

# GLOBAL EMERGING MARKETS



MARTIN CURRIE  
A Franklin Templeton Company

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For institutional, professional and wholesale investors only

## TALES FROM THE ROAD: SEMICONDUCTORS SUSTAINABILITY JOURNEY IN TAIWAN

Portfolio Manager, Divya Mathur, recently conducted a research trip to Taiwan. Here, we outline key observations around the opportunities in the country.





**Divya Mathur**

Portfolio Manager

**Taiwan continues to be an interesting space for us. We are particularly interested in the Taiwanese technology sector and semiconductor subsector, reflected in our overweight position relative to the benchmark (although we have a small underweight to Taiwan as a country)<sup>1</sup>.**

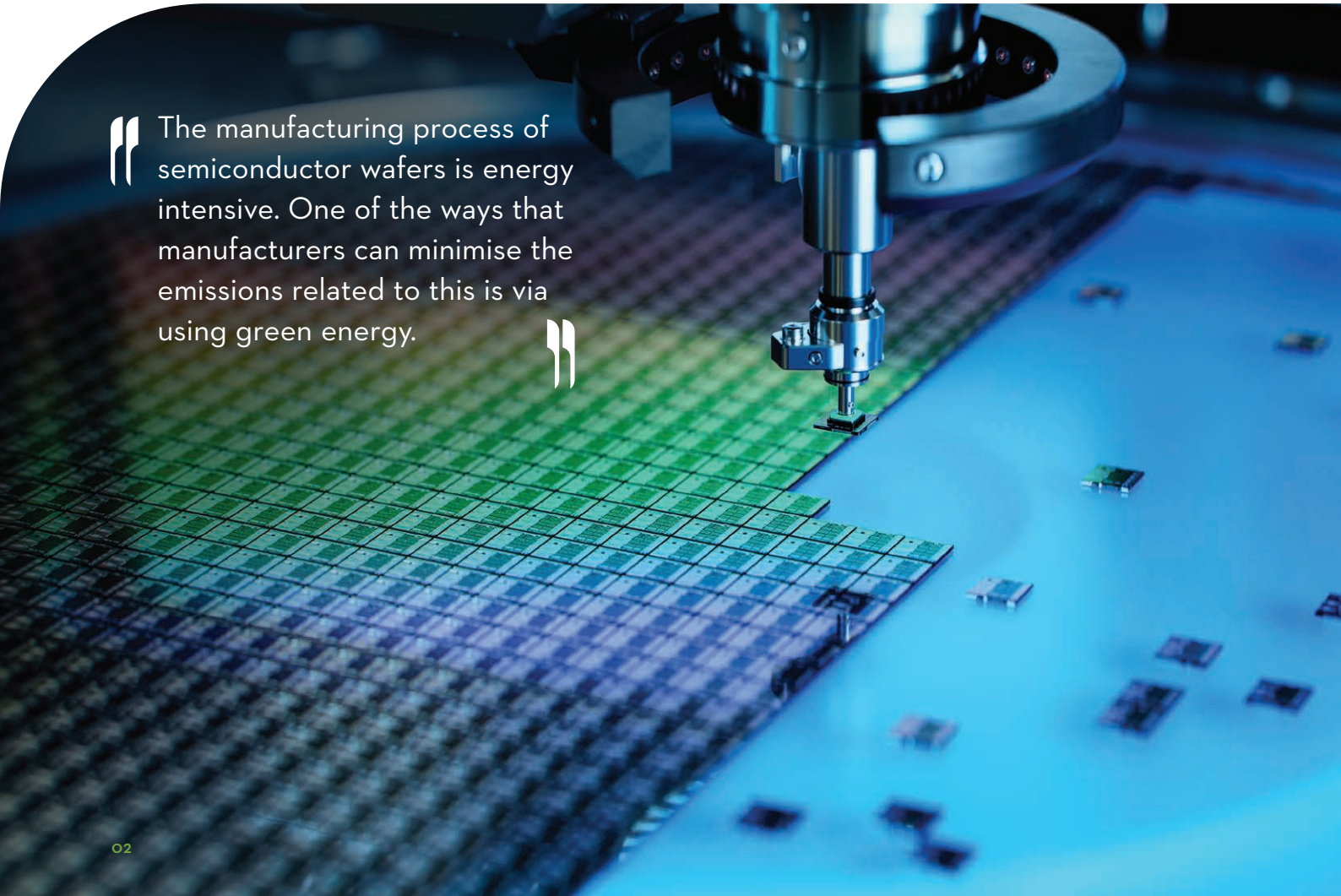
Portfolio manager, Divya Mathur, recently conducted a research trip, visiting Taipei and Hsinchu, meeting with a variety of companies within the technology space. The majority of companies we spoke to within the semiconductor space reported that they are in the early stages of a recovery in demand, however the jury is out on exactly when this will happen with expectations ranging from the latter half of this year to mid-2024. One of the highlights from the trip was a site visit to a leading Taiwanese semiconductor company's manufacturing facilities. The site visit allowed us to gain insight into the production process and a better understanding of the semiconductor industry's sustainability outlook.

