

The India edge: U.S. industries catalysing the growth trajectory



May 2023

Foreword

India today stands at a global vantage point. The world's most populous country with an increasingly open economy and a strong technology sector has demonstrated the potential to operate at scale with skill. The energies and aspirations of its industries and citizens, coupled with the investor friendly reforms are helping drive its near-term ambition of becoming the third largest economy by the turn of this decade.

Strong ambitions often require like-minded partners to achieve and this partnership has stood the test of time, geopolitics and economics, to emerge even more vibrant and resilient. The U.S.- India dynamic needs little substantiating with both countries at the threshold of a closer, more strategic relationship than at any point in the past.

Emergence of U.S. as India's largest trading partner marks an important shift from historical trading partners like China, at the back of an integrated value chain that both countries share with each other across industries. The vibrancy of the Indian economy presents U.S. companies with unparalleled opportunities to trade, invest and grow -- and the jobs they create in India act as a multiplier to the economy, be it in manufacturing or the services sector.

India has made significant strides on ease of doing business which has reinvigorated the

business sentiment among global investors. The foundational spade work is in place on both ends to race forward towards a joint ambition of USD500 billion in trade over the coming years.

Indian companies are gradually also becoming active in the global supply chain of U.S. companies. They are much better placed today to explore collaboration in cutting edge technologies, including sectors of national interest. The recent initiative on Critical and Emerging Technology (iCET) has the potential to take the bilateral collaboration to the next level, especially around establishing trusted and secured supply chains.

Leadership will be the defining focus of this partnership and with India's premiership at the G20, we probably have all the soundings of able leadership to accelerate into a brighter economic, cultural and political future for our two nations. The announcement of the new U.S. ambassador to India is expected to further strengthen the diplomatic relations between the world's two largest democracies.

KPMG in India is proud to collaborate with AMCHAM India to share a perspective on India's economy and the role of U.S. companies in catalyzing the next level of the growth trajectory.



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No better time to invest in...

India

Hotspot for foreign investments

- India received around **USD84 billion** in FY22 as FDI across sectors, with the U.S. being the second largest investor since FY21
- Until August 2022, India received **811 industrial investment proposals** of about USD43 billion

Unprecedented growth in exports

- India's overall exports are expected to touch **USD 770 billion** in FY23, an increase of 13.8 per cent from FY22
- India's Foreign Trade Policy 2023 aims to make the country an export hub with **USD2 trillion exports** targeted by 2030

Greater ease of operability

- India has been taking multiple steps to enhance ease of doing business in the country which is attracting foreign investors
- To enhance the ease of doing business more than **39,000 compliances** have been reduced and over **3,400 legal provisions** decriminalised

Manufacturing 2.0

- Government has enacted proactive policy measures which is drawing in private sector investments and driving the adoption of digital technologies
- In FY21 alone, the spend on Industry 4.0 by India's manufacturing sector was between **USD5.5 billion to USD6.5 billion**

Thrust on bilateral partnerships

- India is part of **13 Free Trade Agreements (FTAs)** and six Preferential Trade Agreements (PTAs), with three of the FTAs signed over the past six years
- The FTA partnerships are helping the country drive both its exports and imports

Leveraging the G20 presidency

- Push the agenda on factors such as cross border trade and movement of goods
- Drive **cross border trade** settlements in India's currency, especially with countries facing issues with a particular currency/currency basket

U.S.-India collaboration

Bilateral trade - the frontrunner

- In FY23, the U.S. became the largest trade partner for India, with bilateral trade reaching **USD191 billion**
- Increasing efforts to **encourage trade through commercial dialogue 2023** and investment policies, including MSMEs, start-ups along with strengthening the supply chain ecosystem

Technology - Harbinger of success

- A stronger Indo-U.S. collaboration through **iCET 2023** has been proposed by the U.S.
- National Science Foundation (NSF), in partnership with the government of India, focuses on AI, semiconductor, clean energy, quantum, cyber security, biotechnology and defence among others

Buoyant cross border M&A market

- While M&A activity was muted in most parts of the world, India's strategic deal volumes and value increased in 2022
- **U.S. entities** are taking keen interest in the Indian market with an **increasing** participation in the number of **M&A deals**

Preferred GCC destination

- India is a preferred location for companies looking to **establish Global Capability Centres (GCCs)**, with U.S. companies leading the charge
- Nearly **58 per cent** of new and existing GCCs in India in Q4 2022 were **from U.S.-headquartered** companies

Global R&D hub

- India is increasingly becoming a preferred global R&D hotspot, with its skilled workforce and domestic demand being market drivers
- Several U.S.-based companies from sectors such as healthcare, semiconductors, and technology are choosing **India as their largest R&D base outside the U.S.** which shows their confidence in India's evolving landscape

Promising alternate in global supply chains

- As part of reducing their reliance on China, various **U.S. companies** are **setting up** their manufacturing **facilities in India**
- The Indian government is also providing a thrust to domestic manufacturing through initiatives such as **Production Linked Incentive (PLI)** scheme which in turn is driving job creation

Advantage India



Bigger.Better.Bolder

The Indian economy amid global headwinds is expected to rebound after showing significant improvements and remains a beacon of growth at USD3.5 trillion¹ economy. The country is projected to be the fastest growing economy in Asia and one of the fastest in the world by the International Monetary Fund (IMF), with a forecasted growth rate of 5.9 per cent in FY24 and 6.3 per cent in FY25². While most large economies in the world are likely to be hit in 2023, India is expected to escape it largely and continue its growth due to its diversified economy, growing foreign investments, trade, productivity gains and the growing consumption in the domestic market. India also has a diversified range of trading partners and slowdown in any one region / country may not impact the trade largely. The production structure in India is also diversified and is not dependent only on few products, commodities or natural resources.

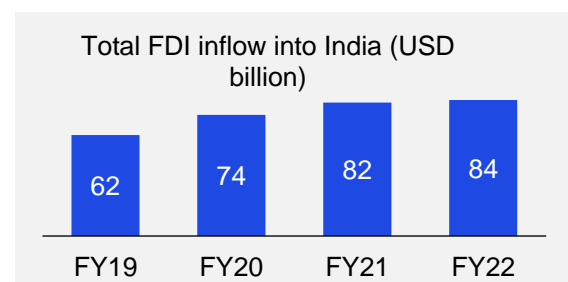
Despite disruptions, the government is focused on accelerating growth. For instance, increase in capex, improving ease of doing business, introduction of green bonds, setting up of digital banks in districts and Emergency Credit Line Guarantee Scheme (ECLGS) to MSMEs in the Union Budget depicts the intention of the government to drive sustained economic growth. The government has various economic and comprehensive packages like Make in India, Credit Guarantee Scheme, Mega Investment Textiles Parks (MITRA), National Hydrogen Energy Mission, Digital India, along

with various structural reforms in the economic policy like higher FDI limits that bring growth across sectors. India has improved ease of doing business by reduction of over 39,000 compliances and decriminalisation of over 3,400 legal provisions³. There is also an easing of FDI restrictions across sectors along with infrastructure support for starting a new business. Currently, customs duty re-alignments across sectors as part of the Budget 2023-24 is aimed at driving domestic manufacturing and crowd in investments from domestic and foreign players.

Factors shaping India's growth

Domestic and foreign investments

India is seeing increasing confidence among domestic and foreign investors, with its unique value proposition, rapid internet penetration and 5G adoption, and attractive investment policies. Currently, there are about 5,068 foreign companies⁴ registered in India (Registrar of Companies, RoC) as of 2022.



Source: "India gets the highest annual FDI inflow of USD 83.57 billion in FY21-22", Ministry of Commerce & Industry, PIB, 20 May 2022

¹ India's nominal GDP to be USD 3.5 trillion by end-March: Economic Survey, The Economic Times, 31 January 2023, as accessed on 21 April 2023

² IMF cuts India GDP for FY24 to 5.9%, Times of India, 12 April 2023, as accessed on 21 April 2023

³ Ease of doing business, Make in India, as accessed on 21 April 2023

⁴ Government says 3,291 foreign companies active in India till September 2022, The Economic Times, 19 December 2022, as accessed on 21 April 2023

U.S. is the 2nd largest FDI investor in India from FY21 to FY23 (Apr – Dec 2022)

~USD5 billion invested in Apr – Dec 2022

FDI equity inflow from the U.S. grew at a CAGR of

49.8 per cent during FY18 – FY22 period

Involvement of U.S. entities in M&A deals in India

increased to **~352 deals** in 2022 from ~120 in 2018

Source: QUARTERLY FACT SHEETS, DPIIT, as accessed on 14 April 2023; M&A deal volumes sourced from Mergermarket as on 14 April 2023

Focus on workforce skilling and technology integration

Policy makers in India have started emphasising on skill creation to make about 90 million people employable by 2030⁵. Most of the jobs are expected to be created in the manufacturing and construction sectors. The government of India runs various skilling programmes that enhance employability and entrepreneurship, such as, imparting engineering skills to drop-out students, establishing Skill Knowledge Providers (SKPs), Employability Enhancement Training Programme (EETP) etc. along with various corporate upskilling and job-creation initiatives being led by companies. A U.S.-based technology company is developing a digital learning platform aligned with the government's Skills India initiative for imparting coaching in digital technologies and other professional skills.

With about half a billion internet users⁶, India has a growing market for digital services, platforms, applications and solutions. The country represents a lucrative opportunity for domestic and global businesses, entrepreneurs and start-ups to invest in emerging technologies like drones, blockchain, AI/ML. Some of the key government initiatives include reaching remote areas with 4G, growth of 5G, Unified Payments Interface (UPI) and digital public infrastructure. There has also been a huge increase in digital payments at a CAGR of 39 per cent from FY20 to FY22⁷. This growth will be further expanded with the joint efforts being made by various U.S. and global firms. For instance, a multi-million-dollar

investment plan from a U.S.-based fintech firm to expand its operations and research and development capabilities in the country. The iCET 2023 is also expected to deepen India-U.S. partnership on developing a secured technology ecosystem. Some areas that iCET 2023 will focus on are developing innovative defence technology, resilient semiconductor supply chains and strengthening bilateral commercial space partnership facilitated through talent and research exchanges.

