achieve net zero by 2050.

The IEA estimates that we will also need a 40% increase in cobalt supply by 2050 – and that supply could become critical in the 2030s because it is less easy to find and mines take longer to develop and put into production.

"Scaling up production of existing mines would be the ideal way to meet growing demand. It is quicker, usually cheaper and less risky. But, in many cases, there is only limited scope to do this and even where you can do so, metals are a finite resource and many existing mines have already been in production for some years and have declining grades of output," says Pay.

Finding new resources, obtaining consents, developing a new mine and achieving commercial production is not a fast process. The average timescale for a new mine is between 10 and 15 years. "One of the challenges is whether we can increase investment and production more quickly to meet the levels of output required to hit our net zero objectives. The very least that we can conclude is that it will be hugely challenging for the mining sector and the supply chain into the mining sector, and for regulators and governments to meet this challenge," adds Pay.

Battery metals are a huge opportunity for the mining sector, but they also highlight a growing number of issues: a lack of skills; the lack of critical equipment suppliers – particularly in the refining sector, where China's dominance has limited the number of suppliers of certain items of key equipment such as autoclaves; the rise of resource

nationalism with producing countries wanting their fair share; and where is the money coming from? In practice, it has become critical for car manufacturers to undertake significant investment in (or at least commit to long-term offtake agreements with) mines and the refining sector in order to secure long-term affordable supplies for the massive investments that are underway in battery gigafactories in China, Europe and the US.

Other challenges for the sector

- Political concerns in developed countries about the security of supply of battery metals – with a resulting desire to diversify sources to avoid over-reliance on the Chinese market and on suppliers controlled by Chinese entities, for example in the Democratic Republic of Congo (DRC) – and on-shore production if possible.

- Political concerns in the producing countries as to how they capture their fair share of the value of the metals that underpin energy transition – causing some to consider following, for example, Indonesia's path by requiring refining to be undertaken in the country of origin.

- Economic concerns regarding how to contract for affordable supplies of key battery metals in a world of rapidly escalating demand and potentially highly volatile and rising prices.

- Capacity and compliance issues – in a rush to increase supply, how can appropriate ESG standards be maintained? How can the carbon footprint of production and refinery be managed? Do governments have the capacity and skills to speed up development of the sector while protecting their own environments, people and economic interests?

- Supply chain – refining and battery manufacture. What matters is not just the mining of these key battery metals, but also the refining capacity that is required to turn them into useful battery materials. The quality and purity of these materials, known as Cathode Active Materials and Pre-Cathode Active Materials (CAM and PCAM, for short) are key to the effectiveness of the batteries that are produced. Based on current announcements, there will be processing shortfalls – 35% for lithium and 60% for nickel sulphate – of the metals that are required to stay on track for net zero 2050.

- Recycling – this is a great source of materials, as battery metals can be reused. However, Thomas Voland, a German-based partner specialising in ESG and regulatory topics, says that recycling has so far been slower than some had expected due to the longevity of EVs and secondary uses of EV batteries for energy storage. Consequently, there is still some overcapacity, but some years down the line it will have an important role to play in the battery metals supply chain. "To make recycling efficient, the batteries have to be designed and built in such a way that the raw materials can be separated with as little input of chemicals, energy and other resources as possible", adds Voland.

- The world's oceans are full of lithium, cobalt and manganese; but deep-sea mining is in its infancy and highly controversial given its potential environmental impacts.

ESG and critical raw materials

"It's very easy to overlook the potential negative impacts associated with resource exploitation and other activities involved in the transition to a global net zero economy," says Rae Lindsay, a London-based Partner specialising in business and human rights and ESG law. "For example, cobalt is vital to the production of rechargeable batteries, but two-thirds of the world's supply of cobalt comes from the DRC where, it is reported, child labour is in use in cobalt mining. The situation on the ground is complex, corruption is rife, including, it is reported, amongst those who are mandated to ensure that child labour doesn't occur, and there is violence with armed groups engaged in conflicts that are fuelled by competition over lucrative natural resources," adds Lindsay.

