Investment Stewardship, Asia ex Japan – 2023 Q1

May 2023

J.P.Morgan
ASSET MANAGEMENT

At J.P. Morgan Asset Management, we are committed to delivering the highest possible risk-adjusted returns to our clients. We believe one of the key contributors to strong investment returns is a full understanding of the corporate governance principles and practices of the companies in which we invest. We expect all our companies to demonstrate the highest standards of governance in the management of their businesses, as far as is reasonably practicable.

Central to our investment approach is regular engagement with our investee companies in order to better understand their operating, strategic and governance issues. As a fiduciary, we recognize the importance of active ownership on behalf of our clients and we have an obligation to maintain a dialogue with the companies in which we invest, to ensure that our clients' interests are represented and protected. We routinely meet with the senior executives of our investee companies to exercise our ownership responsibilities. And where a governance issue is material, we will engage with the company to better understand the issue and seek to promote best practice. Our analysts and portfolio managers take these issues into account as part of their investment process.

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Market developments and trends

India's securities regulator to tighten environmental, social and governance (ESG) disclosure requirements for public companies, investors and rating providers

In February 2023, the Securities and Exchange Board of India (SEBI) issued a consultation paper on ESG disclosure, ratings and investing[1]. Rather than targeting one specific group of stakeholders in the investment community, SEBI's proposals cover the ESG requirements for locally listed companies, investors and ESG rating providers.

"Reasonable assurance" of sustainability / ESG reports is not yet common.

When compared with annual financial statements, ESG/sustainability reports are less standardized and, more importantly, unaudited. Moreover, some of these reports are scrutinized with limited assurance. However, sustainability reports with reasonable assurance are uncommon, which implied the information in the reports is materially correct. To lift investor confidence in ESG/sustainability reporting, SEBI proposed that listed companies publish their reasonable assurance a list of core mandatory ESG metrics for their Business Responsibility and Sustainability Reports (BRSRs). The regulator suggested the following glidepaths:

- FY2023-2024: reasonable assurance on core-mandatory metrics for top 250 companies
- FY2024-2025: reasonable assurance on core-mandatory metrics for top 500 companies
- FY2025-2026: reasonable assurance on core-mandatory metrics for top 1000 companies

SEBI also aims to strengthen the ESG disclosure requirements at the supply chain level. Such information is important for the investors to have a better assessment of the ESG risk exposure of their investee companies. The regulator proposed to change the reporting from a voluntary basis to a comply-or-explain basis for the core ESG risks of supply chain for FY2024-2025. The assurance of such disclosure will also be changed for FY2025-2026 from voluntary to a comply-or-explain basis.

The creditability of the ESG disclosure by investee companies is a key hurdle that investors need to overcome as stewards. But to ensure that ESG funds are aligned with their stated strategy and purpose, SEBI proposed a set of requirements in the disclosure, including their labeling and the stewardship activities – engagement and proxy voting. To mitigate the risks of greenwashing, SEBI recommended an ESG investment scheme to invest a minimum of 65% of its assets under management in companies which are reporting on comprehensive BRSR and are providing assurance on BSRS Core disclosures.

[1]Source: "Consultation Paper on ESG Disclosures, Ratings and Investing", SEBI, Feb. 20, 2023.

The regulatory consultation also included the ask for enhancement transparency in ESG ratings and the mitigation of conflict of interests in ESG rating providers. A regulatory framework for ESG rating providers is under development. SEBI's paper also presents more details of the regulatory proposals for ESG disclosure of corporate, investors and rating companies.

Other markets in Asia to scrutinize ESG reporting and disclosure

The Shenzhen Stock Exchange, after publishing a white paper on environmental information disclosure (in Chinse only)[2], issued in February, their revised self-disciplinary guidelines[3] for listed companies' industrial information disclosure. Among other things, the guidelines aim to enhance ESG information disclosure requirements, such as on the major pollution and security incidences for certain industries. China is one of key markets where investors are looking for improvements in ESG disclosure. Echoing market demand, China's regulators are reportedly[4] planning to make ESG disclosure mandatory for listed companies.