Start-up ecosystem

With over 77,000 start-ups across the country, as of August 2022, India is the third largest start-up ecosystem globally⁸. A growing start-up ecosystem with about 107 unicorns in 2022⁹ and a large young workforce are aiding growth. The current geopolitical scenario in India has also supplemented the start-up growth and about 30 per cent¹⁰ of them have crossed national boundaries to make a global footprint. Many U.S. based multinational enterprises (MNEs) have invested in the robust tech start-up ecosystem comprising 8 per cent¹¹ of M&A deals as of 2021. Most deals were aimed at market entry and access to local innovation. For instance, a U.S.-based venture capital (VC) firm engaged in multiple investment deals in 2022, being one of the largest investors in India's start-ups. Additionally, Government of India launched Supporting Entrepreneurs in Transformation and Upskilling (SETU) in September 2022 to connect start-ups with U.S. investors along with mentorship and assistance for start-up leaders in various areas including funding, market access and commercialisation.

⁵ Over 90 million to join workforce by 2030! India ups ante in digital skilling as govt approves Rs 436 crore outlay, Financial express, 18 December 2019, as accessed on 21 April 2019

⁶ India to have around 900 million internet users by 2025: report, Mint, 29 July 2022, as accessed on 24 April 2023

⁷ "Transforming India's Digital Payment Landscape", Ministry of Finance, PIB, 3 October 2022, as accessed on 14 April 2023

⁸ "The Indian Unicorn Landscape", Invest India, 7 September 2022, as accessed on 14 April 2023

⁹ "The Indian Unicorn Landscape", Invest India, 7 September 2022, as accessed on 14 April 2023

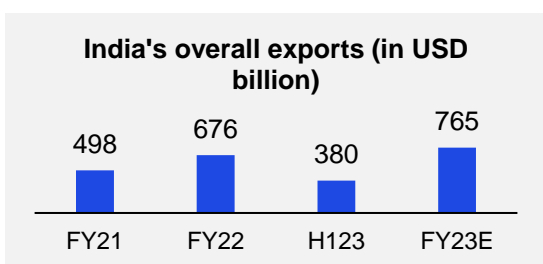
¹⁰ It Is Time For Indian Startups To Go Global, Entrepreneur India, 16 January 2023, as accessed on 24 April 2023

¹¹ World Investment Report 2022, UNCTAD, 9 June 2022, as accessed on 12 April 2023

Export promotion

India today is exploring a new trade agenda due to various global events of supply chain crisis like COVID-19, Russia-Ukraine war, and trade tensions between U.S. and China.

India's Foreign Trade Policy 2023 (FTP) lays a stronger focus on exports and ease of doing business for exporters to enable merchandising. Furthermore, FTP 2023 coupled with the country's G20 Presidency position, is likely to boost trade and help achieve the growth target of the economy.



Source: India's Services exports set a new record of USD 254.4 Billion in FY 2021-2022, beats previous high of USD 213.2 Billion in 2019-20, Press information Bureau, Government of India, 04 May 2022; At USD 254 bn, India's services export sets new record in FY22, ET Now, 04 May 2022; All accessed on 21 April 2023

Manufacturing 2.0

Positive developments like capacity expansion, more foreign investments, government policy support, increased M&As coupled with technology will play a pivotal role in productivity and overall output for the sector. Another competitive advantage for the sector in India is its skilled workforce and low cost of labour. With increased inflow of capex, exports from the sector have increased multi fold. In 2023, a U.S. packaged food manufacturer announced plans for a multi-billion-dollar investment to upgrade its production capacity in the country. With the changing manufacturing and trade dynamics, supply chains are reshaping across industries and geographies. With advent of growing geopolitical tensions, companies started outsourcing their functions to India for offshoring and nearshoring. For instance, in

FY23, a U.S. technology company reported **multi-fold growth in exports of mobile phones**, which were manufactured in India.

Tax reforms to drive competitiveness

Government of India has been on the path of continuous reforms with the objective of bringing consistency and stability. There have been significant strides in ease of doing business, lower tax rates, easing of compliances, simplification of processes, and fiscal/non-fiscal incentives which have put India at a vantage point. Aided by the buoyancy in tax collections, the underlying theme of the finance ministry has been one of empowerment – to both the industry and the common man.

There have been concerted efforts on building a competitive and simplified tax rate structure. Corporates will continue to have an optional concessional rate of 22 per cent and a lower baseline rate of 15 per cent is extended for new manufacturing companies. The government is also doing its bit to incentivise the flagship programs. India's first International Financial Services Centre (IFSC), the Gujarat International Finance Tec-City (GIFT City) continues to gain interest with many capital market intermediaries registering their operations. While IFSC units enjoy a 10-year tax holiday, the proposed change of Offshore Derivative Instruments (ODIs) to a valid contract if issued by an offshore banking unit has the potential to draw further investor interest and boost confidence. These initiatives are creating interest among the U.S. organisations which are increasingly looking at India when it comes to new investments as well as diversifying the existing ones. Steps are also being taken to streamline the tax administration, litigation and tax collection mechanism to reduce burden on the judiciary as well as provide much needed relief for taxpayers. The government has been on the path of continuous reforms by taking proactive measures to ensure India remains on top of mind for foreign investors.

Growth of GCCs

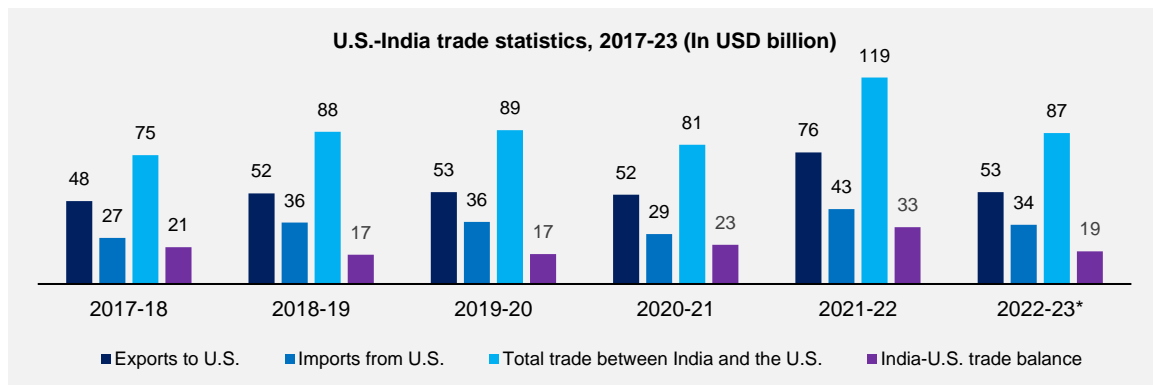
India has been observing a significant increase in Global Capability Centres (GCCs). As per a report published by NASSCOM in Q32022, about 60 per cent¹² of the new GCCs in India are across software and internet verticals. Nearly 76 per cent¹³ of the new GCCs are from U.S. based MNCs. These captives help companies drive cost efficiencies, lead innovations, leverage technology and boost delivery quality. These GCCs reflect work cultures of their headquarters and allow workforce in India to enjoy similar work life balance and other benefits. Among major drivers, available digital talent, startup maturity and peer GCC ecosystem lead growth.

Partnership with the U.S.

India and U.S. have been cooperating on a gamut of areas including IT, logistics, AI, space

exploration, cyber security and allow manufacturers to access and share technologies. As per data from the Indian Ministry of Commerce, U.S.-India bilateral trade crossed USD191 billion¹⁴ in FY23, with exports from India dominating imports. Both nations are expected to collaborate intensively in sectors like defence, technology, clean energy and space.

Through U.S.-India commercial dialogue in March 2023, both nations shared a focus on emerging areas of their bilateral commercial partnership. The partnership is also expected to increase investments across sectors, create opportunities for domestic manufacturing in India, build resilient supply chains, elevate technology partnerships, digital growth, clean technology along with various other engagements.



Source: "India-US Collaborate to Bolster Supply Chains, Enhance Trade Ties", India Briefing, 16 January 2023, as accessed on 14 April 2023

¹² "India GCC Trends Quarterly Analysis Q3CY2022", Publications, NASSCOM, November 2022, as accessed on 14 April 2023

¹³ "India GCC Trends Quarterly Analysis Q3CY2022", Publications, NASSCOM, November 2022, as accessed on 14 April 2023

¹⁴ "India-US goods & services trade doubled since 2014, surpasses \$191 bn", Business Standard, 10 March 2023, as accessed on 14 April 2023





Partners for growth: Sectors and related opportunities

- **Manufacturing**
- **Electronics System Design and Manufacturing (ESDM)**
- **Pharma & Medical Devices**
- **Technology**
- **Energy**
- **Aerospace & Defence**



02

Manufacturing



Manufacturing

Key takeaways

- The manufacturing sector in India is steered towards consistent growth. This growth is primarily driven by government initiatives like Make in India, Digital India and incentives like PLI
- Among megatrends, rise in public and private capex, free trade agreements and government schemes and reforms play a vital role
- For growth in the Indian manufacturing space, U.S. OEMs can look at various sectors that are expected to have a huge growth in next 3-5 years, such as industrial machinery, chemical, textiles and apparels and automotive

Global manufacturing supply chains have witnessed turbulence over the last few years owing to pandemic, geopolitical strains and the Russia-Ukraine conflict, which in turn have led manufacturing companies to rethink their supply chain strategies. India, due to its government support, favourable demographics and development of a robust infrastructure, is well placed to capitalise on the changing market dynamics and emerge as a global manufacturing hub. India's manufacturing sector, with 16-17 per cent¹⁵ contribution to GDP, plays a critical role in the country's economy.

5 million + manufacturing establishments	30 million + people employed (organised and unorganised)	Merchandise exports of USD447 billion ¹⁶ in FY23, YoY growth of 6 per cent	FDI equity inflow worth USD21.3 billion ¹⁷ in FY22, YoY increase of 76 per cent	Potential to contribute more than USD500 billion ¹⁸ to the global economy by 2030.
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Source: Manufacturing Sector in India, India Brand Equity Foundation, accessed on 13 April 2023; Quick Estimates of Merchandise Trade, Ministry of Commerce and Industry, 13 April 2023

¹⁵ Manufacturing Sector in India, India Brand Equity Foundation, accessed on 13 April 2023

¹⁶ India – A 1 trillion manufacturing export market by 2030, mint, 01 December 2022, accessed on 13 April 2023

¹⁷ FDI Policy, Invest India, accessed on 14 April 2023

¹⁸ Manufacturing Sector in India, India Brand Equity Foundation, accessed on 13 April 2023

Though the changing macro-economic situation due to recessionary and inflationary pressure had an impact on the global investment, the fundamentals of the sector remains robust. As per the March 2023 FICCI Manufacturing Survey, the average capacity utilisation stood at 75 per cent¹⁹ which indicates a sustained performance in the sector. The country also has a competitive advantage of low labour cost which coupled with favourable megatrends and strong government support to promote manufacturing, makes India a favourable manufacturing destination. For instance, India had an average manufacturing labour cost per hour of USD2.3²⁰ in 2022, which is at a competitive level in comparison to other regions such as Vietnam and China. As of 2022 data from the International Labour Organization, the labour productivity growth rate for India was 3.1 per cent²¹, which is at par with that of China (3.4 per cent) and higher than countries such as Indonesia (2.8 per cent), the Philippines (1.2 per cent) and Malaysia (2.7 per cent).