Semiconductor companies are increasingly focusing on their sustainability commitments and setting ambitious targets<sup>2</sup>. The manufacturing process of semiconductor wafers is energy intensive. One of the ways that manufacturers can minimise the emissions related to this is via using green energy, with companies setting targets for significant reductions over several decades. The Semiconductor Climate Consortium was established to focus on the challenges of climate change and work to reduce emissions associated with the semiconductor manufacturing process. Its membership includes several leading, Taiwanese players within the industry. Companies that have signed up to the consortium are encouraged to target net zero emissions no later than 2050<sup>3</sup>.

<sup>1</sup>Source: Martin Currie as at 30 April 2023, index used is MSCI Emerging Markets.

<sup>2</sup>Source: McKinsey, "Keeping the semiconductor industry on the path to net zero".

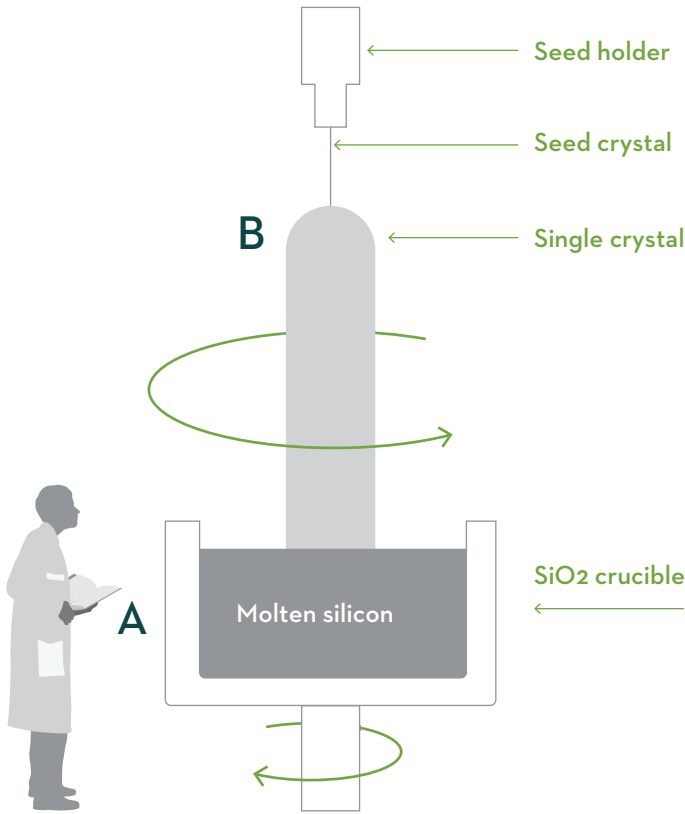
<sup>3</sup>Source: Semiconductor Climate Consortium mission statement as at 30 April 2023.



“ The manufacturing process of semiconductor wafers is energy intensive. One of the ways that manufacturers can minimise the emissions related to this is via using green energy. ”



During the site visit to one of the leading semiconductor company's manufacturing facilities, a discussion took place around the company's sustainability targets. It is currently in the process of standardising its carbon reporting, using International Organization for Standardization (ISO) standards to measure its carbon footprint of its products. A key area of focus for the company is around energy intensity, especially at the early stages of the wafer manufacturing process.



Polysilicon is melted in a crucible (A). The temperature is maintained at around 1420° Celsius, above the polysilicon melt point. Once the temperature is stabilized, the seed crystal (B) is lowered into the molten silicon. This acts as the starting point for the crystal formation.

The seed crystal is then slowly pulled up at a constant speed to grow the crystal. This process takes three to four days, during which the 1420° Celsius temperature is maintained.

Once formed, the crystals are cut into wafers (C) sized 200-300 micrometer thick (1 micrometer  $\mu\text{m}$  is 1/1000 millimeters)



Source: <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/czochralski-method>

Around 60% of energy consumption to manufacture a semiconductor occurs in this process<sup>4</sup>. Although semiconductor manufacturers are planning to increase the amount of power coming from green sources, we also discussed other methods this company (amongst others) are exploring to reduce carbon emissions. One area is whether redesigning the process would result in greater energy efficiency. Additional areas of exploration have included increasing the use of automation and looking into using more recycled materials<sup>4</sup>.

## Conclusion

We remain confident in our positioning within Taiwan, and the long-term growth potential for semiconductors. Overall, we think the worst of the headwinds for the industry are over and we could start to see considerable tailwinds from here. We are focused on names that have strong technological leadership and are well-positioned to benefit from long-term industry growth. Our approach to the Taiwanese market and semiconductor industry is in line with our portfolio more broadly. We continue to believe our highly selective, stock-focused approach will prosper through accessing companies with a high return on equity, that operate in structurally growing industries.

<sup>4</sup>Source: Pragmatic Semiconductor "Intelligent Low-Carbon Semiconductor Manufacturing" as at January 2023.

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