In the Association for Southeast Asian Nations, Thailand's Securities and Exchange Commission issued in January, the guidelines[5] on the management and disclosure of climate-related risk by asset managers aimed at helping asset managers consider the risks and opportunities that accompany climate change and the financial impact on the investee companies. The guidelines also include suggestions for asset managers in their disclosure of climate-related information to stakeholders, in accordance with recommendations by the Task Force on Climate-Related Financial Disclosures. The adoption of the guidelines is voluntary.

To facilitate greater transparency and consistency in sustainability disclosures, Bursa Malaysia announced in March that it will develop a Centralised Sustainability Platform[6] in collaboration with the London Stock Exchange Group, which will serve as a repository for listed companies' ESG disclosures. Additional capabilities will include a carbon emission calculator for corporates and their supply chains.

[2]Source: 《深市上市公司环境信息披露白皮书》, Shenzhen Stock Exchange (SZSE), Jan. 20, 2023.

[3]Source: "SZSE Revises Industrial Information Disclosure Guidelines to Optimize Institutional Supply and Drive the High-Quality Development of Listed Companies", SZSE, Feb. 10, 2023.

[4]Source: "China Considers Mandatory ESG Disclosures Framework", ESG Investor, Regulation Asia, Feb. 23, 2023

[5]Source: "SEC launches Guidelines on Management and Disclosure of Climate-related Risk by Asset Managers", the Securities and Exchange Commission, Thailand, January 10, 2023.

[6]Source: "Bursa Malaysia Commences Centralised Sustainability Platform", Bursa Malaysia, March 22, 2023

Corporate engagement

Shenzhou International Holdings Ltd.

Asset class: Equity Market: China Stewardship priority: Social stakeholder engagement, human capital management, natural capital and ecosystems Focus: Labor rights, suppliers management, living wages, water stewardship

Quality disclosure of material ESG data would be help investors better assess a company's sustainability.

Issue

In our engagement in 2022, Shenzhou told us that it forbids forced or child labor at its direct operations and its salary offerings are generally higher than peers. The company said the importance of employee welfare and the low turnover of workers contributed to its long-term success. However, there is a lack of public disclosure by Shenzhou on these issues. We shared examples of industry labor practice with Shenzhou and encouraged the company to disclose more details regarding management of its labor and suppliers.

Action

We engaged with the company in-person twice in the first quarter of 2023 and are encouraged by some of initiatives over the past few months.

First of all, in November 2022, Shenzhou uploaded on its website a Chinese version of its code of conduct, which addresses some core standards recommended by the International Labour Organization (ILO), such as no child or forced labor, no discrimination or harassment, more than minimum-wage pay and occupational health and safety.

With respect to labor issues in the supply chain, Shenzhou has disclosed in Chinese, its whistle-blowing policy and channel on its website. We welcome the improved disclosure and will encourage the company to disclose annual grievance findings. It also relies on internal audit teams to monitor the suppliers' environmental and social performance. However, it currently does not disclose details on audit practices and the company sees room for improvement.

Regarding fair/living age, we understand that Shenzhou could verbally communicate the average wages of its general workers during investors meetings. The disclosure in public documents could be a challenge given the secrecy of the matter and the pushback of its customers. What is good to know is that the company reported its wages are generally 10-15% above its peers.

At the end of the meeting, we discussed about water stewardship and the importance of water replenishment. Noticeably, Shenzhou is a heavy user of water, and there are water sustainability issues particularly in locations where they operate. These issues would affect the long-term costs of its operations in different ways. The management is aware of the importance of water stewardship and plans to increase water efficiency at its fabric units by 20% by 2025 as compared with 2022. The company has disclosed a list of environmental programs on its annual report alongside the outcome it wants to achieve in each program. Some of these programs are aimed at reducing its water footprint. While the information presented some good initiatives, it is difficult for investors to estimate the impact to the firm

Outcome/ Next stage

To further demonstrate efforts in managing its own labor and those of its suppliers, we see the need for Shenzhou to disclose its stance on freedom of association, collective bargaining and responsible recruitment in its supplier code of conduct. In addition, we recommended that the company make a public statement of paying fair/living wages for its workers. We also suggested that the company disclose its grievance mechanism in addition to its whistle-blowing policy, which is publicly available in Chinese on its website.

