

India's Semiconductor Potential

We hosted an expert session on capitalizing on India's semiconductor potential with Mr. Ajit Manocha, the president and CEO of SEMI and a member of the India Semiconductor Mission (ISM) advisory board. He brings over four decades of experience in the semiconductor industry, including over five years of service in the US President Obama's committee. Mr. Ajit spoke about the scope of semiconductors in India and how the country can expand its share in semiconductor manufacturing with the help of government initiatives. The Indian semiconductor market is expected to clock 19.6% CAGR and reach INR80.3b by FY28. Several components used in the manufacturing of semiconductors are imported from foreign countries; however, the same can be indigenized in future. The vision, mission, strategy, and ambition are all set in place to transform India into a powerhouse of semiconductors. Additionally, recent policies (ISM 1.0 and expected ISM 2.0) implemented by the government will attract foreign entities to install manufacturing plants in India and facilitate new start-ups to commence business in semiconductor manufacturing.

Key highlights of the discussion

SEMI network is the gateway to the USD3t+ target

Members of SEMI are spread across the value chain, from equipment and materials to fabless and foundry to electronics systems (PCBs, etc.). The idea behind SEMI is to enable the semiconductor industry to grow in the next two decades, driven by Smart Data-AI, Smart Manufacturing, Smart Mobility, and Smart Medtech. According to the expert, the global semiconductor market is expected to reach USD1t by 2030. The demand for semiconductors is driven by three waves: 1) the first wave IoT is led by cloud, IoT, and the transition toward industry 4.0; 2) the second prevailing wave is led by AI; and 3) the third wave Quantum is led by 6G/7G, quantum, and the Industry 5.0 adoption. This is likely to result in 108 300mm and 200mm new fabs coming online between CY23 and CY27, and 50+ more fabs needed through CY30 to support the AI wave. Each investment varies from USD3b to USD22b per fab. This will also result in the production of 60m more wafers spread across memory, logic/foundry, and others. All these factors will support the growth of the semiconductor market, which is expected to post a CAGR of over 10% during CY23-CY30. The market has the potential to continue growing and clock 8% CAGR beyond CY30.

Scope for the Indian semiconductor sector

India's semiconductor market posted 12.6% CAGR, reaching USD33b, during FY17-FY23. It is expected to reach USD80.3b by FY28, posting 19.6% CAGR during FY23-FY28. Although the semiconductor business is capital-intensive in nature, it is a highly profitable industry globally. The government has taken several initiatives to promote semiconductor manufacturing and learn from the experience of global players. India is currently rich in design capacity, with 20% of total design houses located in the country. These houses are also involved in designing AI-enabled chips used across various segments. Further, players are now investing in establishing fab and OSAT facilities. SEMI estimates that around 1m positions will need to be filled in the semiconductors industry by 2030. India, which produces 800k fresh engineers annually and has expertise in software development and design, can play a significant role in addressing the talent shortage globally.



Mr. Ajit Manocha

Mr. Ajit Manocha is the President and CEO of SEMI. He has 4+ decades of sterling career in the semiconductor industry spreading across companies such as GlobalFoundries, Philips/NXP, Bell Laboratories and the Semiconductor Industry Association. He had the rare distinction of being inducted into two Hall of Fames:- Silicon Valley Engineering Council – 2020, VLSI Research – 2021. He was honored with the ELCINA Special Jury Award, Ambassador of India Electronics Industry – 2024, and is a Member of India Semiconductor Mission (ISM) Advisory Board.

Ecosystem for Indian semiconductor companies

Countries such as Taiwan and South Korea, though relatively smaller, are the powerhouses of semiconductors. India has already initiated path towards manufacturing Fabs and will now have to focus to invite players to invest in key raw materials. Though AI-enabled chips are designed in India, the country largely depends on imports for raw material components, such as SiC, gallium arsenide, chemicals, and gases, of all semiconductor-enabled products. India has a strong chemical industry; however, the materials required for semiconductors are of ultra-high purity, and only a few countries possess the capabilities to produce them. In order to support the growth of the semiconductor market, many material companies are planning to expand their base in India. Japan is a market leader in material substrates, followed by Europe and US. However, we are still awaiting large-scale announcements from players.

ISM2.0 is under discussion

The government launched the initial scheme to incentivize semiconductor manufacturing in Dec'21 with an outlay of INR760b, which is now called ISM 1.0. The government is also working on ISM 2.0, which will be an expanded version of the first phase of the program.

