The Ecosystem of Electric Vehicles

With this report, we lay out an **ecosystem of stocks** exposed to the Electric Vehicles value chain. While this note represents a snapshot in time, an evolving interactive version of the ecosystem can be found on the **Cars: The Road Ahead** page on the Goldman Sachs Research portal. We will update this portal-hosted ecosystem as our coverage evolves.

Currently the EV industry is facing cross currents from a number of directions – Greenflation, rising electric power prices, the US Inflation Reduction Act (IRA) – but we expect the industry to steadily overcome these obstacles through technological innovation. However, we expect technological innovation, and we see considerable growth through 2030 in the EV ecosystem, and think profit pools in the automobile industry will be transformed.

We believe that **Tesla, LG Energy Solution/LG Chem**, **SKI**, **Samsung SDI**, **Panasonic** and **FREYR Battery** are likely to benefit the most from the increased adoption of EVs, as we think these companies should be able to tap IRA opportunities as the battery market becomes more concentrated. We are also focusing on the potential for earnings growth at **Infineon**, **STMicro**, **Rohm**, **Fuji Electric**, **ON**, **WOLF, Disco** and **SICC** on the adoption of SiC power semiconductor technology. We highlight **Denso**, **ADI**, **APTIV**, **TE Connectivity** and **Sensata for their electronic components exposure**. Furthermore, we pay special attention to **Hon Hai** for its EV production outsourcing opportunity.

We would like to thank Varuna Nangia and Anik Joshi, members of the Digital Content Strategy team, who oversaw the effort to pull together the investment theses and create the interactive exhibit.

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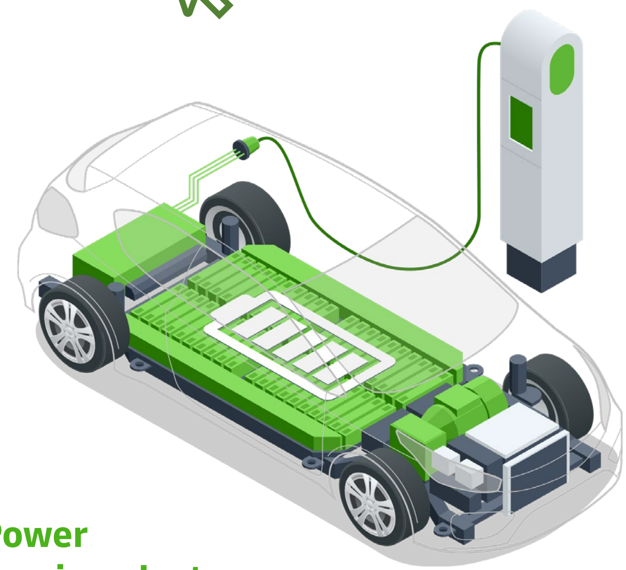

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Pony Testing

Software, Networking, Compute
AMD
Marvell
Nvidia
NavInfo
KPIT Tech

Not rated or not covered: National Instruments, Broadcom

* **Core components** include one or more of the below:
Motor, Powertrain, Transmission, DC/DC Converter, Onboard charger, Inverter, Thermal Management, Battery Management System.

(+) indicates integration into additional segments of the value chain.

We note that the list of companies across the Electric Vehicles value chain we present above is not exhaustive, and the universe of companies involved in the global chain is likely to be larger than what is presented in this exhibit.

PM summary: Technological innovation should cut through the near-term noise

Electric vehicle (EV) penetration is rising sharply amid an accelerating push towards carbon-neutrality. We expect EV adoption to be 16%/33%/49%/61% of global new vehicle sales in CY25/30/35/40.

Major players are looking to in-source more components with an aim to improve costs, control their supply and leverage existing industrial assets. Further, recent developments like the US Inflation Reduction Act make it important to understand where firms lie within the value chain.

This ecosystem divides the EV value chain into six sub-segments: OEMs, Batteries, Core Components, Power Semiconductors, Charging Infrastructure, Assembly and Other Components (Electrical and Software).

Core components include motor, DC/DC converter, onboard charger, inverter, powertrain, transmission, thermal management and battery management system.

Exhibit 1: Moves toward electrification are not going to stop
Forecasts for vehicle electrification

	2020	2021	2022E	2023E	2024E	2025E	2030E	2035E	2040E
EV sales ratio									
Total	**2%**	**5%**	**8%**	**10%**	**13%**	**16%**	**33%**	**49%**	**61%**
USA	2%	3%	6%	9%	13%	20%	50%	70%	85%
Japan	0%	2%	2%	2%	3%	6%	20%	50%	80%
China	5%	12%	20%	27%	31%	33%	43%	57%	68%
EU	6%	10%	11%	13%	20%	25%	72%	100%	100%
India	0%	1%	1%	2%	3%	4%	20%	37%	55%
Others	0%	0%	0%	0%	0%	0%	5%	21%	38%
Hyper adoption	**2%**	**6%**	**11%**	**14%**	**17%**	**20%**	**46%**	**65%**	**93%**
Bear	**2%**	**5%**	**7%**	**8%**	**10%**	**12%**	**26%**	**40%**	**54%**
EV sales (mn)									
Total	**1.9**	**4.3**	**6.3**	**8.5**	**11.1**	**14.1**	**32.6**	**53.5**	**72.9**
USA	0.2	0.5	0.8	1.2	2.1	3.4	8.0	11.2	13.6
Japan	0.0	0.1	0.1	0.1	0.1	0.3	0.9	2.1	3.3
China	0.9	2.4	4.1	5.6	6.3	6.9	8.9	11.8	13.9
EU	0.7	1.2	1.2	1.5	2.4	3.4	11.8	16.0	16.0
India	0.0	0.0	0.0	0.1	0.1	0.2	1.3	3.0	5.5
Others	0.0	0.0	0.0	0.0	0.0	0.0	1.8	9.4	20.6
Hyper adoption	**1.9**	**4.5**	**8.3**	**11.1**	**14.1**	**17.7**	**45.6**	**71.1**	**111.8**
Bear	**1.9**	**4.3**	**5.3**	**6.7**	**8.9**	**10.7**	**26.0**	**43.4**	**64.4**
LiB demand (GWh)									
Total	**158**	**313**	**498**	**642**	**849**	**1,112**	**2,583**	**4,325**	**6,178**
Hyper adoption	**156**	**362**	**728**	**998**	**1,299**	**1,668**	**4,249**	**6,704**	**10,586**
Bear	**156**	**311**	**420**	**543**	**727**	**904**	**2,018**	**3,482**	**5,390**

	2020	2021	2022E	2023E	2024E	2025E	2030E	2035E	2040E
Powertrain outlook (mn)									
PHEV	0.9	1.8	2.8	3.6	4.4	5.1	4.8	4.8	6.4
EV	1.9	4.3	6.3	8.5	11.1	14.1	32.6	53.5	72.9
ICE and others	74.1	74.2	69.7	69.5	69.6	70.2	61.3	50.7	41.1
Powertrain ratio									
PHEV	1%	2%	4%	4%	5%	6%	5%	4%	5%
EV	2%	5%	8%	10%	13%	16%	33%	49%	61%
ICE and others	96%	92%	88%	85%	82%	78%	62%	47%	34%
NEV (EV+PHEV)									
NEV	2.8	6.0	9.2	12.2	15.5	19.2	37.4	58.3	79.3
NEV ratio	4%	8%	12%	15%	18%	22%	38%	53%	66%
(China NEV)	1.1	3.0	5.7	7.7	8.9	9.8	11.8	14.7	16.8
(China NEV ratio)	6%	15%	28%	38%	43%	48%	58%	72%	82%
(China NEV yoy)		169%	91%	36%	15%	10%	5%	4%	3%

Source: IHS Global Insight, Goldman Sachs Global Investment Research

We see considerable sales growth potential for EVs

We expect the automobile industry to undergo a major transformation between 2020 and 2030, driven by the increasing adoption of vehicle electrification and autonomous driving. We expect particularly strong moves toward vehicle electrification, and we forecast average annual sales growth of 32% for EVs. We also forecast average annual sales growth of 28% for the essential components used in EVs (e.g., batteries, inverters). While we see automotive software as another growth market, we think the growth potential for electrification will be the main focus through 2030. At the same time, we expect a slump in sales of products related to gasoline engines.

Profit pools also set to change

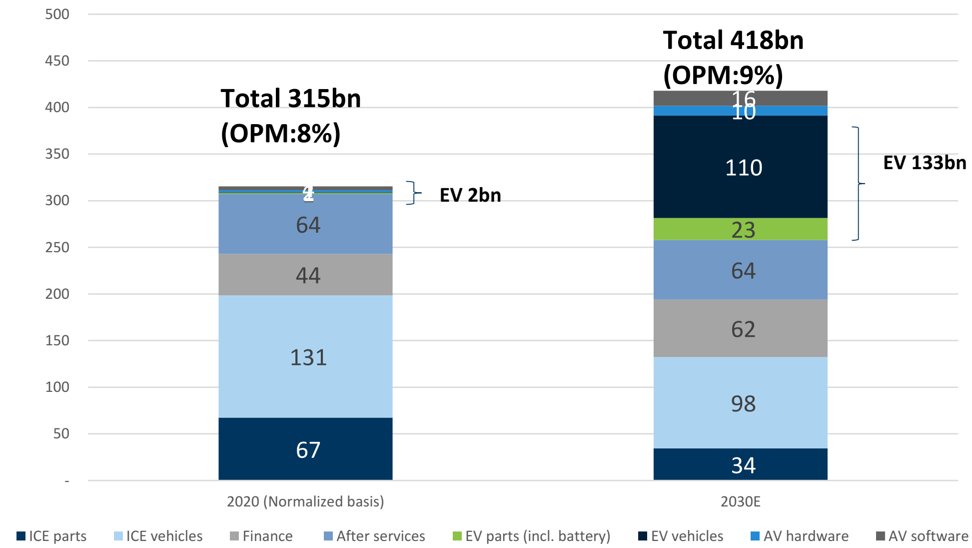
We forecast that operating profits in the global automobile industry will rise from US$315 bn in 2020 (GSe; operating margin: 8%) to US$418 bn (9%) in 2030. Within this, we expect the EV-related profit pool to grow substantially, from US$2 bn to US$133 bn. Although we expect the profit pool for EV themselves to increase from US$1 bn to US$110 bn, traditional automakers will inevitably see a decline in profits from gasoline-engine vehicles. Competition is likely to be tough, but we see considerable growth potential for pure EV makers that can prevail. We expect the profit pool for EV-related components to increase from US$1 bn to US$23 bn over the decade, and see considerable earnings growth potential for manufacturers that can create new value in EV batteries, inverters, and motors.

Exhibit 2: Strong growth potential for EV-related products
Sales growth outlook by product category (2020-2030E)

Business segment	Sales CAGR	Outlook
AV software	15%	Rapid growth in revenue on autonomous function. Assuming 20% OPM on normalized basis.
AV hardware	17%	LiDAR,GPU, Camera and other sensors to drive rapid growth. Assuming 15% OPM on normalized basis.
EV vehicles	32%	Battery cost decline, premium pricing and and decreased production complexity to drive OPM to around 12%.
EV parts (incl. battery)	28%	Battery, motor and inverter to drive profit expansion
After services	0%	Keeping stable operation. EV maintenance costs is 20-30% lower than ICE but VIO (Vehicle in Operation) to grow.
Finance	3%	Keeping stable margin operation regardless of powertrain shift from ICE to EVs.
ICE vehicles	-1%	ICE vehicle sales to decline. OPM to come down to 6% from 7%.
ICE parts	-1%	ICE vehicle sales to decline. Engine/Transmission product segments to see faster deterioration.

Source: Company data, Goldman Sachs Global Investment Research

Exhibit 3: EV profit pool is expected to grow substantially
Profit pool for the global automobile industry (US$)



2020 numbers are based on the industry wide average OPM by each segment and not an aggregation of each company's profit pool by segments.

Source: IHS Global Insight, Company data, Goldman Sachs Global Investment Research

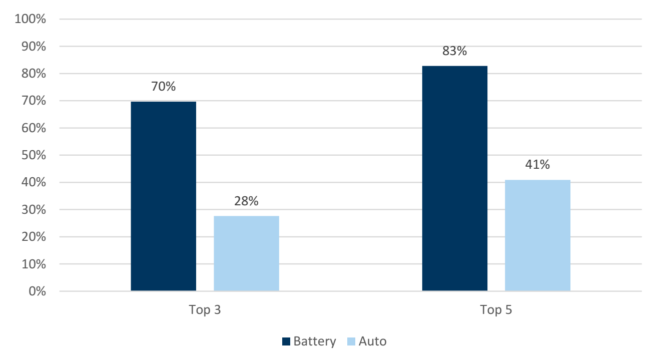
Two power balances that will shape profit pool expansion

While we think there will be no letup in expansion of the EV industry as environmental regulations are tightened and electrification technologies advance, we believe that access to profit pools will vary considerably depending on the product and the region.

First, we note that the global market is becoming increasingly concentrated for EV batteries, which account for 25-40% of the total cost of an EV. As of 2020, the top five automakers had a global market share of 41%, whereas the top five battery makers had a global share of 83% (GSe). We think pricing power has increasingly shifted toward battery makers, which makes the environment more conducive for them to achieve higher earnings. Finished vehicle assemblers, meanwhile, are rushing to establish vertically integrated production structures and joint venture plants as they look to address the power balance with battery makers.

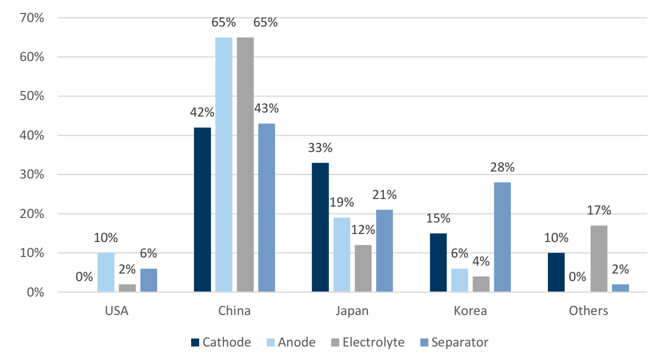
Second, we note government-led moves toward supply chain localization, as exemplified by the US IRA. Taking the battery supply chain as an example, dependency on China for the four key battery materials (cathode materials, anode materials, separators, electrolytes) was very high as of 2020. The IRA seeks not only to promote the local assembly of EVs, but it also calls for the localization of battery assembly and battery material production, and the procurement of battery minerals from countries with which the US has FTAs. Under this structure, companies will not be able to use the battery supply chain that has been built up in China to export to the US. In Europe, also, proposals for a similar initiative to the IRA are being raised for discussion, and developments there will bear close monitoring. Governments in both regions are strongly interested in the battery supply chain, which brings the potential for strong growth as well as job creation. We see a strong possibility that the IRA official announcement in March 2023 will have positive implications in terms of relative advantage for manufacturers that are pushing ahead with local production in the US of EVs, battery-related products, and EV components.

Exhibit 4: Market concentration in the battery industry
Global market share for the top three and top five manufacturers (as of 2020)



Source: Company data, SNE

Exhibit 5: High dependence on China
Regional production share for the four main battery materials

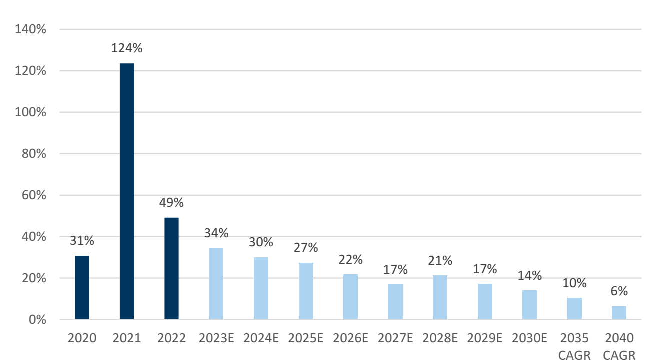


Source: US Department of Commerce, Goldman Sachs Global Investment Research

Some near-term noise, but medium-term EV growth story is intact

We estimate that global EV sales volume will increase from 1.9 mn units in 2020 to 72.9 mn units in 2040. We expect the percentage of sales accounted for by EVs to rise from 2% in 2020 to 61% in 2040, and we think the percentage will be over 80% in many developed nations. However, in terms of yoy momentum, we estimate that growth came to 49% in 2022, down from 124% in 2021. Although growth will ease as the market expands, EVs still represent the strongest growth potential within the automobile industry. We estimate EV sales growth of 34% in 2023, but we expect noise resulting from a number of headwinds to cloud the picture in the near term.

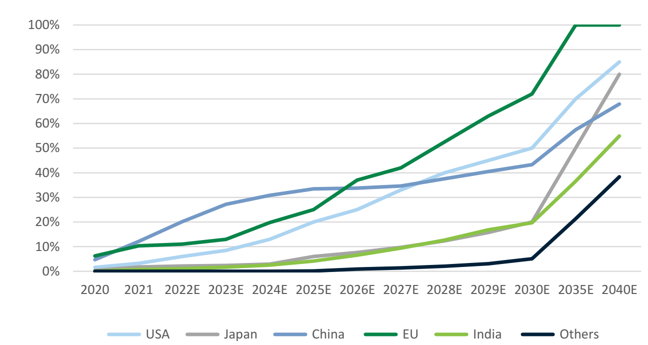
Exhibit 6: We forecast double-digit (%) sales growth for EVs
Global EV sales volume growth



2035 CAGR: 2030-2035, 2040 CAGR: 2035-2040

Source: IHS Global Insight, Goldman Sachs Global Investment Research

Exhibit 7: EV adoption pace varies from market to market
EV sales ratios by region



Source: IHS Global Insight, Goldman Sachs Global Investment Research

Near-term headwinds

(1) Greenflation is pushing up battery prices. We look for battery costs to rise 6% yoy to US$171/kWh in 2023, from US$161/kWh in 2022, and we estimate this will increase costs per EV by US$600. Given that initial costs for an EV are higher than an ICE vehicle, lowering the costs via technological innovation (in areas such as batteries and semiconductors) is a major premise to more widespread uptake of EVs.

(2) Total cost of ownership (TCO) is changing. Crude oil prices have settled at around US$80/bbl recently, while electricity costs are on an uptrend. EVs will therefore have less of a relative cost advantage (gasoline cost savings) in the near term. Based on the experience of the Prius to date, we estimate a payback period of about three years will be needed to lead to a turning point triggering wider uptake of EVs, and at present we think 2027 will be the year in which this turning point takes place (for consumer-led uptake that does not rely on government subsidies).

(3) There are many uncertainties around how consumers will be affected by government policies on EV supply chains, with the US IRA being the prime example at present. According to Korea's SNE Research, requirements in the IRA will reduce the number of EV models eligible for a US$7,500 tax credit upon purchase from 90 to 20 models. The IRA also sets new limits on the purchaser's annual income and the retail price for the vehicle to be eligible.

Conditions for qualifying for the EV tax credits

Final assembly in North America: To qualify for any credit, all vehicles must be assembled in North America.

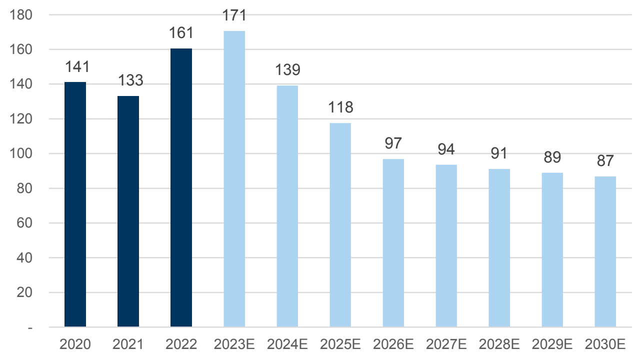
MSRP limitations: To qualify for any credit, all SUVs/pickup trucks/vans must have an MSRP below $80k and all other vehicles (e.g. sedans) must have an MSRP of below $55k.

Modified gross income limit: To qualify for any credit, individual tax filers must report an adjusted gross income (AGI) of less than $150k, heads of households must report an AGI of less than $225k and all joint filers must report an AGI of less than $300k.

Battery materials sourcing: To qualify for $3,750 of the credit, the percentage of value critical materials extracted or processed in any country with which the US has a fair trade agreement or is recycled in NA must be ~40%+ before 2024, ~50%+ during 2024, ~60%+ during 2025, ~70%+ during 2026, and ~80%+ after 2026.

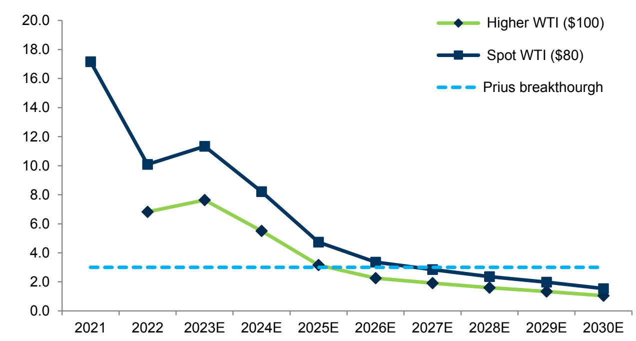
Battery components sourcing: To qualify for $3,750 of the credit, the percentage of value of components in the battery manufactured or assembled in North America must be ~50%+ before 2024, ~60%+ during 2024/25, ~70%+ during 2026, ~80%+ during 2027, ~90% during 2028 and 100% after 2028.

Exhibit 8: Battery prices have been trending upward recently
Forecast of cost per kWh



Source: IHS Global Insight, SNE, Goldman Sachs Global Investment Research

Exhibit 9: The turning point for EVs is expected around 2027
Payback period on EVs



Source: Company data, Goldman Sachs Global Investment Research

EV prices are declining

Tesla (covered by our US Autos analyst Mark Delaney) announced on January 12 that it was lowering retail prices in the US for its EVs by 6-20% (while prices for interior options and vehicle delivery were raised slightly). Tesla has also decided to lower prices for its EVs in other markets including China. Following the price reductions that have occurred globally in recent weeks, we show current starting prices for Models 3 and Y in the US, Germany, France, and China on a USD basis as of 1/13/22.

Given Tesla's vertically integrated business model extending upstream to batteries, the company's EV price reductions may boost sales volume and enable it to reap economies of scale per our US autos team. Tesla is also looking to apply technologies that lower EV costs, such as 4680 batteries and LFMP (lithium-iron-manganese-phosphate) batteries. However, this is negative news for the EV industry as a whole. EV players face a number of headwinds around battery costs, with material costs rising, the IRA leading to greater upfront investment, and higher costs to diversify suppliers. The potential for this to depress EV industry margins is real.

We believe that Tesla's price reductions could substantially increase the addressable market for both the Model Y and Model 3. Our industry discussions suggest that about 20-30% of unit volumes in the US are done in the $40-$55K price tier, compared to a mid teens percent of industry volumes in the $55-$70K price range (where the Model Y had been priced). The Models 3 and Y, especially when considering federal and state incentives, are now well within this $40-$55K price band, with Model Y now starting at about $53.5K in the US and Model 3 now starting at about $44K in the US (with the starting prices prior to any potential government subsidies like the IRA). Moreover, the Standard Range Model 3 when considering incentives and fuel savings could even address parts of the $25-$40K price band (about 40% of industry unit volumes).

Exhibit 10: Pricing comparison in key countries
Tesla starting pricing for key regions as of 1/13/2023 in USD

	USA	Germany	France	China
Model Y				
Standard Range	-	$48,614	$50,888	$38,725
Long Range	$52,990	$59,550	$58,469	$46,175
Performance	$56,990	$70,381	$69,298	$53,625
Model 3				
Standard Range	$43,990	$47,639	$48,722	$34,255
Long Range	-	$58,469	$57,386	-
Performance	$53,990	$66,049	$64,966	$49,155

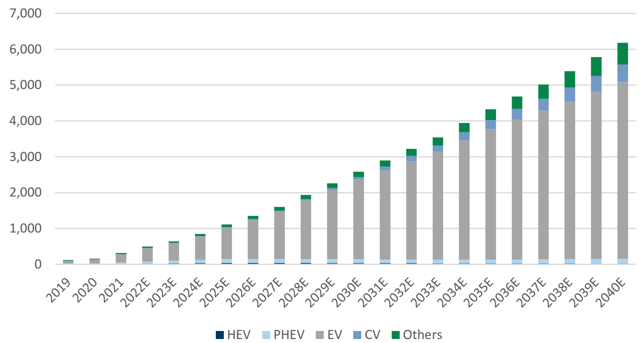
Source: Company data, Goldman Sachs Global Investment Research

New technological breakthroughs to be critical

Technological innovations will be essential to overcome this sort of near-term noise. We think the vehicle battery market is poised to grow substantially through 2040, with growth to be driven by development of new materials and the introduction of new battery designs. In 2023, the introduction of LFMP batteries (evolved from LFP designs) will be key. Tesla plans to adopt LFMP batteries made by Contemporary Amperex Technology Co. Limited (CATL, covered by our China autos analyst Fei Fang). Adding manganese to the batteries enabled CATL to raise energy density by 15% compared to a conventional LFP battery without the cost rising too much. Competition in all solid-state batteries (ASSB) is also set to be fierce ahead of 2028. There are still a number of hurdles to their practical use, including (1) dendrite management when metallic lithium is used as an anode material, (2) maintaining the interface effect between the solid electrolyte and active materials, and (3) lower energy density when solid electrolytes are mixed with cathodes/anodes.

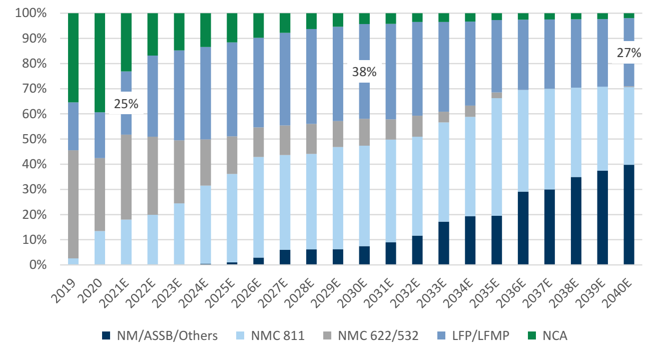
We also see considerable scope for improving efficiency in powertrain units, which consume about 55% of battery output in EVs. Expectations on this front include growing adoption of silicon carbide power semiconductors that contribute to reducing energy loss in inverters, and further improvements in motor efficiency. We think the use of heat pump technology could boost efficiency in air conditioners, which consume around 25% of battery output. We expect overall thermal management capabilities to come into play, as the efficient heating/cooling of batteries and motors/inverters can improve a vehicle's electric power consumption. Lightweighting is another indispensable technology for increasing the range of EVs, which have to carry heavy batteries. In addition to the increasing adoption of high tensile steel, aluminum, and resin, we will also be keeping an eye out for measures to reduce the weight of tires.

Exhibit 11: Scale merits in batteries increasing year by year
Battery demand outlook by vehicle type (GWh)



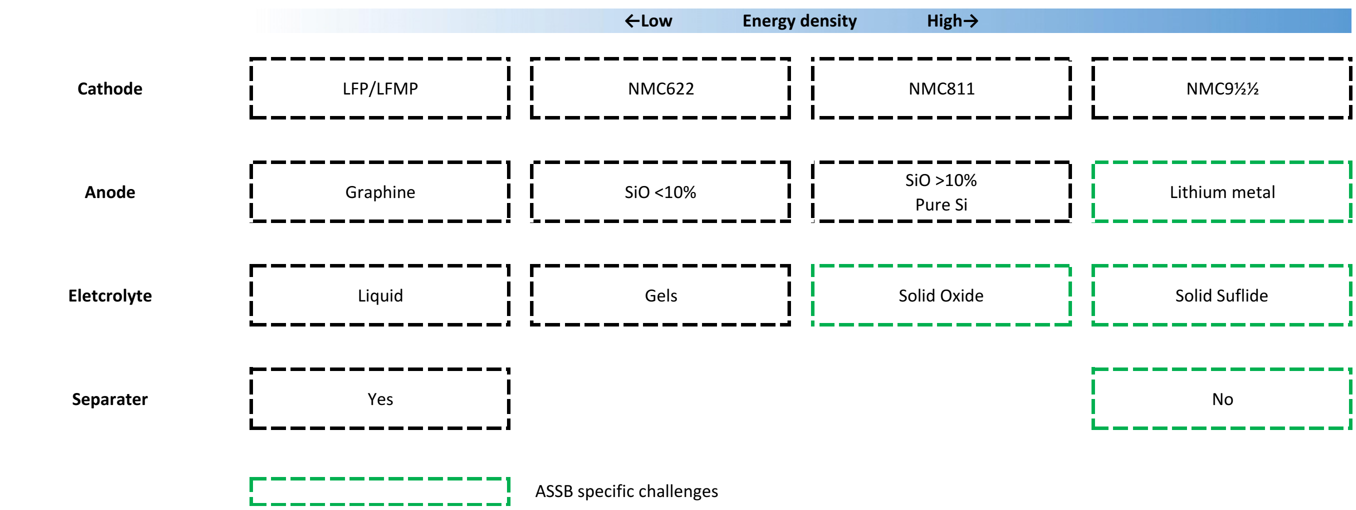
Source: IHS Global Insight, Company data, Goldman Sachs Global Investment Research

Exhibit 12: LFP/LFMP battery usage may accelerate ahead of 2030
Outlook on cathode material weightings



Source: IHS Global Insight, SNE, Goldman Sachs Global Investment Research

Exhibit 13: Time needed for adoption of new technologies
LiB ASSB road map



Source: Company data, Goldman Sachs Global Investment Research

Electric Vehicle OEMs

Automotive OEMs, that include the likes of Tesla, BMW, and GM, are companies that are building the actual cars. Many legacy OEMs are increasingly pivoting towards Battery Electric Vehicles (BEVs) and are committed to increased production levels of electric vehicles. As part of this, OEMs are also bringing more components in-house, from batteries to power trains, that were previously purchased from external companies.