A strong focus is also seen towards digitisation in the Indian manufacturing sector, with a spend of over USD5.5 billion in Industry 4.0 initiatives in FY21²². A major part of this investment was from manufacturers in sectors such as automotive, electronics and electricals. Over the coming year, there is also a focus from companies towards increasing investments in technologies such as remote-controlled monitoring and automation.



*Note: Value has been converted from INR to USD using the conversion rate: 1INR = 0.012USD

¹⁹ Growth continues in Q-4 supported by better capacity utilisation and investment outlook: FICCI Manufacturing Survey, FICCI, 13 March 2023

²⁰ EIU data, as accessed on 26 April 2023

Key trends impacting India's manufacturing sector

Rise in public and private sector capex:

With an aim to improve the country's infrastructure and play a critical role in the global supply chain, the Government of India, in the Union Budget 2023-24 increased the infrastructure related capital spending by 33 per cent. This in turn will help manufacturers reduce the logistics cost significantly, thereby improving their cost competitiveness. Along with the public sector investment, there is a continuous rise in the private sector capex to create additional capacities. As per Centre for Monitoring Indian Economy (CMIE), the average quarterly new investment proposals from private sector were USD54 billion* (INR4.5 trillion) in the first three quarters of 2022, as compared to USD28 billion* (INR2.3 trillion) and USD17 billion* (INR1.4 trillion) in 2021 and 2020, respectively.²³

Foreign trade and exchange controls:

With an objective to boost bilateral trade and promote exports, India signed free trade agreements with Australia (India-Australia Economic Cooperation and Trade Agreement) and UAE (India-UAE Comprehensive Partnership Agreement) in 2022. Furthermore, the country is in discussion with EU, Gulf Cooperation Council (GCC), Israel and the UK for trade agreements which might see success in the near future. United States Trade Representative (USTR) is working with the Ministry of Commerce in India towards opening-up key sectors across both markets.

Favourable government policies:

The government efforts have grown manifold over the last few years to provide an enabling environment to manufacturers in India. Some of the favourable policies that are paving the path for sector growth include:

²¹ Annual growth rate of output per worker (GDP constant 2017 international USD at PPP), in per cent, ILO, as accessed on 26 April 2023

²² "India Industry 4.0 Adoption", NASSCOM, February 2022, as accessed on 26 April 2023

²³ Private enterprise drives new projects, CMIE, 2 October 2022

<p>PLI schemes</p> <p>Launched in 2020, these schemes provided a budget outlay of USD27 billion for 14 sectors with an aim to attract investments, scale up domestic capacity, reduce import dependence and boost exports. These schemes are anticipated to generate employment for 6 million people.</p>	<p>Development of Enterprise and Service Hubs (DESH) Bill</p> <p>In 2022, the bill was proposed to revamp the existing Special Economic Zone (SEZ) laws and provide a necessary fillip to the manufacturing sector. It will facilitate increased access for companies to the domestic market and reduce several fiscal deterrents under the current regime. This revamped policy, once legislated, supported by the PLI schemes will allow foreign companies to expand supply chain strategies in India.^{24,25}</p>	<p>Labour reforms</p> <p>In 2022, the government formulated 29 central laws under four labour codes. The new framework, once introduced will benefit both the industry players (fixed-term employment contracts offers flexibility in hiring workers) and the labour force (reskilling programmes).²⁶</p>
<p>Skilling initiatives</p> <p>The launch of Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 4.0 will include establishment of 30 Skill India international centres and a unified Skill India digital platform to enable demand-driven formal skilling with a focus on courses such as Industry 4.0 and IoT.²⁷</p>	<p>National Logistics Policy</p> <p>In 2022, the Government of India also launched the National Logistics Policy that aims to bring the cost of logistics on par with developed countries. It is an interdisciplinary, cross-sectoral, and multi-jurisdictional framework for developing the complete logistics network.²⁸</p>	<p>Adoption of advanced manufacturing practices</p> <p>The government has supported this transition through initiatives such as Smart Advanced Manufacturing and Rapid Transformation Hubs or SAMARTH Udyog Bharat 4.0 that aims to enhance competitiveness in the capital goods domain.²⁹</p>

As a result of government support along with digital and financial investments, the sector is bound to move towards growth and witness few trends in the near future. Some of these trends include lean manufacturing and mass customisation through industrial IoT, supply chain resilience and nearshoring to improve margins, increased investments in cybersecurity due to digitisation and cash flow improvements due to emerging finance platforms. For India to emerge as a global manufacturing hub in this changing digital landscape, the country needs to significantly upskill the labour which currently is a bottleneck for the sector. U.S. companies in India have contributed significantly to this upskilling and in uplifting the Indian economy as well as impacting lives.

For instance, a U.S.-based company operating in India that manufactures agricultural, construction and forestry machinery, provides employment to thousands of people spread over manufacturing, IT and engineering services. The company impacts lives by running social development programmes in multiple villages across various states on sanitation, education, minor infrastructure, women empowerment and agriculture advancement. The company also has various direct and indirect suppliers some of which even cater globally.

Growth potential for U.S. manufacturers in India

Major U.S. OEMs have adopted a China Plus One and Europe Plus One business strategy to diversify their supply chain, with India emerging as a suitable alternative. This is primarily due to the competitive advantage that India provides including large growing market, relatively stable economic and political environment and large workforce. In addition, the governments in the U.S. and India have

²⁴ SEZs to be turned into mfg hubs for domestic markets, mint, 03 July 2022, accessed on 13 April 2023

²⁵ Special Economic Zone scheme in India: a hit-and-miss albeit ambitious..., KPMG in India analysis based on industry discussions, accessed on 13 April 2023

²⁶ Shifting Global Value Chains: The India Opportunity, World Economic Forum, accessed on 13 April 2023





²⁷ Budget 2023-24: For jobs of the future, FM announces PMKVY 4.0 to boost skilling, The Economic Times, 01 February 2023, accessed on 13 April 2023

²⁸ National Logistics Policy in India, Invest India, 20 September 2022, accessed on 13 April 2023

²⁹ SAMARTH Udyog Bharat 4.0, Government of India, accessed on 13 April 2023

elevated strategic partnerships in industrial production, biotech, advanced materials, technology and academia among many others.

Some of the major sectors that provide opportunities in India include:

Sector	Market size growth	Key opportunities	OEM's success case
Chemical 	USD344 billion by 2027 CAGR: 12.6 per cent during 2022-2027 ³⁰	<ul style="list-style-type: none"> Promotion of Bulk Drug Parks through PLI schemes 100 per cent FDI, duty free import Key segments: agrochemicals, dyestuff, fine and specialty chemicals such as polymers, additives, antioxidants 	A U.S. based company operating in India provides polyimide (<i>polymer belonging to high performing plastics</i>) films to insulate wires to Indian railways.
Industrial Machinery 	USD400 billion by 2027 CAGR: 6.3 per cent between 2021-2027 ³¹	<ul style="list-style-type: none"> Completely de-licensed and allows 100 per cent FDI Government support to farmers to buy agricultural machinery has created a huge push Key segments include construction, textiles, food processing, automotive, storage and handling 	A U.S. based conglomerate corporation in India gets its revenue from locally developed products catering to mass mid-segment. The company develops products like sensors for local markets to reduce dependence on China.
Automotive 	USD160 billion by 2027 CAGR: 8.1 per cent during 2022 - 2027 ³²	<ul style="list-style-type: none"> Opportunities to develop electric and hydrogen fuel cell vehicles Attractive PLI scheme for manufacturing advanced chemical cell batteries Expected sharp rise in exports from the country India's global automobile component trade to expand 4-5 per cent to USD80 billion by 2026 Key segments: EV components 	A U.S. battery technology player announced a joint venture with an Indian EV manufacturer to introduce differentiated battery technology for the Indian market.
Textile and apparel 	USD340 billion by 2027 CAGR: 14.6 per cent during FY22-FY27 ³³	<ul style="list-style-type: none"> 100 per cent FDI through automatic route Attractive PLI schemes for man-made fibre and technical textiles Large funds by the government to establish Scheme for Integrated Textile Parks (SITP) Key segments: man-made fibres, technical textiles 	A U.S.-based retail giant operating in the textile segment in India has increased capacity since the segment is expected to showcase a substantial growth.

³⁰ India Chemicals Market Outlook (2016-2027), EMIS report, March 2023, accessed on 14 April 2023

³¹ Industrial Machinery Market report, Brand Essence Research, November 2022, accessed on 14 April 2023

³² "Analysis of Automobile Industry in India", Mordor Intelligence Industry Reports, accessed on 14 April 2023

³³ Indian Textile and Apparel Market, IMARC Group, January 2023, accessed on 14 April 2023

03

Electronics System Design and Manufacturing (ESDM)



Electronics System Design and Manufacturing (ESDM)

Key takeaways

- India has emerged as a large producer and exporter in the electronics segment. It is the second largest manufacturer of mobile phones and will be the biggest consumer by 2025.
- Semiconductor production in India is expected to grow over the next few years. Many global and U.S. companies are making investments in this space in India and also supporting domestic players by offering them design services.
- Government support comes through 100 per cent FDI and PLI and DLI schemes. Along with ongoing initiatives like Digital India and Make in India, Union Budget 2023-24 has allocated USD2 billion for the Ministry of Electronics and Information Technology, which is nearly 40 per cent higher year-over-year.
- Factors that can help U.S. players grow in India include benefits through electronic manufacturing clusters in lowering logistics cost, contract manufacturing using third parties for R&D and production and technical expertise in semiconductor design and manufacturing.