Three metals are crucial to lithium-ion battery technologies:

- **Nickel:** Has historically been used for nickel plating in stainless steel. Australia and Indonesia have about 44% of the world's reserves of nickel, and Russia and Canada are also big producers, so production is relatively concentrated geographically.

- **Cobalt:** Cobalt has a range of historical uses, including in pigments, alloys and catalysts, but it is much rarer than nickel and production is even more geographically concentrated – with some 70% of production (and rising) coming from the DRC. Indonesia and Australia also have significant reserves and production, but often with lower grades and more expensive extraction. There is a great deal of R&D in battery technology, so we may see the emergence of lithium-sulphur batteries in due course, not least as there is a desire to limit exposure to cobalt due to potential limits on supply and the difficulty of dealing with some of the jurisdictions where it is found.

- **Lithium:** Lithium does not have a long history of successful production and its price has been very volatile over the past decade. It is located far more widely and can be extracted from brine as well as rocks containing lithium, such as spodumene. Australia, Chile, Argentina and China have the biggest reserves, but until recently there has been relatively little investment in lithium.

In the DRC, the large-scale mining operations owned by international companies exist alongside widespread artisanal mining that is unregulated, but on which many local communities depend. The impact on those communities and on human rights is challenging and highlights the risks involved in sourcing these metals, which are then passed up the value chain.

Water resources are also a challenge – 60% of the world's known lithium reserves are found in the so-called 'lithium triangle', an area spanning Chile, Argentina and Bolivia. The extraction methods used in that region are very water intensive. This can create pressure on what is already a scarce resource and can affect the quality of the water supply to local communities, depending on the processes used. There have been reports of abuses of the rights of indigenous peoples around lithium mining projects in South America, and there are similar stories in other parts of the world. For example, land acquisition and the establishment of mining assets can occur without adequate consultation with indigenous communities, there may be unequal sharing of benefits, destruction to communities and livelihoods and damage to the environment.

"It is important to consider the exponential increase in demand for critical raw materials that is expected to occur globally and the inevitable increase in exploitation activity in places where these materials exist," says Lindsay. "It is clear that if these risks are not managed properly, then meeting the increased demand could only lead to new issues and exacerbate those we are already seeing."

How can the risks be identified and mitigated?

In many cases, effectively identifying and addressing these environmental and human rights risks is not easy, but it has been the focus of recent initiatives on supply chain due diligence. The EU's legislative approach, under the draft Corporate Sustainability Due Diligence Directive (CS3D), might be emulated in other parts of the world and expectations are increasing for businesses to play their role in identifying where these environmental and human rights negative impacts may arise, and to take steps to deal with them. "It might seem particularly challenging for businesses operating in the US or the EU to determine how they can meaningfully contribute to the mitigation of these impacts down the supply chain in far-flung geographical areas where they have no direct contractual relationships. However, there are well-established standards of due diligence and risk management to help businesses identify and manage these risks in appropriate ways that are consistent with their responsibilities," Lindsay explains.

The UN and the OECD have been instrumental in this, but these frameworks have now been adopted in the EU through the CS3D and the Batteries Regulation. Essentially, these measures require the creation of policies and processes that are integrated into a company's risk management system and help the business identify actual and potential human rights and environmental adverse impacts, whether in their own business operations or through their supply chains. This involves understanding and mapping business relationships and supply chains right from the source and through all the transactions, from extraction right up to manufacture and distribution.

In contrast to other forms of due diligence that a business might undertake, the main focus is not to identify risks to the business itself, be they financial, legal or reputational, although of course those risks will be assessed in tandem, but to identify the impact on people and their human rights and on the environment and for a business to consider what steps it can take to address and mitigate them and potentially put in place processes to remediate them. There is also an expectation of increased transparency and disclosure, so that the measures that are being taken by a business must be published, usually both in formal corporate reporting and on the company's website. This includes not just policies and processes, but also the impacts that have been identified and the measures taken to address them. "We expect to see much more scrutiny, both from the regulatory authorities within the

EU and also from civil society and other stakeholders, so that businesses will be held to account for the way in which they undertake their due diligence and react to the findings," Lindsay says.