The company is keen to exchange ideas about water stewardship. We would follow up on this topic later this year.

POSCO Holdings Inc.

Asset class: Equity

Market: South Korea

Stewardship priority: Human capital management and social stakeholder engagement

Focus: Labor rights, freedom of association, responsible sourcing

Issue

POSCO's operation in Turkey was alleged to be in violation of human and workers' rights[7]. We have been engaging with the company about this and urged it to resolve this. We shared an example where a labor unionization issue was successfully resolved.

Riding on the surge in demand for battery packs, POSCO aims to become a leading global producer of battery materials, including lithium, nickel and cobalt. We want to understand POSCO's strategy in managing the potential social issues underlying the production of "conflict minerals".

[7]Source: "Concerns over workers' rights violations at POSCO Assan in Turkey", IndustriALL Global Union, March 2, 2023..

Corporate engagement continued

Action

We engaged with the company in March 2023 on the stated issues. With respect to its Turkey labor rights allegations, the company acknowledged it is one of the core human rights issues it needs to address, and it is investigating the concern internally. We highlighted to the company recent public articles[7] by IndustriAll, a global union confederation, alleging POSCO Assan of violating labor rights and emphasized the importance of engaging with relevant stakeholders.

Materials ESG issues of suppliers could have significant impact on companies

Next, we discussed responsible minerals sourcing. Ahead of the meeting, we sent several questions concerning, for example, the geographical source of key battery minerals procured directly or indirectly, its supplier engagement style and strategy, and its process to prioritize severe human rights risks. POSCO has not addressed sustainability issues relating to lithium extraction. We shared that lithium extraction can lead to water stress issues, and often conflict with the indigenous communities, especially in the Lithium Triangle area. Any mishandling can escalate into a community protest and cause reputational damage. On cobalt, we raised to the company ongoing child labor issues at the mine sites in the Democratic Republic of Congo. We asked the company to accelerate its understanding of various potential and actual environmental and social impacts and develop a strategy for remediation. This may ultimately impact the company's sourcing strategy.

Outcome and next steps

We will share examples of how other companies handled similar labor incidents in the past and continue to monitor the company's progress on both issues.

Lenovo

Asset Class: Equity and Fixed Income

Market: China

Stewardship priority: Social stakeholder engagement

Focus: Trusted artificial intelligence (AI)

Issue

We engaged with Lenovo on trusted AI, which is a key engagement topic due to technology companies' past controversies over the handling of sensitive personal data, content algorithms and content moderation after increased scrutiny by regulators globally. The financial impact from non-compliance of evolving regulations can include significant fines and losses in market capitalization.

Action

We first raised this issue with the company in March 2022 to understand the path of its public commitment to gender-neutral AI with Cercle Interelles. In February 2023, we met with its senior AI data scientist and senior manager of global AI business. The senior AI data scientist walked us through the principles, the governance structure and the current practice Lenovo adopted to mitigate the risks. We asked for specific examples whether Lenovo rejected any AI solutions because of their deviation from its responsible AI principles. We are encouraged by the progress Lenovo has made on trusted AI.

Outcome/Next steps

We suggested that Lenovo disclose its responsible AI policy on its website, and to showcase some examples to demonstrate how it is incorporating the principles into its company operations.

Techtronic Industries Company Limited (TTI)

Asset Class: Equity

Market: Hong Kong

Stewardship priority: Governance

Focus: Board effectiveness

Issue

We have been engaging with TTI on various strategic and financially material topics, including board quality and succession planning. In our view, the current chief executive officer (CEO) is a strong and passionate leader. As the company's long-term investors, we are keen to understand the team culture, and how the board of directors strike a good balance with him and senior executives.