The electronics industry in India has experienced constant progress and is well known in the international market due to growth in domestic production as well as exports. The electronic goods production in India was valued at about USD80 billion³⁴ (INR6,402 billion) in FY22 with exports of about USD12.4 billion (INR1,098 billion³⁵). Additionally, India currently is the second largest³⁶ manufacturer of mobile handsets globally, with 15-20 per cent³⁷ of the parts getting indigenously manufactured. This growth can be attributed to various factors such as multinational companies shifting to India, advanced manufacturing capabilities, growing domestic demand and strong government focus on electronics segment which is an integral pillar for Make in India, Digital India and Start-up India programmes.

³⁴ Ministry of Electronics & IT, Production of Electronic Goods, accessed on 17th April 2023

³⁵ The Economic Times: India's electronic goods exports rose 22.39% in 5 years, 15 March 2023, accessed on 17th April 2023

³⁶ India becomes second-largest mobile phone maker globally: Government, moneycontrol, 26 July 2022, accessed on 14 April 2023

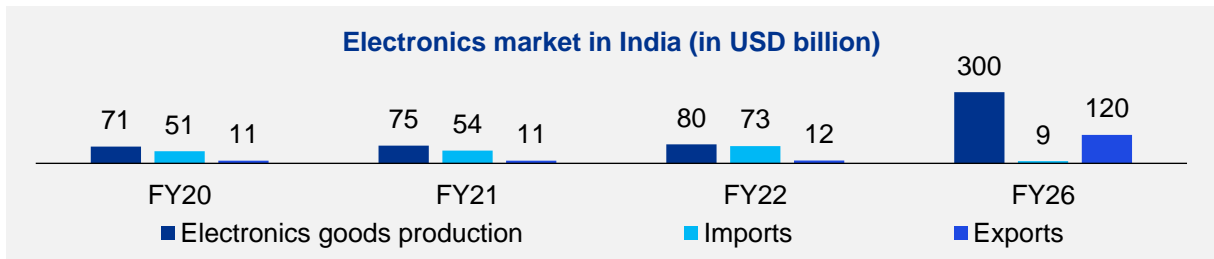
This has led to a consistent equity inflow of FDI in electronic goods segment which stood at USD3.8 billion³⁸ from April 2000 to December 2022. Government initiatives coupled with technology development led to growth in the sector.

In India, shipment of smartphones from the country surpassed 168 million units in 2021, and in 2022, shipment expectations were 190 million. Furthermore, a 129 per cent YoY growth for shipments of 5G devices, from 28 million in 2021 to about 64 million in 2022 was expected. Electronics design segment, which was growing at about 20 per cent, was 22 per cent of the ESDM market size in FY19; and it is forecasted to be 27 per cent of the ESDM market size in FY25³⁹."

³⁷ India targets China's dominance in mobile phones, BBC News, 13 January 2023, accessed on 14 April 2023

³⁸ Electronics systems, Make in India, accessed on 14 April 2023

³⁹ Electronics System Design & Manufacturing, IBEF, accessed on 26 April 2023



Source: Electronics production in India at Rs 5,33,670 cr in FY21, Times of India, 10 December 2021, accessed on 14 April 2023; Domestic electronics manufacturing reaches ₹5.54-lakh crore in 2020-21, Business line-The Hindu, 20 July 2022, accessed on 14 April 2023; Government is laser focused on achieving target of 300 billion USD electronic production by 2026: MoS Mr. Rajeev Chandrasekhar, Ministry of Electronics & IT, 29 August 2022, accessed on 14 April 2023

Electronics Systems and Design Manufacturing (ESDM), with 2.7 per cent⁴⁰ to the country's GDP, is among the fastest growing sectors under manufacturing in India. The ESDM market is expected to grow at a CAGR of 16.1 per cent during 2022-25 period, to reach USD220 billion by 2025⁴¹. This could be attributed to proliferation of Industry 4.0 and digitalisation which in turn has led to the rise of several sunrise industries such as smart factories, 3D printing, Internet of Things (IoT) and embedded systems, AR/VR among others. Hence, IoT and digitalisation initiatives (backed by government programmes such as 'Smart City' and 'Digital India') will create substantial demand for IT, automation, hardware, sensors, networking products and applications and platforms.⁴²

Many large U.S. companies in electronics and semiconductor space have manufacturing, sales and application support centres in Tier 1 and 2 cities in India creating thousands of job opportunities. Along with large investments in India, they support cross-sector growth. Most of the semiconductor companies have good presence in India and support domestic players by offering them design services. India is also setting up dedicated centres called Electropreneur Park (EP) set up by MEITY and IESA and has funded 23 start-ups. The EP is expected to grow to be a hub with 20 spoke centres which are aimed at promoting innovation and create unicorns in ESDM by extending access to a holistic ecosystem to drive the government's leading schemes like Start-up India and Make in India. Large companies from the U.S. also work with institutes in India to promote knowledge of technology and system design. The top

institutes have also increased focus on R&D in electronic and semiconductor design and manufacturing technology and developed various platforms. These companies not only partner with large players such as telecom companies for 5G, IoT, Radio, Wireless Access Code, Cloud but also partner with start-ups and government entities to try to enable India with the technological needs of tomorrow. For instance, a U.S. based semiconductor manufacturer in India has started a programme to collaborate with start-ups which have innovative solutions that are scalable, disruptive and solve real-world problems. This helps start-ups through ecosystem and customer connects, technology and business mentorship, marketing support and investor connects.

However, the country's electronic manufacturing system is hampered by lack of component availability (limited supplier base) and domestic chip fabrication. Bulk of the essential and high-value components such as PCBs, ICs are predominantly imported.⁴³ Also, there are many other technical challenges associated with specific sectors that lead to limitations in performance expansion and improvement, along with increase in manufacturing cost.

Despite all challenges and global economic headwinds, India is moving towards a better self-sufficiency of semiconductors/ components and the market is expected to reach about USD80 billion⁴⁴ by 2028. The growth will be primarily driven by three key industries: wearables, smartphones and automotive.

⁴⁰ Market Assessment for India EMS/ODM Industry, Bharat FIH Ltd., accessed on 14 April 2023

⁴¹ Electronics System Design & Manufacturing (ESDM) Industry Analysis, IBEF, December 2022, accessed on 14 April 2023

⁴² Assessment of Electronics System Design & Manufacturing, Skill Development (ESDM) In India, Kaynes Technology India Ltd., accessed on 14 April 2023

⁴³ Assessment of Electronics System Design & Manufacturing, Skill Development (ESDM) In India, Kaynes Technology India Ltd., accessed on 14 April 2023

⁴⁴ India's Key To Becoming A Global Semiconductor Hub: Skilled Manpower In Semiconductor Manufacturing, Outlook India, accessed on 14 April 2023

Government initiatives and fiscal support in 2023-2024

The National Policy on Electronics (NPE) 2019 aims to place India as a global ESDM hub by reassuring and driving capabilities for the development of core components, including chipsets and by forming an environment that enables the industry to compete globally. Ministry of Electronics & Information Technology (MeitY) announced “Scheme for Promotion of Semiconductor Eco-System” in India with an investment of USD 9.5 billion in 2022. There are Electronics Manufacturing Clusters, both greenfield and brownfield, in various locations like Noida, Bhiwadi, Tirupati, Karnataka and Tamil Nadu. These EMCs include start-ups as well as multi-national companies. Adding more EMCs like the one upcoming in Pune will catalyse investments and generate large employment. The ESDM sector is expected to play a key role in India’s goal for a USD5 trillion economy by 2025. Hence, various government initiatives have been introduced to overcome the aforementioned challenges related to domestic production and assembly activities across consumer electronics products such as mobile phones. The government permits 100 per cent FDI in the ESDM sector via the automatic route for Original Equipment Manufacturers (OEMs) and Integrated Device Manufacturers (IDMs). The FDI norms are investor-friendly to allow global companies to establish a component ecosystem in India.

SPECS SCHEME	PLI SCHEME
<p>The Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS) has been introduced to reinforce the manufacturing ecosystem of electronic products. Target manufacturing of semiconductors and electronic components will lead to increased domestic value addition and generate higher employment opportunities in the ESDM sector.⁴⁵</p> <p>Fiscal support of about 50 per cent of the project costs is being covered under various modified schemes for setting up semiconductor fabs, display fabs, compound semiconductors / silicon photonics / sensors fab / discrete semiconductors fab and semiconductor Assembly, Testing, Marking and Packaging (ATMP) / Outsourced Semiconductor Assembly and Test (OSAT) facilities in India.</p>	<p>Under the PLI scheme for IT Hardware, equipment worth about USD21.62 billion⁴⁶ will be manufactured by 2025 of nearly half the production will come from foreign companies in India. Under the investment guidelines, fully integrated manufacturers will be the largest beneficiaries of this programme.</p> <p>The Design Linked Incentive (DLI) Scheme⁴⁷ offers various financial incentives, design infrastructure support across numerous phases of development and deployment of semiconductor design for System on Chips (SoCs), Integrated Circuits (ICs), Chipsets, Systems & IP Cores and semiconductor linked design.</p>
<p>USD120 million (INR10 billion)⁴⁸ for the modified scheme for establishing semiconductor fabs in India, while about USD4,900* (INR400 thousand) has been allocated for the scheme to establish display fabrication units in the country.</p>	<p>USD25 million (INR2 billion)⁴⁹ was allocated in the budget towards the design-linked incentive scheme to enable companies to design semiconductor chips and wafers in India.</p>
<p>USD220 million (INR18 billion)⁵⁰ has been assigned for the first time towards the modified scheme for setting up compound semiconductors, sensors fab, silicon photonics, discrete semiconductors fab and semiconductor ATMP, OSAT facilities in India.</p>	<p>USD 550 million (INR45 billion)⁵¹ towards the production-linked incentive (PLI) scheme for large-scale electronics manufacturing; incentives between 3-5 per cent⁵² on incremental sales of goods made in India.</p>

*Note: Value has been converted from INR to USD using the conversion rate: 1INR = 0.012USD

⁴⁵ Schemes for Electronics Manufacturing in India, Make in India, accessed on 14 April 2023

⁴⁶ PLI Scheme for IT Hardware manufacturing herald a new era in Laptops, Tablets, All-in-One Personal Computers (PCs) and Servers electronics manufacturing, Ministry of Electronics & IT, 01 July 2021, accessed on 14 April 2023

⁴⁷ Design Linked Incentive (DLI) Scheme', Government of India, accessed on 14 April 2023

⁴⁸ Budget 2023: Govt allocates Rs 16,549 crore to IT ministry, 40% higher on year, Economic Times, 02 February 2023, accessed on 14 April 2023

⁴⁹ DoT introduces design linked incentive scheme, extends PLI by a year, Times of India, 20 June 2022, accessed on 14 April 2023

