

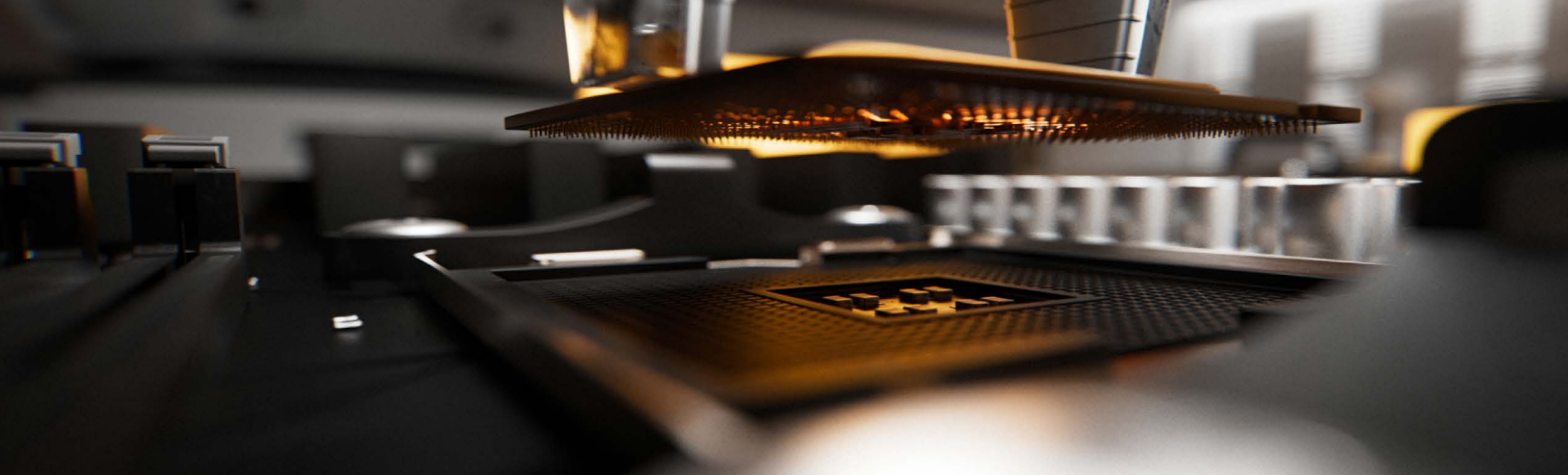


Structural Trends in the Technology Sector

Semiconductor Supply Chain

Market Insights

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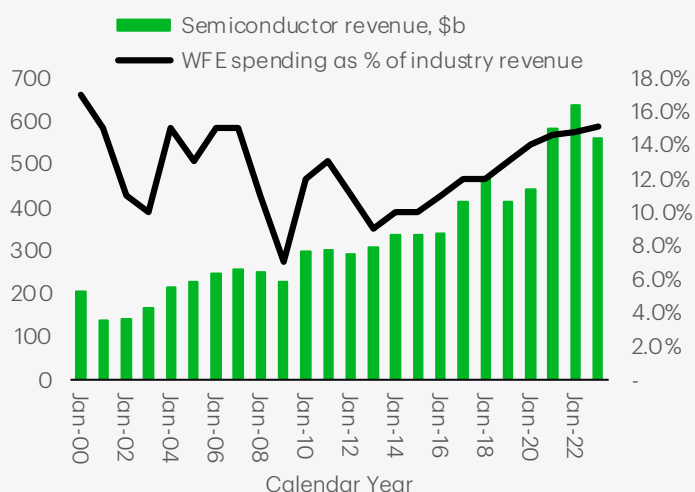
The value of a company's stock stems in large part from its ability to compound earnings growth. That's why we try to identify broad secular industry trends that will drive multi-year growth for the company. These thematic opportunities help us narrow our selection to a pool of growth compounders that are set to outperform the wider market. In past Market Insights, that focused on Artificial Intelligence, we looked at the democratization of GenAI productivity and how the "data layer" cohort of software companies are well-positioned to benefit because they manage and process the data, which are the key ingredients in the process. We now turn our attention to the semiconductor supply chain.

Semiconductor equipment sector is more than an industry

The suppliers of semiconductor equipment enable the production of components. Since they are positioned at the beginning of the supply chain, the equipment vendors benefit from all industry trends driving the demand for semiconductor chips. In the case of GenAI, the equipment suppliers enable the development of components used in the networks that power foundation models. The GenAI opportunity is just one of several reasons to own the shares of semiconductor equipment makers.

The semiconductor industry revenue is expected to reach over US\$1 trillion in 2030. That implies a compound annual growth rate (CAGR) of approximately 7% for the current decade and meaningful acceleration from the prior decade's rate of 4% to 5%, which led to total industry revenues of around US\$475 billion in 2020. In order to accelerate growth, the sector will have to meaningfully increase the pace of its capital investments, approximately two-thirds of which are allocated to wafer fabrication equipment (WFE). This trend is already in place, as chip fabricators increased WFE expenditures from 10% of industry revenue in 2020 to 15% in 2023, and look set to maintain elevated spending through the remaining balance of the current decade.