Increasing European regulation – the Critical Raw Materials Act and the Batteries Regulation

To deal with the environmental and social impacts of producing batteries and to ensure that the EU has access to a secure and sustainable supply of critical raw materials, the European Commission is introducing new legislation. It published its proposal for a Critical Raw Materials Act in March 2023, which sets out clear benchmarks to be achieved by 2030. EU capacities along the supply chain of strategic raw materials must achieve the following levels:

- At least 10% of the EU's annual consumption for extraction.
- At least 40% of the EU's annual consumption for processing.
- At least 15% of the EU's annual consumption for recycling.

Most significantly, no more than 65% of the EU's annual consumption of each strategic raw material at any relevant stage of processing should come from a single third country.

"To achieve these goals, the Act aims to reduce the administrative burden and simplify permitting procedures for critical raw materials projects in the EU. For example, selected Strategic Projects will benefit from support for access to finance and shorter permitting time frames – 24 months for extraction permits and 12 months for processing and recycling permits," says Thomas Voland, a Partner based in Düsseldorf.

Further measures include the co-ordination of strategic raw materials stocks among Member States and a significant increase in recycling activities. The Act aims to improve both the recycling of mining waste and of products containing permanent magnets, such as wind energy generators and dishwashers.

"The Critical Raw Materials Act helps implement the EU's Green Deal as it contributes to securing the resources necessary for green technologies, such as batteries for electric vehicles, and as it strongly focuses on recycling, which is one of the key priorities under the Green Deal," says Voland.

Recycling is also a key topic under the upcoming EU Batteries Regulation, which was agreed in December last year. The Regulation aims to make batteries sustainable throughout their entire life cycle – from the sourcing of materials to their collection, recycling and repurposing. It establishes sustainability requirements for carbon footprint, recycled content, and performance and durability. For example, a carbon footprint declaration and label will be obligatory for EV batteries and minimum levels of recovered raw materials, such as cobalt, lithium and nickel from manufacturing and consumer waste, must be reused in new batteries. In addition, portable batteries in appliances such as mobile phones must be designed so that they can be easily removed and replaced by consumers. These requirements will be introduced gradually from 2024 onwards.

The Regulation will also establish higher collection targets for end-of-life batteries. For portable batteries, the targets will be 63% in 2027 and 73% in 2030, while for batteries from light vehicles, the target will be 51% in 2028 and 61% in 2031. Moreover, the Regulation stipulates that all collected batteries must be recycled.

"Under the Batteries Regulation, companies placing batteries on the EU internal market will have to demonstrate that the materials used for their manufacturing were sourced responsibly. This means that social and environmental risks associated with the extraction, processing and trading of the raw materials used for the battery manufacturing will have to be identified and mitigated in line with international standards. In other words, due diligence assessments need to be conducted in the supply chain. The Batteries Regulation establishes similar risk management obligations to the draft Corporate Sustainability Due Diligence Directive," says Voland.

However, it remains to be seen how the Regulation and the Directive will be aligned with each other. According to the Council's position on the draft CS3D, the Batteries Regulation should prevail in so far as it establishes more specific and comprehensive due diligence requirements.

The Critical Raw Materials Act does not explicitly stipulate a sustainability-linked due diligence requirement. Such requirements will follow from the CS3D. The CS3D proposal will cover companies using critical raw materials, ensuring that they adequately address adverse human rights and environmental impacts in their own operations and value chains. For projects to be implemented in the EU, the strict environmental and social laws of the EU and its Member States will apply.

Last but not least, the Critical Raw Materials Act establishes new requirements to enable consumers to make informed choices about the environmental footprint of products containing critical raw materials.

US/EU EV battery project financings

The global demand for EVs has spurred the development of EV-related manufacturing facilities all over the world, especially for batteries. China currently dominates the processing of critical minerals and production of EV batteries, and the US and Europe are now trying to catch up. The EU is pushing to onshore its supply chain and production, and the US is accelerating its efforts to onshore the EV value chain with federal fundi¬ng through the Infrastructure Investment and Jobs Act and tax incentives included in the Inflation Reduction Act.

