



Cabinet This Week: India Semiconductor Mission

For Prelims: [Development of Semiconductors and Display Manufacturing Ecosystems in India](#), [Semiconductor Fab](#), [System on Chip \(SoC\)](#), [India Semiconductor Mission](#)

For Mains: The effects of semiconductor manufacturing facilities and the domestication of technology on the Indian economy.

Why in News?

Recently, the Union Cabinet chaired by the **Prime Minister of India** approved the establishment of three semiconductor units under [Development of Semiconductors and Display Manufacturing Ecosystems in India](#).

- All three units will start construction within the next **100 days**.

What are the Key Highlights?

▪ About:

- The Programme for Development of Semiconductors and Display Manufacturing Ecosystem in India was notified with a total outlay of **Rs. 76,000 crore**.
- The Union Cabinet had approved the proposal of Micron for setting up a **semiconductor unit** in **Sanand, Gujarat**.
 - Construction of this unit is progressing at a rapid pace and a robust semiconductor ecosystem is emerging near the unit.

▪ The Approved Three Semiconductor Units:

- **Semiconductor Fab with 50,000 wfsm (wafer starts per month) Capacity:** Tata Electronics Private Limited (TEPL) will set up a [semiconductor fab](#) in partnership with **Powerchip Semiconductor Manufacturing Corp (PSMC), Taiwan**.
 - **Investment:** This fab will be constructed in **Dholera, Gujarat**. Investment in this fab will be **Rs.91,000 crore**.
 - **Technology partner:** PSMC is renowned for its expertise in logic and memory foundry segments.
 - **Segments Covered:** High performance compute chips with 28 nm technology.
 - Power management chips for [Electric vehicles \(EV\)](#), telecom, defense, automotive, consumer electronics, display, power electronics, etc. Power management chips are high voltage, high current applications.
- **Semiconductor ATMP (Modified Assembly, Testing, Marking, and Packaging) unit in Assam:** Tata Semiconductor Assembly and Test Pvt Ltd ("TSAT") will set up a semiconductor unit in Morigaon, Assam.
 - **Investment:** This unit will be set up with an investment of **Rs.27,000 crore**.
 - **Technology:** TSAT semiconductor is developing indigenous advanced semiconductor packaging technologies including **flip chip** and **ISIP (Integrated System In Package) technologies**.

- **Capacity:** 48 million per day
- **Segments covered:** Automotive, electric vehicles, consumer electronics, telecom, mobile phones, etc.
- **Semiconductor ATMP unit for specialized chips:** CG Power, in partnership with Renesas Electronics Corporation, Japan and Stars Microelectronics, Thailand will set up a semiconductor unit in **Sanand, Gujarat**.
 - **Investment:** This unit will be set up with an investment of **Rs.7,600 crore**.
 - **Technology partner:** Renesas is a leading semiconductor company focussed on specialized chips. It operates 12 semiconductor facilities and is an important player in **microcontrollers, analog, power**, and **System on Chip ('SoC')** products.
 - **Segments covered:** The CG power semiconductor unit will manufacture chips for consumer, industrial, automotive and power applications.
 - **Capacity:** 15 million per day.

What is the Strategic Importance of Semiconductor Units?

- **Establishment of Semiconductor Ecosystem:**
 - The **India Semiconductor Mission** has achieved significant success in establishing a robust semiconductor ecosystem within a remarkably short timeframe.
 - These achievements mark a pivotal moment in India's journey towards becoming a key player in the global semiconductor industry.
- **Development of Chip Fabrication Capabilities:**
 - India boasts deep expertise in chip design, and with the establishment of these semiconductor units, the country is poised to develop formidable capabilities in chip fabrication.
 - This milestone not only enhances India's technological prowess but also positions it as a leading destination for semiconductor manufacturing.
- **Indigenous Development of Advanced Packaging Technologies:**
 - This approval heralds the indigenous development of advanced packaging technologies in India.
 - This achievement underscores the country's commitment to innovation and self-reliance in critical areas of semiconductor technology.
 - By fostering homegrown expertise in advanced packaging, India strengthens its position as a trailblazer in the semiconductor landscape.
- **Fostering Growth of Semiconductor Ecosystem:**
 - The successes of the India Semiconductor Mission pave the way for the organic growth of the semiconductor ecosystem in India.
 - These milestones signify a paradigm shift, propelling the nation towards greater self-sufficiency, technological innovation, and economic prosperity in the semiconductor domain.
- **Potential of the Employment Generation:**
 - These units will generate direct employment of 20 thousand advanced technology jobs and about 60 thousand indirect jobs.
 - These units will accelerate employment creation in downstream automotive, electronics manufacturing, telecom manufacturing, industrial manufacturing, and other semiconductor consuming industries.

What is the India Semiconductor Mission (ISM)?