Figure 1: Reinvestment in capex/WFE set to accelerate growth



Source: Gartner, company data, Wealth Investment Office as of 2024

Below are several reasons why WFE expenditures will remain elevated:

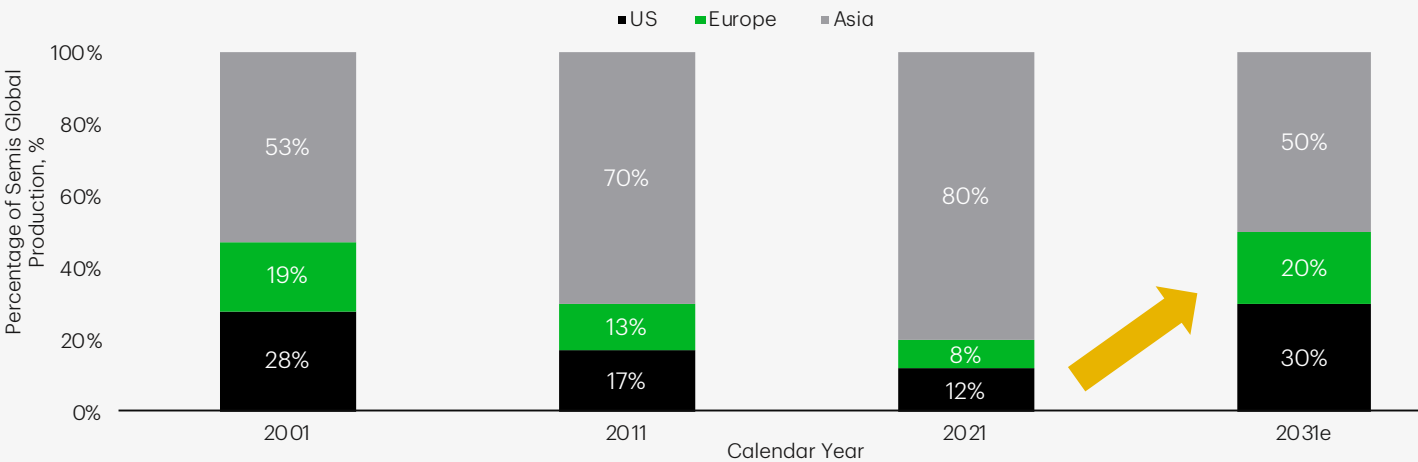
Growing complexity of chip design: The cost per transistor gate continues to rise due to the difficulty of producing chips at lower geometries. Smaller chips with greater transistor density have higher performance and power efficiency. This is important for the accelerator chips used in GenAI infrastructure, given that the system performance is limited by energy consumption. Thus, the industry will rely on the next-generation equipment to deliver higher performance per watt, the cost of which will be reflected in sustained revenue growth and higher margins of WFE vendors.

Demand for WFE tools from China: This reflects the geopolitical importance of establishing a native semiconductor manufacturing sector in China. The resulting demand for semiconductor equipment led to softer industry revenue declines this downcycle. It also helped the WFE sector exceed expectations set at the beginning of 2024. The suppliers have recently projected that the momentum of China demand will remain in place in 2025.

Greenfield opportunity in the West: The localization of chip production in the West has led to a series of public initiatives to subsidize semiconductor manufacturing (\$50 billion in the U.S. CHIPS act). Like China, the West has recognized the industry’s geostrategic importance and has committed to expenditures, which will in part fund equipment purchases. The construction of new fabs is a multi-year revenue opportunity for WFE vendors, extending through the current decade.

WFE is a consolidated market that consists of four to five leading suppliers. This is a result of growing product complexity that, over the years, has led to consolidation and higher barriers to competitive entry. This made growth and margins expansion sustainable for WFE suppliers, when averaged over cycles. We believe that the impact from the catalysts listed above will result in another multi-year period of sustainable earnings growth.

Figure 2: Semis production capacity in the West set to rise rapidly



Source: KLA Corp, Gartner, Chips Act

The next-gen materials for new frontiers of power and energy

The innovation in materials is a source of emerging revenue opportunity for the semiconductor industry. A group of chipmakers are increasingly relying on a family of semiconductor compounds called wide bandgap semiconductors (WBG) to unlock new markets. The chemical properties of WBGs allow chips to be more power efficient than the materials predominantly used in component production, primarily silicon (Si).

As a result, we expect a broad range of energy applications to adopt WGS and offer these chip companies a source of additional revenue growth.

The two main WBG materials currently in mass production are silicon carbide (SiC) and gallium nitride (GaN). Both compounds have high thermal conductivity, which allows them to dissipate less power in the form of heat, making them more energy-efficient. The properties of WBG, such as high switching frequency and power ratings, allow the suppliers to address applications in the transportation industry, some consumer electronics and the energy grid.