Tesla (TSLA)

Rating: Buy | Price Target: US$200.00 | Analyst: Mark Delaney

In-sourced components: Tesla has its own charging infrastructure and has also internally developed 4680 battery cells. The firm also manufactures some core components such as motors in-house.

We continue to believe that Tesla is well positioned for long-term top- and bottom-line growth, given its leading position in the EV market (which we attribute in part to its ability to offer full solutions including charging and software, brand, and cost leadership), as well as drivers for cost and EPS. While we expect Tesla to lower vehicle prices going forward, we continue to think it can do so with strong margins. We believe cost drivers will include scale in its new factories given that the cost per vehicle in Austin and Berlin should be well below Fremont longer-term as Tesla is using a purpose built EV factory design in those locations (similar to what it has done in Shanghai where its costs are very attractive) and increasingly reducing parts/steps globally (e.g. with casting). In addition, we see the IRA as positive for its cost structure and pricing potential in the US (especially as Tesla has been at a competitive disadvantage in recent years in terms of federal tax credits).

Initiation (14 Apr 2020)

General Motors (GM)

Rating: Buy | Price Target: US$42.00 | Analyst: Mark Delaney

In-sourced components: Motor, transmission, inverter.

GM is ramping up its own battery supply, with a focus on a JV approach.

We are positive on General Motors, one of the world's leading global auto OEMs given the company's relative position in both EVs and ADAS/AVs. On EVs, we believe that GM can be a beneficiary of the IRA and believe its flexible EV architecture (Ultium) can help it to profitably address a wider range of price points in the EV market (e.g. Equinox and Blazer). On ADAS/AVs, we believe that GM has a strong set of autonomous capabilities, including Super Cruise, Ultra Cruise and its self-driving subsidiary, Cruise (majority owned by GM). Cruise's recent announcement that it is pulling forward its timeline for expanding its autonomous service, offering a fully driverless robotaxi service in Phoenix and Austin in December 2022, which it expects to scale in 2023, underpins our view. While we acknowledge that GM's earnings in the near to intermediate term could be impacted by cyclical factors, we believe the company is positioning itself well to capitalize on the shift to electric and autonomous vehicles in the long term.

Initiation (14 Apr 2020)

Ford (F)

Rating: Neutral | Price Target: US$13.00 | Analyst: Mark Delaney

We are generally positive on the steps Ford is taking to transition toward EVs and software/services, but this is offset in our opinion by the long duration that some of these efforts will take and cyclical risk, and we still believe that Ford is moderately behind key peers in its EV cost structure, which will impact its margins as EVs increase as a percentage of company mix (though with some benefit from the IRA). As it regards to the industry, while Ford has a long order book for certain models, and the company said it is benefiting from a refreshed vehicle lineup, we believe that price and mix will moderate for the auto industry in general in 2023 (with a mix shift toward smaller and more fuel efficient vehicles/EVs, and easing vehicle supply/demand more generally). We also expect a significant moderation in Ford Credit profits in 2023 vs. 2022 on reduced gains on used vehicles and a more difficult credit environment. In the future Ford will have its own batteries via a JV. Ford is also shifting over time to its own EV platform with some vertically integrated parts

Initiation (14 Apr 2020)

Rivian (RIVN)

Rating: Neutral | Price Target: US$19.00 | Analyst: Mark Delaney

We believe Rivian's long-term growth outlook remains promising. Key elements of our positive view include: 1) a positive demand backdrop for Rivian, which is due in part to rising consumer interest in EVs and word of mouth advertising from its growing customer base; 2) the Inflation Reduction Act, which can help establish a North America supply chain and accelerate the shift to clean transportation; 3) the company's strategy in software and services, which is a key part of the value proposition and monetization opportunity for Rivian. However, we believe risks remain related to the pace of its manufacturing ramp compared to consensus expectations.

Initiation (5 Dec 2021)

Lordstown (RIDE)

Rating: Sell | Price Target: US$0.75 | Analyst: Mark Delaney

We see substantial fundamental and balance sheet risks with Lordstown's balance sheet/cash position limiting its ability to ramp into volume production, and the company needs meaningful incremental cash in order to invest in the tooling that would allow it to bring its BOM cost in line with its selling price. Moreover, the fleet EV pickup market is highly competitive, with both Ford (with its F-150 Lightning that is currently available) and GM (starting in 2023 with the Silverado) selling their fleet EV pickups at lower starting prices than the Endurance.

Initiation (11 Dec 2020)

Volkswagen (VOWG_p.DE)

Rating: Neutral | Price Target: €150.00 | Analyst: George Galliers

In-sourced components: Onboard charger, motor, transmission, battery pack, battery management system

Volkswagen also plans to make batteries in-house.

Volkswagen AG is the largest carmaker in Europe with a portfolio of 10 brands split across 'volume', 'premium' and 'sport' brand groups. As per our broader coverage, we see macro and Household Available Cashflow risks to 2H23/1H24, notably in Europe, by when we believe today's order books will be largely depleted. As Europe's largest auto player, and given we estimate VW derives >50% of revenues from the region, we see risks to earnings in coming quarters. Further to this, we emphasise caution over VW's capital allocation, as despite generating >€40bn of FCF in 21-23E, VW continues to source further funds such as the recent Porsche IPO and hybrid equity. At this point, it is not clear that VW's investments, notably in future technologies and companies to enable future Mobility models, will yield attractive returns for investors. In our view, VW continues to trade at an attractive valuation, post its recent IPO of Porsche AG (c.€10bn stub value ex-PAG). However, VW has consistently appeared cheap on a SoTP basis, and we see limited scope for this to change in the near-term.

Initiation (9 Oct 2019)

BMW (BMWG.DE)

Rating: Buy | Price Target: €108.00 | Analyst: George Galliers

In-sourced components: Onboard charger, motor, transmission, battery pack, battery management system

BMW is a leading premium automobile and motorcycle manufacturer. We expect a solid year for BMW, given product cycle and the ongoing buyback program. We are Buy rated and believe there is a negligible value being placed on BMW's strong cash position. We believe there is material scope for incremental shareholder returns. We estimate that BMW will have positive industrial working capital of €11.0bn at year-end 2022 and at this point forecast minimal unwind in coming years. Finally, BMW has communicated that it sees a gross liquidity floor of €20bn as appropriate.

Initiation (15 July 2019)

Stellantis (STLA, STLA.MI, STLA.PA)

Rating: Buy | Price Target (STLA): US$20 |Price Target (STLA.MI): €19 | Price Target (STLA.PA): €19 | Analyst: George Galliers

In-sourced components: Battery pack, battery management system

Stellantis plans to move manufacturing of battery cells, motor, transmission and inverters in-house.

Stellantis is an automotive manufacturer formed from the merger of FCA and PSA. We believe that Stellantis' management team has a strong track record of maximizing price/mix, where possible, across its portfolio. This was notable, pre COVID-19, at both FCA in North America (first major OEM to heavily withdraw from passenger cars) and PSA in Europe (price improvement 2016-19 in lieu of market share). In addition to the synergies the merger continues to offer, we believe the opportunity for best practices to be shared across the group continues to yield improvements in price/mix and, in part, explains Stellantis' outperformance over the last 2 years. We expect the outperformance to be sustainable, irrespective of industry volumes. Stellantis' scale in Europe allows it, in our view, to improve both the price point and sales channel mix for the FCA inherited brands which, historically, had unfavorable exposure to rental markets. We believe there is a negligible value being placed on Stellantis' strong cash position and that there is material scope for incremental shareholder returns.

Initiation (1 Feb 2021)

Renault (RENA.PA)

Rating: Neutral | Price Target: €39.00 | Analyst: George Galliers

In-sourced components: Onboard charger, motor, transmission, inverter, battery pack, battery management system

Renault is a French automotive manufacturer of volume cars. The company is part of an Alliance with carmakers Nissan and Mitsubishi. As a result of a substantial reduction in fixed costs (>€2bn), the company continues to exit unfavorable sales channels, thereby improving both pricing and mix. In addition, its next generation of vehicles have a materially better variable profit contribution, as Renault has reduced complexity and variable cost and is also able to achieve a better price point due to the introduction of fresh product. Finally, mix will structurally benefit in 2023 from the new Megane E and Austral; both vehicles occupy a white space for Renault and should be able to contribute >100k incremental units in aggregate (IHS >109k) even in a soft sales environment.

Initiation (15 July 2019)

Porsche (P911_p.DE)

Rating: Buy | Price Target: €117.00 | Analyst: George Galliers

Porsche AG (Dr. Ing. h.c. F. Porsche AG) is a German manufacturer of high-performance luxury sport cars. We view Porsche as an embodiment of our Cars++ thesis and an attractive equity, given its unique luxury pure-play positioning, highly coveted product offering and clear focus towards the BEV transition. Porsche occupies a unique market position, in our view, with substantially more scale than other luxury pure plays (302k unit sales vs. Ferrari's 11k in 2021) and yet with price points which are close to double those of premium car makers (Auto ASP €100k vs. BMW's €51k 2021). We believe Porsche's financial targets appear achievable. We expect volume and price improvements to offset higher costs on electric vehicles with a relatively stable mid-term gross margin evolution at Porsche compared to 2021. We see Porsche as well positioned for this transition, having a 6+ year lead in BEV technology compared to luxury peer Ferrari as well as the potential to benefit from economies of scale and leveraging the wider VW Group's investments in electrification and software.

Initiation (8 Nov 2022)

Volvo Car AB (VOLCARb.ST)

Rating: Neutral | Price Target: Skr46.00 | Analyst: George Galliers

Volvo aims to be a leader in the automotive industry's transition from an internal combustion engine, largely analogue product sold to dealers, to digital battery electric vehicles sold directly by manufacturers to customers. Volvo's BEV penetration has grown in 2022 following the introduction of the XC40 Recharge and the C40 and currently sits at 7.5% of Volvo's deliveries (1Q-3Q22) vs. 7.3% at BMW and 6.4% at Mercedes. From a volume perspective, both the EX90 flagship and a smaller more affordable BEV SUV, both expected in the next 12 months, should make a notable difference. We believe Volvo Cars has an opportunity to differentiate itself on software, with the company seemingly taking a pragmatic and open-minded approach to software development, in our view. With respect to hardware, we view Volvo Cars' collaborative approach positively, as it leverages the expertise and scale of leading industry players. Volvo Cars' strategy to invest in battery supply and thereby have "in-house batteries" is consistent with that of its traditional OEM peers. Overall, in light of developments over the last 12 months, which make for a more challenging starting point, we see a lower probability of Volvo achieving its mid-term financial targets and our own forecasts sit materially below the company's objectives. We see an increasing risk to European volumes in 2H23/1H24 and with it pressure on both price and mix, as a result of the ongoing deterioration in the macro environment and pressure on household available cash flow. Against this backdrop, we believe the 2024 run-rate for the industry and Volvo Cars is unlikely to be supportive to the company achieving its mid-decade targets by 2025 which were set prior to the ongoing higher inflation/interest rate environment.

Initiation (9 Dec 2021)

Mercedes (MBGn.DE)

Rating: Buy (on CL) | Price Target: €88.00 | Analyst: George Galliers

The Mercedes-Benz Group AG is one of the world's leading global suppliers of premium luxury cars and vans. Mercedes remains our top pick as we start 2023, and we expect financials to continue to be supported by the company's luxury strategy. During 4Q, Mercedes seemingly streamlined their compact offering by >30% in both markets, reducing complexity and cost, while increasing average list prices by 15.4%/5.5% on the A-Class, respectively. The reduction in Mercedes' model/powertrain offerings for the A-/B-Class in Germany and the UK is consistent with the company's overall strategy to reduce complexity. This is one of the reasons why we believe Mercedes can reduce its level of investment (both capex and R&D) in absolute terms in coming years. Actions taken on the entry level products in 2022, together with the introduction of the new C-Class and E-Class are likely to have led to a major reduction in powertrain investment at the end of 2023 helping Mercedes deliver on its 80% reduction in investment in ICE/PHEV by 2025. In 2023/24, we believe that actions on the Core and Entry segments will be important to support price/mix at Mercedes as the broader industry sees production volumes normalise at levels consummate with demand. Additionally, we believe that Mercedes continues to be a stand-out example of our CARS++ thesis, with the market seemingly not recognising its high levels of profitability, (14.2% average adjusted EBIT margin 2022-26E), FCF generation (16.6% FCF yield 2022-26E) and competitive positioning with respect to technologies of the future.

Primer (11 May 2022)

Toyota Motor (7203.T)

Rating: Buy | Price Target: ¥2,200 | Analyst: Kota Yuzawa

In-sourced components: Onboard charger, motor, transmission, inverter, battery management system.

Toyota is also venturing into making its own batteries.

Toyota is Japan's largest global automaker, with 2021 global sales of just under 10 mn vehicles. It has collaborative relationships with other Japanese automakers such as Subaru, Suzuki Motor, and Mazda Motor, with the aim of achieving even greater economies of scale. We are Buy-rated on the stock, as we see Toyota as one of the few automakers globally capable of constructing a vertically integrated model for electric vehicles, including batteries and vehicle energy efficiency technology. We also view positively the high visibility on price increases in response to inflation and progress in reducing COGS. We expect a boost to company earnings from improved model mix as the semiconductor supply chain starts to recover. While Toyota's valuation is relatively high among domestic automakers, we believe it is at a sufficiently compelling level when compared with global companies with competing EV strategies in regions like the US and China.

Primer (21 Jul 2021)

Honda Motor (7267.T)

Rating: Buy | Price Target: ¥4,000 | Analyst: Kota Yuzawa

Honda operates automobile and motorcycle businesses. Structural semiconductor shortages and China lockdowns are putting pressure on near-term earnings, but we see good prospects for disciplined pricing strategies in the US market and an upturn in the SUV model cycle. We also view positively Honda's acceleration of development in EVs and autonomous driving, including the establishment of a new EV company with Sony Group. We expect sales in the company's core markets of the US and China to be lackluster in the near term due to supply shortages, but Honda expects end demand to remain strong, and we see its earning power increasing once component shortages are resolved. We are Buy-rated on Honda as valuations look low relative to average valuations at other automakers in Japan.

Primer (18 April 2019)

Nissan Motor (7201.T)

Rating: Buy | Price Target: ¥600 | Analyst: Kota Yuzawa

Nissan is a Japanese global automaker and is part of an alliance with Renault and Mitsubishi Motors. We are Buy-rated on the stock, as we see significant scope for margin improvement once semiconductor shortages are resolved and lockdowns in China are lifted. Specifically, while the FY3/23 sales target of 3.7 mn vehicles is well below the 5.4-mn vehicle target in the company's medium-term plan, we estimate that the breakeven sales point is down significantly in the wake of the restructuring of US dealers (leading to improved earnings per vehicle) and benefits from new models. Additionally, we think the shares look undervalued versus the average for Japanese automakers.

Primer (18 April 2019)

Hyundai Motor Co. (005380.KS)

Rating: Buy | Price Target: W220,000 | Analyst: Kota Yuzawa

We expect Hyundai to enjoy stable 8-9% ROE generation in 2022E-25E, thanks to continued mix improvement from SUV/Genesis model expansion and tailwinds from a weaker won. Compared to the company's stable ROE generation, we believe the current 0.5X Price-to-Book appears too low and see risk-reward for Hyundai as skewed to the upside. We have a Buy rating on Hyundai with a constructive view focusing on ASP hike opportunities in EV and Genesis models, and a strong EV-dedicated platform which should help the company meet its long term EV sales target. We also acknowledge that Hyundai has already reached mass production of an 800V EV dedicated platform by leveraging SiC solutions, which enable higher efficiency, faster charging, and greater retention of power. Key catalysts in the near term: (1) early production ramp-up from chip shortage recovery; (2) increase in SUV/Genesis mix; (3) market share gain in key regions including US and Europe.

Initiation (5 Mar 2021)

Kia Motors (000270.KS)

Rating: Buy | Price Target: W100,000 | Analyst: Kota Yuzawa

Initiation (5 Mar 2021)

We see risk-reward for Kia as skewed to the upside. While Kia's shares have historically moved closely with its EBIT trend, the current stock price appears underappreciated by the market due to concerns over macro uncertainties and earnings peak-out. We believe Kia still has room for price/mix improvement, and expect gradual production recovery will ease production constraints on high-ASP SUV models and EVs. We have a Buy rating on Kia and like the company's strong EV profitability (targeting mid-single digit OPM this year), structural margin improvement, and robust market share growth in the US and India. Key catalysts in the near term: (1) early production ramp-up from a chip shortage recovery; (2) an increase in the SUV/EV mix; (3) market share gains in key regions including the US and Europe.

Mazda Motor (7261.T)

Rating: Neutral | Price Target: ¥1,050 | Analyst: Kota Yuzawa

Mazda is a Japanese automaker that has channeled resources into SUVs, with the CX series. Even amid an environment defined by rising input prices and semiconductor shortages, Mazda has improved its earnings structure by steadily lowering its breakeven point and introducing US dealership reforms to bring adjusted prices to appropriate levels. At the same time, the roadmap for electrification envisaged for 2030 is unclear to us. We are Neutral-rated on the stock. The stock looks to be appropriately valued relative to other domestic automakers.

Suzuki Motor (7269.T)

Rating: Buy (on CL) | Price Target: ¥5,900 | Analyst: Kota Yuzawa

Suzuki Motor is a Japanese automobile and motorcycle maker. It has an approximate 50% share of the Indian market through subsidiary Maruti Suzuki India. Pent-up demand is strong in the Indian market, which is recovering from the impact of the pandemic, and the company is actively trying to hike prices in response to inflation. With price-hike momentum building, even in Japan, where the company has taken a cautious stance on raising prices in the past, we think Suzuki's domestic sales weighting of 23% (2021 actual) could be a tailwind. We are Buy-rated (on Conviction List). Deducting Maruti Suzuki's market cap, Suzuki Motor's market cap is in negative territory, indicating an excessive discount. We look for the India business to contribute strong earnings backed by solid sales, price increases, the launch of new SUV models, and a peaking of steel prices. We also focus on earnings improvement in segments other than India as a potential upside valuation catalyst.

Mitsubishi Motors (7211.T)

Rating: Neutral | Price Target: ¥500 | Analyst: Kota Yuzawa

The Japanese automaker Mitsubishi Motors (MMC) is part of an alliance with French automaker Renault and Nissan, MMC's largest shareholder. The company focuses its limited resources on the ASEAN market, which is its main target. Earnings look set to improve in ASEAN markets, where new models are due to arrive. The company's strategy for the US and Europe is to focus on profitability, but these markets are likely to become more competitive as semiconductor supply/demand improves in FY3/24. Should production recover, we would expect sales prices, sales mix, and incentives to return to normal. We are Neutral rated on the stock, and think the valuation multiple is reasonable vis-a-vis other Japanese automakers.

Subaru (7270.T)

Rating: Neutral | Price Target: ¥2,300 | Analyst: Kota Yuzawa

Subaru is a Japanese automaker with US earnings exposure of 70%-80% (GSe). It offers the lowest incentives in the US market and also has the lowest inventory levels. It is actively raising prices, with two price hikes in the US since the start of 2022. It has decided investment plans for a dedicated EV plant in Japan and is capable of efficient EV investment with support from Toyota. We expect profitability to rise once semiconductor supply constraints are eliminated and global production volume recovers. We are Neutral rated on the stock based on ongoing concerns over US SAAR slowdown and IRA uncertainty. We think the valuation multiple is reasonable vis-a-vis other Japanese automakers.

BYD (002594.SZ, 1211.HK)

Rating: Buy (H on CL)| Price Target (002594.SZ): Rmb435.00 | Price target (1211.HK): HK$383.00 | Analyst: Fei Fang

BYD manufactures most of its components in-house.

BYD is one of the largest new energy vehicle (NEV) and power battery makers globally with 32% NEV and 26% power battery market shares in China as of 3Q22. We are Buy rated on BYD-A and include Buy-rated BYD-H on our Asia ex-Japan Conviction List. Our investment thesis is based on several key factors: 1) BYD seeks leadership in both auto-making and battery-making and we expect it to gain share in a large and growing China TAM; 2) Pricing premiumization: We expect pricing growth to accelerate as the company focuses its product line on high ASP models (mostly >Rmb200k/vehicle); 3) Lower "fashion risk" of car design as evidenced by BYD's stability in the EV league tables in recent years; 4) Battery capacity ramps and potential to sell externally. OEM customers have been reportedly exploring partnerships with BYD per GGII, including ChangAn-Ford, Dongfeng Voyah, Toyota, Tesla and FAW Group. We believe the stock offers attractive risk-reward.

Primer (4 Jul 2022)

Li Auto (LI, 2015.HK)

Rating: Buy (on CL) | Price Target (LI): US$39 | Price Target (2015.HK): HK$153 | Analyst: Fei Fang

Li Auto is one of the leading EV startups in China. We are Buy-rated (on CL) on both the H-share and ADR given that we believe Li Auto is differentiating itself from the broader Chinese auto-making industry by envisioning and creating compelling EV consumer experiences – and showing a willingness to take on the risk of unconventional technologies and act innovatively. We believe the success of Li ONE illustrates the company's understanding of consumer needs, operational capability as well as brand establishment, and it is leveraging these to its next generation products of EREV/BEV models with evolving autonomous driving technologies. We see risk-reward skewed to the upside.

Initiation (23 Aug 2020)

Nio (NIO, 9866.HK)

Rating: Buy | Price Target (NIO): US$24.00 | Price Target (9866.HK): HK$190| Analyst: Fei Fang

Nio is one of China's leading EV startups. We are Buy rated on both the ADR and H-share believing that Nio's positioning of new models is strategic. ET7, a sedan which Nio began delivering at end-March 2022, is positioned vs. the full-size premium sedans including Mercedes S-class and BMW 7 series. ET5, a sedan launched in Dec. 2021, started to deliver from Sept. 2022, and is comparable to Tesla's Model 3 and the BMW 3-series / Mercedes C-class in terms of wheelbase and product features. The top-selling models in the above mentioned two segments have scaled to >10k / > 15k units per month in China, suggesting sizable volume potential relative to Nio's current volume base. Ec7, an SUV launched in June 2022 and started to deliver from late August, is positioned relative to BMW X5 in terms of size and features. ES7 is priced above Rmb450k, targeting premium customers. We see risk-reward for the stock as skewed to the upside.

Initiation (24 Mar 2022)

Seres Group (601127.SS)

Rating: Neutral | Price Target: Rmb54.00 | Analyst: Fei Fang

In-sourced components: Powertrain, motor

Seres has transformed from a combustion car assembler to an emerging leader in the Chinese new energy vehicle market since its EV partnership (AITO) with Huawei in Mar 2021. It sold 10.1k plug-in hybrid vehicles in Sep 2022, already catching up with Li Auto (11.5k) and Nio (10.9k) and we forecast Seres will produce 45k AITO models per month in 2024E, and 86k by 2030E, making it one of the largest premium EV makers worldwide. While Huawei offers Seres world-class component technologies, their partnership is not exclusive, which means the long-term roadmap remains unclear. Hence, we are Neutral rated on Seres.

Initiation (9 Oct 2022)

BAIC Motor Co (1958.HK)

Rating: Neutral | Price Target: HK$2.10 | Analyst: Fei Fang

BAIC is one of the key players in the China automobile market space, offering self-owned mass auto brands and joint-venture brands Beijing-Hyundai and Beijing-Benz with Mercedes (BAIC owns 50% / 51% share of the JVs). Its self-owned mass brands are still loss making and the Luxury products including Mercedes A/C/E class sedans and GLA / GLC glass SUVs are the sources of BAIC's profit stream. We expect the opportunity of premiumization is no less than for electrification and therefore luxury vehicles offered by Beijing-Benz will likely benefit while BAIC's self-owned mass brand still faces challenges in brand recognition, margin pressure, and market share cannibalization from new energy vehicle leaders like BYD.

Initiation (5 Jun 2019)

SAIC Motor (600104.SS)

Rating: Sell | Price Target: Rmb10.40 | Analyst: Fei Fang

SAIC, as one of China's largest car makers by sales volume, sold 5.5mn vehicles in 2021, equivalent to 27% market share of China's total passenger vehicle sales volume of 20.1mn in 2021. Its brands include joint ventures with General Motors, Volkswagen, and self-owned brands SAIC Roewe, MG, IM, etc. Historically, SAIC's consolidated net profit has been mainly driven by SAIC-GM and SAIC-VW. The two joint ventures, each at 50%/50% partnership with General Motors and Volkswagen, contributed 62% of SAIC's earnings in 2020. We are Sell rated due to rising gasoline prices and the Chinese EV industry's product innovations which are driving faster-than-expected EV adoption amongst consumers. This exposes SAIC, particularly its JV brands, to increasing market share loss and profit declines for SAIC-GM and SAIC-VW. In addition, SAIC's top-selling EV model SAIC-GM-Wuling Mini EV is at margin risk. Therefore, we are cautious on earnings and see downside risk to valuation.

Initiation (5 Jun 2019)

Dongfeng Motor (0489.HK)

Rating: Neutral | Price Target: HK$4.80 | Analyst: Fei Fang

Dongfeng is one of the key players in China's passenger and commercial vehicle space with 2.8mn units in sales volume in 2021, including 2.3mn units in passenger vehicles and 523k commercial vehicles. Dongfeng offers self-owned mass brand and key joint-venture brands with Honda / Nissan (Dongfeng holds 50% share in the two JVs), which are the main source of Dongfeng revenues and profits in the passenger vehicle segment, i.e. Honda / Nissan JV sales volume accounted for 82% of Dongfeng's total passenger vehicles sold (FY21). The JV brands' market share has been eroded by new energy vehicle leaders like BYD and Dong-Nissan, with sales volume decreasing by -12% yoy in 2021 and further widening to -22% yoy in 1H22 per CPCA. On the other hand, Dongfeng is among the top-3 commercial vehicle makers in China and 63% of its revenue is contributed by this segment. Driven by stimulus-led construction demand, easing Covid control measures, and a new cycle of emission standard upgrades, Dongfeng could encounter a commercial vehicle sales recovery in 2023.

Great Wall Motor Co (2333.HK, 601633.SS)

Rating: Neutral | Price Target (601633.SS): Rmb23.60 | Price Target (2333.HK): HK$12.50 | Analyst: Fei Fang

Great Wall is one of the key car makers in China, producing 1.0mn passenger vehicles and 233k pick-up units in 2021. Under its brand are six individually operated sub-brands: Haval, Pickup, Tank, WEY, Ora, and Salon. Its Haval H6 has long been known as the best seller in China's SUV market. We expect Great Wall to expand its volume share of the Chinese passenger vehicle market from 6% in 2020 to 8% in 2025E, and maintain this share moving forward. We base our positive expectations on its recent ICE vehicle launches and its upcoming EV launches (such as Lightning Cat), though in the long-term its incumbent combustion sales volume is at risk. In the long term, we expect the company to maintain 8-9% market share in the domestic passenger vehicle market, which should drive top-line growth at single digits yoy starting in 2024E. We are Neutral rated on valuation.

Initiation (8 Jan 2019)

Commercial

Daimler Truck Holding (DTGGe.DE)

Rating: Buy | Price Target: €44.00 | Analyst: Daniela Costa

In-sourced components: Motor

Daimler plans to move manufacturing of batteries, battery management system, on-board charger, transmission and inverters in-house.

Daimler Truck is the largest global truck manufacturer, producing trucks and buses in over 40 locations under its brands: BharatBenz, Freightliner, FUSO, Mercedes-Benz, Setra, Thomas Build Buses and Western Star. We are Buy rated. Despite the strong cyclicality of the truck industry, we expect greater resilience against a macro downturn than historically has been the case, as deliveries over recent quarters have been constrained due to supply challenges. Given its recent positive momentum on margins, most notably within Mercedes-Benz, we expect a strong margin expansion to double-digit levels within the next 4 years, driving ROIC toward the top third of the sector. As such, we see Daimler as significantly undervalued relative to the sector, currently trading at 2.7x 2024E industrial EV/EBIT, a 73% discount to sector median.

Initiation (13 Dec 2021)

Iveco Group (IVG.MI)

Rating: Buy | Price Target: €9.30 | Analyst: Daniela Costa

Iveco Group specialises in the manufacturing of trucks and powertrains. It has c.7%

market share in the global truck market, however carries strong positions in Europe. The majority (c.61%) of Iveco's deliveries are light commercial vehicles, followed by medium- and heavy-duty trucks (c.28%). Whilst acknowledging its historical operational underperformance vs. peers, as well as concerns regarding the truck cycle, in our view downside risks for Iveco are now entirely priced in, with it trading below its industrial tangible book value. Conversely, we see operating leverage and self-help driving 180bps of margin expansion to 4.8% in 2026. Upside risks appear to be neglected; we see potential margin upside arising from Iveco's collaboration with various partners, such as Hyundai and Nikola, along its BEV and FCEV transition journey. Amongst the global truck OEMs, we see Iveco as pioneering 'trucks-as-a-service', the recent launch of GATE bringing an opportunity to capture greater BEV/FCEV aftermarket value. Moreover, we view Iveco's current valuation as highly undemanding. Our analysis stress-testing the stock for industrial tangible book value per share implies upside for most scenarios with >60% asset recoverability. We are Buy rated.

Initiation (4 Jan 2022)

Traton (8TRA.DE)

Rating: Neutral | Price Target: €16.50 | Analyst: Daniela Costa

With its brands Scania, MAN, Volkswagen Trucks and Bus, Navistar, and RIO, Traton is one of the world's leading commercial vehicle manufacturers. Self-help potential appears large at Traton, with significant margin expansion in brands MAN and Navistar should the OE/AM mix move closer to that of Scania. Within Scania, we expect a return to DD margins by 2024. However, we note that the combining of MAN and Scania under a single entity has thus far failed to eliminate the margin gap, thus we remain cautious on the ability to capture upside within Navistar. Moreover, we expect a softening in the Latin American truck market into 2023. With Traton most exposed to this market of the truck OEMs, it is likely to be most affected.