⁵⁰ Budget 2023: Govt allocates Rs 16,549 crore to IT ministry, 40% higher on year, Economic Times, 02 February 2023, accessed on 14 April 2023

⁵¹ Union government allocates Rs 16,549 cr to MeitY, Projects Today, 02 February 2023, accessed on 14 April 2023

⁵² "Schemes for Electronics Manufacturing", Invest India, as accessed on 14 April 2023

USD370 million (INR30 billion)⁵³ for the Indian Semiconductor Mission in the Union Budget 2023-24 which will support **semiconductor and display manufacturing ecosystem** in India

USD18 million (INR1.46 billion)⁵⁴ for **PLI scheme for IT Hardware** with incentives between 2-4 per cent⁵⁵ on incremental sales for devices including laptops, servers, tablets, and all-in-one PCs made in India

Growth potential for U.S. companies in the Indian ESDM sector

The government has identified some emerging areas for public-private collaborations and investments, which include mobile phone production, semi-conductor wafer fabrication, LED production, wearable devices manufacturing and solar cells and modules manufacturing. This provides an opportunity for the U.S. based players to collaborate and develop a rewarding relationship with Indian companies, further exploring investment opportunities, such as:

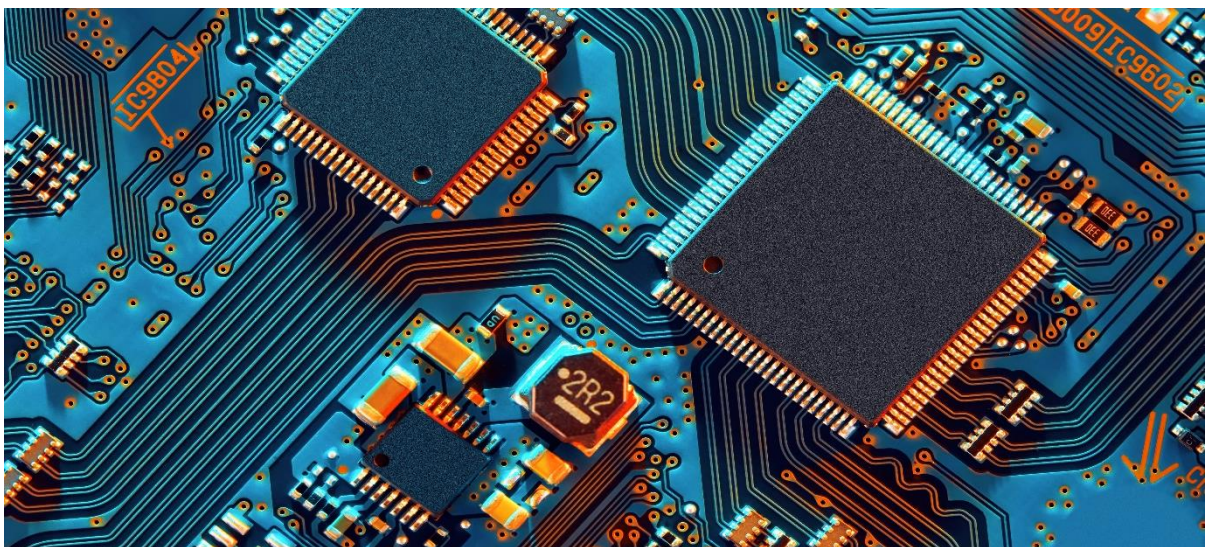
Benefits through Electronic Manufacturing Clusters (EMC) 2.0 scheme in India: It offers numerous benefits including consolidation of suppliers, lower logistics costs, access to ready built factory sheds and stronger supply chain responsiveness that will enable larger investment by U.S. players in the ESDM sector.

- A U.S. based retail ecommerce firm established its manufacturing facility in a manufacturing cluster in the southern part of India. The cluster offers various investment policies and relocation packages.

Growth in contract manufacturing: U.S. companies can leverage the significant cost benefits provided by PLI schemes by setting up third-party R&D centres/manufacturing units in India to emerge as a production and exports base for OEMs and component/chip makers to diversify supply chain and de-risk components sourcing.

- A U.S. based chipmaker partnered with an Indian engineering and contract manufacturing company to manufacture enterprise grade technology products.

Growth of semiconductor supply chain in India – U.S. and India signed an MoU in 2023 to build semiconductor supply chains in India to decrease dependence on China and Taiwan. This partnership will facilitate collaborative incentives programmes for companies. This will also enable U.S. companies to leverage India's expertise in semiconductor design and manufacturing along with assembly, testing and packaging services. U.S. companies can also leverage the labour supply in India along with technical expertise in semiconductors.



⁵³ Budget 2023: Govt allocates Rs 16,549 crore to IT ministry, 40% higher on year, Economic Times, 02 February 2023, accessed on 14 April 2023

⁵⁴ Union government allocates Rs 16,549 cr to MeitY, Projects Today, 02 February 2023, accessed on 14 April 2023

⁵⁵ "Schemes for Electronics Manufacturing", Invest India, as accessed on 14 April 2023

04

Pharma and Medical Devices



Pharma and Medical Devices

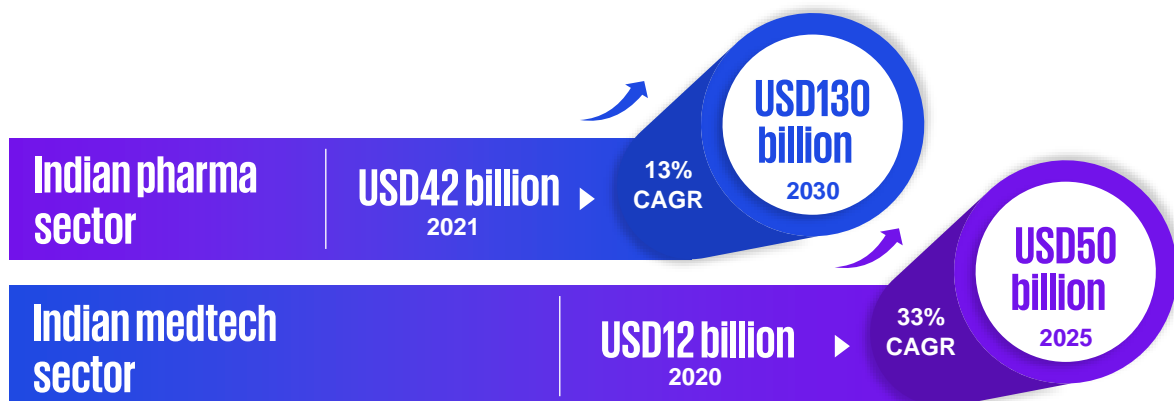


Key takeaways

- India, established as a global powerhouse for generics manufacturing, is looking towards biologics, biosimilars, and high-end medical devices to become a high value player in the value chain.
- The government has announced new initiatives to promote research and innovation in the life sciences sector. This, in turn, will ensure development of a robust ecosystem for life science players to thrive in and innovate.
- The U.S.-India partnership will play a pivotal role in helping Indian pharma sector achieve its true potential. Inbound investments, knowledge sharing through setting up of research centres, and technology sharing are avenues by which both countries will stand to benefit.
- With the help of the National Medical Devices Policy 2023, the medical devices sector is expected to expand and meet the goals of public health regarding access, cost, quality, and innovation. The sector is expected to grow to **USD50 billion by 2030**.

Following restricted growth during the pandemic, Indian pharma and medtech sectors will grow at healthy rates, positioning India as a future hotspot for innovation and production.

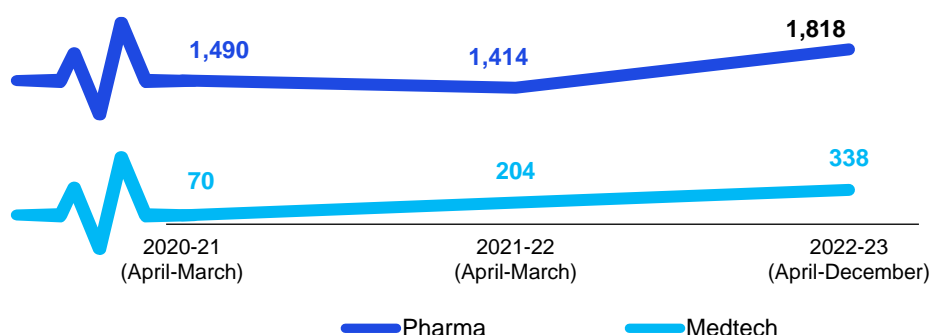
Over the years, India has emerged as ‘the pharmacy of the world’. This was further corroborated during the pandemic when India exported vaccines globally. Post pandemic, India has been steadily moving up the value chain. The future pace of growth will be faster and it will bridge the gap currently seen in terms of innovation for complex molecules (biosimilars and biologics) and high-end medical devices.



Source: Pharmaceuticals, Medical devices. IBEF

The last few years have seen an uptrend in FDI in the sector, indicating at a favourable business environment and future growth

FDI inflow in drugs and pharma and medtech activities in India (USD million), 2020-21 to 2022-23



Source: Quarterly Fact Sheet on FDI inflow- April 2000 to December 2022*, DPIIT
 Note: All figures have been converted as per the exchange rate for that year

Varied factors are driving growth in pharma and medtech sectors^{56,57,58,59}

The advancing research and innovation landscape, rapidly increasing vaccines and biologics capacities, steadily expanding global presence and rising domestic market spend on medicines are some of the factors fuelling growth of pharma and medtech sectors.



High Non-Communicable Disease (NCD) burden

NCDs account for more than 50 per cent of the total disease burden and more than 60 per cent of deaths in the country, which has led to a focus on improving quality of care as well as the provisions for drugs and medical equipment.



Increase in purchasing power and health awareness of citizens

India will have more than 73 million middle class households over the next decade. This will increase purchasing power, and with growing health awareness, will drive the domestic pharma and medical device markets, especially in segments such as wearable devices.



Continued export growth

With increasing regulatory approvals and new market penetration (such as Africa), pharma export reached USD24.6 billion in FY22. Medtech export is expected to be at USD10 billion by 2025, showing a four-fold increase from 2021.



Conducive ecosystem created by simplifying regulatory risks

Post pandemic, several government initiatives have reduced regulatory risks, leading to greater ease of doing business. This should help drive growth in the pharma and medtech sector.