Action

In March 2023, we initiated an in-person governance meeting with the company's first female independent director appointed in 2021.

We asked about her onboarding process, her impression of the CEO and the board dynamics. We are encouraged to hear several anecdotal examples which demonstrate how she strikes a balance with the board and how she asks the right questions, including succession planning tactfully. We also discussed her observation about the current working model between the US and Asia management teams.

Corporate engagement continued

Independence and diversity of the board improves has improved

We further discussed board composition including long tenure of an independent director. She shared how various independent directors, including the longstanding independent director, add value to the board, especially during in crisis management. Specifically, on the company's response to a recent short seller report, we provided our feedback on its rebuttal, as well as raised our concerns that the board audit committee has financial experts without prior audit expertise.

In addition, we suggested that the company consider using board evaluation as a tool to improve board effectiveness. We shared how a few Hong Kong-listed companies conduct external board evaluation, and some have uploaded the findings on their website. She promised to look into this further. We also suggested that the company consider offering a dialogue between investors and independent directors to provide transparency on board dynamics and oversight.

Outcome and next steps

Her sharing shows the company is serious about getting strong and well-formed contributions from their independent directors. We will monitor the company's progress on audit expertise, board evaluation practice and environmental, social and governance (ESG) communication with investors.

Proxy voting

We review all resolutions to ensure that votes cast are in the best interests of our clients. Most resolutions raised are uncontentious, and we typically vote in support of incumbent management. However, in a number of instances, we either abstain from voting or vote against specific resolutions. In Asia Pacific, we have appointed Institutional Shareholder Services Inc. (ISS) to assist us in the processing of proxies and to provide us with recommendations based on our Proxy Voting Guidelines. At the same time, we are under no obligation to accept these recommendations if we believe that client interests are best served by voting differently.

Between January and March 2023, we voted 2,141 proposals at 348 Asia ex Japan company meetings, of which China and Hong Kong accounted for close to 54.0% of total number of meetings, followed by South Korea (26.7%), Association of Southeast Asian Nations (ASEAN) (9.5%), India (7.5%) and Australasia (2.0%). Our voting statistics for the quarter are summarized below:

J.P. Morgan Asset Management voting for Asia ex Japan companies in 2023 Q1

*All Asia ex Japan companie	2023 Q1		2022 Q1	
Number of meetings	**348**		254	
Number of votable proposals	**2,141**		1,536	
Votes with management	**1,852**	**86.5%**	1,299	84.6%
Votes against management	**286**	**13.4%**	227	14.8%
Abstain and withhold	**3**	**0.1%**	10	0.7%
Total number of proposals voted	**2,141**	**100.0%**	1,536	100.0%
Number of shareholder proposals voted for	**67**		36	

Key Markets	China, HK		ASEAN		India		South Korea	
Period*	**2023 Q1**	2022 Q1	**2023 Q1**	2022 Q1	**2023 Q1**	2022 Q1	**2023 Q1**	2022 Q1
Number of meetings voted	**188**	96	**34**	36	**26**	29	**93**	93
Number of proposals voted	**1119**	566	**278**	263	**84**	81	**622**	626
For	**964**	447	**237**	220	**74**	73	**546**	559
Against	**152**	119	**41**	35	**10**	8	**76**	65
Abstain/Withhold	**3**	0	**0**	8	**0**	0	**0**	2
As % of total								
For	**86.1%**	79.0%	**85.3%**	83.7%	**88.1%**	90.1%	**87.8%**	89.3%
Against	**13.6%**	21.0%	**14.7%**	13.3%	**11.9%**	9.9%	**12.2%**	10.4%
Abstain/ withhold	**0.3%**	0.0%	**0.0%**	3.0%	**0.0%**	0.0%	**0.0%**	0.3%

**Based on ISS Country of Coverage*

Propsoal category	2023 Q1			2022 Q1		
	Number of Proposals	**As a % of total**	**% voted Against / Abstain / Withold**	**Number of Proposals**	**As a % of total**	**% voted Against / Abstain / Withold**
Capitalization	350	16%	7%	172	11%	4%
Compensation	251	12%	16%	219	14%	21%
Director related	799	37%	10%	512	33%	15%
Strategic Transactions	243	11%	38%	199	13%	35%
Routine business	266	12%	12%	396	26%	9%
Others	232	11%	10%	38	2%	5%

Similar to our observation in the past years, the January– March quarter coincided with the peak of the annual general meeting (AGM) period in South Korea. In South Korea, we voted against 76 proposals, of which 55.7% were related to board of directors and 25% were related to compensation.