Ramp-up in India's semiconductor journey

In Sep'24, the government of India announced its India Semiconductor Mission, stating it will provide 50% financial support to companies setting up semiconductor manufacturing facilities in India. This policy has attracted investments worth more than INR1.5t in India in a short period, with many more projects in the pipeline.

■ Micron's OSAT Facility, Sanand

American chipmaker Micron Technology is setting up an OSAT plant in Gujarat's Sanand. The facility will focus on assembling and testing DRAM and NAND products, catering to both domestic and international markets.

■ Tata Electronics, Dholera - Nation's First Fab

Tata Electronics, in collaboration with PSMC of Taiwan, is establishing a mega semiconductor fabrication facility (fab) at Dholera, Gujarat. This will be India's first advanced chip manufacturing plant and have a production capacity of 50,000 wafers per month.

■ Tata Electronics, Morigaon – Nation's First Indigenous Semiconductor Assembly and Testing Facility

Tata Electronics is setting up India's first semiconductor unit in the North East region by establishing a greenfield semiconductor assembly and testing facility at Jagiroad in Morigaon, Assam. This unit will focus on three key platform technologies: wire bond, flip chip, and Integrated Systems Packaging (ISP), with a production capacity of 48 million chips per day.

■ CG Power's Sanand OSAT

CG Power has teamed up with Japan's Renesas Electronics Corporation and Thailand's Stars Microelectronics to establish an OSAT facility in Sanand, Gujarat. The factory will manufacture a diverse range of products, from legacy packages to advanced solutions, serving industries such as automotive, consumer electronics, industrial applications, and 5G technology. It is designed to scale up production to 15 m units per day.

■ Kaynes Semicon Plant, Gujarat

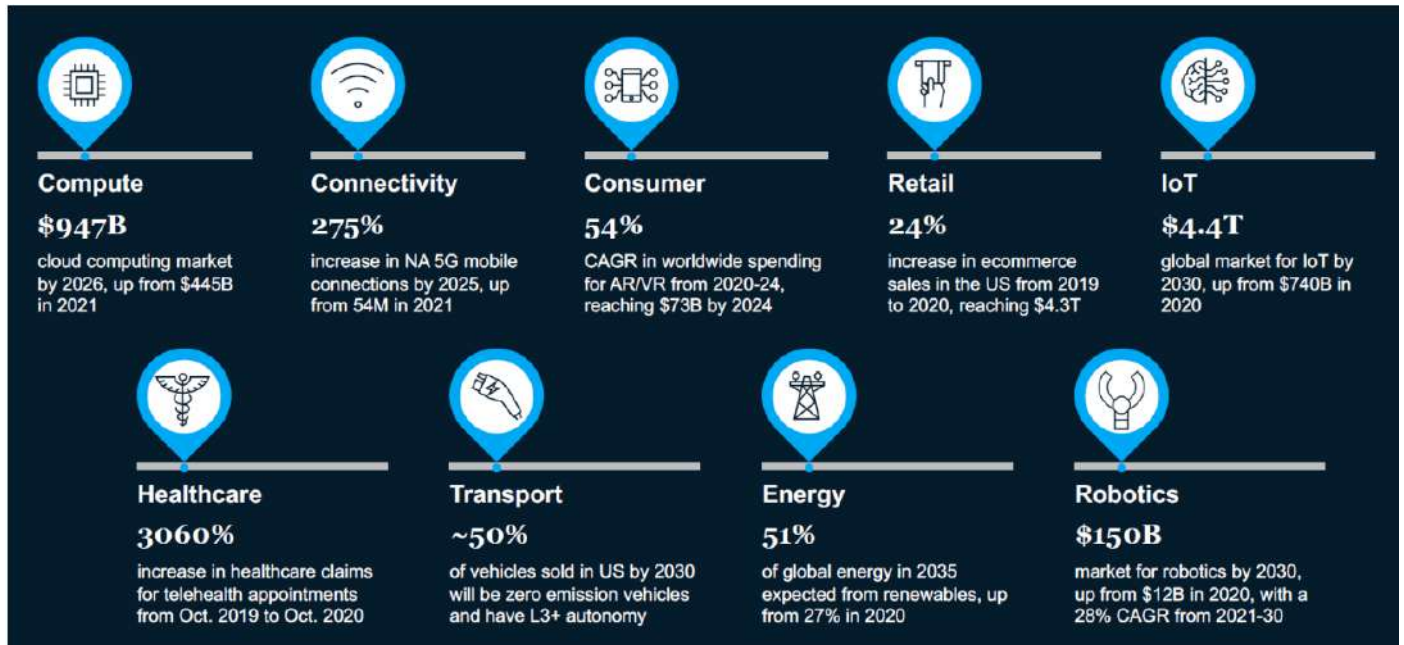
Kaynes plans to establish its OSAT unit in Sanand, Gujarat, with a total capacity of 6.3m chips per day at an investment of INR33b.

