



## Modified Incentive Scheme for Semiconductor Chip-Making

**For Prelims:** Semiconductors and Related Schemes, Chip-making Initiative, PLI Scheme, DLI Scheme, Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECs), Internet of Things (IoT).

**For Mains:** Significance of Semiconductor Devices in Indian Economy, Semiconductors and their Future in India.

### Why in News?

Recently, the **Centre approved changes to the scheme for the development of a semiconductor and display manufacturing ecosystem in the country in order to make India's \$10 billion chip-making initiative more attractive to investors.**

### What are the Approved Changes to India's Chip-making Scheme?

#### ▪ Background:

- In 2021, India announced its roughly **\$10 billion dollar Production-Linked Incentive (PLI) scheme to encourage semiconductor and display manufacturing** in the country.
- Also, a **Design-Linked Initiative (DLI) scheme to drive global and domestic investment** related to design software, IP rights etc. was announced.

#### ▪ Changes:

- **Uniform 50% Fiscal Support:** In the previous version of the scheme, the Centre was offering to fund 30% of the project cost for 45nm to 65nm chip production, 40% for 28nm to 45nm, and 50% or half of the funding for chips 28nm or below. The modified scheme provides **uniform 50% fiscal support for all nodes.**
- **Setting-up of New Semiconductor Plants: Vedanta** and Taiwanese chipmaker Foxconn have signed a Memorandum of Understanding (**MoU**) to set up a ₹1,54,000 crore **semiconductor plant in Gujarat.**
- **Two other projects have also been announced:**
  - **A \$3 billion plant in Karnataka** by the International consortium **ISMC.**
    - ISMC is a joint venture between Abu Dhabi-based Next Orbit Ventures and Israel's Tower Semiconductor.
  - **A \$3.5 billion plant in Tamil Nadu by Singapore's IGSS Ventures.**
- **Production of the 45nm Chip:** The modified scheme also **emphasised** the production of the 45nm chip, which is **fairly less time-consuming and economical in terms of production.**
  - These chips have **high demand, driven primarily by automotive, power and telecom applications.**

#### ▪ Significance:

- The changes will lead to the **harmonisation of government incentives for all technology nodes of semiconductors.**
- It will encourage all areas of chip-making to **create an integrated ecosystem in India.**

- PLI and DLI schemes had attracted many global semiconductor players for setting up semiconductor fabrication plants (fabs) in India and the **modified programme would further expedite these investments and bring in more applicants.**
- **Associated Concern:**
  - Although the scheme is an encouraging move, chip production is a **resource-intensive and expensive process.** The new scheme **provides equal funding** for all steps of the process. **However, the outlay of the scheme remains \$10 billion.**
  - It requires an **investment of anywhere between \$3 and \$7 billion to just set up one semiconductor fab.**

## What are Semiconductor Chips?

- **About:**
  - **Semiconductors** are materials which have a **conductivity between conductors and insulators.**
  - They can be pure elements, **silicon or germanium** or compounds; **gallium, arsenide or cadmium selenide.**
  - The **basic component of a semiconductor chip is a sliver of silicon, which is etched with billions of microscopic transistors** and projected to specific minerals and gases, forming **patterns to control the flow of current** while following different computational instructions.
  - The **most-advanced semiconductor technology nodes** available today are the **3 nm and the 5 nanometer (nm) ones.**
  - Semiconductors having **higher nanometer value are applied in automobiles, consumer electronics and so on,** while those with **lower values are used in devices such as smartphones and laptops.**
  - **The chip-making Process** is complex and highly exact, having **multiple other steps in the supply chain** such as **chip-designing** done by companies to develop new circuitry for use in appliances, **designing software for chips and patenting them through core [Intellectual Property Rights \(IPR\).](#)**
    - It also **involves making chip-fabrication machines; setting up fabs or factories; and ATMP.**
- **Significance:**
  - Semiconductors are the thumbnail-sized **building blocks of almost every modern electronic device** from smartphones to connected devices in the **[Internet of Things \(IoT\).](#)** They help give computational power to devices.
- **Global Scenario:**
  - The chip-making industry is a **highly-concentrated one,** with the big players being Taiwan, South Korea and the U.S. among others. Infact, **90% of 5nm chips are mass-produced in Taiwan,** by the Taiwan Semiconductor Manufacturing Company (TSMC).
  - Therefore, the **[global chip shortage, U.S.-China tensions over Taiwan,](#)** and the **supply chain blockages owing to the [Russia-Ukraine conflict](#)** have **led major economies to enter the chip-making sector with a renewed push.**
  - The **global semiconductor industry is currently valued at \$500-\$600 billion** and caters to the **global electronics industry** currently valued at about **\$3 trillion.**
- **Indian Scenario:**
  - **India currently imports all chips** and the market is estimated to touch \$100 billion by 2025 from \$24 billion now. However, for the domestic manufacturing of semiconductor chips, **India has recently launched several initiatives:**
    - The Union Cabinet has allocated an amount of ₹76,000 crore for supporting the development of a **'semiconductors and display manufacturing ecosystem'.**
    - India has also launched the **[Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors \(SPECS\)](#)** for manufacturing electronics components and semiconductors.
    - In 2021, the MeitY also launched the **Design Linked Incentive (DLI) Scheme** to nurture at least 20 domestic companies involved in semiconductor design and facilitate them to achieve a turnover of more than Rs.1500 Crore in the next 5 years.
  - India's own consumption of semiconductors is **expected to cross \$80 billion by 2026**

and to \$10 billion by 2030.

## What can be the Way Ahead for India's Semiconductor Dream?

- Though India is focusing on “**lagging-edge**” technology nodes in the start to supply to the automotive and appliance sector, **creating global demand may be difficult as big players like Taiwan offer viable cutting-edge chip-tech worldwide**. Thus, **attracting global players to set up here would be beneficial** as they come with their customer base.
- Much of the current scheme outlay could be allocated to supporting other elements including display fabs, packaging and testing facilities, and chip design centres. However, the **initial funding should focus on areas like design and R&D**, for which India already has an established talent pool.
- Chip-making also **requires gallons of ultrapure water in a single day**, which could be a task for the **government to provide to factories, compounded also by the drought conditions** which often prevail in large parts of the country.
  - Besides, an uninterrupted supply of power is central to the process, with just seconds of fluctuations or spikes causing millions in losses.
- Another task for the government is to **drive up consumer demand in the semiconductor industry** to not end up in a situation where these ventures remain successful only till taxpayers are forced to fund required subsidies.

### UPSC Civil Services Examination, Previous Year Question (PYQ)

**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)**

**Exp:**

- Silicon wafers are thin slices of semiconductor, such as a crystalline Silicon (c-Si), used for the fabrication of integrated circuits and, in photovoltaics, to manufacture solar cells. China is by far the world's largest producer of Silicon, followed by Russia, the United States, and Brazil. India does not figure among the top five producers of Silicon and Silicon wafers. **Hence, statement 1 is not correct.**
- Solar tariffs are determined by the Central Electricity Regulatory Commission and not by Solar Energy Corporation of India. **Hence, statement 2 is not correct.**
- **Therefore, option D is the correct answer.**

**Source: TH**