Initiation (7 Aug 2019)

Volvo Group (VOLVb.ST)

Rating: Buy | Price Target: Skr272.00 | Analyst: Daniela Costa

With demand and sector-leading indicators likely to moderate into 2023, we expect companies with strong FCF conversion, ROIC, and an attractive valuation to rise to the fore. Volvo has consistently delivered amongst the strongest FCF and ROIC within our coverage whilst trading at a 43% discount on 2024 industrial EV/EBIT to sector average. We see significant margin growth potential for Volvo, and view it as the best-positioned truck OEM for the BEV transition (especially in terms of capturing aftermarket, having delivered its first BEV in 2019). We expect Volvo to display resilience into a macro downturn, with it scoring amongst the lowest downsides within the sector under our trough valuation scenario, whilst management's focus on protecting cash generation raises our confidence in the potential for an announcement of high cash returns to shareholders, providing a potential catalyst for the stock at Y/E. We are Buy rated.

Initiation (2 Apr 2019)

Hino Motors (7205.T)

Rating: Neutral | Price Target: ¥550 | Analyst: Kota Yuzawa

Hino is a Japanese manufacturer of commercial vehicles such as trucks and buses. We expect demand to recover in the Indonesia market – a core source of earnings for Hino – as commodity prices rise. However, a key overhang for the stock is the ongoing investigation surrounding falsified emissions and fuel economy data that was submitted when applying for the certification of vehicle engines for the Japanese market (announced on March 4, 2022). Engine-related investigations by the US Department of Justice are also ongoing. We are Neutral-rated relative to coverage. We think valuations are at appropriate levels relative to those at other Japan automakers.

Isuzu Motors (7202.T)

Rating: Buy | Price Target: ¥2,400 | Analyst: Kota Yuzawa

Isuzu Motors is a Japanese automobile manufacturer focused on producing commercial vehicles, passenger vehicles, and diesel engines. Its main business is commercial vehicles such as trucks and buses, but it also makes pickup trucks for private use in Thailand. Although semiconductor shortages have temporarily depressed truck production for developed markets, we think Isuzu should be able to increase shipments of high-margin trucks to Japan and North America once conditions normalize. We also expect efforts to lower CoGS and the planned launch of new truck models in 2023 to help boost earnings. We are Buy-rated, based mainly on the stock’s compelling valuation.

EV Battery

Lithium-ion batteries (LiBs) dominate the EV battery market and are comprised of cathode, anode, separator, electrolytes and peripheral materials (foils and binders).

The power and capacity of a LiB battery is determined by the type of cathode used.

Lithium Iron Phosphate (LFP) cathodes are inexpensive and have a module free structure. They are less prone to degradation and more heat resistant.

Nickel Cobalt Manganese (NCM) and Nickel Cobalt Aluminium (NCA) cathodes have higher energy density and longer range than LFP, but are less heat resistant and more expensive.

The Future: All-solid-state batteries (ASSBs) will use liquid electrolytes instead of solid, leading to higher energy density, increased safety and faster charging. Most ASSB makers target commercialization between 2025-30.

At this point, the supply chain remains heavily dominated by China, with the country accounting for ~70% of global EV battery production. In our report, Global Batteries: The Self-Sufficiency Challenge, we look at battery supply chain and leverage our battery and materials supply demand models to assess the self-sufficiency gaps across regions.

Explore the **ecosystem of EV Batteries**.

CATL (300750.SZ)

Rating: Neutral | Price Target: Rmb516 | Analyst: Fei Fang

Battery type: LFP, NCM

As China's largest battery manufacturer, CATL has competitive advantages on the back of evolving technology, its consistent market share gains, and the recent Chinese industry's battery price hikes. Our analysis of China's EV industry metrics reveals CATL's technological strength. The company's power battery energy density, measured at the pack level, has increased from 146Wh/kg in Jan 2021 to 151Wh/kg in June 2022. This is despite domestic EV battery demand moving away from high content nickel cathode (NCM), and moving towards the more economic iron cathode (LFP). We believe CATL's density improvement is achieved via its proprietary cell-to-pack technology, which optimizes the use of structural components within battery packs in order to lower module weight and save costs. We note CATL's market share gain has been broad-based at the car model level, and is driven by higher adoption rate amongst both traditional incumbents (e.g. SAIC) as well as new entrants (e.g. Nio). We are Neutral rated on valuation.

Initiation (8 Jan 2019)

LG Energy Solution (373220.KS)

Rating: Neutral | Price Target: W540,000 | Analyst: Nikhil Bhandari

Battery type: NCM

LGES is the second-largest EV battery supplier globally (24% of 2021 shipments) and the largest outside China, with leadership in high nickel battery chemistries. We see LGES as competitively well positioned globally in the battery industry with its technology and vertical integration approach as well as a key battery self-sufficiency enabler driving a sharp market inflection in the US (from 11% in 2021 to 39% in 2025). Specifically on LGES battery technology we note: 1) its current leadership in high nickel (NCMA) battery chemistry and having the highest number of battery IPs globally (over 23k as of end 2021); 2) plans to start commercial production of LFP battery for energy storage (China and the US in 2023/24 respectively), as well as potentially commercializing 4680 size battery cell for EVs earlier than its peers (in 2023) – both key for offering more competitively priced batteries in the long term; and 3) long term targets to launch next generation batteries in 2026 (Polymer based Solid state battery) and 2030 (Sulfide based Solid state battery). We are Neutral rated as valuation risk-reward is not compelling, in our view, with +66%/+15%/-44% variance to the current share price in our bull/base/bear case scenario.

Initiation (8 Mar 2022)

LG Chem (051910.KS)

Rating: Buy (on CL) | Price Target: W830,000 | Analyst: Nikhil Bhandari

The market is pricing in a combination of trough-on-trough petchem valuations and a bear case TAM for EV batteries long term. We believe the market still does not fully appreciate LG Chem's "unique" higher returns US-centric integrated battery exposure (from cathode to battery cell), especially with the drag of the petchem down-cycle on earnings getting behind us. We estimate LGC's EBITDA/EPS can grow at a 35%/48% CAGR over 2022-25E (battery related businesses to account for 65%-70% of OP in 2023E-25E) for which 13.4x and 6.6x valuation multiple on 2023 P/E and EV/EBITDA appears inexpensive, and risk-reward is attractive with +77% implied upside in our bull case vs. -16% downside in our bear case. We see four key drivers for share price strength ahead: (1) North America heavy battery backlog (70% in 3Q22) to cushion demand risks in China and Europe; (2) Improved visibility on IRA benefits to drive a potential earnings upgrade cycle (GSe 2023E/24E EBIT 21%/29% above VA consensus); (3) Battery material business to structurally grow on higher shipments largely offsetting margin normalization; (4) Petchem earnings have likely already bottomed (we find NAV discount correlated to petchem earnings in the long run) with potential for a gradual recovery for LGC's key products like ABS/SAP from China re-opening/supply demand and more capacity expansions in high margin products (e.g. POE, IPA). We are Buy rated (on CL) on the stock.

Initiation (8 Mar 2022)

Panasonic Holdings (6752.T)

Rating: Neutral| Price Target: ¥1,140 | Analyst: Ryo Harada

Battery type: NCA, NCM

In addition to Batteries, Panasonic also makes EV relays and charging infrastructure.

Panasonic Holdings has a broad range of businesses, from home appliances to automotive batteries, industrial equipment, automotive equipment, and e-components. In the past, it managed these businesses as one. However, following the shift to a holding company structure from April 2022, the company has put in place a structure for each operating company to generate profits and make investments independently. This operating company structure should make it easier to benchmark companies against competitors. While a conglomerate discount is applied to valuations, we see prospects for this discount to diminish if (1) each operating company improves its competitiveness, and (2) the company remains aware of not operating businesses in a uniform manner. Until we see progress on these fronts, we think the stock will trade in the range of its historical EV/EBITDA of about 5X, and we rate the stock Neutral. Also, per the company, Panasonic is making progress with the preparations for publicly listing businesses, including acquired unit Blue Yonder.

Initiation (24 Jan 2022)

Samsung SDI Co. (006400.KS)

Rating: Buy | Price Target: W850,000 | Analyst: Giuni Lee

Battery type: NCA, NCM

Samsung SDI (SDI) is a battery and electronic materials manufacturer maintaining industry-leading profitability levels in the large-sized battery business. Based on our view that SDI is trading at an undemanding valuation level and with one of the strongest profit growth outlooks that we expect in Korea tech, both in the near term and over the longer term, we are Buy rated on the stock.

Initiation (14 Jul 2017)

SK Innovation (096770.KS)

Rating: Buy | Price Target: W210,000 | Analyst: Nikhil Bhandari

Battery type: NCM

We are positive on the battery maker SK Innovation as (1) we continue to see a path to margin normalization of EV battery business, with sector-leading revenue growth and underappreciated US market share growth, (2) strong cash flows of SKI's energy business amid a multi-year upcycle for refining, de-risking the balance sheet and (3) attractive valuations, with the share price implied hold-co discount on the EV battery and Separator business remaining above 100%. Going forward, China exports remain a potential risk to our margin views, but we see multiple sources of upside risk which include: (1) gas-to-oil switching which is likely to boost distillate demand; (2) more gas shortages into next year providing cost curve tailwinds for Asian refiners; and (3) EU Russian product ban if implemented.

Initiation (14 Jul 2017)

Primer (14 Nov 2022)

Ganfeng Lithium (1772.HK, 002460.SZ)

Rating: Buy | Price target (1772.HK): HK$115 | Price Target (002460.SZ): Rmb137 | Analyst: Trina Chen

Battery type: LFP (also expanding into ASSBs)

Ganfeng is one of the largest global lithium producers. It produced 90kt of LCE lithium compound in 2021A, for an 18% global market share. The major end market for lithium is EV and consumer electronics batteries. With several greenfield projects to start operation in 2022E-26E as well as newly announced projects, we expect Ganfeng's lithium compound output volume to grow at a 26% CAGR for 2021-25E to 223.7-320.6kt LCE by 2025-27E, with improving self-sufficiency and cost position. In addition, we expect the company to reach 600kt LCE lithium capacity (including 200kt LCE from recycling) by 2030E, underpinned by continued project additions and strong market demand. Valuation appears to have priced in much of the near-term risk as well as long-term supply risk, with current H/A share prices' implied mid-cycle lithium price at US$8,450-17,364/t-LCE (at 10-15x terminal PE), versus our long-term price assumption of US$15,000/t-LCE. We are Buy rated on Ganfeng-H/A and expect continued execution on new project expansion to serve as a catalyst. Risks to our view are 1) lower lithium product prices, including lithium compounds and spodumene, which are driven by industry supply/demand; 2) project execution risk; 3) raw material purchase risk; 4) policy risk that may affect the pace of EV adoption; 5) overseas assets' currency/country risk; and 6) EV battery recycling growth slower than expectation.

Initiation (21 August 2020)

FREYR Battery (FREY)

Rating: Buy | Price Target: US$19.00 | Analyst: Philipp Konig

Battery type: NCM

FREYR is developing battery gigafactories, initially targeting the energy storage end-market. We see FREYR as a strong beneficiary of the Inflation Reduction Act in the US, given its planned 34GWh plant in Georgia, USA. In addition, FREYR is currently constructing a 29GWh gigafactory in Mo i Rana, Norway (Giga Arctic), which represents, in our view, the most capital efficient gigafactory so far in Europe. The plant has an implied capex spend of $61mn/GWh and about 34 employees per GWh, below any announced gigafactory in Europe. We believe FREY's advantage on capital and operational efficiency is driven by the proprietary use of 24M's manufacturing technology. In 2023, FREYR will produce their first battery cells off their pilot line in Norway that should unlock several commercial and financial milestones.

Initiation (20 Jun 2022)

VARTA AG (VAR1.DE)

Rating: Neutral | Price Target: €30.00 | Analyst: Philipp Konig

Battery type: NCM

VARTA AG is a German battery manufacturer, producing batteries for automotive, industrial and consumer markets. After a challenging 2022 with several guidance cuts and the introduction of stabilization measures such as plant closures, we expect VARTA to continue to face a difficult environment next year. With Household Available Cash flow in Europe set to remain under pressure, we believe demand for VARTA's end markets (consumer discretionary) will continue to deteriorate. Additionally, we expect VARTA to remain disadvantaged vs competitors due to the company's footprint. Going forward, we expect structurally lower volumes for CoinPower products. VARTA's key customer has started to dual-source batteries, making it challenging to return to previous market share levels. Moreover, we continue to see higher energy costs in Europe as a headwind for the business.

Initiation (20 Jun 2022)

QuantumScape Corp. (QS)

Rating: Sell | Price Target: US$5.00 | Analyst: Mark Delaney

QuantumScape is working on developing solid state batteries.

QuantumScape's long-time to market (with a commercial ramp now implied to occur in the late 2026 timeframe compared to the original 2025 target per company comments) likely resulting in continued negative EPS and FCF for several years. Even if/when the technology is commercially ready, we believe per our industry discussions that ramping into volume production as a new entrant could also pressure FCF. With investors increasingly focused on EPS power and FCF in light of the tough macro conditions, we believe that QuantumScape shares will underperform our broader coverage (even though we consider QuantumScape to be one of the leaders in next-generation battery technology). Additionally, we believe the broader battery industry is highly competitive. We are expecting industry shipments over the next few years (before QuantumScape even plans to enter volume production) to scale from 507 GWh in 2022 to 1,020 GWh in 2025. This ramp will likely reduce industry costs (we assume battery industry ASPs per kWh fall from $160 in 2022 to $114 in 2025) which will make a higher bar for QS to reach in our opinion.

Initiation (4 February 2021)

Core components

EV architecture, or the way in which components are put together, is an important area of differentiation across OEMs.

Key components within an EV architecture include motor, onboard charger, DC/DC converter, inverter, thermal management, battery management system, transmission and powertrain.

Electric motor converts electrical energy from the battery pack into mechanical energy to drive the vehicle's wheels via the transmission.

Onboard charger and DC/DC converter manage the incoming power supply to charge the battery pack.

Inverter or motor drive controls the speed, torque, and direction of the electric motor. For AC induction motors, the motor drive includes a DC/AC inverter that converts DC power from the battery pack into AC power for the motor. For DC electric motors, a DC/DC converter delivers power from the battery pack to the motor at the appropriate voltage.

Thermal management system maintains a proper operating temperature for the electric motor, power electronics, and other vehicle components.

Battery management system (BMS) regulates the voltage, current, and temperature. Some OEMs are exploring using wireless BMS systems and looking to reduce cost by integrating cells directly into the assembly or pack.

Increasingly, OEMs seem intent on making many of these components, either on a stand-alone basis or via a joint venture/partnership with other companies. Benefits from in-sourcing include cost, control of supply/capacity, and the ability to leverage manufacturing knowledge and existing industrial assets.

BorgWarner Inc. (BWA)

Rating: Neutral | Price Target: US$45.00 | Analyst: Mark Delaney

Investment Thesis

BWA continues to make progress transitioning its portfolio toward electrification, with the company on track to achieve $4 bn in electric vehicle revenue by 2025 driven by areas including commercial vehicles and DC charging (which it expects to generate $225-$275 mn in annual revenue by 2025 when including the proposed SSE acquisition). The company also continues to expect to more than double its EV revenue in 2022 to about $850 mn (which would make up a mid-single-digit percent of total company revenue).

Importantly, BorgWarner announced its intent to spin off its Fuel Systems and Aftermarket Segments into a separate, publicly traded company which has the potential to help the company better execute on the transition toward EVs and it could lead some investors to value BWA on a sum of the parts. However, we believe the company still has work to do with its EV transition. Some of the products the company is proposing to keep like turbochargers are highly profitable but are not directly applicable for BEVs in our view (although management commented how air and heat management technology is applicable more generally for EVs). Turbochargers were ~$2.8 bn of revenue in 2021 per the company's 10-K (which would be >20% of the remaining company revenue) and we believe have above average margins.

Initiation (14 Apr 2020)

Hyliion Holdings (HYLN)

Rating: Sell | Price Target: US$2.25 | Analyst: Mark Delaney

We believe that Hyliion continues to make progress towards its ERX launch with continued testing, and the ERX will likely qualify for IRA and partial ZEV credits. In addition, the KARNO fuel agnostic generator acquisition could help the company offer a differentiated and flexible option long-term (and could be applicable in other end markets). However, the company has several challenges to still address including ramping the ERX into production with a target to start in late 2023 (with production ramps having created issues for several early-stage companies) and with likely negative gross margins to start. Additionally, the ERX pricing is higher than we had expected (although the company expects it to offer TCO savings and be less expensive than other clean truck options), and we're reducing our unit and margin assumptions. We'll look for more traction on the ramp and TCO to potentially be more positive on the stock.

Initiation (14 Oct 2020)

Visteon (VC)

Rating: Buy | Price Target: US$160.00 | Analyst: Mark Delaney

We believe Visteon has one of the best growth profiles among auto suppliers, with over $5 bn in YTD new business wins and strong market outgrowth, and the company is well-positioned to capitalize on the increasing use of digital instruments/displays in vehicles (including in EVs which has accounted for 45% of YTD business wins as of 3Q22). We are also encouraged by Visteon's growing EV-specific business (i.e., Battery Management System or BMS, where its revenue on key EV platforms is just starting to ramp). While we believe that the macro environment will constrain auto production in 2023, we expect Visteon to benefit from higher global auto units over time as global production has been depressed for over 2 years due to supply chain issues (down by the amount typical of a recession), and dealer inventories remain low in the US.

Initiation (14 Apr 2020)

Lear Corp. (LEA)

Rating: Buy | Price Target: US$170.00 | Analyst: Mark Delaney

We believe Lear continues to make progress expanding it electrification business with the company on track to meet or surpass its 2025 target of $1.3 bn of electrification revenue, and it achieved more than $400 mn of new business awards YTD as of 3Q22. We also expect Lear to benefit as auto production trends higher from a low base (albeit with softer global demand limiting the degree of production recovery in 2023), and believe that Lear can outgrow that driven by rising content per vehicle. We view that there is the opportunity for the company to improve margins as volumes recover, a potentially neutral if not positive commodity impact in the intermediate term, improved cost recoveries from OEMs, and savings from the Lear Forward plan (which seeks to streamline operations between the Seating and E-systems segments).

Initiation (14 Apr 2020)

Jabil Circuit Inc. (JBL)

Rating: Buy | Price Target: US$80.00 | Analyst: Mark Delaney

We believe Jabil's increased end market and product diversification, as well as its exposure to secularly growing and/or more stable markets such as EVs, healthcare and cloud, will position the company better than in past periods of slowing macroeconomic conditions. In addition, we believe the company should benefit as supply chain constraints generally ease throughout 2023.

Primer (23 Jun 2021)

Flex (FLEX)

Rating: Buy | Price Target: US$25.00 | Analyst: Mark Delaney

We believe that Flex is well positioned for long term growth given its increasing exposure to non-traditional and secularly growing markets (i.e. renewables, EVs, medical, and hyperscale datacenter) which we believe have higher margin potential than its traditional end markets. Additionally, we believe that the company is benefiting from share gain, which we attribute in part to customers looking to use a more regional approach to manufacturing (with more output coming from North America, where Flex is well positioned) given the supply chain and geopolitical issues of the last several years. We expect these share gains to help offset the weakness in communications and consumer related end demand (although we continue to model limited FY24 revenue growth overall given the macro backdrop).

Primer (23 Jun 2021)

Aptiv Plc (APTV)

Rating: Buy | Price Target: US$121.00 | Analyst: Mark Delaney

We view Aptiv as one of the key auto tech enablers and believe that the company is well positioned to capitalize on the key trends of EVs and AVs given its strong market position in connectors, high voltage harnesses, and autonomy. Importantly, Aptiv's BEV opportunity is now about ~$1500 and about 3X that of an ICE vehicle (vs. prior comments of a ~2-2.5X increase), and Aptiv also has significantly higher content in higher level autonomy (its opportunity in L3 at $4K+ per vehicle compares to about $500 in L2), which we believe should drive substantial long-term growth above market. While there could be several potential headwinds for 2023 (e.g. macro risks, supply chain volatility, and FX), we think these are largely industrywide and not Aptiv-specific issues.

Initiation (14 Apr 2020)

Valeo (VLOF.PA)

Rating: Neutral | Price Target: €19.00 | Analyst: Philipp Konig

Valeo is an international supplier of automotive components, integrated systems and modules. The company proved as one of the best executors throughout the supply chain crisis in the past two years, being the only supplier to deliver their margin guidance for two years in a row. However, we expect 2023E to present a more challenging year for Valeo vs peers, both driven by market headwinds (high EU exposure) and the internal transition (JV consolidation). Although we forecast 9.3% organic growth this year due to solid outperformance (5pp) and an improvement in global LVP, we expect margins to increase by only 50bps to 3.7% (VA cons 4.1%) due to higher cost inflation (GSe €800mn) and dilutive effects from the full consolidation of the Siemens JV (-€40mn). We continue to view Valeo as well-positioned to benefit from the transition to electric and autonomous vehicles, but believe the path to the targeted 6.5% operating margin remains long(GSe 2026E 5.3%), requiring a significant improvement in European production and a normalization in R&D spend.

Primer (2 Dec 2020)

Vitesco Technologies (VTSCn.DE)

Rating: Buy | Price Target: €78.00 | Analyst: Philipp Konig

Vitesco is a global pure-play automotive powertrain supplier, spun off from Continental AG in 2021. Vitesco has emerged as a leader in the fast-growing EV powertrain space, recording orders of €15bn since early 2021, materially ahead of any other player in the segment. Although we see OEMs increasingly in-sourcing parts of the electric powertrain, we expect more sophisticated components (inverter, BMS) to remain largely outsourced to tier 1 suppliers. These are components where Vitesco has a strong track record and commercial success with global customers. Additionally, Vitesco presents the only name with a net cash position, setting up well for further investments into the industry transformation. Vitesco has also crystallized as a leader in the highly competitive electric powertrain space, recording >€12bn of orders in the past 12 months, more than any other supplier. We also view it as important that orders were won across Vitesco's entire product portfolio, ranging from e-axles over inverters all the way to their in-house developed high-voltage box. With different EV components facing different risks of in-sourcing, we view Vitesco and its broad product offering as well-placed to retain their leadership in the space. We estimate that Vitesco currently command an electrification order backlog of >€20bn, ahead of any other pure-play powertrain supplier globally.

Initiation (2 Dec 2021)

TI Fluid Systems Plc (TIFS.L)

Rating: Neutral | Price Target: 132p | Analyst: Philipp Konig

TI Fluid Systems is a leading global manufacturer of fluid storage, carrying and delivery systems, primarily providing products and services for light vehicles. We believe TIFS is well positioned to benefit from a recovery in auto production volumes in 2023/24, combined with a softening in certain raw material inputs. Nevertheless, we believe margins could remain under pressure due to elevated labour and energy costs as well as higher investment spend into products for electrification. We also believe that concerns around the structural outlook of the fuel tank business need to be addressed, as well as how the segment can support FCF generation in the medium term. TIFS has been able to record a solid order intake for its BEV products with Western OEMs, but so far has had little exposure to new entrants.

Initiation (5 Dec 2017)

Denso (6902.T)

Rating: Buy (on CL) | Price Target: ¥9,500 | Analyst: Kota Yuzawa

In addition to core components, Denso also makes power semiconductors.

Denso is Japan's largest manufacturer of auto parts/components, including inverters, air conditioning (AC) systems, and sensors. Against a backdrop of surging costs for batteries, Denso products such as motor/inverter/battery management/AC systems incorporate a range of technologies that contribute directly to energy efficiency. As the industry moves to eliminate semiconductor shortages, we see increased hybrid vehicle output as an opportunity for a rise in the value of Denso's installed components per vehicle. We are Buy-rated (on CL), as we think Denso shares look attractive on P/B compared to other Japanese auto part stocks.

Primer (2 Dec 2020)

Mitsui High-tec Inc. (6966.T)

Rating: Buy | Price Target: ¥8,800 | Analyst: Kota Yuzawa

Mitsui High-tec is a world leader of leadframes with a global market share of 10-20% (per our estimate, based on sales in 2020) and we believe is well positioned to maintain around 20% share in the fast-growing motor core market. We look for global EV sales volume to grow a strong 30% or so annually over 2020-2030. Similarly, we expect powertrain motor sales volume to increase about 20% annually. With carbon neutrality becoming a stronger theme in the global community, we still see prospects for strong sales and profit growth in Mitsui High-tec's motor core business, which accounts for the majority of the company's earnings. Although the leadframe business is currently in a correction phase owing to the semiconductor cycle, we expect catch-up production by automakers and think the market will start to price in prospects for medium-term growth in the earnings contribution from motor cores. With the shares currently trading below peers on EV/EBITDA, we see valuation as attractive and are Buy-rated.

Primer (15 Feb 2018)

Aisin (7259.T)

Rating: Sell | Price Target: ¥3,600 | Analyst: Kota Yuzawa

Aisin is an auto parts manufacturer that mainly makes automatic transmissions. The China market is the main earnings driver in Aisin's automatic transmission business, and we believe that China auto production volume will have a large impact on the company's profitability in the near term. A key medium-term focus point is whether the company is able to make eAxles into an earnings driver capable of replacing automatic transmissions. We maintain our cautious stance on the stock until there is better visibility on orders for the 2G version of eAxle due out in 2025 and the 3G version in 2027. We are Sell-rated on relative return potential versus peers. Valuations look relatively low, but we think investor focus is on the lack of visibility on new earnings sources.

Primer (10 Jan 2018)

Nidec (6594.T)

Rating: Buy | Price Target: ¥9,700 | Analyst: Daiki Takayama

Nidec's business segments are divided into small precision motors, automotive components, appliance, commercial & industrial products (ACIM), and other products (machinery, electronic, and optical component). In the small precision motors business, the company is rapidly downsizing its HDD-SPM lineup, and focusing its business expansion around growth in mobility applications (mainly motors for electric two-wheeled vehicles) and leveraging the features of its brushless DC motors. In the automotive products segment, the company has seen rapid growth in demand for its E-Axle traction motor system for electric vehicles, which is becoming a major companywide growth driver. Nidec also manufactures other auto-related motors. The ACIM business supplies a variety of products, including motors for HVAC systems, automated transfer systems used in distribution centers, power generators and motors for industrial infrastructure applications, and motors/compressors for refrigeration applications. Management has rapidly expanded its ACIM business portfolio via M&A, and is currently focused on improving profitability. In the other products segment, Nidec mainly produces semiconductor testing equipment, robots for transferring displays, and stamping equipment, and plans to focus on M&A in the machine tool industry moving forward. With motors accounting for over 40% of total power consumption worldwide, we expect Nidec to garner attention as a Greenabler on the contribution to greater energy saving/efficiency from its brushless and other motor products. On this basis, we are Buy rated on Nidec.

Initiation (16 Feb 2017)

Mitsubishi Electric (6503.T)

Rating: Sell | Price Target: ¥1,100 | Analyst: Ryo Harada

Mitsubishi Electric makes EV motors, inverters and power semiconductors.

Mitsubishi Electric's business portfolio is diverse, and it has a strong position in the industry, with growth businesses in factory automation, air conditioning, and power semiconductors. However, we view lower margins in its businesses than at peers as an issue. It is also facing the issue of quality inspection irregularities. Amid mounting quality-related investments, margins are unlikely to improve in the near term. As such, we do not think the current valuation discount of 50% vs the Japan machinery sector will decrease any time soon. Although its strong balance sheet could provide valuation support, we expect the P/B of slightly under 1X to persist and are Sell-rated relative to our sector coverage. We think the first step for rerating of the stock is resolving quality issues, and the second step is putting forth concrete plans for improving margins.

Primer (24 Jun 2022)

Meidensha (6508.T)

Rating: Neutral | Price Target: ¥2,400 | Analyst: Ryo Harada

Meidensha makes EV motors and inverters.

In recent years, Meidensha has begun focusing on volume production-type businesses in EV motors and inverters in addition its existing custom production businesses in the power infrastructure and social systems fields. While we expect strong growth in the market for mass production-type EV motor/inverter products, at this stage we assume this is unlikely to translate into profitability, due mainly to the significant investment/depreciation burden. Given auto component makers are also focused on this field amid the global shift toward EVs, it is unclear whether Meidansha can generate significant growth in orders given its weak affiliation with OEMs, and we think it has now entered an important phase that will determine if it can secure sales sufficient to recoup investments to date. The company's overseas business continues to generate losses in the power infrastructure field as well, and we think its ability to achieve and sustain profitability will be key. At this stage, we are Neutral rated. The stock is currently trading close to an EV/EBITDA multiple of 6X, its historical five-year average, and as this multiple looks reasonable based on prospects for EBITDA growth, we think the company is neither overvalued nor undervalued.

Initiation (6 Dec 2022)

Delta Electronics (2308.TW)

Rating: Buy | Price Target: NT$376.00 | Analyst: James Wang

Delta makes DC/DC converters, onboard chargers, inverters and charging infrastructure.

Delta Electronics is the largest power supply components vendor globally and a key servo motor/inverter/PLC supplier in China (7-10%+ market share in 2022). Delta

Electronics is also a key supplier for the EV/server power industry, holding among the largest market shares in both markets. We are positive on the company's long-term growth opportunity driven by multiple factors (EV/EV charger/5G infrastructure/Datacenter power/ESS etc.) in the coming years. We also expect demand for Delta's industrial automation products to gradually recover as Covid conditions normalize, as we see industrial automation as the key solution for the continuing labor shortage issue (which should intensify in the future given Chinese net population growth of only 0.03% of the total population in 2021 vs. 0.6% in 2010). Delta has recently been trading at a one-year forward P/E multiple that is below our target multiple, which we believe undervalues the stock given the company's strong growth sectors (including EV&EV charging / green capex & renewable energy / cloud computing / smart manufacturing / satellite communication & smart connectivity) revenue outlook (18% 2023E-30E CAGR), and its leadership in the power component industry. Key risks include: (1) sharper NTD appreciation; (2) rising component costs or any component shortages; and (3) slower power system growth on 5G project delays.

