SEMICONDUCTOR INDUSTRY IN INDIA - ECONOMY

The Union Cabinet approved 4 new semiconductor projects in Odisha, Punjab, and Andhra Pradesh under the India Semiconductor Mission (ISM), bringing the total to 10 projects across 6 states.

Key Trends and Opportunities in India's Semiconductor Market

Expanding Market Size

India's semiconductor consumption market is valued at USD 52 billion in 2024-25, projected to nearly double to USD 103.4 billion by 2030, growing at a strong CAGR of 13%, making it one of the fastest-growing markets globally.

Sectoral Demand Drivers

Around 70% of India's semiconductor revenue comes from mobile handsets, IT, and industrial applications, while automotive electronics, EVs, and industrial automation represent rapidly emerging growth segments.

Dependence on Imports

India's imports of ICs, memory chips, and amplifiers have surged by 2,000%, 4,500%, and 4,800% respectively between FY16–24, with China supplying nearly one-third, highlighting India's vulnerability to supply-chain disruptions.

Global Industry Dominance

The semiconductor industry is currently dominated by Taiwan, South Korea, Japan, China, and the US, which collectively control design, foundry, and advanced manufacturing, making India a late entrant but a high-potential player.

Smartphone & 5G Opportunity

India is the world's second-largest 5G smartphone market, accounting for 13% global share, behind China (32%). This provides a huge domestic base for chip consumption and opportunities for localized manufacturing.

Domestic Demand Expansion

Rising adoption of AI, cloud computing, IoT, and 5G technologies in smartphones, laptops, EVs, and digital services is fueling strong demand for advanced and energy-efficient semiconductors.

Strengthening Ecosystem through Partnerships

India is entering strategic collaborations with global leaders (e.g., US, Japan, Taiwan) for technology transfer, R&D, and supply-chain resilience, enabling India to gradually integrate into global value chains.

Government Push via Semicon India Programme

Flagship schemes under Semicon India and the broader digitalisation drive provide fiscal incentives, infrastructure development, and industry-academia linkages, positioning India as a future hub for chip manufacturing and design.

India Semiconductor Mission (ISM)

About the Mission

Approved in 2021, the ISM is a strategic initiative under MeitY to establish India as a global hub in the electronics value chain, with a focus on semiconductors and display technologies.

Core Objective

To reduce import dependence, strengthen domestic design and manufacturing capacity, and build a resilient ecosystem covering the entire semiconductor value chain.

Mission Priorities

1. Setting up semiconductor fabrication plants (fabs) in India.
2. Creating Assembly, Testing, Marking, and Packaging (ATMP/OSAT) units to strengthen backend processes.
3. Supporting chip design startups with financial and technical assistance.
4. Training engineers and technical professionals in chip design, fabrication, and materials.
5. Attracting global semiconductor investments through policy support and incentives.

Key Schemes under ISM

Semiconductor Fabs Scheme

Up to 50% fiscal support for fabs engaged in wafer manufacturing.

Display Fabs Scheme

Up to 50% support for AMOLED and LCD fabs to promote India's display panel industry.

Compound Semiconductors & ATMP/OSAT Scheme

Support for specialized chips such as MEMS, silicon photonics, and sensors, along with packaging/testing facilities.

Design Linked Incentive (DLI) Scheme

Financial support up to ₹15 crore per company to encourage domestic chip design startups and MSMEs across the design-to-product cycle.

Other Initiatives to Promote India's Semiconductor Industry

Production Linked Incentive (PLI) Scheme

Incentivizes large-scale electronics manufacturing and IT hardware, making India cost-competitive in exports.

SPECS Scheme

Provides incentives for manufacturing electronic components and semiconductors, strengthening the domestic supply chain.

Electronics Manufacturing Clusters (EMC & EMC 2.0)

Develop specialized clusters with world-class infrastructure to support the electronics and semiconductor ecosystem.

Public Procurement (Preference to Make in India) Order, 2017

Mandates preference for domestically manufactured semiconductor-based products in government purchases.

Tax Reforms

Includes tariff rationalization, duty exemptions on capital goods, and fiscal support for R&D and infrastructure.

FDI Policy

Allows 100% foreign direct investment (FDI) in electronics and semiconductor manufacturing, encouraging global players to set up bases in India.

Key Challenges to India's Semiconductor Industry

Infrastructure & Technological Barriers

Semiconductor fabrication requires 500–1,500 complex steps in highly controlled cleanroom environments, demanding advanced infrastructure, which India currently lacks at scale.

High Costs of Fab Setup

Setting up a single fab requires USD 5–10 billion investment, and coupled with India's limited R&D ecosystem, it creates dependency on foreign IP and equipment.

Skilled Workforce Shortage

India employs ~220,000 professionals in semiconductors, but faces a projected shortfall of 250,000–350,000 skilled workers by 2027, spanning design, fabrication, testing, and packaging.

Global Competition

Taiwan and South Korea control ~80% of chip foundries, while ASML (Netherlands) dominates EUV lithography, and firms like Nvidia and ARM dominate chip design, leaving India at a disadvantage in core technologies.

Environmental Challenges

Semiconductor manufacturing uses toxic chemicals, metals, and huge water and energy resources, leading to environmental risks and compliance burdens.

Policy and Regulatory Hurdles

Complex regulations, IP disputes, export controls, and policy uncertainty deter long-term investments in India's nascent semiconductor ecosystem.

Steps India Should Take to Strengthen Semiconductor Industry

Skill Development

Establish specialized institutes, courses, and training programs in semiconductor design, fabrication, packaging, and testing to bridge the talent gap and create a future-ready workforce.

Boost R&D and Indigenous IP

Increase public and private investment in semiconductor research, promote indigenous IP creation, and enable startups/MSMEs to scale innovations for global competitiveness.

Incentives and Policy Support

Strengthen schemes under ISM, expand state-level policies like UP Semiconductor Policy 2024, and ensure policy stability to attract long-term global investments.

Chip Diplomacy

Use strategic partnerships with US, Japan, Taiwan, and EU for technology transfer, joint R&D, and supply-chain security, while positioning India as a neutral and reliable alternative to China.

Focus on Niche Segments

Instead of competing head-on with Taiwan/South Korea, India can specialize in MEMS, sensors, compound semiconductors, and AI chips, aligning with domestic needs and global trends.

Private Sector Participation

Encourage domestic industry leaders like Tata Electronics, Vedanta, HCL to collaborate with foreign partners (e.g., Tata-PSMC fab in Gujarat) for technology and infrastructure development.

Geopolitical Leverage

Capitalize on US-China trade tensions and global supply-chain diversification strategies to position India as a trusted semiconductor partner.

Conclusion

India's semiconductor market is poised for exponential growth, supported by domestic demand, global partnerships, and government incentives. Flagship initiatives like India Semiconductor Mission (ISM), PLI, SPECS, and Semicon India are laying the foundation for a robust ecosystem. However, challenges such as infrastructure gaps, workforce shortages, high costs, and global competition must be strategically addressed. By investing in skills, R&D, niche technologies, and international collaborations, India can transform from being a large consumer of semiconductors to becoming a key global hub for chip design and manufacturing.

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