According to the think tank Atlas Public Policy, to date, US$830 billion has been invested in vehicle and battery plants and battery recycling facilities, and that figure is expected to rise to over US$1 trillion by 2030. Atlas attributes approximately US$230 billion of the US$830 billion announced investments to Europe, US$210 billion to the US, US$210 billion to Asia (excluding China) and US$199 billion to China.

"Based on the Atlas figures, of the US$210 billion announced in the US, more than 70% has been announced since the start of 2021. This figure speaks to the massive upscaling that is happening at the moment," says Peter Hughes, a Clifford Chance Counsel based in Washington, D.C. "While the bulk of the investment is being made in EV and battery facilities – Atlas has identified 23 different companies that have each already allocated at least US$1 billion of investment for a specific EV or EV battery plant – this upscaling in the US is happening across the value chain, including mining, processing and battery recycling."

What are the financing risks?

Generally, the risks and issues are similar to those in any project or corporate financing, but there are aspects that are unique to EV battery projects. "In addition to due diligence considerations, some key issues include equity and sponsor support, the type of company developing the project – are we talking about an automotive original equipment manufacturer (OEM), a battery manufacturer, or a joint venture? – intellectual property, supply and offtake arrangements, validation of products and recall/warranty risk," says Hughes. This raises a number of questions:

- **Source of funds:** many EV battery facilities are massive projects. Where is the equity coming from and what certainty do lenders have that the equity will be contributed as required, especially when some of the same players are pursuing multiple projects across different jurisdictions? Will the sponsors provide parent guarantees?

  Automotive OEMs have large balance sheets and may be able to commit large amounts of equity upfront leading to an inverted debt to equity ratio, whereas a battery manufacturer might prefer a structure with a more traditional debt to equity ratio.

- **Government incentives** for building factories and creating jobs are critical to every project.

- **Borrower structure:** is the borrower a battery manufacturer, or perhaps a joint venture between an automotive OEM and a battery manufacturer or technology partner? What is each partner bringing to the JV (is one partner committing to the offtake; is the other supplying the critical IP), and what happens if one partner fails? Would another partner be able to step in, or would the remaining partner have the rights and capability to continue the project?
- **Intellectual Property and battery technology is critical:** is the technology subject to export controls and, if so, in what situations would a JV partner or licensee not be able to use the technology? Can it be part of a lender's security package? Is the IP subject to litigation or disputes with other manufacturers? Battery technology will change during the life of the loan. How is the borrower planning for that, and how will that impact the lender's model?
- **Supply and Offtake Contracts:** the markets for critical minerals and batteries are still evolving. The high demand for, and fluctuating costs of, raw materials means that most supply contracts are short term and offtake, despite confidence in market predictions, is not fixed or guaranteed. In addition, construction costs continue to fluctuate due to supply chain constraints.
- **What testing and validation procedures are in place** to ensure that products meet specification and what is the extent of liability associated with potential recalls or warranty issues, which are common in the automotive industry?
- **What is the risk tolerance** to lend to both entrenched market participants and market disruptors in an industry known for bankruptcy?

"With these risks and considerations in mind, we are still in the early days of financings for the EV battery market, and there are many lenders and investors who want to be involved in the first financings. That said, lenders are definitely cautious," says Hughes. "In Europe, lenders do not yet seem willing to lend without Export Credit Agency (ECA) cover, and the ECAs appear willing to write large cheques. With ECA backing, lenders appear to be more comfortable with traditional debt to equity ratios."

In the US, the Department of Energy's Loan Programs Office is financing the first transactions across the value chain, from mining to processing, to EV batteries and EVs to recycling.

He adds: "For EV battery facilities, we are not seeing fully structured, "traditional" project finance transactions (though we are seeing traditional project finance structures for supply chain and processing facility transactions). Since there often are no long-term contracts in place, lenders are considering financing phases of projects as the business grows, which limits exposure. If traditional debt to equity ratios are flipped, lenders might be willing to consider a hybrid corporate-project finance structure or even a corporate financing, depending on the balance sheet and level of parent support."