Proxy voting continued

Directors' election

During the quarter, we voted against 73 proposals related to director election due to concerns about overall board independence and long-tenure of independent directors and the lack of female director on the board. About 74.0% these proposals came from South Korean companies. Please refer to the following voting highlights:

Shinhan Financial Group (South Korea)

The company proposed the appointment of directors in this AGM. We voted against the re-election of all incumbent independent directors as they failed to fulfill their fiduciary duties. The board has failed to give a compelling reason on how it would handle legal risk differently in the future should a similar matter happens again. Given that no systemic frameworks have been adopted even after the CEO's incident, it is very likely the board will behave in the same way as they have done until the final court ruling

POSCO Holdings Inc. (South Korea)

The company proposed the appointment of directors in this AGM. We voted against the appointment of non-independent and non-executive directors due to concerns over allegations of inadequate oversight on human rights in its Turkey operations as well as overall board independence. We hold the view that voting against the executive directors in this case would impact the running of the business, and so did not vote against them. We believe a strong independent element to a board is essential to the effective running of a company. We expect that at least most of the board should comprise independent directors, with clear steps being taken to improve board independence over time.

Innocean Worldwide Inc. (South Korea)

The company proposed the appointment of directors in this AGM. We voted against two executive directors as well as one non-independent and non-executive directors due to their poor governance track record. We believe boards should be headed by an effective chairman, who is independent on appointment. There should be a clear division of responsibilities at the head of a company, such that no one individual has unfettered powers of decision. We believe the roles of chairman and CEO should normally be separate, and a lead independent director be appointed.

Proxy voting continued

Executive remuneration

During the quarter, we voted against 41 proposals related to executive remuneration due to concerns about failure to provide clarity on the increase of total remuneration and the grant of incentive schemes. About 46% of these proposals came from South Korean companies. Please refer to the following voting highlights:

Kangwon Land Inc. (South Korea)

The company proposed an item on the approval of remuneration for executive directors and non-executive directors in this AGM. We voted against this item because the company failed to provide reasonable justification for increasing the director remuneration limit and has shown a poor track record of disclosure.

Capitalization and capital allocation

During this quarter, we voted against 116 proposals related to capitalization, capital allocation and strategic transactions. About 97% of these proposals came from China and Hong Kong companies. We do not support companies that failed to meet our expectations on the issuance of new shares without pre-emptive rights (including the issuance of repurchased shares, maximum issuance limit) and failed to provide compelling reasons

Shareholder proposals

During the quarter, we observed 70 shareholder proposals in the region but most of them were proposed by controlling shareholders about director re-election. We supported 67 proposals and voted against three proposals related to election of directors and article of incorporations. There were no environmental and social shareholder proposals this quarter.

Spotlight on: Electric Vehicles (EVs)

In this quarter's report, we asked five Research Analysts covering Automotives in our Global Equities team to discuss EVs. We hope it demonstrates how we think about EVs from an ESG perspective and the role they play in transitioning to a low-carbon society. We asked Chris Ceraso, Gokhan Ates, Mark Mao, Robert Dickinson and Koichi Hirokawa who cover the US, Emerging Markets, China, Europe and Japan, respectively.

1 While EVs do not produce tailpipe emissions, the sourcing and the processing of raw materials used in their manufacturing have often been criticized as having a high-carbon footprint. How does this compare to the manufacturing of internal combustion engine (ICE) vehicles? How do you view progress in this evolving area for EVs and what does this mean for investors?