Larger scale to result in cost efficiencies

Currently, due to a smaller scale, India's fabs will be 30% costlier than those made in Taiwan and Southeast Asia. However, as companies achieve scale by targeting demand from a wider user-base segment as well as exports, the pricing of chips will decline.

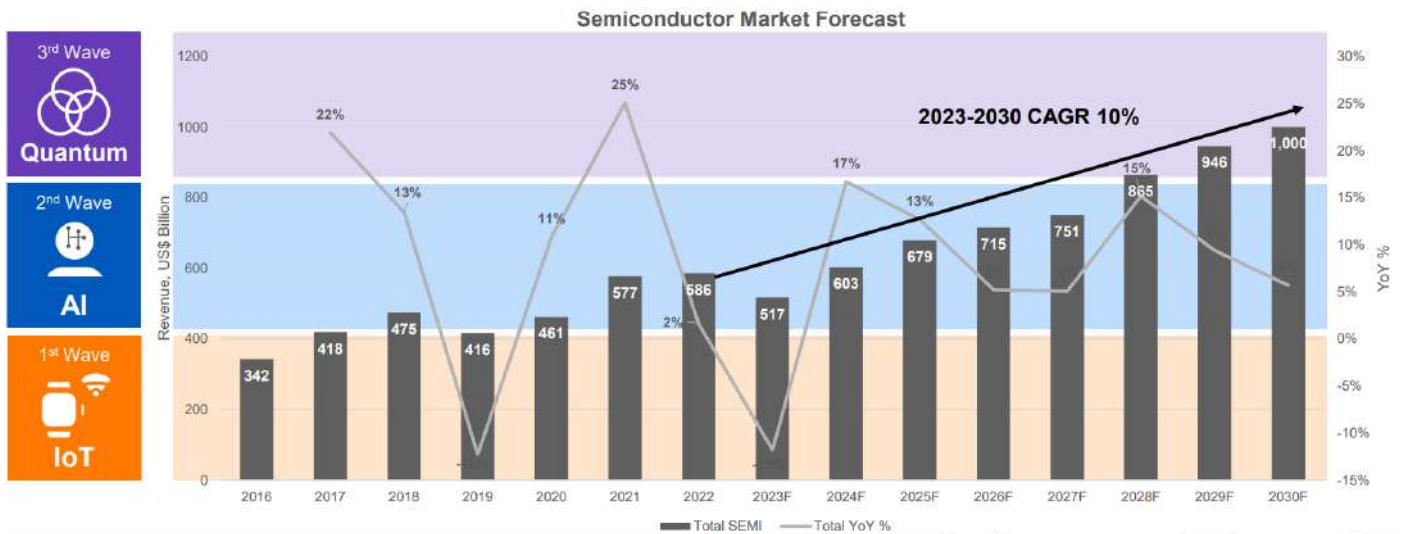
Key charts

Exhibit 1: Demand for semiconductors is growing multi-fold across areas



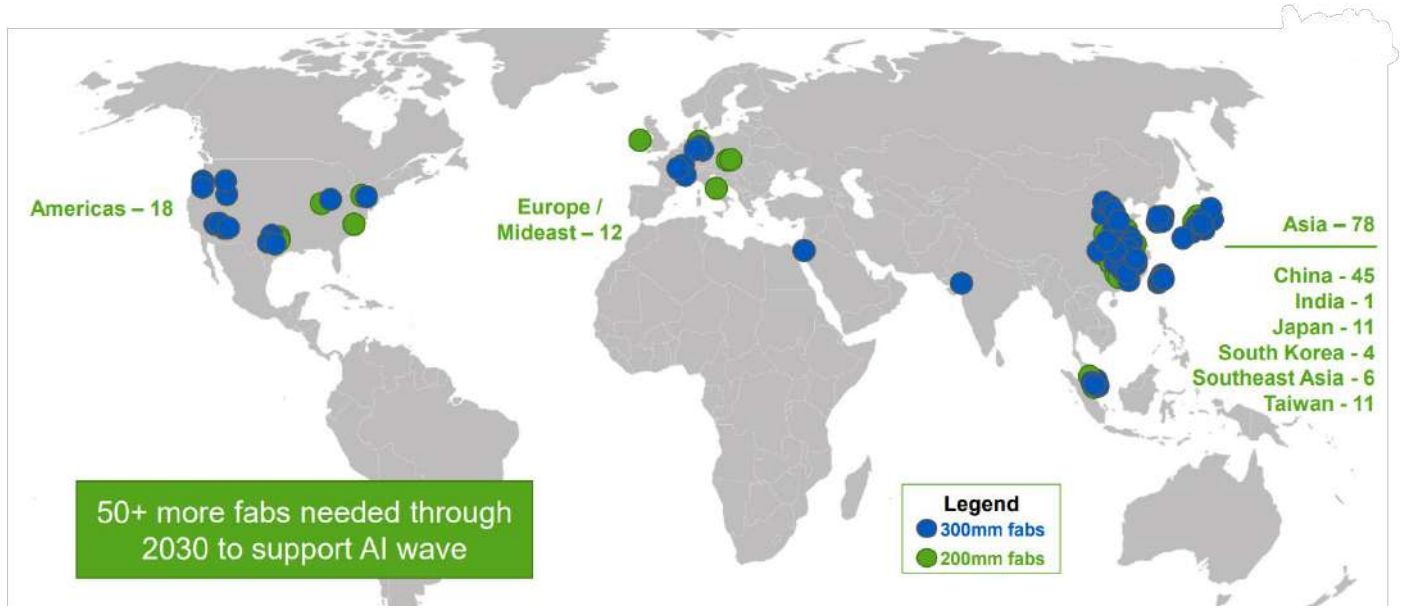
Source: McKinsey & Co., Markets and Markets research, GSMA, World Economic Forum, Allied Market Research, AMJC, and The White House

Exhibit 2: Semiconductor market forecast: Three waves of disruptions driving exponential growth to USD1t by CY30



Source: WSTS, Gartner, and SEMI Market Intelligence Team Forecast