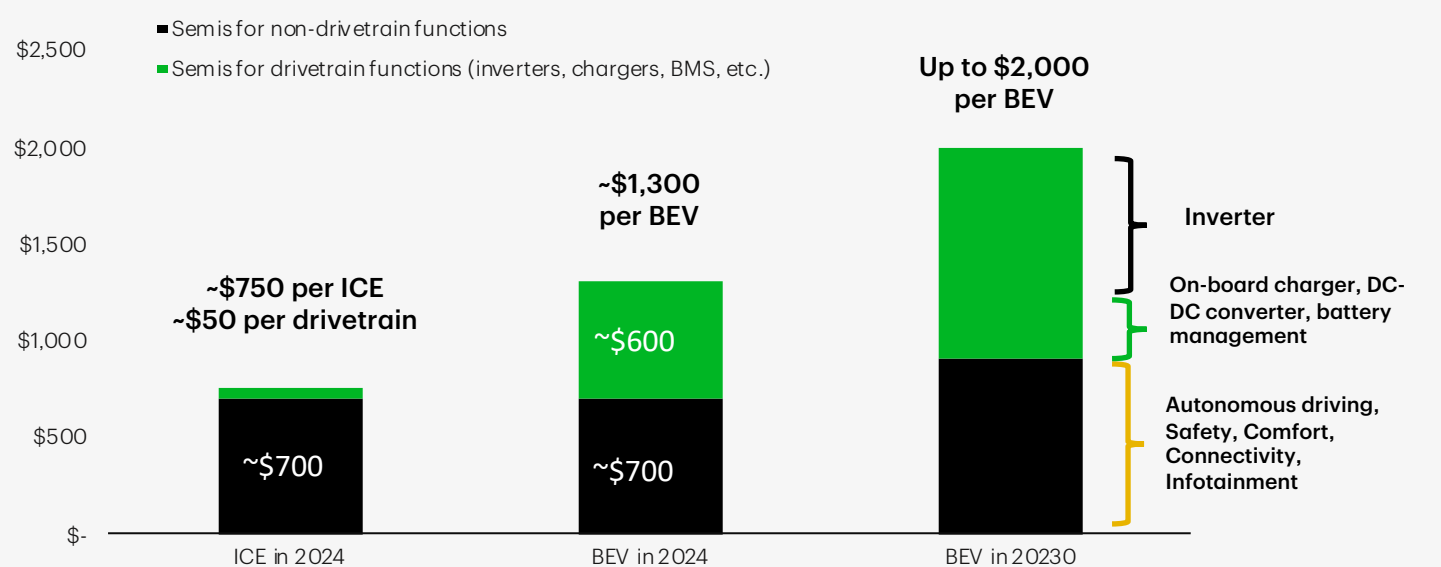
Some key emerging and growing opportunities include:

Electric vehicles: A growing number of car manufacturers are using SiC inverters in their EV lines. The inverter is a device that converts direct current (DC) from the battery to alternating current (AC) that powers the electric motor. Since SiC-based inverters are more power-efficient they require smaller modules, reducing the weight of the overall vehicle. In turn, SiC-equipped EVs can extend their range up to 7% compared to that of Si-based EVs.

Charging infrastructure: GaN compounds have high electron mobility, which allows the components to operate at higher switching frequencies. As a result, GaN chips can charge a battery in less time than it takes a Si-based charger. In turn, GaN chips are used in onboard EV chargers and charging stations. Given that long charging times are one of the key impediments to EVs’ mass adoption, we see GaN chips as one of the enablers of this market and a source of future revenue for the suppliers.

Data-centre power supplies: Power requirements are increasingly becoming the key limiting factor for GenAI model performance. Training and usage (inference) of GenAI models are constrained by the amount of power that these compute networks draw. In turn, the industry has turned to vertical (backside-mounted) power supply units (PSU) that contain SiC and GaN chips. These systems consume less power because of better cooling performance and lower energy consumption by the WBG chips inside the box.

Figure 3: Inverters to account for bulk of acceleration for semis in adoption in autos



Source: Infineon

The SiC-based-power semiconductor devices market is set to grow at an average rate of 18% per year, from US\$3.1 billion in 2023 to approximately US\$6 billion in 2027. The EV industry (battery-powered and plug-in hybrid vehicles) will likely comprise the majority (70% to 75%) of the revenue. The market for GaN semiconductor chips is a bit more fragmented but is still expected to grow at a similar rate. The overall automotive semiconductors market is expected to grow at a CAGR of 9% to 10% over the same period. In turn, the suppliers with meaningful exposure to WBG are well-placed to outgrow the broader industry.

Conclusion: Focused on compounders

We have identified the themes that will help us select earnings compounders that over time will outperform the broader market. These thematic trends will drive multi-year growth at the company level. Since they are long-term drivers of industry and company fundamentals, identifying such dynamics has become a standard part of our security-selection process. We will be relying, in a large part, on these trends to define our selection universe within the technology sector.

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