There are two factors that investors need to consider when comparing the carbon footprint of an EV versus an ICE vehicle: the source of electricity used to charge the battery and the energy required in mining, processing and producing the battery. These factors dent the 'well-to-wheel' emissions profile of an EV relative to an ICE vehicle.

Japan is the only major economy that considers the 'well-to-wheel' impact of EVs as part of its carbon emissions regulatory policies and as such, is one of the economies with the least aggressive requirements in terms of phasing out ICE vehicles in favor of EVs. That said, it is important for the industry to start making the transition and building out the infrastructure to accommodate the EV switch, as over time, energy sources that provide electricity for EV charging will shift further towards renewables. Additionally, as the size of the EV fleet grows, battery recycling will provide a meaningful offset to the amount of new minerals that need to be mined and refined to produce batteries for EVs. Thus, EV should truly be a more sustainable mode of transportation over the long run.

In addition to the source of electricity and the incremental 'well-to-wheel' energy required to make an EV, another relevant consideration is the environmental impact of mining and the intermediate materials processing that goes into making an EV. Lithium processing is dirty, and making this process cleaner is expensive and this is one reason why China has taken such a lead in this area. While China has strict environmental rules, regulatory interference in EV materials processing plants as well as the environmental costs of these plants have been low. As a result, processing capacity grew rapidly in China.
A further relevant consideration is how much an EV will be driven in its life as most of an EV's environmental impact is in its production. When in use, an EV has a clear and substantial advantage over an ICE vehicle, even when its electricity comes from a coal-fired plant. The more miles an EV is driven, the better its environmental impact will be versus an ICE vehicle.

Whether an EV emits lower carbon emissions or not very much depends upon the mix of renewable energy used in manufacturing the EV, the mix of renewable energy used in producing the electricity for daily driving use and lastly, the miles driven by the car. Depending on these conditions, a Hybrid Vehicle (HV) or Plug-in Hybrid Vehicle (PHV) could emit less carbon emissions throughout their lifecycles than an EV. Additionally, from a supply of lithium perspective, promoting a PHV over an EV may be a better solution as three or four PHVs can be produced with the lithium required to produce one EV.

1 Cont/ ...

On the other hand, the strategy of a company or location could be different. Considering firstly, that HV and PHV will ultimately be replaced with battery EVs (BEVs) in the future and secondly, establishing strong supply chains for BEVs requires BEV exclusive vehicle platforms, BEV unique manufacturing processes and the control of upstream materials, it is a rational move for a company or location to lead the competition by focusing on BEVs in the early stages. Our investment opinion must take care of both perspectives, but is more affected by the economically rational strategy.

2 When we at J.P. Morgan Asset Management engage with EV manufacturers, what are the main ESG issues discussed? What are the most important data points for assessing the ESG progress of these companies?

On the environmental front, EV companies are generally better positioned than legacy ICE manufacturers as they do not have to worry about making the transition away from profitable vehicles which will ultimately be phased out to new technologies that will at first be unprofitable. Thus, when we engage with EV manufacturers, our focus is on the sourcing of materials and evaluating whether this is done in a sustainable way from suppliers.

In recent years, our bigger focus, especially as it relates to Tesla, has been on social and governance factors. Corporate governance has long been a challenge at Tesla, but we have regularly engaged with management and the board to offer our input and recommendations with regards to preferred policies and procedures. We also tend to discuss governance much more often than environmental issues when engaging with South Korean automotive companies. With Indian EV manufacturers, we have extensively discussed India’s motivation as it strives for wider EV penetration. The primary reason behind this aspiration is less so about pursuing a cleaner environment in India and more so about ensuring India’s competitiveness as a vehicle exporter in a world that is moving toward EVs.

3 What differentiates automotive leaders in EV production from others? How is this reflected in our ESG Checklist and Materiality frameworks?