Initiation (24 Oct 2018)

LG Innotek Co. (011070.KS)

Rating: Neutral | Price Target: W300,000 | Analyst: Giuni Lee

LG Innotek (LGI) manufactures various electronic components and is the top supplier of camera modules for Apple iPhones. We expect ROE to continue to decline from the peak level in 2021 but the stock is trading at undemanding levels, hence our Neutral rating on the stock. Key risks include higher-/lower-than-expected iPhone shipments, higher-/lower-than-expected camera module market share of LGI in Apple, and a higher/lower adoption rate of triple camera and 3D sensing at Apple.

Initiation (10 Jan 2019)

LG Electronics (066570.KS)

Rating: Neutral | Price Target: W98,000 | Analyst: Giuni Lee

LG Electronics (LGE) is a consumer electronics, vehicle components, and commercial electronic products manufacturer, as well as one of the world's top home appliances makers. While the company is seeing rising B2B profit exposure as the vehicle component business has become a profitable business, we believe near-term earnings momentum remains weak from its B2C businesses such as TV and appliances, hence our Neutral rating on the stock.

Initiation (14 Jul 2017)

Ningbo Tuopu Group (601689.SS)

Rating: Neutral | Price Target: Rmb78.00 | Analyst: Olivia Xu

Product: Chassis and thermal management

Tuopu is a leading Chinese chassis components supplier. Although we expect its increasingly diversified product portfolio to benefit from the electrification and light-weighting trends, we believe its near-term growth is already priced in and hence are Neutral rated on the stock. Considering Tuopo's 5 competitive advantages (i.e. chassis technology know-how, capacity and cost advantages, ability to expand its customer base on its Tesla-qualified products and its positioning as a tier 0.5 supplier), and its recently diversified product portfolio to thermal management systems and integrated die-casting (significantly lifting its per-vehicle product value from Rmb2k to >Rmb8k, and up to Rmb30k in the long run), we believe Tuopu will continue to perform well in such an emerging niche market.

Initiation (13 Nov 2022)

CRRC Times Electric (3898.HK, 688187.SS)

Rating: Buy (on CL) | Price Target (3898.HK): HK$53.00 | Price Target (688187.SS): Rmb94.30 | Analyst: Jacqueline Du

Product: Electric motors, inverters, power semiconductors

Times Electric is China's largest railway traction system (or rail inverters) provider, with 50-60% China market share for locomotive/MU/subways as of 2021. We forecast a 2022-25E revenue/net profit CAGR of +22%/+25% on 1) a 46% revenue CAGR from the emerging industries segment (51% revenue contribution by 2025E, from 17% in 2021), such as IGBT (top 3 locally), solar/wind/ESS inverter (top 4), EV drive systems (top 5), sensors (leader in ASIC hall sensor locally); and 2) 2% revenue CAGR for the main railway equipment segment (we expect some recovery after low revenues in 2021-2022 due to Covid headwinds on railway passenger demand and thus weak equipment tendering); and 3) potential to decrease SG&A expense ratio (to 20.2% by 2025E from 23.5% in 2021) on its wide coverage of IGBT end-applications and expense control track record. We believe the stock is undervalued and see the catalysts as 1) further information on its IGBT Phase III capacity plan; 2) SiC to be formally adopted by customers while the product is still in the verification and refinement stage; 3) higher market shares in IGBT, solar/wind/ESS inverters, EV drives; 4) lower SG&A expense ratio. We are Buy rated (on CL) on both Times Electric A/H.

Initiation (21 Sep 2022)

Shenzhen Inovance Technology Co. (300124.SZ)

Rating: Buy | Price Target: Rmb90.30 | Analyst: Jacqueline Du

Product: Inverters

Shenzhen Inovance is a domestic leader in industrial automation & EV components. We like the company's resilient growth outlook vs our sector coverage and believe it can weather a slower growth environment, given: (1) its more diversified end-market exposure; (2) enhanced product offerings and technology; and (3) stronger supply chain management capability. We expect solid revenue/EPS CAGRs of 20%/24% in 2022E-2025E driven by market share gains across several product segments, especially led by industrial automation (servo/PLC) and EV components, with energy management and Industrial IoT as potential new revenue streams ahead. We are Buy rated on the stock, which we view as undervalued trading at 34x 2022E/23E P/E which is at its five-year historical average. Potential catalysts are: (1) continued strong market share gains in the industrial automation segment; (2) fast EV component volume ramp-up; (3) sequential margin improvement.

Shuanghuan Driveline (002472.SZ)

Rating: Neutral | Price Target: Rmb30.90 | Analyst: Jacqueline Du

Product: EV Transmission

Shuanghuan Driveline is one of the largest gear manufacturers in China, and one of the few producing high-precision gears. We expect its market share to grow from 9% in 2021 to 18% in 2025E within its Rmb62bn TAM by 2025E, as it extends its gear applications from traditional end-markets (motorcycles, construction machinery, power tools) to growing new applications (automatic transmissions for passenger/ commercial vehicles, electric vehicle gears, robotic RV reduction gears). We forecast a 20%/30% revenue/net profit CAGR in 2022E-25E, reflecting strong OP leverage from previous CAPEX investments as scale increases. However, we are slightly concerned its BEV gear market share may be too high, at c.70% currently, although it's also expanding its global market presence. We view the stock valuation as fair vs. China Industrial Tech coverage average, and are Neutral-rated.

Initiation (8 Nov 2021)

Sanhua Intelligent Controls (002050.SZ)

Rating: Buy | Price Target: Rmb31.20 | Analyst: Jacqueline Du

Product: Thermal management

Sanhua is a global leader in HVAC control & thermal management components. We are Buy rated on the stock, expecting it to deliver 22%/28% revenue/EPS CAGRs in 2022-25E, and like its growth potential in auto/EV thermal management, expecting the importance of thermal management systems in EVs to continue to increase, with a clear content value improvement path on the horizon. On the HVAC side, we believe continued EEV penetration, as well as new opportunities from ESS and overseas residential heat pumps (especially Europe) will likely rise as new drivers of growth. We expect GPM to deliver incremental improvement ahead driven by easing raw materials cost pressure and economies of scale. Catalysts include continued strength in EV orders, acceleration of ESS business proving its capability of TAM expansion as well as the humanoid robot component gradually kicking in as new revenue stream. We view the stock valuation as attractive vs. our China Industrial Tech coverage average.

Initiation (11 Jun 2018)

Power Semiconductors

Power Semiconductors are key in converting electricity from one form to another e.g., from AC to DC current in Electric Vehicles. These are embedded in EV inverters, onboard chargers, DC/DC converters and charging stations.

Silicon (Si) has been the most widely used material within power semiconductors.

Silicon Carbide (SiC) is fast replacing Si as a much more efficient conductor of electricity. SiC can withstand much higher voltages vs. Si (10x) and SiC-based power modules require significantly less expensive/complex cooling systems. As a result, the battery can be smaller, while still allowing the car to achieve the same range following a full charge of the battery.

ON Semiconductor Corp. (ON)

Rating: Buy | Price Target: US$73.00 | Analyst: Toshiya Hari

Although ON will not be immune to a broad-based cyclical downturn, in our view, and in fact we model 2023 revenue down 14% yoy and non-GAAP EPS (incl. SBC) down 33% yoy to $3.54, we see the ongoing transformation combined with secular growth in SiC and sensing driving solid through-cycle revenue growth and margin expansion. On the self-help component, we see benefits associated with the exit from low-margin businesses (i.e. ~$280mn from 3Q21 to 3Q22 and an additional ~$450mn in 2023) as well as the shift toward a fab lighter operating model providing a cushion to margins in 2023 (offset by headwinds in the EFK fab acquisition).

Primer (24 Jun 2022)

NXP Semiconductors NV

Rating: Neutral | Price Target: US$165.00 | Analyst: Toshiya Hari

We remain constructive on NXP's long-term growth profile predicated on content gains in Auto, particularly those tied to xEVs and ADAS, but await normalization in shipments and/or a more favorable risk-reward set up. However, with the uncertain macroeconomic outlook, underscored by persistently elevated inflation, likely to further depress consumer demand through 1H23, we expect that Industrial and IoT revenues will decline by ~23% yoy and Mobile revenues decline by ~14% yoy in 2023. Even with a favorable view of the company's exposure to xEVs and the secular semiconductor content trajectory, we still anticipate that NXP's Auto segment will contract by 5% yoy in 2023.

Primer (15 Apr 2020)

Texas Instruments Inc. (TXN)

Rating: Sell | Price Target: US$162.00 | Analyst: Toshiya Hari

We see risks based on potential share loss and a normalization in the company's margin and return profile. While tailwinds from the CHIPS Act will serve as a partial offset starting in 1Q23, we expect cyclical demand headwinds, rising depreciation, and a catch-up in opex to drive a yoy decline in 2023 EPS that exceeds many of TXN's peers in the analog and MCU space.

Primer (15 Apr 2020)

Analog Devices Inc. (ADI)

Rating: Buy | Price Target: US$186.00 | Analyst: Toshiya Hari

We expect ADI's a) above-average exposure to defensive/secular end-markets (i.e. EV, A&D, Test & Instrumentation, Healthcare), b) hybrid manufacturing model, and c) opportunity to capture cost and revenue synergies associated with the Maxim acquisition, to drive near-term fundamentals that are resilient relative to industry peers. We believe ADI's hybrid manufacturing set-up will particularly help differentiate the company from its closest peer, TI, which we expect to experience a decline in margins, earnings, and FCF greater than ADI given its elevated capex (and thus, increasing depreciation) profile.

Primer (15 Apr 2020)

Skyworks Solutions Inc. (SWKS)

Rating: Neutral | Price Target: US$99.00 | Analyst: Toshiya Hari

While we have been impressed by Skyworks' design win momentum, particularly across the 2022 flagship SKUs, we are concerned that elevated smartphone channel and RF component inventory could drive sub-seasonal revenue patterns and downward pressure on margins in the December and March quarters. Key positives for the stock include limited potential downside to the company's overall Android business beyond the December quarter, sustained growth in Broad Markets and steady gross margin execution despite volatile demand trends and inflationary pressures. A bleak outlook for the overall smartphone market given the volatile macro backdrop remains our major concern.

Microchip Technology Inc. (MCHP)

Rating: Neutral | Price Target: US$76.00 | Analyst: Toshiya Hari

Although we do not foresee any near-term challenges, we expect supply tightness across Microchip's MCU, analog, and FPGA franchises to support sequential revenue growth through CY2022. We believe customer bookings could moderate, particularly if the evolving macro backdrop leads to more muted consumer spending and industrial activity. We also fear TI's unwavering commitment to capacity growth could ultimately derail the ongoing pricing and margin expansion seen across the analog and MCU industries.

Wolfspeed Inc. (WOLF)

Rating: Buy | Price Target: US$105.00 | Analyst: Brian Lee

Wolfspeed (formerly Cree) is a US-based silicon carbide device manufacturer. We see its supply agreement with Jaguar Land Rover as a strong indication of WOLF's ability to secure prominent tier-1 customers and demonstrates its confidence in being able to ramp its capacity to execute on high volume agreements. We believe WOLF's long term ability to achieve >50% gross margins remains intact and will drive a strong inflection in earnings growth starting in FY2023. Mohawk Valley will help drive better gross margins due to lower labor costs, 20%-30% better yields, and a 50% die cost reduction, according to management. WOLF has also been able to demonstrate continued improvements to its Durham fab both from a process yield and die yield perspective.

Primer (24 Jun 2022)

Infineon (IFXGn.DE)

Rating: Buy | Price Target: €42.50 | Analyst: Alexander Duval

In addition to Power Semis, Infineon also makes sensors for EVs.

Infineon provides power semis and microcontrollers for all EV technologies ranging from 48V mild hybrid vehicles to full BEVs. We see Infineon as well-positioned to benefit from structural growth related to automotive digitalisation and electrification, with a leading position in IGBTs and accelerating momentum in Silicon Carbide design wins. We believe that Infineon's incremental growth will be largely driven by trends related to digitalisation and electrification, with opportunities in ADAS, EVs, renewables, data-centre and IOT expected to comprise c60% of incremental revenue growth in the next 5 years per IFX. We also see scope for Infineon to benefit from value-based pricing in the autos vertical, driven by the increasing strategic importance of semiconductors in defining and differentiating the fundamental technical qualities of the end-product.

Primer (15 Apr 2020)

STMicroelectronics (STM, STM.PA)

Rating: Sell | Price Target (STM): US$36.00 | Price Target (STM.PA): €33 | Analyst: Alexander Duval

In addition to Power Semis, STMicro also makes sensors for EVs.

STMicro supplies power semis into EVs such as Silicon Carbide MOSFETs and Silicon based IGBTs. While we continue to view the firm as a long-term Digital Enabler in light of its strong position in a range of tech building blocks, including semis for Automated Driving and Electrified Vehicles, with scope for strong long-term EPS growth, we are cautious on a number of short-term headwinds / cyclical risks coupled with sector-relative valuation. Key points underpinning our rating are: 1) Relatively higher (c.30%) exposure to the weak discretionary consumer market; 2) Early mover advantage in Silicon Carbide lessened to some extent with at least one semis peer catching up (albeit its SiC position is still strong); 3) Pricing benefits look already baked into FY22 margin expansion, creating greater risk to FY23 margins should the weak macro precipitate a worse-than-expected decline in the analog semis market.

Primer (8 Nov 2018)

Fuji Electric (6504.T)

Rating: Buy (on CL) | Price Target: ¥7,400| Analyst: Ryo Harada

Fuji Electric is an electrical equipment company, and we see potential for it to become increasingly recognized as a global power semiconductor company, given rising power semiconductor demand related to xEV and renewable energy as well as its global No. 3 position in IGBT modules. We also see potential upside in Fuji's other core business – power electronics. We expect demand for switches and transformers supplied by this business to increase in line with the spread of renewable energy and distributed power supply systems. We expect a shift to occur in power electronics customers from existing utilities, steelmakers, and chemical companies, which have maintenance expertise, to new types of customers focused primarily on providing data services that have limited maintenance know-how, such as small-scale energy providers. In that event, we think Fuji Electric could see an increase in maintenance service outsourcing contracts and potentially greater profitability. Accordingly, we think Fuji Electric's technological competitiveness, target market and margin are superior to its peers, and rate the stock Buy (on CL).

Initiation (14 Jul 2021)

Rohm (6963.T)

Rating: Buy (on CL) | Price Target: ¥13,600 | Analyst: Daiki Takayama

Rohm produces LSI and semiconductor devices, and has now entered a growth trajectory centered around its power and analog semiconductor businesses. The company has positioned automotive and industrial applications as growth fields, and its weighting for consumer electronics applications is declining. In addition, Rohm is starting to gain ground with customers outside of Japan. We take a positive view of the company's development of products used to improve energy efficiency and that effectively capture energy-saving demand. In particular, we see rapid growth in the market for silicon carbide (SiC) power semiconductors produced by Rohm's semiconductor device business on the back of technological changes in EV inverter circuitry. We view SiC as a major growth driver for Rohm, and we believe it is poised to become a global major in this space. In addition, the company has ample cash holdings, and we are upbeat on prospects for shareholder returns along with growth investments. We are Buy-rated (on Conviction List) on Rohm's accelerating growth story.

Primer (15 Apr 2020)

Renesas Electronics (6723.T)

Rating: Buy (on CL) | Price Target: ¥1,600 | Analyst: Daiki Takayama

We expect the automotive semiconductor business will remain on a growth trajectory, fueled mainly by a recovery in auto production, higher ASP per installed content, and EV/ADAS demand-related initiatives. We note that the slowdown in demand for non-automotive (industrial, infrastructure, IOT) applications is widening. However, we see stronger prospects for a recovery again from 2H2023, driven by initiatives in growth fields, such as factory automation and data centers. Near term, although we expect the focus will be on peaking and sustainable margins, we are Buy rated (on Conviction List) based primarily on (1) progress on Renesas' companywide growth and value-added strategies, and (2) the stock's considerably low valuations.

Primer (15 Apr 2020)

DISCO (6146.T)

Rating: Buy | Price Target: ¥42,000 | Analyst: Shuhei Nakamura

We are Buy-rated on Disco as a Japan Greenabler. Although the SPE market is in a downcycle and macro uncertainties are increasing, we expect SiC power semiconductor market growth to fuel demand for Disco's products. Among SPE names in our coverage, Disco produces equipment used in back-end processes, with dicers and grinders as the main products. The company has more than 50% market share in both products, and in equipment for power semiconductors it has exposure to both Si/SiC. In particular, we expect the SiC power semiconductor market to expand at a more rapid pace in step with rising EV battery costs, and see ample scope for investors to price in stronger value-added/market growth for dicers and grinders given the greater difficulties handling SiC, which is harder to process than Si. While we expect slower demand for SPE used in logic/memory and other ICs in FY3/24, given a slowing semiconductor market, we expect demand for power semiconductor production equipment/consumables to remain solid. We see SiC market growth as a key catalyst for the shares, together with capex plan announcements from related makers.

Initiation (24 July 2020)

Sanan (600703.SS)

Rating: Buy | Price Target: Rmb25.00 | Analyst: Allen Chang

Sanan is expanding beyond the LED business into the RF PA (radio frequency power amplifier) and compound semiconductor areas (SiC, GaN). We are positive on the company given its growing compound semis business, and we expect its compound semis business (PA, SiC, GaN, filter, etc) and Mini/Micro LED to drive product mix upgrades and long-term earnings growth. Sanan has formed collaboration and signed long-term contracts with EV customers on SiC supply, which we think will be long-term drivers.

Initiation (13 Jul 2020)

Silan (600460.SS)

Rating: Buy | Price Target: Rmb44.50 | Analyst: Lynn Luo

Silan is a power semiconductor integrated device manufacturer (IDM) in China focusing on MOSFETs, IGBTs, and power ICs. Both MOSFETs and IGBTs are used as switches in power electronics for applications such as industrial converters, home appliances, consumer electronics, power tools, etc. Silan's key point of differentiation from other local peers is that it can provide turnkey solutions with diversified product lines

(MOSFET, IGBT, power IC, MCU, etc.). We are positive on its growth outlook driven by growing demand from local customers, and product line expansion toward higher-voltage MOSFET/IGBT and SiC/GaN. The stock is trading at 36X/24X 2023E/24E P/E, which we view as attractive with strong earnings growth of +38% CAGR in 2023E-26E.

Initiation (13 Jul 2020)

Wingtech (600745.SS)

Rating: Buy | Price Target: Rmb89.00 | Analyst: Verena Jeng

Wingtech is a leading smartphone ODM vendor, expanding to power semis via the Nexperia acquisition, and diversifying into non-smartphone ODM and camera modules. We are Buy rated on Wingtech, given 1) power semi – smart driving drives semis dollar content per car; product mix upgrade toward 100V+ MOSFET, 600V/1200V IGBT, 650V/900V/1200V GaNFET, SiC diodes, SiC MOSFET, along with strong auto semis demand supporting ASP and GM; 2) ODM – we see a profits recovery under easing chipset costs, new end products (notebooks, wearables), and new components (camera modules). Wingtech valuation looks attractive considering its strong earnings growth ahead at +36% CAGR in 2022-25E, and is currently trading at 18x, below its average P/E at 48x since 2020. Key risks: 1) slower-than-expected GM expansion; 2) slower-than-expected semiconductor revenue growth; and 3) slower-than-expected synergies / integration between Wingtech and Nexperia.

Initiation (13 Jul 2020)

SICC (688234.SS)

Rating: Buy | Price Target: Rmb141.00 | Analyst: Verena Jeng

SICC is a leading SiC substrate supplier in China, offering 4-inch SiC conductive and semi-insulating substrates and is migrating towards 6-inch conductive substrates. We expect SICC to deliver a strong +56% revenues CAGR in 2022E-27E, driven by 1) growing SiC adoption in EVs by domestic brands with the China EV SiC TAM to see a 22% CAGR over 2022-27E to US$1.7bn; 2) capacity expansion at a +67% CAGR in 2022E-27E to address customers' rising demand for EV SiC; and 3) improving production yield rate and expanding customer base in the EV and photovoltaic segments. We are Buy rated on the stock. SICC valuation looks attractive considering the strong revenues growth ahead compared to its global peers. A key near-term catalyst would be 6-inch conductive SiC substrate demand. Downside risks: (1) slower-than-expected capacity expansion and shipment ramp-up of 6-inch substrate; (2) slower-than-expected penetration into high power supply applications, such as EV, transportation, photovoltaic, or industrial; (3) more intense competition in the SiC substrate market; (4) short listing history and volatile valuation; (5) loss of access to key equipment or capacity supply tightness.

Initiation (24 Jun 2022)

StarPower (603290.SS)

Rating: Buy | Price Target: Rmb461.00 | Analyst: Allen Chang

StarPower is a local IGBT leader in technology and scale, and is well positioned for share gains in the China market. We expect the company to enjoy strong ramp-up momentum in IGBTs for EV and clean energy applications (solar PV, wind power, etc.) driven by rising end-demand and market share gain potential, supported by its technological leadership among local peers. Our 36X target 2025E P/E multiple is derived from the sector's P/E-EPS YoY growth correlation. We believe StarPower valuation is fair considering its high earnings growth in 2023-25E and the rising EV uptrend. Our regression analysis suggests that higher EPS growth companies in the semiconductor industry have generally been rewarded with higher multiples. Key catalysts include: 1) stronger demand from EV and clean energy applications; 2) market share gains in the China IGBT market; and 3) SiC ramp up progress. We are more positive on its EV IGBT business than consensus as we expect StarPower to enjoy share gains in a structurally growing industry.

Initiation (13 Jul 2020)

SinoWealth (300327.SZ)

Rating: Buy | Price Target: Rmb52.00 | Analyst: Jin Guo

Sinowealth is the front-runner among local peers in China's home appliance MCU and BMIC market and a key beneficiary of MCU/BMIC localization. We are Buy rated on SinoWealth: Despite the near-term challenges of 1) softening end-demand in consumer electronics; 2) the pricing downtrend in MCUs, which is largely priced in, we see Sinowealth as well positioned for the demand recovery and structural growth opportunities in its expansion into automotive (MCU and BMIC) and further penetration into smartphones (AMOLED driver IC). We expect product mix improvement (i.e. BMIC ramp up and AMOLED driver IC for smartphone brands) to drive margin expansion potential. We see the stock's valuation as attractive alongside the company's structural growth potential in 2024-25E. We believe the key catalyst will be its new product ramp-up in automotive and smartphone space in 2023E.

Initiation (17 Mar 2022)

SG Micro (300661.SZ)

Rating: Buy | Price Target: Rmb226.00 | Analyst: Lynn Luo

SG Micro is a leading signal chain IC and PMIC (power management IC) supplier in China, with 4,000+ types of products ready-for-sale and 1,700+ types contributing revenue. We are Buy rated on the stock as we expect strong earnings growth driven by growing demand from local customers for its PMIC and signal chain IC as customers seek to diversify supply chains and ensure supply when the market is in tight supply. We also expect product ASP improvement on the back of better mix and new product expansion. Although there are several local peers also focusing on PMIC or signal chain IC, we believe SG Micro has more diversified product lines covering wider end-market applications, while other local peers usually focus on a few specific areas. The company is also focused on expanding its product lines toward higher-end automotive and industrial control applications, which have higher entry barriers with limited competition from local peers. The stock is trading at 44x/27x 2023E/24E P/E, which we view as attractive given strong earnings growth of 51% CAGR in 2022E-25E. Downside risks: 1) weaker demand for smartphones and consumer electronics; 2) slower progress launching new products and expanding into new markets; and 3) more severe competition from domestic peers.

Primer (13 July 2020)

Hua Hong (1347.HK)

Rating: Buy | Price Target: HK$35.20 | Analyst: Allen Chang

Hua Hong is a semiconductor foundry (8" and 12") focusing on specialty technologies with products in power discretes, analog, NOR flash, logic, RF, CIS, MCU, etc.; key end-markets include consumer electronic, communication, computing and industrial, and automotive industries. We are constructive on Hua Hong given its diversified specialty technologies, localization opportunities, and product mix improvements (shifting to more 12" and higher-end node process 55nm). The migration from 90nm to 55/65nm and better product mix should also drive its wafer ASP and margin improvement. We see current valuation as undemanding with 2022E/23E P/E well below peers and target P/E. Our target 2025E P/E is based on its long-term EPS growth in 2025E-27E based on global peers' P/E vs. EPS growth correlation. While the market is concerned about the semis downturn overall and the impact on Hua Hong, we are positive on the company's product mix upgrade and expansion in 12" and EV exposure (power discretes).

Initiation (7 May 2019)

Bomin (603936.SS)

Rating: Buy | Price Target: Rmb19.10 | Analyst: Jin Guo

Bomin is a PCB maker with end-market exposure in EV and is expanding into ceramic substrate business (key applications are IGBT/SiC modules for EVs). We are constructive on Bomin given the company is the leading ceramic substrate supplier among local peers with volume ramp from 2023 onwards, supporting margin expansion and earnings growth in 2023-25E. Key downside risks to our thesis include 1) ceramic substrate ramp being slower than we expect; 2) PCB demand and profitability that is much weaker than we expect.

Initiation (2 Nov 2022)

AccoTest (688200.SS)

Rating: Neutral | Price Target: Rmb240.00 | Analyst: Jin Guo

AccoTest provides Automated Test Equipment (ATE) used in the testing of analog and mix-signal IC and is expanding into SoC, SiC/power semi testing equipment. We expect analog/mixed-signal testers growth to be mild given a high market share already, while power semis and SoC testers will see a strong ramp-up given successful penetration into key customers locally. While we are positive on its new product (SiC/power semi and SoC testers) expansion and leading market position among local peers, AccoTest has faced demand headwinds as the semis supply chain entered an inventory correction cycle. Besides, the export control rules could further weaken the demand outlook across consumer electronics, PC, and servers/data centers, which would impact AccoTest's growth outlook in our view. We are Neutral rated on AccoTest.

Initiation (13 July 2020)

Other components & software

EVs use several other components and software.

MLCCs, or multilayer ceramic capacitors, are passive components utilized to ensure continued, stable operation.

Sensors are used to monitor internal and external systems to ensure proper functioning and have wide application – from powertrains to batteries to ADAS systems.

Relays are electromagnetic switches that make or break a circuit feeding into other components.

Wiring harnesses comprise multiple power and data cables integrated and connected as a single unit.

Connectors are coupling devices that join electrical terminations to create circuits thus enabling contact between wires, cables, PCBs, and electronic components.

Cables are used for both data and energy. These can be run independently or in conjunction with other components (such as the wiring harness).

Memory is increasingly required as cars do more than drive – DRAM/NAND memory is used in everything from infotainment systems to ADAS.

Test Solutions verify that components (such as the battery or powertrain) are properly functioning.

Software and Networking includes various components and systems that are responsible for powering and connecting different parts of the EV as well as internal systems, like navigation and ADAS.

MLCCs, Sensors, Relay, Harnesses, Charging Connectors, Cables etc.

TE Connectivity (TEL)

Rating: Buy| Price Target: US$160 | Analyst: Mark Delaney

TEL makes several EV components including connectors, relays, harnesses.

We believe TEL is well positioned for long-term growth driven by its exposure to growing markets (e.g. EVs, factory automation, medical, renewables) including with higher content per device (TE has about 2X higher content on EVs vs. ICE vehicles), and its exposure to end markets that are either relatively stable and/or cyclically below normalized levels (e.g. auto, A&D, and medical that in total are about half of its revenue). We expect that ~10-20% of its FY25E EPS will come from EV/ADAS applications in 2025. We view risk/reward as favorable.

Amphenol (APH)

Rating: Buy| Price Target: US$91 | Analyst: Mark Delaney

Amphenol makes several EV components including connectors and sensors.

We view Amphenol as well positioned to benefit from increasing connector and sensor content per vehicle, including in the automotive market where the company's organic auto revenue has outgrown auto production at a mid-to-high single-digit rate on average historically. We expect the company to outperform, especially in the current weaker macroeconomic environment given the company's ability to benefit from higher content per unit, its track record of quickly responding to changing market conditions (and in turn taking share and/or protecting margins) thanks to its flexible operating model, strong FCF conversion, and tuck-in M&A strategy which we believe can augment its growth.

Sensata (ST)

Rating: Buy (on CL) | Price Target: US$57 | Analyst: Mark Delaney

The firm makes sensors for EVs.

We believe that Sensata is well-positioned for longer-term growth given its exposure to Electrification (Sensata targets $2 bn in Electrification revenue by 2026) and to a lesser extent its opportunity in Smart & Connected/Insights. This is evidenced by ~70% of its wins last quarter coming from Electrification, and the company tracking toward 50% growth in Electrification revenue in 2022. We think that the company can meet its target for BEV content to be 2X that of a typical ICE vehicle by 2026. Furthermore, we expect margins to trend higher over time driven by cost recoveries/cost management in the near- to intermediate-term and higher volumes in the longer-term.

Avnet Inc (AVT)

Rating: Sell | Price Target: US$44 | Analyst: Toshiya Hari

Avnet has executed well since the start of the pandemic and management has driven permanent change (e.g. shift to e-commerce at Farnell) that could drive through-cycle improvements in profitability, and yet we maintain our relatively cautious view on AVT based on our concerns of a cyclical correction in volumes and growing inventory.

Continental (CONG.DE)

Rating: Sell | Price Target: €52 | Analyst: Philipp Konig

The firm makes sensors for EVs.