Rising Private Equity (PE) investment

With the government intending to make India a self-reliant drug manufacturer, Active Pharmaceutical Ingredient (API) production and drug development have garnered attention from PE investors. In 2021, PE/VC deals worth USD1.64 billion were made in the pharma sector, compared with USD395 million in 2017.

*Note: Value has been converted from INR to USD using the conversion rate: 1INR = 0.01USD

⁵⁶ Sector-Medical devices, Invest India, as accessed on 13 April 2023

⁵⁷ Sector-Pharmaceuticals, Invest India, as accessed on 13 April 2023

⁵⁸ PE/VC investments in healthcare, pharma sectors grow 87% to \$5.8 billion in 2021, Pharmabiz, as accessed on 13 April 2023

⁵⁹ Rising PE play to align Indian pharma with global trend of professional management, ownership, CNBC, as accessed on 14 April 2023

Government backing and focus on R&D presents new growth opportunities for pharma and medtech sectors

- The 2023 budget has provisions and initiatives that focus on advancing domestic R&D capabilities that build upon India's 'Pharma Vision 2020' of developing end-to-end drug discovery capabilities. There are plans to facilitate collaborative research in association with the Indian Council of Medical Research (ICMR) for promoting research and innovation across the pharma and medical device sectors⁶⁰. The government will also focus on pharma R&D by setting up Centres of Excellence (CoE) and introducing multidisciplinary courses for medical devices, which will help with workforce development⁶¹. Initiatives laid out in the budget will help realign priority of the sector towards innovation and help generate employment opportunities, enabling development of a skilled workforce.⁶²
- In 2022, the Strengthening of Pharmaceuticals Industry (SPI) scheme was launched by the Department of Pharmaceuticals in collaboration with the Ministry of Chemicals and Fertilizers for bolstering existing infrastructure, upgrading production capabilities of Micro, Small and Medium Enterprises (MSMEs), and promoting knowledge building in the pharma sector⁶³. The SPI scheme active from 2021–22 to 2025–26 has a total financial outlay of USD61.1 million* (INR5

billion) and consolidates previously launched schemes for better realignment with stakeholders. As of March 2023, the scheme has supported three projects, providing a total assistance of USD6.7 million (INR547 million⁶⁴).

- **PLI continues to drive the manufacturing of generics and high-end medical devices, creating new growth opportunities**

The Production Linked Incentive (PLI) scheme was launched in 2021 with the vision of bolstering domestic pharma and medical device manufacturing, thereby reducing import dependency. The total outlay of the PLI scheme for pharma is USD1.83 billion* (INR150 billion), while that for medical devices is USD418 million* (INR34.2 billion). The financial year 2022-23, being the first year of production under the PLI schemes, Department of Pharmaceuticals (DoP) earmarked USD84.3 million* (INR6.9 billion) as the budget outlay and 21 applicants have been selected for medical device manufacturing in the first year⁶⁵. The government incentives for the Indian pharmaceutical industry are USD2.7 billion (INR 219 billion) under PLI1.0 and PLI2.0.



*Note: Value has been converted from INR to USD using the conversion rate: 1INR = 0.01USD

⁶⁰ Budget 2023: Boosting the Pharmaceutical Sector, Invest India, as accessed on 13 April 2023

⁶¹ Union Budget 2023-2024, Government of India, as accessed on 13 April 2023

⁶² ICMR unveils centres at 7 IITs to foster MedTech innovations, Economic Times, as accessed on 13 April 2023

⁶³ Guidelines for the Scheme for "Strengthening of Pharmaceuticals Industry (SPI), Government of India, as accessed on 13 April 2023

⁶⁴ Assistance to Pharma Industries for Common Facilities Scheme with outlay of Rs. 500 crores, Government of India, as accessed on 13 April 2023

⁶⁵ First Release of Rs.166 Crores incentives under PLI scheme for Pharmaceuticals, Ministry of Chemicals and Fertilizers, as accessed on 13 April 2023

Key opportunities that make India an attractive proposition for pharma and medtech investment^{66,67,68,69,70,71,72}

Government-driven initiatives and budget allocations create a conducive ecosystem for pharma and medtech manufacturers to operate and leverage existing opportunities.

India is a lucrative destination for pharma and medtech expansion



- Cost effective — Manufacturing cost of drugs is 33 per cent lower than western nations
- Robust infrastructure — Highest number of Food and Drug Administration (FDA)-compliant manufacturing sites outside the U.S.
- Government incentives — The Indian government has been very supportive in terms of laying out incentives to drive growth of the sector
- Favourable FDI policy — For medtech sector, 100 per cent FDI is allowed in greenfield as well as brownfield projects. In the pharma sector, 100 per cent FDI is allowed in greenfield, while 74 per cent FDI is allowed in brownfield projects

With a strong foundation, India will emerge as a powerhouse of life-science innovation



Government efforts to promote collaborative research across life-sciences will provide the required platform for leveraging India's skilled workforce. The private sector is also emphasizing on R&D, with a major Indian pharma company planning to invest USD650 million in research from 2022 to 2027. Given the investments, India is poised to become an attractive location for global companies and institutions to set up research centres.

With the onset of patent expirations in the U.S., India can be a key partner to help capitalise on the biosimilars and generics opportunity



Multiple blockbuster drugs in the U.S. are at a patent cliff and by 2030, will have their patent expired, creating a market opportunity of up to USD200 billion. As branded drugs lose their exclusivity, the market will be open to biosimilars and generic drugs. India has the third highest number of approved biosimilars and the country's deep expertise in generics is well known, which places India in a key position to drive pharma growth.

Digital innovations will enable medical devices sector to deliver on the promised growth



Powered by digital innovations, the sector is all set to attract global attention. ICMR and Indian Institutes of Technology (IITs) have collaborated to build a pipeline of innovative imaging products. Further, the Ayushman Bharat Digital Mission (ABDM), launched in 2021, will form the backbone for implementation of digital health solutions in the health analytics space, remote monitoring, and personalised medicine. PLI schemes and medical device parks will enable large-scale manufacturing of innovative products.

National Medical Devices Policy (NMDP) 2023



This policy would implement the PLI Scheme for medical devices and establish four Medical Devices Parks and strengthen the sector into a self-reliant and innovative sector catering to global healthcare needs along with meeting the evolving healthcare needs in India. This sector is expected to grow from USD11 billion to USD50 billion by 2030. The policy covers six broad areas — regulatory streamlining, enabling infrastructure, facilitating R&D and innovation, attracting investments, human resources development, and brand positioning and awareness creation.

⁶⁶ Sector-Pharmaceuticals, Invest India, as accessed on 13 April 2023

⁶⁷ Sector-Medical devices, Invest India, as accessed on 13 April 2023

⁶⁸ Indian pharma firms look to ramp up investments in R&D, innovation, Business Today, as accessed on 13 April 2023

⁶⁹ Article-India well positioned to capitalize on global biosimilar opportunity, Pharmabiz, as accessed on 13 April 2023

⁷⁰ PE/VC investments into healthcare, Pharmabiz, as accessed on 13 April 2023

⁷¹ Big pharma's looming threat: a patent cliff of 'tectonic magnitude, Biopharma Dive, as accessed on 13 April 2023

⁷² "Cabinet approves the Policy for the Medical Devices Sector", PIB, 26 April 2023, as accessed on 27 April 2023




The U.S. has been a key stakeholder in shaping the Indian pharma and medtech sectors from an export perspective. Some of the leading U.S.-based companies, with their global centres in India, have been strongly contributing to India's pharma and medtech exports.

Positive outlook of Indian pharma and medtech sectors attracting attention of U.S. organisations

Over the years, India and the U.S. have fostered strong relations in pharma and medtech sectors. In the pharma sector specifically, India has become a strong partner to the U.S., catering to 40 per cent of the generics demand of the country.⁷³

As part of this growing relationship, pharma and medical device players based out of the U.S. have established research centres in India to capitalise on the latter's skilled labour and robust infrastructure. The new research centres will act as catalysts in strengthening R&D expertise and can play a crucial role in helping India move up the value chain. The events of COVID-19 have made pharma companies rethink their global supply chain strategy that was heavily reliant on China. Additionally, with the new 'friend-shoring' policy for the pharma industry, India has emerged as the new destination for the U.S. to move its pharmaceutical supply networks.

Some of the recent developments are discussed in the use cases below:

Drug discovery and development	Generics and injectables	Medtech innovation
<p>In 2023, a U.S.-based pharma company announced the establishment of a new science and technology innovation centre in India. The centre will focus on drug discovery and digital products, providing employment opportunities.</p>	<p>In 2022, a U.S.-based pharma company inaugurated a research and development centre in the western part of India. The research centre will focus on generics and injectables across multiple segments, including cardiovascular and renal areas for supporting manufacturing plants across various countries.</p>	<p>In 2022, two U.S.-based medical device companies announced a collaboration for advancing cardiac care in India. The collaboration will focus on developing end-to-end interventional cardiac care innovations across diagnostics, treatment, and patient monitoring.</p>
		

India is poised to bolster its footprint globally and transition from high-volume to high-value products in the pharma and medtech sectors. The Indian government's proactive commitment to ensure competitiveness of the life sciences sector is promising. This will make drugs and medical devices more accessible and affordable in domestic as well as global markets. For India to achieve its pharma potential, the U.S.-India partnership will play a critical role. However, India will need to address certain roadblocks such as quality issues and inadequate regulatory monitoring to continue with its promising growth. The signs are encouraging, with leadership being instrumental in nurturing a conducive ecosystem for innovation, thus ensuring India becomes a global pharma and medical devices exports hub.

⁷³ FDI Funding in Pharmaceutical Sector, FDI India, as accessed on 13 April 2023

05

Technology



Technology



Key takeaways

- The technology sector is a key contributor to India's GDP, with robust FDI equity inflow and increasing talent base. India is emerging as a hub for technology and innovation, driven by a strong focus on developing technology and digital infrastructure.
- 5G at the core, digital infrastructure focus, and emerging technologies such as AI, cloud and quantum computing are the pillars driving growth across the technology landscape in India.
- India's supportive government policy and partnership with the U.S. is leading to the emergence of opportunities such as establishment of hyperscale data centres, technology design and manufacturing, and development of industrial use cases leveraging 5G services.

The growing digital ecosystem is driving the technology landscape in India

India's focus on technology and digital infrastructure are key pillars of its growth strategy and journey. The increasing penetration of technology is digitally equipping the people of India, accelerating skill development and socio-economic growth. The growth story of India's technology industry is evident from the huge share of IT and Business Process Management (BPM) sector in the country's GDP, high FDI equity inflow and growing employment opportunities.