The primary differentiation between EV leaders and the rest of the legacy automotive industry comes down to cost and manufacturing efficiency. Tesla, for example, has significant cost advantages versus other original equipment manufacturers (OEMs), owing to its innovations in vehicle design and manufacturing. One clear and powerful example is Tesla's use of large 'giga castings' which replace hundreds of individual stamped steel parts which would have to be bolted, welded or glued together, with two or three very large castings. This saves Tesla thousands of dollars per vehicle in materials and labor.

Another big differentiator is in battery sourcing and technology. We would highlight both Tesla and BYD as having significant cost and efficiency advantages versus the rest of the industry in this regard. In addition to dedicated EV platforms and battery sourcing, charging networks is a key differentiator among EV makers. Tesla's superior charging network in the US is a substantial competitive advantage and as 'charging network' implies, this is a network effect that benefits first movers with an early scale advantage.

Most legacy OEMs are still in the process of developing their dedicated BEV production platforms which will be launched over the next few years. Examples would be Mercedes's Mercedes Modular Architecture (MMA) platform in 2024 and BMW's Neue Klasse platform in 2025. These should provide step-change improvements in BEV product performance. But Tesla is not standing still, so it remains to be seen whether the legacy players can close the performance and efficiency gap.

Using the ESG Checklist and Materiality frameworks, we assess whether management are held accountable to targets to reduce the environmental impact of production processes. Primarily, this is through these targets being incorporated into short and long-term remuneration plans.

4 What are the main barriers to achieving mass adoption of EVs? How should investors prepare for potential changes in government policy and incentives?

There are four primary limiting factors currently holding back EV adoption: firstly, charging infrastructure (which remains woefully inadequate relative to consumer needs, especially for non-Tesla vehicles); secondly, battery material availability and cost; thirdly, vehicle cost (which remains high relative to ICE vehicles); and lastly vehicle availability (as it will take time to build out manufacturing capacity to produce EVs).

One incremental point is that EV is alien for locations that are not mandating an end to ICE vehicles or subsidizing EV substantially. Consumers have inertia; unless something pushes them, they stick with what is familiar. This is also reinforced by poor resale values for the first EVs that come onto the second-hand car market in any location.

It might be included in the issue of charging infrastructure but a battery's capacity for rapid-charging directly affects the number of required charging stations and posts. That is why many companies are developing next generation batteries such as all-solid-state batteries. Also, concentration in use of a certain material (lithium) could lead to significant price inflation of that material and could become the barrier. In that sense, diversification of key materials (sodium as a lithium alternative) should be important.

Development of charging infrastructure is likely to take several different forms. Mercedes-Benz recently announced plans to develop a global high-power charging network in collaboration with MN8 Energy, a large solar energy and battery storage operator in the US and ChargePoint, a leading EV charging network company. Volkswagen has partnerships with BP, Iberdrola and Enel in Europe to build out charging networks as well as participating in the IONITY joint venture with many other global OEMs. The main electric trucks OEMs in Europe have formed a joint venture to operate at least 1,700 charge points on major routes.

Regulation is a major driver of electrification in Europe through the 2030 Climate Target Plan. Ambitious auto OEM targets such as Stellantis planning to be 100% electrified in Europe by 2030 are in response to European carbon emissions regulations and a likely attempt to ban ICE vehicle sales by 2035. Despite these ambitions, EV incentives for consumers have been reduced in large European markets such as Germany and the UK. So financial incentives are not necessarily aligned with policy targets.

5 Could you talk about the importance of the source of energy for charging infrastructure? How does this influence whether EVs have a lower environmental impact compared to internal combustion engine vehicles in aggregate over their life cycle?

The source of energy used for EV charging certainly makes a difference in terms of the 'well-to-wheel' carbon footprint of an EV versus an ICE vehicle. But over time, as generation sources shift further toward renewables, this aspect of EV emissions should improve. But we need to start today to make the transition in order to develop the vehicles as well as energy transmission to bring the power to hundreds of thousands of charging stations.

Additionally, there are degrees of dirty within electricity from coal, oil or even solar. And to reiterate, the more miles driven by an EV before it reaches the end of its life, the better an EV is in a comparison of environmental impact versus an ICE vehicle.

RISK SUMMARY

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