Continental is a global tire manufacturer and supplier of various auto parts. With underlying auto margins remaining close to breakeven and tire margins expected to decline, we remain cautious on Continental into 2023. We forecast tire margins to come under pressure next year from a mix of (1) lower volumes (GSe -2.7%), (2) higher inflation from labour and energy (GSe -€900mn) and (3) negative inventory valuation (GSe -€150mn). We view Continental as unfavourably positioned due to its large footprint in Europe (66% of capacity) and strong exposure to the passenger car segment. We view the ability of tire makers to further raise prices next year as limited (GSe pricing +7.1%), as Asian imports have returned to Western markets. We also note that winter tires are a pivotal part of Continental's tire business (c.15% of volumes) and that demand so far has been softer than in previous years. Overall, we expect tire margins to decline 260bps next year to 10.3% (company-compiled consensus 12.5%) and our adj. EBIT estimate sits 21% below consensus.

Nexans (NEXS.PA)

Rating: Buy| Price Target: €119 | Analyst: Daniela Costa

The firm makes sensors for EVs.

Nexans makes cables and charging infrastructure.

Nexans is a global leading cable manufacturer operating across the high, medium and low voltage spectrum. The group designs solutions and services along the entire value chain in five main business areas: Usages (safer energy to residential, commercial and industrial buildings); Distribution (fully integrated turnkey solutions to all Transmission System Operators and Distribution System Operators); Generation & Transmission (covering offshore wind farms, subsea interconnections, land high voltage); Industry & Solutions (including renewables, transportation, oil and gas, automation, and others); and Telecom & Data (a comprehensive range of differentiated connectivity solutions, including LAN cabling, telecom solutions, FTTx networks, as well as solutions for data centres and submarine infrastructure). We continue to see the cable names as beneficiaries of the push towards higher energy independence in Europe and the expansion of renewables globally. We note that Nexans' project selectivity and self-help initiatives currently put it at the best ROIC in the cables industry on our estimates. Nexans also continues to compare favourably vs renewable-exposed stocks, which trade at materially higher multiples despite much lower ROIC.

Prysmian (PRY.MI)

Rating: Buy| Price Target: €44 | Analyst: Daniela Costa

Prysmian makes cables.

Prysmian is the world's largest supplier specialising in the production of electrical cable for use in the energy and telecom sectors and for optical fibres. We expect high backlog, coupled with a strong anticipated increase in offshore wind tenders, is set to contribute to strong top-line growth and high-voltage (HV) margin improvement for Prysmian. We note Prysmian continues to trade at a discount vs renewable-exposed stocks.

SKF (SKFb.ST)

Rating: Buy| Price Target: Skr188 | Analyst: Daniela Costa

SKF makes ceramic bearings for EVs.

SKF is Swedish bearing and seal manufacturing company. We think weakening macro headwinds especially in Europe will put more pressure on volume growth into FY23/24, which will be partially offset by a better price/cost match as recent price rises start to flow through while raw material costs come down. For FY22 we expect SKF to stay at the upper end of the 4-8% organic sales growth guidance, while we are currently 5% above Visible Alpha Consensus Data on FY23 adj. EBIT, given a tailwind from price/cost, and roughly in line on FY24 adj. EBIT.

Toyota Boshoku (3116.T)

Rating: Buy| Price Target: ¥2,100 | Analyst: Kota Yuzawa

The firm makes motor cores.

Toyota Boshoku is an auto parts company that manufactures and sells interior components. FY3/23 seat production volume has been significantly affected by lower production at Toyota. However, we believe that earnings will recover when production at Toyota Motor returns to normal levels. Potential catalysts for the share price include (1) catch-up production and mix improvement at core client Toyota Motor, (2) improved production/sales momentum after the re-opening of the economy in China, the company's core earnings source, and (3) a peak in logistics costs, which have depressed earnings in FY3/23. We believe the valuation of the stock is relatively cheap in terms of P/B within our auto parts sector coverage, and we are Buy-rated.

IRISO (6908.T)

Rating: Neutral| Price Target: ¥4,600 | Analyst: Ryo Harada

The firm makes connectors for EV power trains.

Iriso Electronics makes various kinds of connectors, and is particularly strong in automotive connectors. Automotive powertrain connectors are the latest growth field, and Iriso seeks to differentiate itself via its Z-MOVE connectors, which are resistant to shocks and vibration. The increased use of connectors on existing solder contacts will be essential as automobile electrification progresses and assembly processes are increasingly automated. We believe that earnings are currently being affected by supply chain disruption, including from the lockdowns in China, given that the company has a plant in Shanghai. We expect earnings to improve gradually as the situation normalizes. We are Neutral rated on Iriso and would look for a re-rating once near-term earnings risks dissipate, and we get better visibility on the longer term.

Nippon Ceramic (6929.T)

Rating: Sell | Price Target: ¥2,400 | Analyst: Ryo Harada

The firm makes EV current sensors.

Nippon Ceramic makes infrared sensors, ultrasonic sensors, and a variety of other sensors. There have been high expectations for the use of ultrasonic sensors in automobiles in recent years, but we see limited sales growth prospects given that (1) ultrasonic sensors have already been installed in most new vehicles, and (2) while these sensors are superior in recognizing obstacles at near distances, they are not well-suited to recognition of objects at long distances, which is required for ADAS and autonomous driving system applications. With sector-relative valuations also high, we are Sell-rated on the company. We see potential for increased sales and earnings contributions from current sensors, where the number of customers is currently rising.

Sumitomo Electric (5802.T)

Rating: Buy | Price Target: ¥2,100 | Analyst: Ryo Harada

The firm makes wiring harnesses.

Sumitomo Electric Industries (SEI) is engaged in a wide array of business areas, including the automotive, infocommunications, environment and energy, and electronics businesses. Automotive wire harness business has the highest sales weighting, and infocommunications (optical fiber cable) and energy and environment (power cables, transformers) are its growth fields. We expect (1) a recovery in wire harnesses on the back of a recovery in automobile production volume driving short-term profits; (2) growth in optical fiber (infocommunications segment) to be driven by higher demand for high-density optical fiber cables by data centers on the back of an increase in public cloud investment in Japan, in particular. We also see good medium-/long-term prospects for the environment and energy business, which stands to benefit from demand in Japan for enhanced power infrastructure in order to promote the use of renewable energy. We believe the stock looks undervalued compared to its past five-year average and our target multiple, based on our future EBITDA growth outlook. We are therefore Buy-rated on SEI.

Initiation (6 Dec 2022)

Fujikura (5803.T)

Rating: Buy | Price Target: ¥1,400 | Analyst: Ryo Harada

The firm makes wiring harnesses.

Fujikura has implemented business reforms and adopted a more selective/concentrated business approach, focusing on the telecommunications business (optical fiber cables) as its key growth driver post booking substantial net losses in FY3/20. The company has also achieved relatively high margins in its electronics business, the second-largest segment in terms of operating profits, by focusing on high-end products. In the telecommunications business, Fujikura has downsized its base material/cables business as a result of past losses, and is now building around differentiating high density fiber optic cable (SWR/WTC) products. The company's optical fiber cable applications are not only progressing on supplying products to hyperscalers for data center applications, but also on widening sales, notably to telecom carriers and rail companies in Europe. These products also have high margins. We see investment in data centers continuing over the longer term, and expect investment in the public cloud to remain particularly high in Japan, which lags behind other countries in this area. We are Buy-rated in light of these factors, and on prospects of Fujikura's telecommunications business growing at a faster rate than the industry as a whole. We apply a target EV/EBITDA multiple of 6X based on the historical correlation between EBITDA growth and EV/EBITDA. The stock is currently trading at an EV/EBITDA multiple (12-month forward basis) below this, and we see upside for the shares as investors start to price in the significant profit growth potential of the telecommunications business.

Initiation (6 Dec 2022)

Furukawa Electric (5801.T)

Rating: Sell | Price Target: ¥2,200 | Analyst: Ryo Harada

The firm makes wiring harnesses.

Furukawa Electric is involved in a broad range of businesses including communications solutions, energy infrastructure, and electronics & automotive systems. The largest revenue contributor is electronics & automotive systems, and much of the company's near-term earnings improvement is likely to come from here in step with a recovery in auto production volume. However, this business is not especially strong in growth areas within the automotive space, such as EVs and ADAS, and earnings improvement is driven largely by external factors (pickup in auto output) rather than idiosyncratic factors. Communications solutions is a growth area, but we consider Furukawa Electric to be positioned less favorably than peers given 1) in data centers – which we expect to be the key driver of revenue in the industry – the company has only a few dealings with hyperscalers, and 2) from a profit standpoint, productivity is low at US manufacturing facilities. As the stock is currently trading at a P/B multiple higher than our target multiple of 0.5X (derived from P/B-ROE correlation), we are Sell rated.

Initiation (6 Dec 2022)

Yageo (2327.TW)

Rating: Buy (on CL) | Price Target: NT$900 | Analyst: James Wang

Yageo makes MLCCs, Chip resistors.

Yageo, as the 3rd largest MLCC and largest resistor / tantalum capacitor supplier globally, should enjoy a more stable earnings trend in the future, with its product upgrading strategy and more diversified product portfolio given the Kemet, Chilisin, as well as the two pending sensor businesses acquisitions. Yageo continues to penetrate into the high-end MLCC market (especially automotive/EV, industrial and high-end computing), which have a better S/D outlook compared to the commoditized market.

Also, high-end MLCC market demand visibility is much longer, with a more stable pricing trend, which suggests a less volatile earnings outlook. We hold a positive view on Yageo, given it is the supplier with the broadest product portfolio, which can help the company to increase its market share by cross-selling and up-selling. Valuation offers attractive risk-reward, in our view. Key risks: (1) weaker inventory builds from OEMs; (2) softer IT end-demand; and (3) slower integration of Kemet/Chilisin.

Initiation (10 Feb 2019)

BizLink (3665.TW)

Rating: Neutral | Price Target: NT$380 | Analyst: James Wang

BizLink makes chargers and harnesses.

Bizlink is a connector supplier focusing on niche markets (1%-2% of global connector market share in 2022E), including Tesla BMS harness (sole supplier), HP/Dell's docking station connector, connectors for semiconductor equipment/server/medical devices/energy etc applications. We believe the company will maintain its strong position within Tesla's Battery Management System (BMS)/charging business supply chain considering its rich experience in the connector market. Hence, we view Bizlink as a key beneficiary of ongoing Tesla shipment growth in the coming years. On the other hand, We believe Bizlink's semiconductor business revenue should continue to deliver strong growth in the coming years, with the surging semiconductor industry capex trend. On the data center cable business, we believe the company can further gain share in its datacenter customers' supply chain given its expanding product portfolio from the new INBG (Industrial Solutions Business Group) business. We are Neutral rated on subdued docking (15% of 2022E rev) growth opportunity and slowing consumer electronics demand, despite the strong semi/EV related business outlook. Key upside risks include: (1) component/material costs falling in the coming months; (2) faster-than-expected EV penetration rate increase; and (3) more project wins from semi cap and datacenter customers. Key downside risks include: (1) much more severe material/IC shortage that drives Bizlink's costs even higher, making the IC shortage timeframe even longer; (2) slower EV demand; and (3) slower than expected product mix improvement.

Initiation (10 Sept 2019)

Etek (688601.SS)

Rating: Neutral | Price Target: Rmb69 | Analyst: Lynn Luo

Etek makes charging cables and connectors.

Etek is a local PMIC (power management IC) supplier in mobile, IoT and wearables. Its key growth drivers are higher growth at power protection IC and power converter IC due to expansion in non-mobile applications. We are Neutral rated on Etek. While we like the company's solid earnings growth, we see limited catalysts (e.g., new product launches) in the near-term, and its high revenue exposure to smartphones (~70% of 2023E revenue) could also bring earnings volatility in the near-term given demand from smartphone customers is more volatile than other applications. We believe near-term growth is already priced in and long-term growth relies on its product diversification. Key upside/downside risks: 1) better/weaker than expected demand of smartphones and IoT devices, 2) faster/slower than expected product line expansion, and 3) faster/slower progress in R&D and new product development.

Initiation (17 Mar 2022)

AVIC Jonhon (002179.SZ)

Rating: Buy | Price Target: Rmb77.80 | Analyst: Jacqueline Du

The firm makes optical and electrical connectors.

AVIC Jonhon is domestic leader in optical and electrical connectors. The company has c. 60% revenue exposure to military applications, which we view as a structurally growing segment, given steadily growing military spending and upward trending aerospace & defense informatization; we also note the 20th Party Congress in China increasingly emphasized national security and social stability, and connectors are a necessary component of such a trend. The company has 17%/15%/1%/7% revenue exposure to telecom/EV/rail/other end markets, and we forecast each segment to deliver -9%/+18%/+12%/+5% 2023E-25E CAGR. We expect EV to lead the growth, riding on the tailwind of an increase in EV penetration. Rail, in our opinion, has hit its bottom this year and will likely recover along with the reopening of China. Overall, we model an 18%/21% revenue/EPS CAGR in 2023-25E. We think the stock is undervalued, at 29X 12-m forward P/E, lower than its historical average. Key catalysts include national emphasis on A&D, and stronger EV sales.

Initiation (11 Jun 2018)

Faratronic (600563.SS)

Rating: Buy | Price Target: Rmb224.90 | Analyst: Tina Hou

Faratronic makes film capacitors.

Faratronic is the No.1 film capacitor supplier globally, with an estimated 21% market share in 2022E (vs. 17% in 2021). We are Buy rated on the stock as we like its (1) pure-play nature in film capacitor levered to the EV/solar/wind markets; (2) scale advantage and in-house production capabilities translating to an industry-leading margin profile; (3) employee-owned structure highly aligning management/company interests with shareholders. While the market has concerns on cost, we note that while high-end film prices have continued to rise due to supply tightness, the rate of increase has slowed from 50% in 2021 to 10% in 1-3Q2022; on the other hand, raw material prices such as tin/zinc/copper have declined since 2Q22, which could help offset part of the cost pressure from film. In addition, we believe Faratronic can enjoy film supply priority, leveraging its position as the largest film capacitor maker globally. The company is also expanding into new areas such as DC power transmission and railway/subway systems. We view valuation as attractive, trading against 24%/26% revenue/net income CAGRs in 2022-25E.

Initiation (31 Mar 2022)

Hongfa Tech (600885.SS)

Rating: Buy | Price Target: Rmb45.40 | Analyst: Jacqueline Du

The firm makes relays for EVs.

Hongfa is a top relay producer with 21% market share in China and 19% globally as of 2021 (both No. 1). We expect continued market share gains driven by technology strength in autos (both ICE and EV)/home appliance/power/signal sectors. We believe the vehicle electrification mega-trend is poised to power China's industrial component champions as content per vehicle rises significantly in EV vs. ICE. And we believe the company could consistently deliver solid and sustainable earnings growth not only in their fast growing EV segments, but also in a diverse set of industrial end-applications. We view the stock valuation as attractive vs. our China Industrial Tech coverage, with potential catalysts coming from 1) strong customer penetration among global EV OEM customers, and (2) fast smart meter order gains against replacement demand. We are Buy rated.

Initiation (11 Jun 2018)

Nantong Jianghai Capacitor (002484.SZ)

Rating: Buy | Price Target: Rmb31.10 | Analyst: Tina Hou

Jianghai makes aluminum electrolytic capacitors and film capacitors for EVs.

Jianghai is a top aluminum electrolytic capacitor supplier expanding into film capacitor and super capacitor products. We are Buy rated on the stock, as we like the company for its (1) vertical integration of key aluminum electrolytic capacitor manufacturing processes with c.75% self-sufficiency rate for formed foil (vs. c.30% for Japanese peers) which provides c.18% GPM advantage and closer control of product performance; (2) strong industrial client base in aluminum electrolytic capacitor, which has high entry barriers – with brand recognition the company can leverage into other segments; (3) the pipeline business of film capacitor and super capacitor products which is about to bear fruit in coming years driven by new energy demand. In terms of market concerns on gross margin, we note 3Q22 has already rebounded 4ppt qoq on (1) a higher capacity utilization rate; (2) declining raw materials cost such as aluminum, ethylene glycol, etc.; and (3) lower electricity prices at its Inner Mongolia foil product plant. We view valuation as attractive, trading against 18%/20% revenue/net income CAGRs in 2022-25E.

Initiation (31 Jul 2022)

Shenzhen Envicool (002837.SZ)

Rating: Buy (on CL) | Price Target: Rmb48.90 | Analyst: Tina Hou

The firm makes cooling systems for EV buses and trucks.

Envicool specializes in precision cooling technology, helping data centers and energy storage systems (ESS) to operate in a highly controlled temperature/humidity environment and enhance their power usage efficiency (PUE) to lower electricity consumption. Its technology and products were the first to be included in MIIT's Green Data Center Catalog in 2018 and widely adopted by hyperscale as well as telco customers. It is also a major supplier of cooling equipment in ESS with 18% global market share in 2022, per our estimates. We believe digital economy and carbon reduction are long-term focuses for China, and technologies – such as precision cooling – enabling and improving energy utilization efficiency will be increasingly adopted to achieve these development goals. As a leader in precision cooling, Envicool not only benefits from strong capacity demand of ESS installation, but also technology/content value upgrade from air cooling to liquid cooling (3X), driving ESS cooling TAM expansion at a 55% CAGR in 2022-25E. We forecast Envicool's share of the global ESS cooling market to grow from 18% in 2022E to 26% in 2025E on the back of its technology leadership. We view the stock valuation as attractive against 34%/40% revenue/net income CAGRs in 2022-25E. Potential catalysts include new customer/order wins, data center industry demand inflection, and new cooling solution launches. We are Buy rated (on CL).

Initiation (8 Nov 2021)

LG Display (034220.KS)

Rating: Sell | Price Target: W11,500 | Analyst: Giuni Lee

The firm makes displays for EVs.

LG Display (LGD) is an LCD and OLED panels manufacturer with the No.1 market share in OLED TV panels. Owing to a lack of near-term catalysts across both of its core businesses (LCD and OLED) along with the continued lack of earnings visibility for the next few quarters, we are cautious on the name and are Sell-rating relative to coverage.

Initiation (14 Jul 2017)

Memory

Micron Technology (MU)

Rating: Buy | Price Target: US$62 | Analyst: Toshiya Hari

Micron is a memory semiconductor supplier of DRAM and NAND chips. It is the third-largest DRAM supplier with c. 23% market share and the fifth-largest NAND supplier with c. 11% market share. Micron has executed well on its technology and product roadmaps. While the timing and shape of a cyclical recovery remains highly uncertain, we are encouraged by Micron's supply-side response – specifically, capex cuts (i.e. FY23 Wafer Fab Equipment spend to decline more than 50% yoy, and potential declines in FY24 yoy), utilization cuts and opex cuts– to narrow the industry supply and demand gap.

Primer (21 Sep 2021)

SK Hynix (000660.KS)

Rating: Buy | Price Target: W110,000 | Analyst: Giuni Lee

SK Hynix (Hynix) is the second-largest DRAM supplier and one of the leading NAND suppliers globally. We expect the stronger-than-expected supply side measures by suppliers including Hynix to lead to a recovery in industry fundamentals in the medium-term, and with the stock trading at below book value, we are Buy rated on the stock. Key risks include major deterioration in memory supply/demand and delays in technology migration.

Initiation (14 Jul 2017)

Samsung Electronics (005930.KS, 005935.KS)

Rating: Buy | Price Target (005930.KS): W70,000 | Price Target (005935.KS): W63,000 | Analyst: Daiki Takayama

Samsung Electronics (SEC) is one of the largest tech companies in the world, with the #1 market share in several products including memory chips, OLED panels, smartphones, and TVs. We expect the industry-wide supply discipline (especially in DRAM) and the limited 2023 memory bit production to drive tighter S/D conditions as we move through next year, hence our Buy rating on the name. Key risks include a major deterioration in memory supply/demand and a sharp contraction in smartphone margins.

Test solutions

Keysight (KEYS)

Rating: Neutral | Price Target: US$189 | Analyst: Mark Delaney

We consider Keysight to be a leader in the test market and one of the better executing companies in our coverage, and expect the company can sustain solid fundamentals even in a slower macro environment given: 1) its exposure to secularly growing applications (i.e. ADAS/EVs, 400G/800G, and O-RAN); 2) the sustainability of its software and services business (about 34% of total revenue in FY2022) that drove record annual recurring revenue to $1.2 bn; 3) sales into relatively stable or defensive areas (e.g. the A&D market and R&D test).

However, the company has above-average exposure to the communications infrastructure market (commercial communications is 45-50% of total company revenue) vs. our broader coverage, which is an end market that we expect to slow in 2023 (and where some competitors have recently seen order weakness), and our EPS estimates are below the Street (FactSet) for FY23/24. In addition, the stock trades at a premium vs. peers.

Initiation (12 Aug 2020)

Chroma ATE (2360.TW)

Rating: Neutral | Price Target: NT$215 | Analyst: James Wang

Chroma is a leading global semi testing equipment supplier that focuses on power supply and automated testing equipment. The company also provides EV battery turnkey solutions for its customers, and mainly focuses on the high-end battery market. We hold a positive view on Chroma's fundamental growth opportunity given the multiple industry tailwinds (including HPC/wearables/EV in the long term). We believe Chroma, as a key testing equipment supplier globally (key SoC SLT supplier which holds a major market share – 50%+), should continue to see strong demand from semiconductor foundries/IDMs in the coming years given the stronger computing performance requirement from the HPC market, and additional sensor requirements in smartphone/wearable devices and automotive (LiDAR). However, we are Neutral rated on the company on a relative basis (lower upside vs. our Buy-rated coverage). Key upside risk is faster-than-expected Photonic and battery turnkey solution demand. Key downside risk is slower HPC demand which could negatively impact the company's SLT product demand.

Initiation (24 Oct 2018)

Centre Testing (300012.SZ)

Rating: Buy| Price Target: Rmb27.10 | Analyst: Jacqueline Du

CTI is the largest local privately-owned tester in China in the fast growing and less cyclical TIC (Testing, Inspection, Certification) industry. It has proven itself flexible to changes in local regulation and has built a strong laboratory network, which, combined with its differentiated service quality and cost structure, could position it to be a consolidator in the TIC market. We see risk-reward for CTI as skewed to the upside. Our analysis suggests a 10% long-term CAGR for China's TIC market, which is characterized by high growth visibility, low volatility, and a highly fragmented landscape. The company's OPM performance has been one of the key investor focus areas, and we believe new rounds of operational refinement initiatives should further drive its OPM improvement from 17% in 2021 to 19% by 2025E. We also see further upside ahead hinging upon carbon emission/auditing demands that could bring new opportunities in the mid-to-long term. We view the stock valuation as attractive against 21%/24% revenue/net income CAGRs in 2022-25E. We are Buy rated.

Initiation (11 Feb 2019)

Pony Testing (300887.SZ)

Rating: Buy| Price Target: Rmb47.40 | Analyst: Jacqueline Du

Pony Testing, one of China's leading third-party providers of testing, inspection and certification (TIC) services, focuses on four areas: 1) life science; 2) consumer goods; 3) electronics; and 4) safety. It is one of the earliest third-party TIC service providers in China, but lags the leader CTI in terms of market share. Our analysis suggests a 10% long-term CAGR for China's TIC market, which is characterized by high growth visibility, low volatility, and a highly fragmented landscape, offering leading domestic players a market consolidation opportunity. We believe Pony is well-placed to diversify business exposure and accelerate market penetration, especially into medical, CRO/CDMO, EV/battery testing space with higher corporate revenue sources (than government) and higher revenue output per employee. We project revenue/net income CAGRs of 9%/28% in 2022-25E. We view the stock valuation as attractive, against 9%/28% revenue/net income CAGRs in 2022-25E, on the back of: 1) solid brand recognition based on 20 years of operational experience; 2) established service infrastructure; and 3) new incentive and management measures to activate efficiency improvement and business expansion.

Initiation (7 Nov 2021)

Software, Networking, Compute

Advanced Micro Devices (AMD)

Rating: Buy | Price Target: US$85 | Analyst: Toshiya Hari

We highlight the following three characteristics that support our above-consensus 2023 earnings outlook and constructive investment thesis on AMD: 1) continued share gains in server CPU predicated on the launch of new products and improved supply availability, 2) a positive reversion in gross margins in 2H23 as mix in Data Center and pricing in client CPUs normalize, and 3) attractive valuation, particularly on a growth-adjusted basis.

Initiation (6 Apr 2017)

Marvell (MRVL)

Rating: Buy | Price Target: US$54 | Analyst: Toshiya Hari

We have a Buy rating on MRVL as we believe the sustainability of revenue growth in excess of the industry average — supported by design wins and content growth across Cloud, 5G infrastructure, and Automotive — as well as the operating leverage inherent to Marvell are not fully priced in. Key downside risks to our investment thesis and price target include 1) supply-side challenges, 2) lumpiness in certain cloud and/or 5G infra projects, and 3) cost inflation.

Nvidia (NVDA)

Rating: Neutral | Price Target: US$162 | Analyst: Toshiya Hari

We are Neutral-rated on NVDA. While we view Nvidia as the key enabler of accelerated computing across cloud and enterprise data centers, and believe expectations for the Gaming business have been appropriately re-set, we await a better entry point. We appreciate the niche opportunity that the company is pursuing with its Grace Hopper Superchip, as we believe the focused approach will yield greater traction, all else equal.

We expect late 2025 to mark an inflection point for the Automotive franchise, supported by the ramp of the company's DRIVE platform at Mercedes-Benz and Jaguar Land Rover. We believe that the growing list of Omniverse connections likely reflects increasing traction of the associated software opportunity.

NavInfo (002405.SZ)

Rating: Buy | Price Target: Rmb17.90 | Analyst: Jin Guo

Navinfo is a leader in automotive map/navigation with 20 years of supply relationships within the auto industry, and is a key beneficiary of ADAS/autonomous driving, with its automotive MCU ramping up driven by mass production orders from Tesla, CATL, etc. We are positive on Navinfo, as we believe the company is 1) a key beneficiary of automobile semis localization and share gain given its product readiness and competitiveness among local peers; 2) well positioned for the increasing ADAS penetration, which drives demand for the company's high-definition map/navigation system; Navinfo is an early mover in this space and has confirmed long-term contracts with top auto makers such as VW, Daimler, BMW, Volvo, etc. Key risks: 1) foundry supply disruption; 2) fierce competition; 3) slower-than-expected end-demand (e.g., auto volume, slower ADAS penetration).

Initiation (17 Mar 2022)

KPIT Tech (KPIE.BO)

Rating: Buy (on CL) | Price Target: Rs950 | Analyst: Chandramouli Muthiah

KPIT Technologies is an automotive software company, helping large global auto OEMs transition from legacy ICE technologies to Electric and Autonomous vehicle platforms of the future. (1) More than 60% of the company's revenue come from CASE (Connected, Autonomous, Shared, Electric) R&D spends by Auto OEMs which are poised to triple to ~US$60bn annually between FY21 and FY26. KPIT is one of the few positive cash flow EV exposed names listed on Indian markets, that benefits from the global shift to EVs, unlike other listed auto OEMs / component makers in India who are getting disrupted by the move to Electric. (2) KPIT has the third-largest global automotive software headcount (largest in India). (3) In addition to working with legacy OEMs which are trying to play catch up with Tesla on Electric and Autonomous vehicle technologies, KPIT is adding new lines of business from work with semiconductor companies and well-funded EV disruptors like Rivian, Nio, and Lucid. We are Buy-rated on KPIT (on CL) and view the relatively higher P/E vs. the broader market as reasonable in light of KPIT's position as a strong global auto software company in the early stages of a multi-year structural shift towards Electric and Autonomous vehicle development by its OEM customers. Catalysts: R&D / Strategy days of large Global OEMs and regulatory updates around global decarbonization targets. Downside risks: Attrition in skilled talent pool; slowdown in auto tech outsourcing; vendor consolidation by OEMs; revival in onshoring; obsolescence of domain expertise; and INR appreciation.

Initiation (5 Jan 2022)

Charging Infrastructure

Accelerating EV adoption is leading to an increase in demand for charging infrastructure. The US Inflation Reduction Act includes EV charging tax credits in addition to manufacturing credits for battery production.

In 2021, total charging connectors globally (inc. home/private chargers) increased over 40% to about 9.1 mn.

Shoals Technologies (SHLS)

Rating: Sell | Price Target: US$20 | Analyst: Brian Lee

Shoals is a US-based supplier of solar EBOS (electrical balance of systems) – key technology components that are critical to the wiring and interconnection of every solar system. We are cautious on Shoals given 1) backlog growth has stagnated since the end of 2021, 2) there is muted operating leverage in the model as the company has not been able to drive significant earnings growth despite strong revenue growth, 3) we believe the relative risk/reward of Shoals' shares skews less favorably compared to stocks with similar utility-scale exposure that have more attractive valuation and/or leverage to Inflation Reduction Act benefits. To the extent that Shoals improves operating leverage profile while expanding into international markets (e.g. EU, emerging markets), this could make us more positive on the shares.

Initiation (22 Feb 2021)

Enphase (ENPH)

Rating: Buy| Price Target: US$379 | Analyst: Brian Lee

Enphase Energy, Inc. is a leading manufacturer of solar microinverter and storage solutions. The company is seeing multiple long-term tailwinds including lower commissioning times which should improve the sell through of storage, the benefits of the extension of the solar ITC and addition of a storage-only ITC in the US, and penetration into European markets. ENPH plans to build 4-6 manufacturing lines of microinverters to take advantage of manufacturing credits in the US. We are constructive on ENPH's ongoing ability to maintain, and potentially grow, gross margins as it continues to ramp IQ8.