- **About:**
 - The **ISM** was launched in **2021** with a total financial outlay of **Rs76,000 crore** under the aegis of the **Ministry of Electronics and IT (MeitY)**.
 - It is part of the comprehensive program for the development of sustainable **semiconductor and display ecosystems** in the country.
 - The programme aims to provide **financial support** to companies investing in semiconductors, display manufacturing and design ecosystem.
 - Envisioned to be led by **global experts** in the **Semiconductor and Display industry**, ISM will serve as the nodal agency for efficient, coherent and smooth implementation of the schemes.

▪ Components:

- **Scheme for setting up of Semiconductor Fabs in India:**
 - It provides fiscal support to eligible applicants for setting up of Semiconductor Fabs which is aimed at attracting large investments for setting up semiconductor wafer fabrication facilities in the country.
- **Scheme for setting up of Display Fabs in India:**
 - It provides fiscal support to eligible applicants for setting up of **Display Fabs** which is aimed at attracting large investments for setting up **TFT LCD / AMOLED** based display fabrication facilities in the country.
- **Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities in India:**
 - The Scheme provides a fiscal support of 30% of the Capital Expenditure to the eligible applicants for setting up of **Compound Semiconductors / Silicon Photonics (SiPh) / Sensors (including MEMS) Fab and Semiconductor ATMP / OSAT(Outsourced Semiconductor Assembly and Test) facilities in India.**
- **Design Linked Incentive (DLI) Scheme:**
 - It offers financial incentives, design infrastructure support across various stages of development and deployment of **semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design.**

What are the Challenges Regarding Development of Semiconductors?

- **Infrastructure Development:** Establishing semiconductor manufacturing units requires significant infrastructure, including reliable power supply, water resources, transportation networks, and skilled labor availability.
- **Supply Chain Management:** Developing a robust and efficient supply chain for semiconductor manufacturing is essential. Challenges include ensuring timely access to raw materials, managing logistics effectively, and minimizing disruptions in the supply chain.
- **Technology Upgradation:** The semiconductor industry evolves rapidly, necessitating continuous innovation and investment in research and development (R&D). Upgrading technology to keep pace with global standards poses a challenge, particularly in terms of funding and access to cutting-edge technologies.
- **Skilled Workforce:** Semiconductor manufacturing requires a highly skilled workforce proficient in areas such as chip design, fabrication, testing, and packaging. Challenges include a shortage of skilled professionals and the need for specialized training programs to meet industry demands.
- **Financial Support:** Setting up semiconductor manufacturing units entails substantial investment in infrastructure, technology, and talent. Securing adequate financial support, including subsidies, tax incentives, and access to affordable financing, poses a challenge for industry players.
- **International Competition:** The semiconductor industry is highly competitive globally, with established players dominating the market. Competing with international competitors, especially in terms of technology, pricing, and market share, presents a significant challenge for Indian semiconductor manufacturers.

How do Other Nations Support Domestic Semiconductor Manufacturing?

- Semiconductor manufacturing units will need private sector investment along with the Government subsidy.
 - The **US** is providing a **USD 3.5 billion subsidy** to their domestic semiconductor manufacturing units.
 - **Japan** is providing **USD 4.5 billion** to establish new semiconductor fab units.

Way Forward

- **Infrastructure Development for Semiconductor Manufacturing:** Governments and industry stakeholders should collaborate to invest in infrastructure development tailored to the needs of semiconductor manufacturing.
- **Advanced Supply Chain Management Practices:** Implementing advanced supply chain management practices, such as Just-In-Time inventory systems and strategic partnerships with suppliers, can enhance efficiency and resilience in the semiconductor supply chain.
- **Investment in Research and Development:** Encouraging investment in R&D and fostering collaborations between industry, academia, and research institutions can facilitate technology upgradation in the semiconductor sector.
- **Skilled Workforce Development:** Developing comprehensive training programs and educational initiatives focused on semiconductor technology can address the shortage of skilled professionals.
- **Financial Incentives:** Governments can provide financial incentives, such as tax breaks, subsidies, and low-interest loans, to attract investment in semiconductor manufacturing.
- **International Collaboration:** Collaborating with international partners can facilitate technology transfer, access to global markets, and knowledge sharing. Joint ventures, strategic alliances, and participation in industry consortia can help Indian semiconductor manufacturers compete effectively on the global stage.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. Which one of the following laser types is used in a laser printer? (2008)

- (a) Dye laser
- (b) Gas laser
- (c) Semiconductor laser
- (d) Excimer laser

Ans: (c)

Q. With reference to solar power production in India, consider the following statements: (2018)

1. India is the third largest in the world in the manufacture of silicon wafers used in photovoltaic units.
2. The solar power tariffs are determined by the Solar Energy Corporation of India.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (d)