7.4%

of India's GDP is contributed by the IT & BPM industry, positioning the industry as a key driver of India's economic growth.

>2X

FDI equity inflow, in 2022, in the computer software and hardware industry as compared to any other industry in India.

450,000

people were employed by the IT & BPM industry, in 2022, with a total employment of about five million jobs in the industry.

Source: "IT & BPM sector," Invest India; "FDI Overview", IBEF; "Technology sector in India 2022", NASSCOM, as accessed on 14 April 2023

⁷⁴ "IT & BPM sector," Invest India, as accessed on 14 April 2023

⁷⁵ "FDI Overview", IBEF, as accessed on 14 April 2023

⁷⁶ "Technology sector in India 2022", NASSCOM, as accessed on 14 April 2023

Fiscal support to digital public infrastructure in the Union Budget 2024 will act as a key enabler of the digital momentum in India, driving transformations across MSMEs and start-ups⁷⁷. In the last one to three years, the country has witnessed a high increase in the number of tech-driven start-ups, grabbing significant investments and becoming unicorns. As the third largest start-up ecosystem globally, India added ~1,300 active technology start-ups in 2022, amounting to 5 per cent of country's total active tech start-ups⁷⁸. The U.S. emerged as a key driving force for start-ups in India, with an investment of about USD1 billion across 573 PE/VC deals in the technology space⁷⁹.

In addition to offshore centres, technology and innovation hubs are taking centre-stage as global MNCs are investing or planning to invest in innovation hubs in 2023, driven by the growing digital infrastructure, policy and structural support, and availability of digital talent in India⁸⁰.

A U.S.-based VC firm recently launched its first innovation centre in India to fund tech investments in robotics, IoT/IIoT and automation, among others across industries.

Companies in the U.S. are increasingly gravitating towards India, not only for setting up innovation hubs, but also as a manufacturing hub for technology.

A technology company in the U.S., recently announced that its smartphone production investment has increased multi-fold in India.

Exploring the growth drivers

5G as the digital core that will transform enterprises' operations and connectivity

Since the launch of 5G services in India in October 2022, Internet Service Providers (ISPs) and network infrastructure players are showcasing keen interest in developing 5G as a digital core powering business and retail connectivity. Supportive government policies and private sector investments have enabled rapid deployment of 5G network coverage in about 397 cities, till March 2023⁸¹. Leading local ISPs in the telecom industry have announced investments worth about USD18 billion⁸² towards the purchase of spectrum, and development of 5G infrastructure and services⁸³ with a focus on both B2C and B2B segments. Interest from global players is further propelling the development of 5G services and infrastructure, with leading U.S. companies exploring the deployment of industrial use cases of 5G, across enterprises in India. 5G services are anticipated to form the digital backbone that will transform industries by augmenting their productivity, delivering efficiency optimisation, and enhancing visibility across business value chains. For retail consumers, 5G services are being rolled out at about the same cost as 4G connectivity to counter the barrier of affordability and drive network penetration. The Indian government is building on the momentum brought about by 5G, by also constituting the 'Technology Innovation Group – 6G' (TIG-6G) to develop and deploy 6G leveraging a two-phased approach, expected to culminate in 2030⁸⁴.

⁷⁷ "Fiscal support to digital infrastructure to aid India's growth story of becoming a \$5 trillion economy by 2025", Financial Express, 04 February 2023, as accessed on 14 April 2023

⁷⁸ "India now has nearly 27,000 active tech start-ups, adds 1300 last year", The Economic Times, 15 February 2023, as accessed on 14 April 2023

⁷⁹ Refinitiv, Private Equity/VC deal data, 01 January 2022 to 31 December 2022, as accessed on 14 April 2023

⁸⁰ "More B2B revenues than B2C", Telecom Talk, 11 April 2023, as accessed on 14 April 2023

⁸¹ "India's 5g rollout fastest in the world", Deccan Herald, 16 March 2023, as accessed on 14 April 2023

⁸² INR1=US\$0.0122, as on 14 April 2023

⁸³ "Technology sector in India 2022", NASSCOM, as accessed on 14 April 2023

⁸⁴ "Bharat 6G", DOT, 23 March 2023, as accessed on 14 April 2023

Emerging technologies are enabling innovation across industries

Indian government is investing and promoting the use of emerging technologies, to digitally transform industry verticals. Technologies such as cloud, quantum computing and artificial intelligence are taking the centre-stage, leveraging data for digital transformation and value creation across industrial processes. Government initiatives such as 'India AI,' 'YUVAi' and MeitY are driving AI enterprise adoption. Consequently, India witnessed a three times YoY jump in the AI adoption in 2022, as indicated in an analysis by the World Economic Forum⁸⁵. Cloud adoption in India is expected to rise in 2023, driven by government focus on e-governance and adoption of cloud by SMEs and start-ups. Gartner forecasts that the growth in end-user spending on public cloud to grow by 27 per cent⁸⁶, with cloud acting as a test bed for entrepreneurs to build, deploy and evaluate business models in India. Additionally, technologies such as quantum computing have received significant investments from the government and will potentially transform cybersecurity, which is emerging as a key concern in India's digitalisation journey. It is then evident that emerging technologies in India are playing a pivotal role in driving innovation, horizontally, across the business landscape.

Digital public infrastructure as a fabric binding the digital ecosystem

Indigenously developed Unified Payments Interface (UPI), common digital identity and a national interface for sharing personal information while ensuring privacy are key contributors in the growth story of India's digital infrastructure. According to the IMF, India has been successful in building a world-class digital infrastructure leveraging a foundational blocks approach⁸⁷. This approach has been instrumental in creating core digital elements that will be further leveraged to digitally extend benefit schemes and governance, thus strengthening the e-governance ecosystem. From an enterprise perspective, a combination of simplified transactions, access to localised data infrastructure, and the open credit enablement network is expected to simplify tech adoption, creating a conducive environment for business growth in the country.

Businesses are transacting digitally, with the number of UPI transactions in India reaching an all-time high of 7.8 billion in December 2022⁸⁸. Additionally, government initiatives such as digital tax reporting portal, DigiYatra and DigiLocker are connecting the people of India with digital governance ecosystem, helping in achieving a digital mesh of connectivity between the people, businesses, and the government. Digital infrastructure is thus creating a fabric that will enable India's vision of becoming a USD1 trillion digital economy by 2025⁸⁹.



⁸⁵ "AI adoption in India", WEF, 2023, as accessed on 14 April 2023

⁸⁶ "India IT spending forecast", Gartner, 14 November 2022, as accessed on 14 April 2023

⁸⁷ "India has built a world-class digital infrastructure: IMF", Economic Times, 06 April 2023, as accessed on 14 April 2023

⁸⁸ "Economic Survey 2022-23: Chapter 12", Government of India, as accessed on 14 April 2023

⁸⁹ "India's digital sector valuations will cross the US\$1 trillion mark by 2023", Livemint, 22 June 2022, as accessed on 14 April 2023

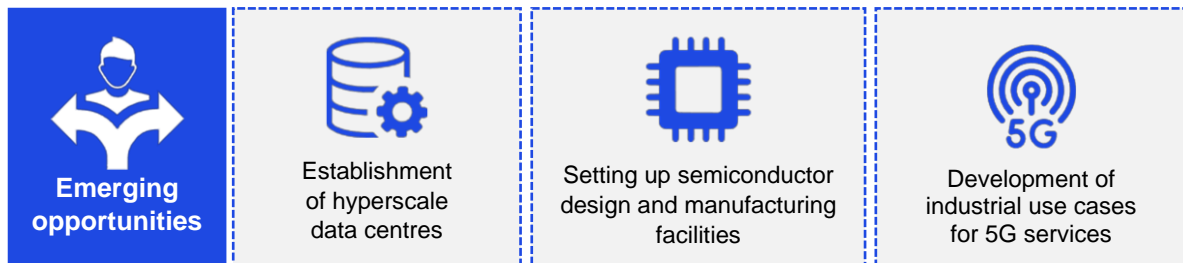
Government initiatives^{90,91,92,93,94,95,96,97,98}

India is driving socio-economic growth through various initiatives across themes, including Information and Communication Technology (ICT) infrastructure, digital focus and launch of regulatory frameworks.

ICT Infrastructure	Digital focus	Strong regulatory framework
<ul style="list-style-type: none"> • Prime Minister Wi-Fi Access Network Interface (PM-WANI) to speed up the growth of broadband internet services. • Indigenous 5G test bed: Free access to recognised start-ups and MSMEs, for 6 months, till January 2023, to accelerate the development and testing of 5G services. • Bharat 6G project: To develop and deploy 6G by 2030. • India set to add 250MW data centre capacity in 2023. 	<ul style="list-style-type: none"> • Five-year investment amounting to USD1 billion, towards the development and advancement of quantum computing. • Digital Rupee, a tokenised version of the legal tender, piloted to boost the digital economy and bolster transactional capabilities. • PLI and Design-Linked Incentive for semiconductor production and design, increased to 50 per cent of project cost, uniformly. 	<ul style="list-style-type: none"> • National Data Governance Framework in May 2022 to enhance access, quality and use of data, in line with emerging technology requirements. • Digital India Act would regulate and enable open internet, enforce privacy controls and penalise cyber-crimes.

India progressing towards becoming a global tech hub

Driven by government investments and a sharp focus on digital progression, India is transforming itself into a digitally empowered society. The country is emerging not only as provider but also as a buyer of tech products and services, driven by increased internal demand for digital transformation. Consequently, India presents numerous opportunities across its technology landscape.



Cloud Service Providers (CSPs) in the U.S. are investing in India to create localised data centres. A U.S.-based CSP announced a multi-billion-dollar investment towards developing India as one of its cloud regions. Leading technology companies have announced plans to ramp up smartphone production in India, and test industrial use cases of 5G within the Indian market.

These investments and partnerships are integral to India's growth story towards becoming the next go-to destination for not only IT services, but also overall ICT sector. These partnerships and investments range from hardware manufacturing to exploring high tech use cases for emerging technologies. India is anticipating growth in its technology landscape driven by a combination of its growing technical expertise, digital focus, and Indo-U.S. collaboration.