Initiation (2 Dec 2019)

Stem Inc (STEM)

Rating: Buy| Price Target: US$16 | Analyst: Brian Lee

Stem Inc is a leading provider of energy storage solutions. The company combines advanced energy storage solutions with its AI-powered analytics platform to enable customers and partners to optimize energy use and maximize the value of renewable energy. Company management noted the broader solar industry experienced headwinds following impacts from UFLPA and ongoing supply issues, but expects a stronger year ahead, with STEM well-positioned to capture upside from solar through its high-margin software and services business. Acceleration through solar and the ramping up of installs for fleet EVs (20%-30% of BTM in coming years) were noted as drivers heading into next year. Additionally, as IRA tailwinds have proven beneficial for STEM, management expects bookings to shift from FTM to BTM (though the mix remains heavily FTM weighted), which can drive better gross margins through a more favorable software-to-hardware mix.

Initiation (23 May 2021)

Sunrun (RUN)

Rating: Buy| Price Target: US$40 | Analyst: Brian Lee

Sunrun Inc. is a leading provider of solar energy solutions. The company sells, installs, monitors, and maintains battery and solar panels. RUN reported 47k cumulative solar+battery system installations as of 3Q22, up from 42k as of 2Q22, though management noted that battery constraints and longer installation times have continued to lead to lower than expected battery attach rates in the near term. That said, the company remains confident that demand for residential storage remains strong and that attach rates will increase rapidly as more battery supply becomes available. RUN significantly exceeded its >$10k net subscriber target, the excellent result for net subscriber value, in our view, and will likely assuage investor concerns about RUN's ability to grow customer margins. RUN is also sourcing from a variety of geographies and remains confident it will have the ability to source sufficient supply to meet its growth targets.

Sunnova (NOVA)

Rating: Neutral | Price Target: US$26 | Analyst: Brian Lee

Sunnova Energy Corporation designs and installs residential solar systems, as well as offers system maintenance and monitoring services. We expect the demand growth to be a bit more challenged in the near-to-medium term given roughly half of NOVA's customer mix is derived from loan/cash sales – where higher borrowing costs are likely to have a bigger impact on volumes. That said, we remain constructive on the proportion of NOVA's volumes tied to lease/PPAs, and we believe risk/reward is relatively balanced for NOVA.

Initiation (19 Aug 2019)

SolarEdge (SEDG)

Rating: Buy (on CL) | Price Target: US$416 | Analyst: Brian Lee

SolarEdge Technologies, Inc. is a provider of power optimizer, solar inverter and monitoring systems for photovoltaic arrays. SEDG is poised to benefit from new growth pillars including residential storage and utility-scale inverters. To that point, the company is expected to ramp battery production rapidly to 2GWh of annualized capacity by the end of 2022. Meanwhile, we expect its new utility-scale-focused inverter product to help expand the company's addressable market to large ground-mount solar installations. We view SEDG's market leading presence in solar through its core residential and commercial inverter business, along with significant TAM expansion in adjacent end markets, as supportive of continued and strong earnings growth.

Primer (2 Dec 2019)

SunPower (SPWR)

Rating: Sell | Price Target: US$16 | Analyst: Brian Lee

SunPower Corporation is a US residential installer of solar and energy storage solutions. SPWR has the highest cash/loan mix among all resi installers in our coverage with cash/loan sales making up ~80% of its sales. We expect cash/loan demand to see the most pronounced impact given the potential for softening consumer demand in general. In addition, we see the potential for headwinds on the housing macro as a key downside risk to residential solar demand as new homes have increased as a proportion of total residential installations in recent years, and we note that new homes account for ~20%-40% of SPWR's systems sales.

Schneider (SCHN.PA)

Rating: Sell | Price Target: €128 | Analyst: Daniela Costa

Schneider is a specialist in energy management, catering to residential, commercial & Industrial buildings, utilities, data centers, Industry & Infrastructure. We remain cautious on the weakening trend in construction activity (c35% of sales), where we see signs of the start of destocking from distributors, which would pose downward risks to growth in FY23E/24E. High energy prices and wage inflation will continue to act as a headwind to margins into 2023, in our view.

ABB Ltd. (ABBN.S)

Rating: Buy | Price Target: SFr38 | Analyst: Daniela Costa

ABB is a Switzerland-based company that manufactures and sells electrification, automation, robotics, and motion products for customers in utilities, industry and transport, and infrastructure. We see ABB benefiting from: (1) a favourable mix of late cycle capex exposures, where we see resilience in a macro slowdown (23% in O&G, mining, power generation), leading the stock to outgrow the Multis space over 2022-25E, in contrast to the trends over the last decade; (2) above-Multis average ROIC since the divestment of Power Grid; and (3) an undemanding valuation vs direct product/industry peers, coupled with catalysts from portfolio simplification.

Siemens (SIEGn.DE)

Rating: Buy | Price Target: €171 | Analyst: Daniela Costa

Siemens AG is an engineering and manufacturing company. The company focuses on areas of electrification, automation, and digitalization. Siemens also provides engineering solutions in automation and control, power, transportation, and medical diagnosis. We are positive on Siemens as the stock ranks in the top quartile of all 3 screens (operational/valuation/ESG) in our Multis Toolkit, while it is also positioned in our Capex Tracker to outperform the sector on organic sales growth over the next 3 years.

Legrand (LEGD.PA)

Rating: Neutral | Price Target: €80 | Analyst: Daniela Costa

Legrand is a global specialist in electrical and digital building infrastructure. We expect the company to benefit from: 1) continuing strong pricing in Europe; and 2) slightly better than expected leading indicators in US non-residential construction, resulting in a sequentially more resilient 1H23E in North America. However, we note that among peers, Legrand has more exposure to residential markets and especially in Europe(>50% of Europe revenue is resi), where we see a series of weakening leading indicators, therefore we remain cautious on the FY23/24 volume outlook. Thus, we see Legrand's operational performance as slightly below the sector median with a PEG ratio/FCF yield in line with sector median.

Primer (16 Nov 2021)

Nichicon (6996.T)

Rating: Buy | Price Target: ¥1,700 | Analyst: Daiki Takayama

In addition to charging infrastructure, Nichicon also makes film capacitors for EVs.

Nichicon is a Japan-based company that primarily manufactures aluminum electrolytic capacitors, film capacitors for hybrid/electrified vehicle applications, and power storage systems for household and industrial use. We note a clear shift in its earnings drivers, from aluminum electrolytic capacitors prior to the Covid pandemic, to power storage systems, EV film capacitors and other carbon-neutral products at present. The hybrid vehicle (HV)/electric vehicle (EV) film capacitor business has seen sharp growth in on the back of demand from a major North American EV automaker. Looking ahead, we see sales growth in products for new models at North American customers, at Chinese and European OEMs via Japanese motor manufacturers, and at other EV-related OEMs, with steep growth accompanying that of the EV market. We note a clear shift by households away from power sales and toward power storage (self-consumption) along with the end of feed-in tariff (FIT) schemes, which helped sales of Nichicon's household energy storage systems to rise sharply. Nichicon's unique system offerings, which leverage household solar power and EV charging/discharging technology, are decarbonization Greenablers. While noting its historically weak track record in generating earnings, we view Nichicon's risk/reward profile as attractive given it is likely being overlooked as a carbon-neutral story. We are Buy rated on Nichicon and find current valuations attractive considering the growth potential of the film capacitor and household energy storage system business.

Primer (6 Jan 2022)

Daihen (6622.T)

Rating: Neutral | Price Target: ¥5,000 | Analyst: Ryo Harada

The SPE-related business has recently been the main driver of Daihen's operating profits as it benefited from market growth in semiconductors and SPE. We expect the impact of the market slowdown to gradually emerge from FY3/24 as the company works down the order backlog. We also think the welding & mechatronics business will be affected by slowing manufacturing capex. In power infrastructure, although we think Daihen may benefit from domestic infrastructure upgrades in the longer-term, the company's mainstay transformer products are low-voltage transformers mounted on utility poles, and we think it could be some time before the benefits reach this area. EV/EBITDA is currently close to the five-year average of 7X and the fair multiple derived from forecast EBITDA growth. We therefore think the stock looks neither significantly undervalued nor overvalued, and we are Neutral-rated.

Initiation (6 Dec 2022)

Shenzhen Kstar Science & Tech (002518.SZ)

Rating: Neutral | Price Target: Rmb53.10 | Analyst: Tina Hou

Kstar specializes in electric power conversion technology, providing data centers and energy storage systems (ESS) with constant and stable power supply. It has held the largest UPS (uninterruptible power supply) shipment in China for 21 years (per CCID), and has domestic/global UPS revenue share of 8%/3% (GSe). We believe both the digital economy and carbon reduction will be long-term focuses for China, and expect technologies – such as power conversion – that enable and improve energy utilization efficiency will be increasingly adopted to achieve the country's dual development goals. For Kstar, after a period of revenue decline in 2018-2020, we expect a turnaround with 29%/29% revenue/net income CAGR (2021-25E), mainly driven by: (1) strong policy tailwinds for the renewable energy, ESS and EV industries; (2) supportive policy for the data center industry with MIIT's 3-year action plan; and (3) a mature global distribution network and a united technology/supply-chain platform. Notably, with Kstar starting to record revenue for its ESS products in 2022, we believe strong residential ESS demand (especially in Europe) and solid supply chain control supported by the JV with CATL will translate into 25%/30% revenue/net income CAGRs in 2022E-25E. We view the stock valuation as fair vs. China Industrial Tech coverage average. We are Neutral rated on the stock.

Initiation (8 Nov 2021)

EV Assembly

The increasingly modular architecture of EVs is making it easier to outsource car assembly. Benefits of outsourcing include (1) saving brand makers from having to build a supply chain and capacity from scratch, (2) rapid model delivery, and (3) enabling brand makers to penetrate a market where they do not have local capacity.

While currently most EVs are made in-house, we expect the outsourcing rate to increase from 2% in 2021 to 6% in 2025E and 10% in 2030E. In turn, this is likely to reduce barriers to entry in the EV market and drive further competition.

Magna (MGA, MG.TO)

Rating: Buy | Price Target (MGA): US$66 | Price Target (MGA.TO): C$90 | Analyst: Mark Delaney

In addition to EV assembly, Magna is also into manufacturing of electric motors and inverters.

We believe that Magna's broad-based product portfolio positions it well to modestly outgrow global auto production, with somewhat higher exposure to secularly growing applications such as EVs/ADAS than to ICE specific product lines. We expect Magna's earnings to improve as auto production picks up from low levels, and on improved price-cost and its ability to deliver modest content per vehicle growth.

Primer (1 Dec 2022)

Hon Hai (2317.TW)

Rating: Buy | Price Target: NT$134 | Analyst: Allen Chang

Hon Hai is the global leader in the ICT market across smartphones, PCs, servers, etc. and is newly entering the EV market – covering whole-car assembly, components, semiconductors and software produced in-house. The company targets to reach 5% global EV market share by 2025E, or 500k-750k EV shipments, with its first EV revenue coming from the production of E-buses and E-trucks in 2022. We are positive on its EV expansion and are Buy rated on the stock. We view valuation as appealing, with the stock trading below its long-term average, despite better prospects for earnings growth. Risks to our view are weaker-than-expected technology products EMS; a higher-than-expected opex ratio; slower-than-expected ramp-up of the EV business, slower-than-expected EV total solution supply, but mainly in pure EV manufacturing, a slower-than-expected ramp-up of EV capacity globally, and differences in working culture and labor unions.

Featured Research

Industry Outlook

Japan Automobiles: 2023 outlook: Challenging business environment ahead; Subaru down to Neutral from Buy (11 Jan 2023)

US Autos & Industrial Tech: 2023 Outlook: Prefer auto tech enablers in a still-tough macro environment; KEYS down to Neutral (10 Jan 2023)

South Korea Automobiles: 2023 Outlook: Recession risk, IRA, and sales financing; maintain Buy on Hyundai and Kia (11 Jan 2023)

China automobiles: Revising 2023E industry retail and production estimates (2 Jan 2023)

India Electric Cars: Charging up for India's Electric Car journey (7 Oct 2022)

Global Automobiles: Electric Vehicles: What's Next VII: Confronting Greenflation (9 Mar 2022)

Inflation Reduction Act

Global: Inflation Reduction Act: From Theme to Tailwind - Quantifying the Impact Across Top 20 Ideas (2 Jan 2023)

GS SUSTAIN: Green Capex: US Inflation Reduction Act: What's new, what's next and stocks to own (15 Dec 2022)

Batteries

Global Batteries: The Self-Sufficiency Challenge (14 Nov 2022)

Batteries Made in Europe (20 Jun 2022)

Batteries: The Greenflation Challenge II: Raising battery price forecasts; addressing six key investor debates (1 Jun 2022)

Batteries: The Greenflation Challenge (8 Mar 2022)

Components

US Autos & Industrial Tech: Auto Tech Enablers: 2025 EV and autonomy EPS analysis; QS down to Sell; GNTX to Neutral (13 Dec 2022)

Global Automobiles: EV architectures: Efficiency in focus - implications for margins, market share and partnerships (21 Dec 2020)

Global Automobiles: Make or Buy - The changing BEV supply chain (2 Dec 2020)

Power Semiconductors

The Green Technology Cycle: SiC: Green inflation accelerates tech shift; inflection point could come sooner than expected (24 Jun 2022)

Silicon Carbide: The next leg of growth in power semis (8 Nov 2018)

EV Assembly

Global EV Outsourcing: From Smartphones to EVs: The opportunity takes early shape (1 Dec 2022)

Price target, methodology and risks

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
OEMS									
Tesla	TSLA	Buy		$	177.90	200	**12.4**	Our 12-month price target of $200 is based on 40X applied to our Q5-Q8 estimated EPS including SBC. Risks include: EV adoption, auto demand, increased competition in EVs, supply chain, FSD, key person risk, the internal control environment, and operational risks associated with Tesla's high degree of vertical integration.	Mark Delaney, CFA
General Motors	GM	Buy		$	37.95	42	**10.7**	Our 12-month price target is $42, which is 7X our normalized EPS estimate of $6.00. Key risks to our view relate to the auto cycle, market share, margins, FCF, and GM's ability to profitably pivot to growth areas such as EVs and AVs.	Mark Delaney, CFA
Ford	F	Neutral		$	13.27	13	**-2.0**	Our 12-month price target is $13 based on 7X our normalized EPS estimate of $1.80. Key risks to our view relate to Ford's ability to profitably pivot to growth areas such as EVs and AVs, the auto cycle, market share, and margins (both margin pressure in a downturn and margin expansion longer term from company specific initiatives).	Mark Delaney, CFA
Rivian	RIVN	Neutral		$	19.83	19	**-4.2**	Our 12-month price target of $19 is based on a 1.5X target multiple applied to our updated Q5-Q8 revenue estimate. Key upside/downside risks to our view relate to volumes, the production ramp, the competitive landscape, Rivian's high degree of vertical integration, cash burn/balance sheet, and the supply chain.	Mark Delaney, CFA
Lordstown	RIDE	Sell		$	1.29	0.75	**-41.9**	Our 12-month price target is $0.75 based on 0.25X 2025E sales (discounted). Risks: Pre-orders/ sales volumes, time to market, market share, margins, the auto cycle, EV adoption.	Mark Delaney, CFA
Volkswagen	VOWG_p.DE	Neutral		€	126.08	150	**19.0**	Our 12-month price target of €150 is based on a target P/E of 5.0x 2024E EPS. Key upside risks include stronger improvement in European demand; macro concerns, notably with respect to Europe, don't materialize; faster-than-expected easing of supply constraints; commodity and energy prices decline as economy slows; corporate reognanisation; and investors start to take a SoTP approach to valuing VW, thereby crediting the equity value of Porsche AG. Key downside risks include software and BEV production issues; new products less well-received than recent products; supply chain constraints; commodity and energy prices; geopolitics; and China slowdown.	George Galliers
BMW	BMWG.DE	Buy		€	92.94	108	**16.2**	Our 12-month price target is €108 based on a target P/E of 7.0x to our 2024E EPS. Risks to the downside include a slowdown in the China premium market; price/mix not being sustainable in outer years; profitability of PHEVs and BEVs weighing on margins; BEV product prove uncompetitive due to lack of dedicated platform; a step-up in capex to develop future EVs; policy changes that negatively impact the flexible powertrain approach; energy restrictions/price inflation in Europe.	George Galliers
Stellantis	STLA	Buy		$	15.54	20	**28.7**	Our 12-month price targets are €19/$20 based on a target P/E of 5.0x to our 2024E EPS. Key downside risks include new products less well-received than expected; slowdown in the EU/NA market; commodity/raw material prices; full-size pick-up truck market slowdown.	George Galliers
	STLA.MI	Buy		€	14.20	19	**33.8**		George Galliers
	STLA.PA	Buy		€	14.21	19	**33.7**		George Galliers
Renault	RENA.PA	Neutral		€	38.21	39	**2.1**	Our 12m target price is €39 based on a target multiple of 4.0x 2024E EPS. Upside risks include the European market recovering quicker than anticipated; faster return to normalised margins; higher savings from restructuring plan; stronger-than-expected improvement in earnings at Nissan; and divestment of non-core asset. Downside risks include Monozukuri savings falling short of expectations; supply chain disruptions as a result of energy shortages in Europe; the European auto sales recovery being held back as a result of Covid-19 restrictions and/or semiconductor shortage, and the ability to execute the new plan.	George Galliers

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Porsche	P911_p.DE	Buy		€	106.20	117	**10.2**	We value Porsche AG using a c.20x P/E multiple, which we derive by adding c.0.5x standard deviation to the mean of a luxury and automotive peer group multiple set. We apply this multiple to our 2024E Net Income leading to a €117 12-month price target. Key downside risks include lower delivery growth, supply and demand mismatch of BEV/ICE models, lower profitability in the case of delivery shortfall or lower than expected BEV gross margins, failure to secure raw material supply for BEVs, increase in competitive forces, transfer pricing/billings more expensive in the future, change in regulation/industry developments resulting in a step-up in investment, FX/commodity risks.	George Galliers
Volvo Cars	VOLCARb.ST	Neutral		Skr	50.88	46.00	**-9.6**	Our 12m Price target of SKR46 is based on a target P/E of 6.7x applied to our 2024E EPS (ex Polestar) plus Volvo Cars' share in Polestar at market price (January 5), to which we apply a 15% holding discount. Key upside risks: (1) Early achievement of the 1.2mn unit volume target; (2) Stronger profitability on BEVs leading to early achievement of 8-10% operating profit margin target; (3) Early mover approach leads to a competitive advantage in its direct sales model and BEV activities; (4) New BEV product benchmarks prove superior to peers; and (5) Positive movement in Polestar's share price. Key downside risks: (1) Volume shortfall in the event that products are not well-received by customers; (2) Technical challenges to BEV products; (3) Green inflation leads to an inability to source desired quantity of parts at the desired quality/price; (4) Lack of scale proves a disadvantage with respect to investment budgets and cost; (5) Loss of 'safety, reliability and understated premium' USP in an EV world; (6) Execution risk in BEV transition, ability to sell cars directly to customers and/or develop software internally; (7) Loss of EV market share to traditional OEM competitors and new entrants with substantial EV strategies; and (8) Negative movement in Polestar's share price.	George Galliers
Mercedes	MBGn.DE	Buy	Yes	€	68.87	88	**27.8**	We value Mercedes on a P/E basis applying a target multiple of 7.5x to our 2024E EPS. Our 12-month price target is €88. Key downside risks are Mercedes deviating from a luxury strategy/focus; slowdown and/or restrictions in key luxury markets, including China; cost savings at Mercedes do not materialise; inability to reduce capex and control working capital; improvements in price/mix cannot be sustained through outer years; cyclical nature of end markets; semiconductor and other component availability constrains production unexpectedly going forward; energy restrictions/price inflation in Europe.	George Galliers
Toyota	7203.T	Buy		¥	1900.5	2,200	**15.8**	Our 12-month target price of ¥2,200 is based on□P/B-ROE correlation using our FY3/24 estimates.□ Risks include yen appreciation, delays in EV development, battery sourcing issues amid rapid growth in the EV market, disappointment in the company's shareholder return policy, and protracted semiconductor shortages.	Kota Yuzawa
Honda	7267.T	Buy		¥	3173	4,000	**26.1**	Our 12-month target price of ¥4,000 is based on P/B-ROE correlation and our FY3/24 estimates. Risks include yen appreciation, a protracted pandemic impact, sharply higher raw material prices, weaker-than-expected sales of new vehicles, and inefficiency in multiple EV projects.	Kota Yuzawa
Nissan	7201.T	Buy		¥	457	600	**31.3**	Our 12-month target price of ¥600 is based on a P/B-ROE correlation using our FY3/24 estimates in our calculation. Key risks include yen appreciation, weaker China sales, protracted semiconductor shortages, and deterioration in the earnings environment for the sales finance business.	Kota Yuzawa
Hyundai	005380.KS	Buy		W	173900	220,000	**26.5**	Our 12-month target price of W220,000 is based on P/B-ROE correlation and our 2023E□estimates. Risks include won□appreciation,□potential negative impact from German prosecutors' emission fraud allegations regarding diesel vehicles, prolonged sales/production disruption from the Russia/Ukraine conflict,□potential downward pressure to EV margins due to higher battery raw material prices and/or quality issues, deteriorating relationships with labor unions, and margin pressure from supplier support program.	Kota Yuzawa
Kia Motors	000270.KS	Buy		W	68700	100,000	**45.6**	Our 12-month target price of W100,000 is based on P/B-ROE correlation and our 2023E estimates. Risks include: 1) potential negative impact from German prosecutors' emission fraud allegations regarding diesel vehicles, 2) prolonged sales/production disruption from Russia/Ukraine war, 3) potential downward pressure to EV margins due to higher battery raw material prices and/or quality issues, and 4) deteriorating relationships with labor unions.	Kota Yuzawa
Mazda	7261.T	Neutral		¥	1028	1,050	**2.1**	Our 12-month target price of ¥1,050 is based on P/B-ROE correlation, using our FY3/24 estimates in our calculation. Key risks include forex swings, new SUV sales trends, and preparations for vehicle electrification.	Kota Yuzawa
Suzuki	7269.T	Buy	Yes	¥	4839	5,900	**21.9**	Our 12-month target price of ¥5,900□is based 85% on a FY3/23E SOTP-based fundamental value of ¥5,800 (applying the stock's historical 10-year average discount of 10%), and 15% on M&A value of ¥6,400 (SOTP-based theoretical value, assuming a discount of 0%). Key risks include protracted semiconductor shortages, yen appreciation, and a stalling Indian economy due to inflation.	Kota Yuzawa

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Mitsubishi	7211.T	Neutral		¥	504	500	**-0.8**	Our 12-month target price of ¥500 is based 70% on a fundamental value of ¥460, derived from FY3/24E P/B-ROE correlation, and 30% on a theoretical M&A value of ¥600, which we base on the average P/B of 1.2X since Nissan made its capital investment in MMC (based on FY3/23E BPS). Risks include forex trends, sales trends in ASEAN markets, additional restructuring costs, and whether the company reinstates the dividend.	Kota Yuzawa
Subaru	7270.T	Neutral		¥	2124	2,300	**8.3**	Our 12-month target price of ¥2,300 is based on P/B-ROE correlation and our FY3/24 estimates. Risks include yen appreciation/depreciation, stricter/milder EV-related regulations in the US, and deterioration/improvement in the US sales finance environment.	Kota Yuzawa
BYD	002594.SZ	Buy		Rmb	270.07	435	**61.1**	Our 12m TPs of Rmb435(with a 27% premium vs. the H-share) / HK$383 for the A/H-share are based on a sum-of-the-parts valuation methodology: DCF for the battery and EV business with the addition of its holding in BYD Electronics at target price implied market value with a 20% hold-co discount. Risks: (1) Intensifying electric vehicle competition: While the BYD brand appears to be transitioning from a mass electric vehicle manufacturer with significant fleet sales, to an auto-tech innovator with back-to-back breakthroughs in product design and supply chain technologies, we still see intensifying competition within the electric vehicle segment, including from pure electric vehicle players and the electric vehicle products of traditional OEMs. (2) Lower-than-expected external battery supply: As power battery suppliers continue to expand capacity, the competition within the battery segment could intensify more than we currently expect, which may induce lower-than-expected external power battery sales.	Fei Fang
	1211.HK	Buy	Yes	HK$	246.20	383	**55.6**		Fei Fang
Li Auto	LI	Buy	Yes	$	24.97	39	**56.2**	Our 12-month TPs of US$39.00/HK$153.00 are based on a 30-year DCF (WACC of 13%, 2% TGR). Risks: 1) Intensifying competition: Given peers are ambitiously developing competing products and expanding capacity, this could pose potential downside risk to the company's long-term market share; 2) Product quality control risks: Given its limited operating history in manufacturing, testing, delivering, and servicing its vehicles, any potential product recalls and/or perceived design/raw material issues could lead to challenges, which would harm its reputation and result in negative publicity; 3) Production: The overall Chinese auto industry is experiencing a semiconductor undersupply, hence a worse-than-expected semiconductor shortage could lead to volume contraction and operating losses.	Fei Fang
	2015.HK	Buy	Yes	HK$	97.45	153	**57.0**		Fei Fang
Nio	NIO	Buy		$	12.71	24	**88.8**	Our 12-month TPs of US$24.00/HK$190.00 are based on a 30-year DCF (WACC of 13%, 2% TGR). Risks: (1) Intensifying competition; (2) a worse-than-expected semiconductor shortage leading to volume contraction and operating loss; (3) if our projected battery price decline / excess capacity does not come through and the industry works with a tighter manufacturing capacity and hefty electric vehicle component prices, it could weigh on Nio's margin expansion.	Fei Fang
	9866.HK	Buy		HK$	93.50	190	**103.2**		Fei Fang
Seres	601127.SS	Neutral		Rmb	39.55	54	**36.5**	Our 12-m target price of Rmb54.00 is based on DCF methodology with 13% WACC (same as its peers Nio and Li Auto) and a terminal growth rate of 2.0%. Risks: Partnership disintegration with Huawei (downside); Huawei's take rate (up/downside); market share (up/downside).	Fei Fang
BAIC	1958.HK	Neutral		HK$	2.45	2.1	**-14.3**	Our 12-month price target of HK$2.10 is based on 5.6x 2023E P/E. Key risks: higher-than-expected government stimulus, recovering/deteriorating consumer confidence impacted by trade friction, and other macro uncertainties.	Fei Fang
SAIC	600104.SS	Sell		Rmb	14.84	10.4	**-29.9**	Our 12m target price of Rmb10.40 is based on 5.6x 2023E P/E. Risks: (1) Stronger-than-expected industry growth in 2023E; (2) strong production capability; (3) better-than-expected cost control.	Fei Fang
Dongfeng	0489.HK	Neutral		HK$	4.82	4.8	**-0.4**	Our 12-month price target of HK$4.80 is based on 4x 2023E P/E. Key risks: Restructuring of underperforming joint ventures, better shareholder return policies, recovering/deteriorating consumer confidence impacted by trade friction, and other macro uncertainties.	Fei Fang
Great Wall	601633.SS	Neutral		Rmb	30.40	23.6	**-22.4**	Our 12m TPs of Rmb23.60/HK$12.50 are based on DCF (12% WACC, terminal growth 2%, A with 111% premium). Risks: Downside: Production hurdles, i.e. Great Wall production volume is subject to the industry's production hurdles (semiconductors, batteries) more meaningfully than smaller vehicle makers; Upside: better-than-expected premiumizing electric vehicle launches / sourcing support from supply chain partners.	Fei Fang
	2333.HK	Neutral		HK$	11.7	12.5	**6.8**		Fei Fang