Global demand is driving change. Michelle Williams, a Clifford Chance partner based in Washington D.C., says "contracts are being drafted quickly, responding to the race for resources, and new companies and joint ventures are being formed. The flow of goods is increasingly restricted by trade barriers. Given scarcity and competition, those seeking "most favoured customer" status with their suppliers could face antitrust scrutiny, while the rate of expansion will increase the likelihood of construction, IP and offtake disputes." The challenges in the sector must be met alongside ever-increasing focus on ESG, sanctions and anti-bribery compliance.

Overview of the PRC battery market

China dominates the global battery supply chain, leading in manufacturing capacity, mineral extraction, raw materials refining and processing, thanks to the government's decade-long focus on strategically growing its battery sector.

However, China's battery sector is highly dependent on imports of key materials. The PRC is estimated to have about 60% of the world's capacity for processing and refining raw materials for battery production but, at the end of 2020, held only about 8% of the world's lithium reserves.

"Reliance on imports makes China's battery industry highly vulnerable to price fluctuations of raw materials. Over the past decade or so, Chinese companies have pre-emptively been investing overseas with a view to ensuring access to raw materials supplies," says Vicky Ma, a Partner based in Hong Kong.

It is reported that in 2021 alone, China's mining and battery companies acquired access to 6.4 million tonnes of lithium reserves and resources. These acquisitions, which stretch from Africa to South America, have helped safeguard China's access to lithium resources. However, China's outbound acquisitions and its continuing hold on overseas natural resources are likely to face increasing scrutiny from governments, whilst geopolitical tensions continue to test the fragility of international supply chains.

China announced in March that it will strengthen domestic exploration and development of scarce and strategically important mineral resources and will roll out a number of measures to attract more private capital within the PRC. "It remains to be seen how these measures may help alleviate China's dependence on raw materials imports, if at all," says Ma.

Overcapacity issues

Another challenge facing China's battery sector is production overcapacity. According to some publicly available data, China's battery production capacity will soon be three times greater than demand from domestic EV makers, so producers will need to look abroad for customers. However, notwithstanding that China's battery technology may be more advanced in some regards, there may be a perception that China's battery supply chain is less developed when it comes to ESG regulations and standards, which are key considerations for most overseas car manufacturers.

In response, in November 2022, the PRC's Ministry of Industry and Information Technology and The State Administration of Market Regulation jointly released a notice which contains a number of recommendations for rebalancing China's battery supply chains. "Whilst the Notice itself is not a piece of regulation and falls short of being a policy statement, it serves as a strong signal to various local authorities and industry players to actively take action to address the supply chain issues," says Ma.

The Notice contains a section which focuses on the need to improve the overall quality of the battery sector, and to strengthen quality control. Local authorities are encouraged to investigate and punish those manufacturers whose products fail to meet the mandatory national quality standards. China has also established a traceability management system for batteries used in EVs, designed to incentivise Chinese manufacturers to improve the quality of Chinese battery production.

"It looks likely that Chinese manufacturers will up their game and local authorities will take action to strengthen the regulatory environment with a view to catching up with the global ESG standards," says Ma.

What are the opportunities?

Despite the economic downturn, Chinese companies remain active in investing in an upstream presence in the global market – with a view to securing resources for EVs and China's renewable industry. "We are seeing Chinese companies entering into joint ventures with international car manufacturers to participate in mining projects in Southeast Asia (for example in Indonesia) and also refining projects inside China. On the one hand, some joint ventures are aimed at helping international car manufacturers secure their supply chains. On the other hand, some joint ventures help address China's security of supply risks as well as improve the ESG standards for China's own production," says Ma.

However, at China's annual parliament meeting, which took place in March, President Xi told a leading Chinese battery manufacturer that he had mixed feelings about its status as the world's largest battery maker due to the geopolitical risks. According to news reports, President Xi said that Chinese battery manufacturers should avoid marching ahead alone in an invincible fashion, only to be caught out by others and fail in the end, noting also that companies should balance development against security. "It remains to be seen what, if anything, the PRC government may do to balance supply and demand issues in the PRC battery sector and to mitigate the risk of overcapacity," Ma says.

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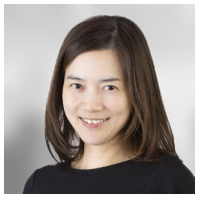

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