Exhibit 3: Fab expansions to realize USD1t



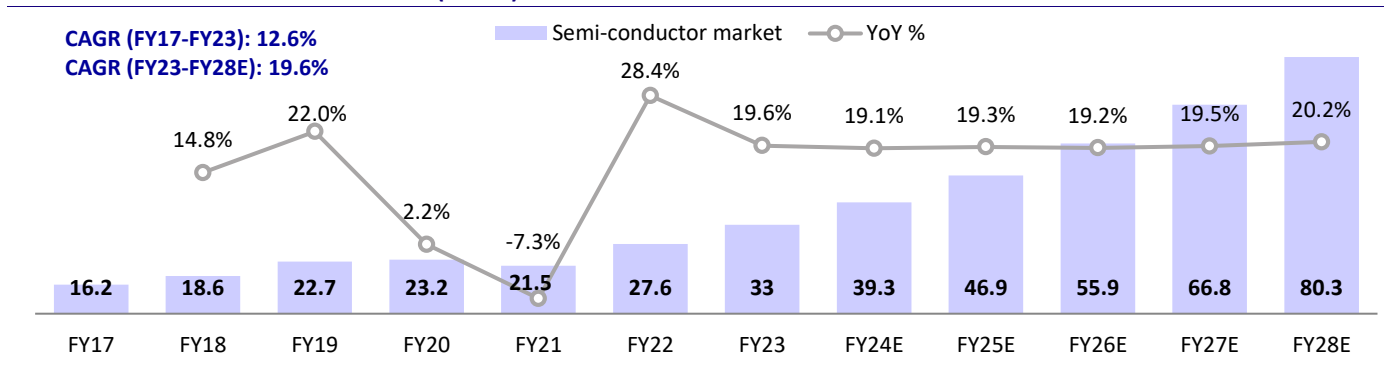
Source: SEMI World Fab Forecast 3Q24 (Sep'24)

Exhibit 4: FAB and OSAT investments planned in India

Scheme	Applicant	Total Project Cost (INR b)	Eligible Project Cost (INR b)	Approved Incentive (INR b)
Modified scheme for setting up semicon fabs in India	❖ TEPL (commercial fab)	915	680	340
Modified scheme for setting up compound semicon/silicon photonics/sensors fab and semicon/ATMP/OSAT facilities in India	❖ Micron Technology Inc. (ATMP)	225	225	113
	❖ TEPL (OSAT)	271	204	102
	❖ CG Power & Industrial Solutions Ltd. (ATMP)	76	70	35
	❖ Kaynes (OSAT)	33	33	17

Source: Industry, Company

Exhibit 5: India semiconductor market (USD b)



Source: Frost & Sullivan Analysis

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