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Commercial OEMs									
Daimler Truck	DTGGe.DE	Buy		€	31.37	44	**40.3**	Our 12m price target of €44 is based on our sector-relative EV/IC vs. ROIC/WACC methodology of 12m 2024E estimates. Key downside risks include a prolonged macro recession driving order cancellations, production disruptions due to the European gas situation, and price competition.	Daniela Costa
Iveco	IVG.MI	Buy		€	7.58	9.3	**22.8**	Our 12m PT is based 85% on our sector rolling EV/IC to ROIC/WACC framework of 12m 2024E, with a 15% weighting on an M&A component at 14.7x industrial EV/EBIT (LTM), based on historical deals in the trucks space. Key downside risks to our Buy thesis and price target are: (1) the cycle deteriorates faster than we forecast; (2) net pricing pressure; (3) difficulties in executing on the MHDT turnaround plan and other cost-cutting initiatives; (4) supply-chain bottlenecks; (5) market share loss to new entrants; and (6) regulatory risks and anti-trust investigations.	Daniela Costa
Traton	8TRA.DE	Neutral		€	16.22	16.5	**1.7**	Our 12m price target is based 100% on our sector-relative EV/IC to ROIC/WACC methodology. Upside risks: (1) Faster-than-expected macro growth; (2) quicker payback from MAN restructuring; (3) faster regaining of Navistar's market share (which has halved since 2009), and, in particular, any signs of Traton's ROIC improving to levels materially above WACC. Downside risks: (1) Prolonged downturn in truck demand; (2) delays on CBE rollout; (3) issues in Navistar integration (4) anti-trust risks.	Daniela Costa
Volvo Group	VOLVb.ST	Buy		Skr	205.55	272	**32.3**	Our 12m price target of SEK272 is based on our sector-relative EV/IC vs. ROIC/WACC methodology of 12m 2024E estimates. Key downside risks: Worse global macro growth affecting the cyclical commercial vehicle industry; further semis shortage driven stoppages; raw material/FX headwinds; product/anti-trust issues.	Daniela Costa
Hino Motors	7205.T	Neutral		¥	539	550	**2.0**	Our 12-month target price of ¥550 is based 85% on fundamental value of ¥530, derived from FY3/24E P/E-ROE correlation, and 15% on M&A value of ¥640 (based on 10-year trailing average P/B of 1.6X). Key upside/downside risks include yen appreciation/depreciation, sharp increases/declines in commodity prices, changes in the capital relationship with the parent company, and higher costs relating to carbon neutral initiatives, larger-/smaller-than-expected costs associated with the engine data irregularities.	Kota Yuzawa
Isuzu	7202.T	Buy		¥	1615	2,400	**48.6**	Our 12-month target price of ¥2,400 is based on a P/B-ROE correlation and the average of our FY3/23-FY3/24 estimates. Key risks include pandemic-related declines in production/sales, a decline in truck demand resulting from falling commodity prices, and yen appreciation.	Kota Yuzawa
Battery									
CATL	300750.SZ	Neutral		Rmb	452	516	**14.2**	Our 12-month TP of Rmb516 is based on DCF with 9% WACC and 2% terminal growth. Downside risks: Cathode prices remaining elevated which could weigh on downstream margins; competition from peers' expanding capacity and overseas suppliers; local EV demand. Upside risks: Global market share expansion, EV penetration increase, battery price hikes	Fei Fang
LG Energy Solution	373220.KS	Neutral		W	506000	540,000	**6.7**	Our 12-month DCF-based target price is W540,000 reflecting our 2023/24E/25E EPS estimates. Key risks: (1) higher-/lower-than-expected competition from OEMs and battery start-up companies, (2) lower/higher raw material cost, (3) further provision from potential EV/ESS battery recalls, (4) faster-/slower-than-expected ramp-up of new EV battery plants, and (5) higher/lower global EV penetration rate.	Nikhil Bhandari
LG Chem	051910.KS	Buy		W	683000	830,000	**21.5**	Our 12-month target price of W830,000 for LG Chem is SOTP-based. Risks: (1) Lower earnings growth from the EV battery business due to slower capacity growth, weaker industry demand or higher raw material inflation, (2) a larger fall in 2022 petchem margins, (3) slower growth in advanced materials capacity expansion, especially cathodes, (4) CROCI dilutive M&A (we note LG Chem has shown interest in M&A of various battery materials companies per press reports).	Nikhil Bhandari
Panasonic	6752.T	Neutral		¥	1221	1,140	**-6.6**	Our 12-month target price of ¥1,140 is based on EV/EBITDA of 5X, referencing the stock's 3-/5-/10-year historical averages, and the average of our FY3/24-FY3/25 estimates. Risks: Lifestyle Updates Business: Increase/decrease in demand for home and commercial air conditioning equipment. Panasonic Connect: Recovery/no recovery in passenger aircraft takeoffs/landings and in staging of events, higher-/lower-than-expected sales growth at Blue Yonder, changes in mounting system demand. Panasonic Energy: Increases in the company's share or loss of share to competitors in batteries for Tesla. Panasonic Automotive Systems: Changes in auto production volume. Panasonic Industry: Changes in factory automation-related demand. Companywide: Higher-/lower-than-expected investment and depreciation related to mass production of new automotive batteries, and ability/inability to manage business portfolio based on clear KPIs over the medium/long term.	Ryo Harada

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Samsung SDI	006400.KS	Buy		W	687000	850,000	**23.7**	Our 12m target price is W850,000 based on 2023E SOTP. Key risks include lower cylindrical and polymer battery sales, slower revenue growth in xEV/ESS batteries, and lower EM margins.	Giuni Lee
SK Innovation	096770.KS	Buy		W	169500	210,000	**23.9**	Our 12M SOTP-based target price is W210,000. Key risks to our investment thesis and target price include refining/chemical margins, oil prices, and EV battery earnings estimates deviating significantly from our base case.	Nikhil Bhandari
Ganfeng Lithium	1772.HK	Buy		HK$	76.25	115	**50.8**	Our 12-month price target for Ganfeng-H/A is HK$115/Rmb137 based on SOTP including 15x/20x P/E for core operation from mining materials on 2027E earnings when we expect Ganfeng's most existing construction projects to be fully ramped up and lithium price at mid cycle levels, 18x/23x P/E for core operation from EV recycling materials, discounting back to 2023E using a discount rate of 10.4%. Risks to our view are 1) lower lithium product prices, including lithium compounds and spodumene, which are driven by industry supply/demand; 2) project execution risk; 3) raw material purchase risk; 4) policy risk that may affect the pace of EV adoption; 5) overseas assets' currency/country risk; and 6) EV battery recycling growth slower than expectation.	Trina Chen
	002460.SZ	Buy		Rmb	78.20	137	**75.2**		Trina Chen
FREYR	FREY	Buy		$	8.71	19	**118.1**	We value Freyr in line with global pure-play battery peers and derive a 12m price target of $19 by applying a 2.5x multiple to 2025E sales. Key downside risks include a slower ramp-up of capacity in Europe and the US than expected; delays in final investment decision for Giga Arctic; higher raw material price developments; less favourable policy support; and a slower uptake of LFP batteries and battery storage solutions.	Philipp Konig
VARTA	VAR1.DE	Neutral		€	28.56	30	**5.0**	Our 12m price target of €30 is DCF-based. Key upside/downside risks are shorter/extended slowdown in TWS volumes, market share losses/gains in microbatteries, orders for V4DRIVE materialize quicker or do not materialize, higher/lower raw material costs.	Philipp Konig
QuantumScape	QS	Sell		$	8.72	5	**-42.7**	Our 12-month price target is $5 based on 2x 2028 sales (discounted). Key risks include ability to hit its targeted battery specs and ramp production, technological breakthroughs in today's lithium-ion batteries.	Mark Delaney, CFA
Core Components									
BorgWarner	BWA	Neutral		$	45.97	45	**-2.1**	Our 12-month price target is $45, which is based on 9X applied to our normalized EPS estimate of $5.00. Key risks to our view relate to revenue growth, including BWA's ability to outgrow the market due to its EV portfolio, diesel exposure, the auto cycle, margins, and market share.	Mark Delaney, CFA
Hyliion	HYLN	Sell		$	3.50	2.25	**-35.7**	Our 12-month price target of $2.25 is based on 0.75x 20235 sales (discounted). Risks include legislation around low-/zero-emission vehicles, order momentum, operational progress, improved relative economics of hybrid/ERX.	Mark Delaney, CFA
Visteon	VC	Buy		$	149.95	160	**6.7**	Our 12-month price target is $160 based on 20X our normalized EPS of $8.00. Key downside risks to our view relate to: 1) Visteon's ability to capitalize on the secular shift to EVs and AVs (including in BMS and with digital cockpit products); 2) margins (with weakness in volume, product, and operational execution as downside risks); 3) revenue (dependent on traction with new, higher ASP offerings as well as industry volumes); 4) general macroeconomic risk, especially as it relates to the auto cycle; 5) market share; and 6) multiple contraction, given that Visteon trades at a premium to peers.	Mark Delaney, CFA
Lear	LEA	Buy		$	140.50	170	**21.0**	Our 12-month price target is $170, which is 10X our normalized EPS estimate of $17.00. Key downside risks include 1) The auto cycle, and more specifically Lear's ability to outgrow underlying auto production through content per vehicle growth in Seating/E-Systems as US auto SAAR is running above normalized levels; 2) an acceleration in OEM in-sourcing of products in Lear's E-Systems portfolio (while we believe Lear is relatively well positioned in this respect, some OEMs are looking to bring the BMS, on-board chargers, and DC/DC converters in-house), 3) margins (supply chain issues, competition, and to a lesser degree commodities headwinds could challenge Lear's margin targets), and 4) loss of market share in both Seating and/or E-Systems.	Mark Delaney, CFA
Jabil Circuit	JBL	Buy		$	77.2	80	**3.6**	Our 12-month price target of $80 is 10X our Q5-Q8 EPS estimate (including SBC). Key downside risks relate to 1) Revenue growth -- especially trends at Apple, which was over 20% of sales in FY21 (Jabil is now doing a wider range of products at Apple). 2) Jabil's ability to ramp new programs in key end markets such as healthcare and in cloud. 3) General macroeconomic weakness including related to COVID-19 and tariffs.	Mark Delaney, CFA

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Flex	FLEX	Buy		$	23.54	25	**6.2**	Our 12-month price target is $25 based on 11x applied to our Q5-Q8 EPS estimates. Key risks to our view relate to macroeconomic demand, the impact of COVID-19 on supply and demand, Flex's ability to expand margins, trade uncertainty, and FCF.	Mark Delaney, CFA
Aptiv	APTV	Buy		$	110.59	121	**9.4**	Our 12-month price target of $121 is based on 21X applied to our normalized EPS estimate of $5.75. Key risks to our view relate to Aptiv's ability to grow its content per vehicle ahead of industry production, the auto cycle, Aptiv's market share, margins, Aptiv's net debt position, component shortages in the auto supply chain, and the impact of COVID-19 on industry supply and demand.	Mark Delaney, CFA
Valeo	VLOF.PA	Neutral		€	20.28	19	**-6.3**	Our 12M price target is €19 based on updated EPS estimates. Key risks include higher/lower than expected growth in light vehicle production, decremental leverage on production cuts more pronounced than anticipated, abrupt raw material price movements, stronger/weaker-than-expected development in high-voltage and/or ADAS order intake, stronger/weaker-than-expected profitability evolution in Powertrain business, and further unanticipated semiconductor constraints.	Philipp Konig
Vitesco	VTSCn.DE	Buy		€	65	78	**20.0**	Our PT of €78 is composed of 85% P/E price target of 8x 2024E EPS (€77) and 15% M&A valuation of €83. Key downside risks: Weaker-than-expected global light vehicle production in 2023 and outer years; Weaker-than-expected EV order development; Incremental investment required in order to deliver on growth targets; Greater than expected strain on cash generation as business transitions out of ICE segments; OEMs accelerate in-sourcing plans; Increasingly competitive landscape, as new players aim to benefit from a higher content per vehicle world.	Philipp Konig
TI Fluid System	TIFS.L	Neutral		£	117	132	**12.8**	We value TIFS by applying our target multiple of 8.0x to a 25%/75% blend of 2023E/24E EPS to derive a 12m price target of 132p. Key risks: (1) Higher/lower-than-expected growth in global light vehicle production; (2) Higher/lower content per vehicle opportunity in new powertrain programs; (3) Faster/slower adoption of pure EVs; and (4) Underestimation/overestimation of capex and R&D requirements.	Philipp Konig
Nidec	6594.T	Buy		¥	7390	9,700	**31.3**	Our 18m target price of ¥9,700 is based on the sum of our EV and non-EV business estimates. We calculate present value of EV-related businesses based on our estimates through FY3/41 and zero terminal growth after that, and present value of non-EV businesses using our estimates through FY3/26. Key risks include a□slower-than-expected recovery in auto production volume, a greater-than-expected slowdown in the European economy, and a further rise in materials prices.	Daiki Takayama
Denso	6902.T	Buy	Yes	¥	6953	9,500	**36.6**	Our□SOTP-based 12-month target price of ¥9,500 is based on□our FY3/24 estimates, applying target P/E□multiples to our operating profit estimates for the ICE (8X),□EV/ADAS (19X), and other (15X)□businesses. Risks include lower-than-expected auto production volume, larger-than-expected upfront investment, and yen appreciation.	Kota Yuzawa
Mitsui High-tec	6966.T	Buy		¥	6900	8,800	**27.5**	Our 12-month target price of ¥8,800□is derived from a DCF-based fundamental value of ¥8,600 (70% weighting in our valuation) and an□M&A value of ¥9,400 (30% weighting). Key downside risks: (1) stiffer competition on an□increase in new entrants to the motor core market, (2) potential for various dilutive financing options if stronger-than-expected motor core demand requires increased capex, and (3) a potential decline in leadframe sales and earnings□owing to inventory adjustments resulting from the semiconductor cycle.	Kota Yuzawa
Aisin	7259.T	Sell		¥	3760	3,600	**-4.3**	Our 12-month target price of ¥3,600 is based on P/B-ROE correlation and our FY3/24 estimates. Key risks include higher-than-expected China automatic transmission shipment volume, greater-than-expected passing on of higher costs to customers, and growth in orders for hybrid units and eAxle systems.	Kota Yuzawa
Mitsubishi Electric	6503.T	Sell		¥	1418.50	1,100	**-22.5**	Our 12-month price target of ¥1,100 is derived by applying a 50% discount to the□EV/EBITDA of 9X we use for the Japan machinery sector. For our valuation base year, we use□the average of our□FY3/24-FY3/25□estimates. Risks include: Companywide: Earlier-than-expected resolution of quality control problems, yen depreciation. Industrial automation systems (FA): Stronger-than-expected investment in semiconductors, xEV batteries, and auto-related fields, leading to growth in factory automation demand. Industrial automation systems (automotive equipment): Stronger-than-expected recovery in production volume at automakers, who are key customers of Mitsubishi Electric. Electronic devices: Greater-than-expected growth in power semiconductor sales for xEV applications, rising profit margins as sales growth leads to higher marginal profits and as production yields improve. Home appliances (HVAC): Greater-than-expected pass-through of higher raw material costs to selling prices, stronger-than-expected recovery in demand for building air conditioning systems due to pandemic impact. Heavy machinery: Successful bids for high-margin public sector projects, better-than-expected profitability in elevators & escalators thanks to the passing through of higher raw material costs and expansion of service operations. Information & communication systems: Growth in defense-related demand and the booking of high-margin projects.	Ryo Harada

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Meidensha	6508.T	Neutral		¥	1893	2,400	**26.8**	Our 12-month price target of ¥2,400 is based on EV/EBITDA of 6X and the average of our FY3/24-FY3/25 estimates. Key risks include: Power infrastructure: Construction delays/normalization overseas due to the pandemic, Construction delays/normalization in Japan due to worker shortages or component procurement difficulties, Mobility & electrical components: Changes in auto production volume, Changes in sales of autos using EV motors/inverters, Companywide: Forex swings.	Ryo Harada
Delta Electronics	2308.TW	Buy		NT$	286	376	**31.5**	Our 12m TP of NT$376 is based on 23x 2023E P/E, which is 0.9x s.d. higher than the past 10-year average of 19.2x. Risks include: (1) sharper NTD appreciation; (2) rising component costs or any component shortages; and (3) slower power system growth on 5G project delays.	James Wang
LG Innotek	011070.KS	Neutral		W	284000	300,000	**5.6**	Our 12m target price is W300,000 based on 2023E SOTP. Key risks include higher-/lower-than-expected iPhone shipments, higher-/lower-than-expected camera module market share of LGI in Apple, and a higher/lower adoption rate of triple camera and 3D sensing at Apple.	Giuni Lee
LG Electronics	066570.KS	Neutral		W	98100	98,000	**-0.1**	Our 12m target price is W98,000 based on 2023E SOTP. Key risks include higher/lower OLED TV demand, higher/lower H&A margins, and faster/slower vehicle component revenue growth.	Giuni Lee
Ningbo Tuopu	601689.SS	Neutral		Rmb	64.83	78	**20.3**	Our 12-month target price of Rmb78 is derived from 14.0x 2026E EV/EBITDA, and discounting back using a 9.7% WACC. The 14.0x EV/EBITDA multiple is the 5-year trading average of domestic auto parts companies, and 9.7% WACC is calculated based on a 3% risk-free rate, 6.5% risk premium and beta of 1.2. Risks: Cash flow management, market and geopolitical risks to its overseas business, customer concentration risk, margin pressure on upstream cost and downstream's bargaining power.	Olivia Xu
CRRC Times Electric	3898.HK	Buy	Yes	HK$	44.40	53	**19.4**	Our 12m TPs for Times Electric A/H are Rmb94.3/HK$53.0, based on a SOTP – in which we continue to apply 12X/35X/25X/20X/30X 2025E P/Es for railway/IGBT/industrial converters (including wind/solar/ESS)/sensors and EV drives segments respectively, then discount them back to 2023E at a COE of 10%, and apply a holdco discount of 20% based on the 10-25% range for TMT conglos as a reference. Downside risks: (1) Risk of being added to the US "Unverified List"; (2) lower IGBT market share, margins, and MU/locomotive tendering; 3) a slower-than-expected reopening (if later than 2Q23) and accordingly, weaker-than-expected recovery in railway traffic thereafter.	Jacqueline Du
	688187.SS	Buy	Yes	Rmb	56.69	94.3	**66.3**		Jacqueline Du
Shenzhen Inovance	300124.SZ	Buy		Rmb	71.11	90.3	**27.0**	Our 12m target price of Rmb90.3 is based on 35X 2025E P/E, discounted back to 2023E at a COE of 10.5%. The target multiple of 35X P/E is set using a 1.4X premium against a 25% long-term EPS growth CAGR. Risks: 1) slower than expected industrial automation market share gains; 2) weaker-than-expected margin trends; 3) a slower-than-expected EV component segment ramp-up; 4) a slowdown in general manufacturing capex/automation demand.	Jacqueline Du
Shuanghuan Driveline	002472.SZ	Neutral		Rmb	29.20	30.9	**5.8**	Our 12m target price of Rmb30.9 is based on 2025E P/E of 25x discounted back to 2023E with a CoE of 10.5%. Upside/downside risks: (1) Higher/lower room to gain market share within EV gears; (2) Faster/slower than expected capacity ramp-up for RV reduction gears' (3) Higher/lower than expected CAPEX.	Jacqueline Du
Sanhua Intelligent Controls	002050.SZ	Buy		Rmb	24.59	31.2	**26.9**	Our 12m target price of Rmb31.2 is based on 30X 2025E PE discounted back to 2023E on a COE of 10.5%. Downside risks: (1) More intensified competition in the EV thermal management segment; (2) Worse-than-expected Tesla EV sales; (3) Increasing home appliance demand/home appliance cycle downturn.	Jacqueline Du

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Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Assembly									
Magna	MGA	Buy		$	63.89	66	**3.3**	Our 12-month price target of US$66 is based on 8X our normalized EPS estimate (including SBC) of US$8.25. Key downside risks relate to 1) the auto cycle (including challenges from COVID-19 and supply chain disruptions, as well as debates around the sustainability of the strong demand environment), 2) market share (specifically Magna's ability to cater to new entrants and grow in key areas such as EVs/ADAS), and 3) Magna's ability to outgrow industry unit production (and profitably pivot toward secular growth themes to make up for the ~10% of its portfolio tied to ICE/legacy applications).	Mark Delaney, CFA
	MG.TO	Buy		C$	85.06	90	**5.8**	Our 12-month price target for MG.TO listed in Canada is C$90. Key downside risks relate to 1) the auto cycle (including challenges from COVID-19 and supply chain disruptions, as well as debates around the sustainability of the strong demand environment), 2) market share (specifically Magna's ability to cater to new entrants and grow in key areas such as EVs/ADAS), and 3) Magna's ability to outgrow industry unit production (and profitably pivot toward secular growth themes to make up for the ~10% of its portfolio tied to ICE/legacy applications).	Mark Delaney, CFA
Hon Hai	2317.TW	Buy		NT$	98.10	134	**36.6**	We are Buy rated on Hon Hai with a 12m target price of NT$134. We apply 11x 2023E P/E to derive our target price, which is in line with the company's historical trading average. Risks include: Weaker-than-expected technology products EMS; a higher-than-expected opex ratio; slower-than-expected ramp-up of the EV business, slower-than-expected EV total solution supply, but mainly in pure EV manufacturing, a slower-than-expected ramp-up of EV capacity globally, and differences in working culture and labor unions.	Allen Chang
Power Semiconductors									
ON Semi	ON	Buy		$	73.67	73	**-0.9**	Our 12-month price target is $73 based 85% on a fundamental component of $68 (based on 15x our normalized EPS estimate of $4.50) and 15% on a hypothetical M&A component of $101 (based on 18x our CY2023 EBITDA estimate). Key downside risks to our investment thesis and price target include: 1) weakness in ON's key end-markets, particularly Automotive; 2) margin execution (predicated on the rationalization of the company's product portfolio and manufacturing footprint); and 3) increased competition in discrete semiconductors.	Toshiya Hari
NXP Semi	NXPI	Neutral		$	181.54	165	**-9.1**	Our 12-month price target is $165 based on 14x our normalized EPS estimate of $11.80. Key upside/downside risks to our estimates and investment thesis include: 1) better- or worse-than-expected demand in the Automotive and Industrial end markets; 2) margin execution (i.e. balance between input cost inflation and price hikes); 3) changes in the MCU competitive landscape; and 4) M&A that is accretive/dilutive to growth, margin and/or returns.	Toshiya Hari
Texas Instruments	TXN	Sell		$	175.24	162	**-7.6**	Our 12-month price target of $162 is based on 19x our normalized EPS estimate of $8.50. Potential upside risks to our earnings estimates and/or cautious investment thesis include, 1) upside to end-demand across key verticals including Automotive and Industrial, 2) market share gains at TI as the company ramps incremental capacity at RFAB2 and LFAB; 3) better-than-expected gross margin performance and/or opex leverage, 4) upside to earnings and FCF as a result of government funding, and 5) capital return that exceeds what we already incorporate in our model.	Toshiya Hari
ADI	ADI	Buy		$	170.83	186	**8.9**	Our 12-month price target is $186 based on 19x our normalized EPS estimate of $9.80. Key risks to our estimates and constructive investment thesis include: 1) weaker-than-expected end demand, 2) customer/channel inventory dynamics, 3) quarter-to-quarter lumpiness, particularly in the Comms business, and 4) slower-/smaller-than-expected cost synergy capture.	Toshiya Hari
Skyworks	SWKS	Neutral		$	111.16	99	**-10.9**	Our 12-month price target is $99 and is based on 11x our normalized EPS estimate of $9.00. Key upside/downside risks to our estimates and Neutral rating include: 1) better- or weaker-than-expected smartphone (particularly, 5G) demand, 2) strength or weakness in any of the other key end-markets (i.e., comms infrastructure, automotive, other consumer), 3) fluctuations in market share, 4) execution on BAW filters, and 5) M&A that is accretive/dilutive to the long-term financial profile of the company.	Toshiya Hari

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Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Microchip	MCHP	Neutral		$	77.68	76	**-2.2**	Our 12-month price target is $76 based on 14x our normalized EPS estimate of $5.40. Key upside/downside risks to our investment thesis and price target include stronger/weaker than expected cyclical and macroeconomic backdrop, strengthened/weakened market share trends in MCU, and any M&A that is accretive/dilutive to growth, margins, and/or returns.	Toshiya Hari
Wolfspeed	WOLF	Buy		$	78.92	105	**33.0**	Our 12-month price target is $105 based on (1) an 85% weighting to our adj. EPS valuation of $956 which is based on a 30X P/E applied to our FY2025E and (2) a 15% weighting to our $159 M&A value based on a transaction comp SOTP. Key risks include slower-than-expected growth in EV/SiC adoption, capacity expansion ramp, lower-than-expected yields, increased competition in wafer materials and/or SiC devices.	Brian Lee, CFA
Infineon	IFXGn.DE	Buy		€	34.23	42.5	**24.2**	Our 12-month price target of €42.5 is based on a fundamental component on 8x CY24E EV/EBITDA (85% weighting) and an M&A valuation of 20x CY24 EV/EBITDA (15% weighting), in line with average historical semis M&A transactions. Key risks to our view and price target include weaker end markets, worsening semi cycle and negative macro dynamics.	Alexander Duval
STMicro	STM.PA	Sell		€	43.69	33	**-24.5**	Our 12-month price targets of €33.0 / ADR $36 are based on 6x CY24E EV/EBITDA. Risks include: a quicker-than-expected inventory correction trough in consumer chips, slowing Silicon Carbide momentum at competitors and evidence that currently favourable pricing can be sustainable.	Alexander Duval
	STM	Sell		$	47.79	36	**-24.7**		Alexander Duval
Fuji Electric	6504.T	Buy	Yes	¥	5190	7,400	**42.6**	Our 12-month price target of ¥7,400 is based on EV/EBITDA of 8X and the average of our FY3/24-FY3/25 estimates. Risks include: Semiconductor business: Further increases in investment and depreciation, deterioration in market conditions due to excessive investment by sector companies, higher-than-expected development costs and lower-than-expected sales prices for automotive IGBT modules, weak sales of auto models that adopt or plan to adopt Fuji Electric's IGBT modules, and power semiconductor makers in China catching up by acquiring module technology sooner than expected. Other businesses: Deterioration in market conditions in the core automation systems business in the power electronics systems segment, protracted impact from COVID-19 and weaker-than-expected recovery in demand for vending machines and store showcases in the food & beverage distribution segment, and a larger-than-expected downturn in demand, mainly in the thermal power business, in the power generation segment. A companywide risk is broad yen appreciation.	Ryo Harada
Rohm	6963.T	Buy	Yes	¥	10370	13,600	**31.1**	Our 12-month target price of ¥13,600 is based on FY3/24E-FY3/25E EV/GCI vs. CROCI/WACC, applying a 20% discount to the sector-average EV/DACF multiple of 8X. Key risks include weaker-than-expected production in the automotive, industrial machinery, and consumer electronics sectors, a fallback in telework-related demand, opportunity losses when demand exceeds production capacity, and yen appreciation.	Daiki Takayama
Renesas	6723.T	Buy	Yes	¥	1340	1,600	**19.4**	Our 12-month target price of ¥1,600 is based on FY12/23E-FY12/24E EV/GCI vs. CROCI/WACC, applying the sector-average EV/DACF multiple of 8X. Key risks include a slowdown in consumer electronics/factory automation product demand, the time lag between component price inflation and price hikes, slower-than-expected sales growth in data center-related products due to delays in the launch of next-generation Intel CPUs, and yen appreciation.	Daiki Takayama
DISCO	6146.T	Buy		¥	38800	42,000	**8.2**	Our 12-month price target of ¥42,000 is based on the global SPE sector average EV/EBITDA multiple of 11X and the average of our FY3/24-FY3/25 estimates. Our target price implies FY3/24E P/E of 22X and P/B of 4.0X. Risks include: A sharp deterioration in capex sentiment at OSAT clients, more serious component shortages and price increases, and rapid yen appreciation against the USD.	Shuhei Nakamura
Sanan	600703.SS	Buy		Rmb	19.03	25	**31.4**	Our 12-month price target of Rmb25 is derived by applying a 25x target P/E multiple to 2025E EPS. Risks include: 1) weaker-than-expected PA market growth; 2) slower-than-expected new order wins and market share gains; 3) slower-than-expected development progress in new technology; 4) more severe competition in the LED market; and 5) potential impact from Covid-19.	Allen Chang

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Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Silan	600460.SS	Buy		Rmb	35.66	44.5	**24.8**	Our 12-month target price is Rmb44.5, derived from applying a 28X target P/E multiple to Silan's 2025E EPS, and discounting it back to 2023E at a COE of 9.7% based on a beta of 1.0 and a risk-free rate of 3.0%, and a market risk premium of 6.5%. Risks are: 1) weaker-than-expected IGBT market growth; 2) weaker-than-expected MOSFET market growth; 3) slower-than-expected new design-win and market share gain; and 4) potential impact from COVID-19.	Lynn Luo
Wingtech	600745.SS	Buy		Rmb	59.51	89	**49.6**	Our 12-month target price is Rmb89 based on 2023E P/E given the growing macro uncertainties. We set our target P/E multiple at 33x for semis and 11x for ODM on 2023 EPS, in line with the sector's average P/E. Risks: 1) Slower-than-expected GM expansion; 2) slower-than-expected semiconductor revenue growth; and 3) slower-than-expected synergies / integration between Wingtech and Nexperia.	Verena Jeng
SICC	688234.SS	Buy		Rmb	86.27	141	**63.4**	Our 12-month target price of Rmb141. Our TP is derived from a DCF-based methodology. We expect FCF to turn around by 2027E and our stage 2 and stage 3 FCF growth rate is at 73% and 21%, and WACC is 10%. Our target price implies 37x 2023E P/S vs. 50% revenues growth in 2023-25E. The implied 37x 2023E PS is similar to the company's historical trading average (38x). Risks include: 1) slower-than-expected capacity expansion and shipments ramp-up of 6'' substrate; 2) slower-than-expected penetration into high power supply applications, such as EV, transportation, photovoltaic, or industrial; 3) more intense competition in the SiC substrate market; 4) a short listing history and volatile valuation; and 5) loss of access to key equipment or capacity supply tightness.	Verena Jeng
StarPower	603290.SS	Buy		Rmb	345.42	461	**33.5**	Our 12-month price target is Rmb461. We apply a 36X target P/E multiple to its 2025E EPS and discount it back to 2022E at COE of 9.5% (1.0 beta, 3% risk-free rate, and 6.5% market risk premium). Our 36X target P/E multiple is derived from the sector's P/E-EPS YoY growth correlation, and our regression analysis suggests that higher EPS growth companies in the semiconductor industry have generally been rewarded with higher multiples. Risks include: 1) weaker-than-expected IGBT market growth; 2) slower-than-expected new design wins and market share gains; 3) new product (such as ≥3300V IGBT) development progress; 4) intensifying competition; and 5) impact from Covid.	Allen Chang
SinoWealth	300327.SZ	Buy		Rmb	41.82	52	**24.3**	Our 12-month price target is Rmb52, which is based on a 2025E P/E. We apply a 26x target P/E multiple to our 2025E EPS, and discount it back to 2023E at a COE of 9.8% and a market risk premium of 6.5%. Our target P/E multiple is based on peer average P/E levels since 2015 and is also at the higher-end of the range prior to the COVID outbreak (i.e., low rate cycle), which we believe is justified as we expect the growth outlook beyond 2025 (42% net profit growth) to be better than in 2019/2020 (13%/11% net profit growth). Risks include: 1) weaker-than-expected demand and pricing outlook; 2) foundry pricing, if not adjusted down, could pressure SinoWealth's margin; 3) slower progress in EV, BMIC, smartphone AMOLED driver IC, or automotive MCU expansion than we expect; 4) fiercer-than-expected competition among local peers, which could lead to share loss and pricing pressure; 5) pricing declines are more severe than we expect.	Jin Guo
SG Micro	300661.SZ	Buy		Rmb	186.75	226	**21.0**	Our 12-month target price of Rmb226 is derived by applying a 29X P/E multiple to SG Micro's 2025E EPS, discounted back to 2023E at a COE of 9.3%. Our target multiple of 29X is derived from the global semiconductor peers' P/E vs. EPS growth correlation. Risks include: 1) weaker demand for smartphones and consumer electronics; 2) slower progress launching new products and expanding into new markets; and 3) more severe competition from domestic peers.	Lynn Luo
Hua Hong	1347.HK	Buy		HK$	33.05	35.2	**6.5**	Our 12-month target price of HK$35.2 is based on a discounted P/E model, where we apply a 15X target multiple on our 2025E EPS and discount it back to 2023E at a COE of 13.1%. Our target multiple of 15X is derived from global semiconductor peers' P/E vs. earnings growth correlation. Our constructive view centers on the company's diversified applications and specialty technologies, product mix improvements (to 12'' fab and 55nm and to higher-end power discretes), and expanding customer base in China driven by localization. Risks include: 1) Uncertainties around US-China trade relations; 2) Weaker-than-expected end-market demand; and 3) Slower-than-expected 12'' fab ramp-up.	Allen Chang
Bomin	603936.SS	Buy		Rmb	14.10	19.1	**35.5**	Our 12m target price is Rmb19.1, based on 20x 2024E EPS and discounted back to 2023E. Key downside risks to our thesis include 1) ceramic substrate ramp being slower than we expect; if the ramp delays into 2024, it would make us more cautious on the stock; 2) PCB demand and profitability is much weaker than we expect, which will drag down overall growth despite the ramp in ceramic substrate.	Jin Guo

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
AccoTest	688200.SS	Neutral		Rmb	285.23	240	**-15.9**	Our 12-month price target is Rmb240 derived from a discounted P/E valuation model where we apply 36x on 2024E earnings and discount back to 2023E at an 8.8% p.a. cost of equity. Upside risks: 1) earlier or faster order recovery than we expected; 2) stronger demand for power semi and SoC testers than we expect; 3) improvement in US-China tech tension. Downside risks: 1) R&D of SOC test equipment slower than expected; 2) weaker demand vs. our expectation, leading to downside risks to our earnings estimates; 3) competition intensifies; if other local peers grow rapidly or launch aggressive pricing strategies, it could cause AccoTest to lose market share or experience margin pressure.	Jin Guo
Charging Infra									
Shoals	SHLS	Sell		$	27.70	20	**-27.8**	Our 12-month price target of $20 is based on a 30X P/E multiple on our Q5-Q8 EPS. Key risks include better than expected solar and non-solar demand, better than expected international sales growth, and better than expected cost control.	Brian Lee, CFA
Enphase	ENPH	Buy		$	210.09	379	**80.4**	Our 12-month price target of $379 is based on a 55X P/E multiple applied to our Q5-Q8 EPS, and adding back ~$1 of net cash per share. Key risks include lower-than-expected revenue growth and margins, changes in the competitive and technology landscape, US-China tariffs, and abnormal inventory builds across the channel.	Brian Lee, CFA
Stem Inc	STEM	Buy		$	9.86	16	**62.3**	Our 12-month price target of $16 is based on 50% from a DCF with a COE of 15% and Terminal Growth multiple of 16.7X, and 50% from an EV/Sales valuation using a 3.0X EV/Sales multiple on 2023 revenue. Key risks include a lower-than-anticipated TAM, higher battery costs, customer attrition from internal software development initiatives, new competitors entering the space, and policy risk.	Brian Lee, CFA
Sunrun	RUN	Buy		$	25.46	40	**57.1**	Our 12-month price target is $40 based on a NAV valuation, with assets expected to be installed through 2023 having $22/sh and our future NAV of $18 for 2024 assets with a 4X multiple. Key risks include slower MW growth, policy shifts (net metering), and higher interest rates.	Brian Lee, CFA
Sunnova	NOVA	Neutral		$	19.21	26	**35.3**	Our 12-m price target is $26 based on a 50/50 weighting of (1) our adj. EBITDA valuation of $13 based on a 14X multiple on our Q5-Q8 adj. EBITDA estimates and (2) our NAV valuation of $12 on a 4X NAV multiple. Key risks include faster/slower MW growth, policy shifts (net metering), and dealer concentration.	Brian Lee, CFA
SolarEdge	SEDG	Buy	Yes	$	306.44	416	**35.8**	Our 12-month price target of $416 is based on a 40X ex-cash P/E multiple on Q5-Q8 EPS with ~$16 in net cash per share added back. Key risks include market share losses due to competition, supply chain and logistics challenges, slower than expected ramp of resi battery product, and trade tension/tariffs.	Brian Lee, CFA
SunPower	SPWR	Sell		$	16.97	16	**-5.7**	Our 12-month price target is $16 based on a 12.5X EV/EBITDA multiple on our Q5-Q8 estimates, plus ~$1 in value from its ENPH equity ownership. Key risks include higher installation volumes, lower interest rates and borrowing costs, and better than expected policy developments.	Brian Lee, CFA
Schneider	SCHN.PA	Sell		€	147.88	128	**-13.4**	Our 12-month price target is €128 based on 3m 2023/9m 2024 ROIC/WACC methodology. Key upside risks: (1) sustained growth outperformance vs. key peers; (2) asset disposals; (3) increased cash distribution to shareholders; (4) higher return on invested capital.	Daniela Costa
ABB	ABBN.S	Buy		SFr	31.93	38	**19.0**	Our 12-month price target is SFr38 and is based 50% on our EV/IC to ROIC/WACC methodology on 24m forward estimates and 50% on our SOTP. Key risks to our view and price target include: (1) lagging capex recovery and/or slower growth vs key peers; (2) market share losses as a result of the focus on profitability; (3) FX and (4) expensive large-scale M&A; (5) pricing pressure.	Daniela Costa
Siemens	SIEGn.DE	Buy		€	144.50	171	**18.3**	Our 12-month price target is €171. We value Siemens 50% on our SOTP (based on peer multiples for all assets, except Siemens Healthineers, for which we use current market price); and 50% on our sector-relative EV/IC to ROIC/WACC methodology. Key risks to our view and price target include: 1) A more profound macro downturn than anticipated; (2) large-scale, value-dilutive M&A; (3) rising pricing pressure, and not being able to fully offset cost increases; (4) FX; (5) risks to production or demand due to large German exposure vs the rest of the coverage (due to energy supply risks).	Daniela Costa

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Legrand	LEGD.PA	Neutral		€	82.96	80	**-3.6**	Our 12-month target price is €80 based on our EV/IC to ROIC/WACC methodology, using 3m of 2023E and 9m of 2024E. Key risks to the downside in our view and price target: (1) delays in implementation of the EU Green Deal; (2) difficulty in complementing organic growth through its established bolt-on M&A strategy for a prolonged period; and (3) significant disruption at one of its key distributors. The converse could make us more bullish. The converse could make use more bullish.	Daniela Costa
Nichicon	6996.T	Buy		¥	1270	1,700	**33.9**	Our 12-month price target is ¥1,700 based on the average of our FY3/24E-FY3/25E EV/GCI vs. CROCI/WACC, implies FY24/3E P/E of 18X and P/B of 1X. Key risks include weaker aluminum electrolytic capacitor supply/demand, higher input costs, potential for delayed companywide margin improvement due to weak earnings execution, and yen appreciation.	Daiki Takayama
Daihen	6622.T	Neutral		¥	4145	5,000	**20.6**	Our 12-month price target of ¥5,000 is based on EV/EBITDA of 6.5X and the average of our FY3/24-FY3/25 estimates. Key risks include: SPE-related: Deterioration/improvement in the SPE/semiconductor market, Power electronics: Changes in various replacement demand from power companies and other sectors, Welding & mechatronics: Changes in capex trends in the auto and other sectors, Companywide: Forex swings.	Ryo Harada
Shenzhen Kstar	002518.SZ	Neutral		Rmb	58.60	53.1	**-9.4**	Our 12m target price of Rmb53.1 is based on 2025E P/E of 30x discounted back to 2023E with a CoE of 10.5%. Upside risks: Global new energy policy tailwind; (2) Higher-than-expected data center capex spending. Downside risks: (1) Price competition of EV charging, ESS PCS and solar inverters; (2) Strategy and execution misstep.	Tina Hou
Others **MLCCs, Sensors, Relay, Harnesses, Chargers, Connectors, Cables etc.**									
TE Connectivity	TEL	Buy		$	125.35	160	**27.6**	Our 12-month price of $160 is based on 20X normalized EPS of $8.00. Key downside risks to our Buy thesis relate to automotive end demand, TE executing on its margin expansion plan, the impact of EVs and new car architectures on automotive content for TE, unfavorable commodity pricing, the impact of COVID-19 on global supply and demand, and how successful TE proves in expanding into the sensor market.	Mark Delaney, CFA
Amphenol	APH	Buy		$	78.65	91	**15.7**	Our 12-month price target of $91 is based on 29X applied to our normalized EPS estimate of $3.15. Key downside risks to our view relate to revenue growth, margins, the trade situation with China (given Amphenol's presence in the country with several manufacturing sites), COVID-19, and Amphenol's ability to continue to execute well on M&A.	Mark Delaney, CFA
Sensata	ST	Buy	Yes	$	46.79	57	**21.8**	Our 12-month price target of $57 is 15X our normalized EPS estimate of $3.80. Key risks relate to auto production, the potential for COVID-19 to impact supply and demand trends, Sensata's ability to increase content per vehicle especially in EVs and hybrids, margins, leverage, tax rate, and FX.	Mark Delaney, CFA
Avnet	AVT	Sell		$	45.93	44	**-4.2**	Our 12-month price target is $44 based on 7x our normalized EPS estimate of $6.35. Key upside risks to our estimates and Sell thesis include: 1) sustained demand strength; 2) resilient industry pricing (and in turn, gross margins); 3) opex leverage above/beyond we model; and 4) capital return in excess of our current expectations.	Toshiya Hari
Continental	CONG.DE	Sell		€	66.24	52	**-21.5**	Our 12-month price target of €52 is based on 6.5x a 25%/75% blend of 2023E/24E EPS. Key upside risks: (1) Higher-than-expected replacement tire volumes; (2) abrupt positive raw material price changes; (3) higher-than-expected production growth; (4) higher savings from restructuring programmes; (5) lower headwinds from raw materials and freight.	Philipp Konig
Nexans	NEXS.PA	Buy		€	97.10	119	**22.6**	Our 12-month price target of €119 is based on our sector relative EV/IC to ROIC/WACC methodology. Key risks to our views and price target include: 1) larger-than-expected volume drops related to the recent macro environment; (2) management changes; (3) value-dilutive M&A; and (4) execution risks in the strategic M&A roadmap.	Daniela Costa
Prysmian	PRY.MI	Buy		€	37.50	44	**17.3**	Our 12-month price target is €44 based on our sector-relative EV/IC to ROIC/WACC framework. Key risks to our views and price target on Prysmian include: (1) delays, cancellations or execution issues in the backlog; (2) delays in restructuring savings; (3) value-dilutive M&A; and (4) execution risks in the strategic M&A roadmap.	Daniela Costa

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
SKF	SKFb.ST	Buy		Skr	188.55	188	**-0.3**	Our 12-month price target is SEK 188 and is based on our sector EV/IC vs. ROIC/WACC framework. Key risks: (1) Slower-than-expected sales growth in 2022 as a result of supply chain issues, new lockdowns, a broader slowdown in China or other macro-economic factors; (2) Lower-than-expected cost savings or delays in automating and consolidating factories; (3) FX weakness; (4) Longer-than-expected automotive underperformance; and (5) Unexpected management changes.	Daniela Costa
Toyota Boshoku	3116.T	Buy		¥	1901	2,100	**10.5**	Our 12-month target price of ¥2,100 is based on P/B-ROE correlation and our FY3/24 estimates (excluding one-off costs). Risks include downward revision in Toyota production volume, weaker-than-expected sales mix/cost increases due to the launch of new models.	Kota Yuzawa
IRISO	6908.T	Neutral		¥	4355	4,600	**5.6**	Our 12-month target price of ¥4,600 is based on FY3/25E EV/GCI vs. CROCI/WACC and the sector average multiple of 8X. Risks include an increase/decline in automobile production, increases/decreases in raw material and distribution costs, changes in factory utilization, changes in the competitive landscape in growth fields for automotive powertrain connectors, and forex fluctuations.	Ryo Harada
Sumitomo Electric	5802.T	Buy		¥	1542.50	2,100	**36.1**	Our 12-month price target of ¥2,100 is based on EV/EBITDA of 6X and the average of our FY3/24-FY3/25 estimates. Risks: Automotive segment: A prolonged delay in the automobile production volume recovery, a decline in automobile production volume due to waning end demand, lack of progress in reflecting component/material costs in selling prices. Infocommunications segment: Capex reductions by hyperscalers extend to the corporate cloud, competitors in high-density optical fiber cables catch up with SEI. Environment and energy segment: New construction/upgrades of power infrastructure are delayed due to parts procurement difficulties and difficulty hiring workers. Industrial material & others segment: Demand for ultra-hard tools slows due to macroeconomic slowdown, manufacturing costs for sintered parts rise due to higher energy prices. Companywide: Yen appreciation, High material costs.	Ryo Harada
Fujikura	5803.T	Buy		¥	995	1,400	**40.7**	Our 12-month price target of ¥1,400 is based on EV/EBITDA of 6X and the average of our FY3/24-FY3/25 estimates. Key downside risks include: Telecommunications: Capex reductions by hyperscalers extend to the corporate cloud, and competitors in high-density optical fiber cables catch up with Fujikura. Electronics: The smartphone market slowdown spreads to high-end smartphones. High-end smartphone production stalls on factors like lockdowns. Automotive products: The recovery in automobile production volume is delayed further.	Ryo Harada
Furukawa	5801.T	Sell		¥	2485	2,200	**-11.5**	Our 12-month price target of ¥2,200 is based on P/B of 0.5X and the average of our FY3/24-FY3/25 estimates. Key upside risks include: Communication solutions: Sharp improvement in the optical fiber business, especially in productivity at the company's US plant, narrowing the margin gap with competitors, Acquisition of new customers in the optical fiber cable business, including hyperscalers, Energy infrastructure: Growth in orders for high-voltage cables, Acceleration in HVDC-related development, enabling the company to secure more projects, Electronics & automotive systems: Recovery in auto production volume, Companywide: Yen appreciation, Margin improvement fueled by selectivity and concentration in individual businesses.	Ryo Harada
Nippon Ceramic	6929.T	Sell		¥	2369	2,400	**1.3**	Our 12-month target price of ¥2,400 is based on FY12/24E EV/GCI vs. CROCI/WACC and the sector average multiple of 8X. Key upside risks include a greater-than-expected increase in auto production volume, a rise in the number of ultrasonic sensors installed per vehicle, sales growth in current sensors, and yen depreciation.	Ryo Harada
Etek	688601.SS	Neutral		Rmb	72.10	69	**-4.3**	Our 12-month TP of Rmb69 is based on 2023E/2024E P/Es of 48X/29X. Downside risks: 1) High dependence on consumer electronics; 2) Discontinuation of tax subsidies and government grants; 3) Failure in R&D. Upside risks: 1) Faster-than-expected expansion into non-mobile applications; 2) Better-than-expected product line expansion; 3) Better-than-expected R&D performance.	Lynn Luo
BizLink	3665.TW	Neutral		NT$	251	380	**51.4**	Our 12-month TP of NT$380 is based on 13x P/E multiple (0.6x s.d. lower than past 10-year average P/E multiple) with 2023 as our valuation base period. Key upside risks include: (1) component/material costs falling in coming months, (2) faster-than-expected EV penetration rate increase, and (3) more project wins from semi cap and datacenter customers. Key downside risks include: (1) much more severe material / IC shortage that drives Bizlink's costs even higher, making the IC shortage timeframe even longer, (2) slower EV demand, and (3) product mix improvement slower than we expected.	James Wang
Yageo	2327.TW	Buy	Yes	NT$	519	900	**73.4**	Our 12m TP of NT$900 is based on 16x 2023E P/E (1.2x s.d. higher than the past 5-year average of 11.1x, but in line with the high-end passive component average). Key risks: (1) weaker inventory builds from OEMs; (2) softer IT end-demand; and (3) slower integration of Kemet/Chilisin.	James Wang

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
AVIC Jonhon	002179.SZ	Buy		Rmb	57.44	77.8	**35.4**	Our 12m target price is based on 30X 2025E P/E discounted back to 2023E on a COE of 9.5%. Risks: 1) Slower-than-expected A&D spending; 2) Intensified competition with China domestic/global connector makers; 3) Weaker than expected expense control; 4) Capacity expansion of its Southern China production base and Luoyang new plant progressing slower than expected.	Jacqueline Du
Faratronic	600563.SS	Buy		Rmb	172.90	224.9	**30.1**	Our 12m target price of Rmb224.9 is based on a 2025E P/E of 32x discounted back to 2023E with a CoE of 10.5%. Risks: (1) Significant pullback of key downstream segments such as EV/solar power/wind power development in China and globally; (2) significant development of aluminum electrolytic and MLCC technology that could potentially disrupt film capacitor adoption; (3) higher-than-expected price hikes for raw materials.	Tina Hou
Hongfa Tech	600885.SS	Buy		Rmb	37.57	45.4	**20.8**	Our 12m target price of Rmb45.4 is based on 2025E P/E of 28x discounted back to 2023E with a CoE of 10.5%. Downside risks: (1) FX risk: further CNY appreciation (45% global ex-China revenues in 2020); (2) Smart meter tendering especially from weaker-than-expected replacement demand.	Jacqueline Du
Nantong Jianghai	002484.SZ	Buy		Rmb	24.08	31.1	**29.2**	Our 12m target price of Rmb31.1 is based on a 2025E P/E of 28x discounted back to 2023E with a CoE of 10.5%. Risks: (1) Significant pullback of key downstream segments; (2) slower-than-expected business development in NEV film capacitor and super capacitor; (3) higher-than-expected price hike of electricity.	Tina Hou
Shenzhen Envicool	002837.SZ	Buy	Yes	Rmb	35.53	48.9	**37.6**	Our 12m target price of Rmb48.9 is based on 2025E P/E of 35x discounted back to 2023E with a CoE of 10.5%. Downside risks: (1) Cooling technology competition higher; (2) Slower-than-expected new business expansion; (3) Slower-than-expected end-market capex spending.	Tina Hou
LG Display	034220.KS	Sell		W	14180	11,500	**-18.9**	Our 12-month target price of W11,500 is based on 1-yr fwd target P/B of 0.4X. Key risks include slower LCD supply growth, stronger demand for OLED TVs, and a faster ramp-up in mobile OLED.	Giuni Lee
Memory									
Micron	MU	Buy		$	63.87	62	**-2.9**	Our 12-month price target is $62 based on 13x normalized EPS estimate of $4.80. Key risks to our estimates and our constructive investment thesis include 1) weaker-than-expected demand for servers, smartphones, and/or PCs, 2) irrational supply behavior by Micron and/or any of its competitors in DRAM and NAND, and 3) execution on node transitions (and cost downs).	Toshiya Hari
SK Hynix	000660.KS	Buy		W	91500	110,000	**20.2**	Our 12-month TP of W110,000 is based on a target 1-yr forward P/B multiple of 1.2X which is the average P/B multiple of the most recent 4 downcycles since 2010. Key risks: A major deterioration in memory supply/demand and delays in technology migration.	Giuni Lee
Samsung Electronics	005930.KS	Buy		W	64600	70,000	**8.4**	Our 12-month 2023E SOTP-based target prices are W70,000/W63,000 for the preference shares which is based on our target pref to common shares discount of 11% derived from averaging: 1) the pref discount of the 2-factor model, and 2) the average preference shares discount to common shares during the past 1 month. Key risks: A major deterioration in memory supply/demand and a sharp contraction in smartphone margins.	Daiki Takayama
	005935.KS	Buy		W	58200	63,000	**8.2**		Daiki Takayama
Test solutions									
Keysight	KEYS	Neutral		$	177.45	189	**6.5**	Our 12-month price target of $189 is based on 27X applied to our unchanged normalized EPS (including SBC) estimate. Risks include: 1) Our revenue outlook, especially in 5G (either because 5G test investment is more or less sustained than we expect and/or due to share shift); 2) Margins (we expect software mix shift to help drive margins higher, but there could be downside risk from pricing pressure and/or from the shift to production test); 3) The impact of COVID-19 on industry demand and production capability; 4) Keysight's ability to continue to innovate and be an industry leader through R&D and M&A; and 5) The impact of the trade war between the US and China on fundamentals.	Mark Delaney, CFA
Centre Testing	300012.SZ	Buy		Rmb	23.15	27.1	**17.1**	Our 12m target price of Rmb27.1 is based on 2025E P/E of 32x discounted back to 2023E with a CoE of 9.5%. Downside risks: (1) Any damage to its credibility; (2) failure to react to new regulations and laws; (3) failure to improve lab utilization rate due to competition; (4) potential provision/impairment due to acquisitive growth.	Jacqueline Du

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Name	Ticker	Rating	On CL	Currency	Price*	12m TP	Upside (%)	PT, Valuation Methodology, Risks	Covering Analyst
Pony Testing	300887.SZ	Buy		Rmb	34.32	47.4	**38.1**	Our 12m target price of Rmb47.4 is based on 2025E P/E of 25x discounted back to 2023E with a CoE of 11.5%. Downside risks: (1) Damage to credibility; (2) Failure to react to new regulations and laws; (3) Failure to improve lab utilization rate due to competition.	Jacqueline Du
Chroma ATE	2360.TW	Neutral		NT$	181	215	**18.8**	Our 12m TP is NT$215 (based on 2023E EV/GCI vs. CROCI, which implies 19x one-year forward P/E). Key upside risks include: (1) faster growth from semi testing or EV power testing; (2) wider ToF (Time of Flight) demand in 2022/2023 mainly from faster 3D sensing adoption from Android smartphone brands; and (3) more project deliveries for turnkey solutions. Key downside risks include: (1) weaker-than-expected semi testing revenue from higher competition; and (2) rising competition from 3D sensing.	James Wang
Software, Networking									
AMD	AMD	Buy		$	75.40	85	**12.7**	Our 12-month price target is $85 based on 24x our 2023E non-GAAP EPS (incl. SBC) estimate of $3.53. Key downside risks to our investment thesis and price target include: 1) a weaker-than-expected PC and server market backdrop, 2) aggressive pricing/marketing tactics by Intel, 3) execution on the technology/product roadmap, and 4) supply chain issues.	Toshiya Hari
Marvell	MRVL	Buy		$	44.25	54	**22.0**	Our 12-month price target is $54 based on 30x our normalized EPS estimate of $1.80. Key downside risks to our investment thesis and price target include 1) supply-side challenges, 2) lumpiness in certain cloud and/or 5G infra projects, and 3) cost inflation.	Toshiya Hari
Nvidia	NVDA	Neutral		$	203.65	162	**-20.5**	Our 12-month price target is $162 based on 38x our normalized EPS estimate of $4.25. Key upside/downside risks to our estimates and price target include: 1) better/worse-than-expected demand for Gaming GPUs, 2) an acceleration or deceleration in the proliferation of GPU-accelerated computing in the Data Center, 3) any positive/negative changes to the current export restrictions, 4) the timing of new product introductions and their impact on revenue and profitability, and 5) supply chain dynamics.	Toshiya Hari
Navinfo	002405.SZ	Buy		Rmb	11.83	17.9	**51.3**	Our 12m TP of Rmb17.9 is based on a discounted P/E model where we apply 42x to 2025E EPS and discounted back to 2023E at cost of equity of 10.2% (beta at 1.1, risk free rate at 3%, risk premium at 6%; assumptions unchanged). Key downside risks: 1) Foundry supply disruptions to Navinfo's auto semis business; Navinfo is a fabless design firm and relies on foundries for production capacity. If Navinfo fails to secure enough wafer supplies, it will limit its auto semis growth and lead to downside risks to our estimates. 2) Slower than expected end-demand, e.g., reduction in auto production volume, lower ADAS penetration than expected. 3) Stronger than expected competition; Navinfo is a leading player in automobile map and autos semis. If competition emerges, it could limit Navinfo's market share or hurt the company's profitability should pricing competition intensify.	Jin Guo
KPIT Tech	KPIE.BO	Buy	Yes	Rs	697.85	950	**36.1**	Our 12-m target price is Rs950 based on 85% DCF and 15% M&A methodology. Our DCF is based on 11.4% WACC, 0.7 beta and 4% terminal growth while our M&A value is based on 50x forward P/E multiple. Downside risks: Attrition in skilled talent pool; slowdown in auto tech outsourcing; vendor consolidation by OEMs; revival in onshoring; obsolescence of domain expertise; and INR appreciation.	Chandramouli Muthiah

*Last price date: 27 Jan 2023

Source: Goldman Sachs Global Investment Research, FactSet

Disclosure Appendix

Reg AC

We, Kota Yuzawa, Mark Delaney, CFA, George Galliers, Fei Fang, Philipp Konig, Nikhil Bhandari, Daniela Costa, Alexander Duval, Toshiya Hari, Brian Lee, CFA, Daiki Takayama, Ryo Harada, Allen Chang, Verena Jeng, Jin Guo, Lynn Luo, Giuni Lee, Trina Chen, James Wang, Jacqueline Du, Tina Hou, Olivia Xu, Shuhei Nakamura, Chandramouli Muthiah, Kee Ryung Kim and Hiroki Muramatsu, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

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Price target and rating history chart(s)

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Target price history table(s)

SK Innovation (096770.KS)

Date of report	Target price (W)
26-Jan-23	210,000
14-Nov-22	240,000
03-Nov-22	230,000
11-Oct-22	220,000
29-Jul-22	290,000
19-Jun-22	310,000
31-May-22	280,000
03-Apr-22	270,000
02-Feb-22	340,000
31-Oct-21	380,000
24-Aug-21	370,000
26-May-21	380,000
13-May-21	360,000
16-Feb-21	350,000

LG Display (034220.KS)

Date of report	Target price (W)
13-Jan-23	11,500
30-Oct-22	12,000
31-Jul-22	13,700
27-Apr-22	16,000
19-Apr-22	17,000
18-Jan-22	17,500
14-Oct-21	17,000
28-Jul-21	18,500
21-Jul-21	18,000
01-May-21	16,500
26-Apr-21	14,800

Kia Motors (000270.KS)

Date of report	Target price (W)
25-Oct-22	100,000
22-Jul-22	120,000
12-Jul-22	110,000
25-Apr-22	100,000
18-Mar-22	90,000
08-Aug-21	110,000
04-Mar-21	99,000

LG Innotek Co. (011070.KS)

Date of report	Target price (W)
26-Jan-23	300,000
13-Jan-23	310,000
31-Oct-22	340,000
31-Jul-22	360,000
19-Apr-22	320,000
27-Jan-22	300,000
18-Jan-22	280,000
28-Oct-21	245,000
14-Oct-21	240,000
01-Aug-21	250,000
19-Jul-21	240,000
02-May-21	225,000
26-Apr-21	220,000

Samsung Electronics (Pref) (005935.KS)

Date of report	Target price (W)
31-Jan-23	65,000
19-Dec-22	63,000
09-Oct-22	64,000
25-Sep-22	65,000

Samsung SDI Co. (006400.KS)

Date of report	Target price (W)
13-Jan-23	850,000
14-Nov-22	900,000
26-Oct-22	880,000
29-Jul-22	800,000

Samsung Electronics (Pref) (005935.KS)

Date of report	Target price (W)
07-Jul-22	74,000
21-Jun-22	78,000
28-Apr-22	89,000
07-Apr-22	91,000
10-Mar-22	94,000
10-Jan-22	93,000
30-Sep-21	91,000
07-Apr-21	94,000
02-Mar-21	89,000

Samsung SDI Co. (006400.KS)

Date of report	Target price (W)
19-Apr-22	890,000
30-Jan-22	900,000
19-Jan-22	920,000
14-Oct-21	970,000
27-Jul-21	950,000
27-Apr-21	900,000
19-Feb-21	950,000

LG Electronics (066570.KS)

Date of report	Target price (W)
30-Jan-23	102,000
13-Jan-23	98,000
31-Oct-22	95,000
10-Oct-22	103,000
31-Jul-22	120,000
01-May-22	140,000
07-Apr-22	145,000
31-Oct-21	155,000
12-Oct-21	160,000
01-Aug-21	165,000
07-Jul-21	155,000
02-May-21	150,000
26-Apr-21	135,000
07-Apr-21	129,000

Samsung Electronics (005930.KS)

Date of report	Target price (W)
31-Jan-23	75,000
12-Jan-23	70,000
19-Dec-22	72,000
09-Oct-22	73,000
25-Sep-22	75,000
07-Jul-22	85,000
21-Jun-22	90,000
28-Apr-22	103,000
07-Apr-22	105,000
10-Mar-22	108,000
10-Jan-22	107,000
30-Sep-21	100,000
07-Apr-21	107,000
02-Mar-21	102,000

SK Hynix Inc. (000660.KS)

Date of report	Target price (W)
12-Jan-23	110,000
26-Oct-22	115,000
25-Sep-22	120,000
27-Jul-22	135,000
21-Jun-22	155,000
19-Apr-22	181,000
10-Mar-22	182,000
30-Jan-22	173,000
10-Jan-22	170,000
26-Oct-21	120,000
06-Oct-21	125,000
27-Jul-21	177,000
02-Mar-21	175,000

Hyundai Motor Co. (005380.KS)

Date of report	Target price (W)
25-Apr-22	220,000
18-Mar-22	200,000
26-Sep-21	285,000
04-Mar-21	291,000

LG Energy Solution (373220.KS)

Date of report	Target price (W)
29-Jan-23	540,000
16-Jan-23	550,000
14-Nov-22	570,000
09-Oct-22	530,000
27-Jul-22	465,000
31-May-22	475,000
27-Apr-22	450,000
08-Mar-22	455,000

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