⁹⁰ "PM WANI launched at 100 stations in one go", The Indian Express, 11 May 2022, as accessed on 14 April 2023

⁹¹ "Facility available to stakeholders at nominal rate", Ministry of Communications – India, 08 August 2022, as accessed on 14 April 2023

⁹² "Bharat 6G project", The Hindu, 22 March 2023, as accessed on 14 April 2023

⁹³ "India to add 250 MW data centre capacity", Economic Times, 19 January 2023, as accessed on 14 April 2023

⁹⁴ "India to invest US\$1 billion in quantum computing", 14 February 2022, as accessed on 14 April 2023

⁹⁵ "What is Digital Rupee", The Economic Times, 17 February 2022, as accessed on 14 April 2023

⁹⁶ "Modified Incentive Scheme for Semiconductors", MeitY, 21 September 2022, as accessed on 14 April 2023

⁹⁷ "Draft: National Data Governance Framework", MeitY, May 2022, as accessed on 14 April 2023

⁹⁸ "Digital India Act", Mondaq.com, 16 March 2023, as accessed on 14 April 2023

06

Energy



Energy

Key takeaways

- India is on a pathway to transform its energy landscape, diversify its energy mix to increase the share of Renewable Energy (RE), natural gas and green hydrogen, and extensively develop and adopt cleantech to enable the transition.
- India requires an investment of USD2.5 trillion by 2030 and USD10 trillion by 2070 to meet its climate goals which opens up significant opportunities for U.S.-India collaboration on providing investment support to help India achieve its target.
- The transition to clean energy requires India to have 160 GWh of energy storage capacity by 2030. The U.S. can become a strategic partner and support in building lithium-ion battery production facilities in the country.

India's energy market landscape undergoing accelerated transition

At Conference of the Parties (COP26) in 2021, India pledged to become a net-zero country by 2070⁹⁹. Considering that the power sector alone accounts for nearly 49 per cent of CO2 emissions (as of 2021), energy sector will play a critical role in decarbonising the country's economy. As a result, India has made transformation of the energy sector a top priority to transition to a low-carbon economy, and planning to fulfil 50 per cent of its electricity needs from renewable energy (RE) sources by the end of this decade. However, oil and natural gas will continue to remain critical power sources before the country can turn around its energy ecosystem completely. The GOI, in particular, has categorised natural gas as a strategic fuel and created ambitious plans to drive the share of natural gas in the energy mix to 15 per cent by 2030 to make India a gas-based economy.

⁹⁹ "India delivers National Statement at COP 27", PIB, as accessed on 17th April 2023

¹⁰⁰ "Energizing India", Niti Aayog, as accessed on 17th April 2023

The U.S. supporting India to meet its gas requirements

The plan to enhance the share of natural gas in the generation mix, spurring domestic activity, and increased usage in the transportation sector, the demand for LNG in India is expected to witness a notable spur in this decade. Thus, to absorb the rising demand, the country is planning to:

- **Bolster its LNG import capacity** (which is expected to reach 124 billion cubic meters by 2040¹⁰⁰): In this regard, an Indian natural gas company has announced interest to acquire shares in either an existing LNG plant or a proposed facility to be commissioned in the U.S.
- **Strengthen its existing gas infrastructure**: India plans to invest USD2.5 billion¹⁰¹ in building floating storage facilities for LNG at major ports in the country.
- Considering the U.S. is one of the world's largest exporters of LNG, India can leverage the knowledge of the U.S. in building cost efficient storage facilities.

¹⁰¹ "Annual Report 2021-22", Ministry of ports, shipping and waterways, as accessed on 17th April 2023

Oil trade continues to deepen Indo-U.S. ties

Triggered by the **Organization of the Petroleum Exporting Countries (OPEC)+ announcement on cutting the output of crude oil**, India is looking to diversify its crude sources and is majorly focusing on limiting its reliance on Middle Eastern crudes. This state of affairs has largely benefitted the import of crude from the U.S. — which off-late has witnessed an uptick. Consequently, in the fourth quarter of FY22, the U.S. became the fifth largest oil supplier to India.



According to S&P Global, the share of U.S. crude in the Indian crude basket surged from 5–6 per cent in April 2022 to nearly 10 per cent in November 2022.

Furthermore, the **Russia-Ukraine crisis** and the subsequent sanctions on import of Russian oil by the U.S. has strengthened the trade partnership between the two nations. The U.S., historically a prominent buyer of Russia virgin gas oil, is now purchasing it from two Indian conglomerates. Consequently, the U.S. has emerged as the biggest purchaser of refined oil products from India (as of December 2022).

Energy as an enabler to fulfil 2070 ambition

As reducing dependence on fossil fuels alone may not be sufficient for reducing emissions — India also plans to expedite its transition to RE. Realising this, the country, by 2030, aims to have 500 GW¹⁰² of installed RE capacity, meeting nearly 50 per cent of the country's power need. The increased focus on RE is paving the way for enhanced collaboration with international partners.



Solar and wind

India is taking strong steps to expedite the generation of solar energy. As of 2021, the country recorded the fourth highest solar power capacity in the world. Further, as of February 2023, about 64.4 GW¹⁰³ of solar power capacity was installed in the country.

Progressive measures enabling growth

- In 2021, enhanced funding support of USD3.2 billion (from the previous USD0.6 billion) under the PLI scheme were announced.

Due to the thrust on domestic manufacturing, the country estimates to manufacture about 100 GW of solar modules annually by 2026¹⁰⁴. If the projections come true, then in a span of three years, the country could be a net exporter of solar power. This will not only help strengthen India's position in the global solar market but will particularly benefit the U.S. Currently, China holds a dominating position in the solar modules market and as the U.S. has imposed sanctions on China's imports, it is majorly relying on India to meet its solar module needs. Therefore, there is a lucrative opportunity for U.S. companies to help open solar module manufacturing facilities in India.

With about 42 GW¹⁰⁵ of wind energy installed by February 2023, the country also stands tall in the wind energy space. It also has established ambitious targets and a roadmap to install 30 GW of offshore wind energy by 2030¹⁰⁶. However, as the country is trying to revamp its policies and reduce the capex of offshore wind projects, it could collaborate with the U.S. to share the learnings of the latter in efficiently designing its capacity auction mechanisms and offshore leasing rules.

¹⁰² "Bidding Trajectory for Renewable Energy", PIB, as accessed on 17th April 2023

¹⁰³ "Renewable Energy", Make in India, as accessed on 17th April 2023

¹⁰⁴ "India's Photovoltaic Manufacturing Capacity set to surge", Indian environment portal, as accessed on 17th April 2023

¹⁰⁵ "Renewable Energy", Make in India, as accessed on 17th April 2023

¹⁰⁶ "Renewable Energy", Invest India, as accessed on 17th April 2023



Energy storage and transmission and distribution infrastructure: As part of the Strategic Clean Energy Partnership (SCEP), India and the U.S. have announced the introduction of an **energy task force**, with its key objectives around:

- Focus on scaling up the deployment of energy storage technologies
- Supporting large-scale integration of RE by strengthening the power grid and introducing smart grids.

However, to meet its 2030 RE target, the country still requires a minimum of 160 GWh of energy storage capacity.

Thus, with battery production gaining momentum in the U.S. and demand for batteries soaring in India — the U.S. could look at introducing a lithium-ion battery cell plan in the developing country.

Progressive measures enabling growth

- In 2023, the Government of India announced plans to modernise its transmission system to allow greater integration of RE, minimum outages, and resilience against cyberattacks and natural disasters.
- It plans to leverage predictive maintenance techniques and advanced technologies (such as AI and ML), robots and drones in transmission assets.
- In the 2023–24 budget, viability gap funding to support the development of 4 GWh battery energy storage systems were announced.
- An energy storage obligation (ESO) to ensure that a minimum of 85 per cent of energy stored in the energy system is annually procured from the RE sources was introduced.
- In 2022, with the objective of achieving 500 GW of RE generation capacity by 2030, the Government of India announced to invest USD29.6 billion to bolster the country's transmission capacity.



Sustainable finance

India needs about USD2.5 trillion¹⁰⁷ till 2030 to meet its Nationally Determined Contribution (NDC) targets under the Paris Agreement and about USD10.1 trillion¹⁰⁸ to achieve net zero emissions by 2070. However, the funding it is receiving is falling short of the current needs, though to help tackle the challenge, the country has taken a few initiatives, including:

- In 2023, the Government of India announced to issue Sovereign Green Bonds worth USD2 billion in the current financial year to provide resources for green infrastructure projects.
- In 2021, it introduced about USD6.1 billion¹⁰⁹ of green bonds to fund climate-related projects.
- In 2019, it launched the Sustainable Development Goals Finance Facility (SFF) and established a technical committee on the Social Stock Exchange (SSE) under SEBI to evaluate performance, social impact and social audits.

Despite these efforts, there is still a long way to go to fulfil its energy commitments and it would not be possible without the support from its international peers, the U.S. being the most crucial among them. The two nations have together introduced critical initiatives in the area.

Climate Action and Finance Mobilization Dialogue (CAFMD)

Launched in 2021, it aims to improve the **climate financing opportunities** to tackle climate change. As per the agreement, the two countries aim to prepare joint proposals to identify ways to reduce emissions in the next decade and to collaboratively build capacities to measure and manage climate risks.

Green hydrogen

Green hydrogen can play a key role in reducing India's energy-related import dependencies and support decarbonisation efforts. According to some studies, green hydrogen can help the country in reducing its CO₂ emissions by 3.6 gigatonnes¹¹⁰ between 2020 and 2050. Majority of this decarbonisation potential lies in high emitting end-use sectors. For instance, a reduction in oil imports as hydrogen fuel cell trucks replace conventional long-haul freight solutions and natural gas imports as green hydrogen can replace grey hydrogen.

- In January 2023, the Union Cabinet approved the National Hydrogen Mission, with a total financial outlay of USD2.4 billion (INR197 billion¹¹¹). It aims to stimulate green hydrogen supply and demand, with a focus on domestic manufacturing and accelerating large-scale investments in green hydrogen projects. The investment can also encourage U.S. players to set up dedicated production facilities in India, with about USD2.1 billion in supply side incentives for green hydrogen production and electrolyser manufacturing.
- Driven by reduction in costs of electrolysers and RE, technology innovation and aggressive national strategies, increased activity is being observed.

Carbon capture technologies

With about 2.6 gigatonnes¹¹² annual emissions released per annum, India accounts for the third¹¹³ most CO₂ emissions globally (as of January 2023). The power and industrials sector contribute about 60 per cent to the total emissions — this necessitates the importance of carbon capture. Hence, carbon capture technology can play a crucial role in realising the country's decarbonisation goals.

¹⁰⁷ "Economic Survey", India budget, as accessed on 17th April 2023

¹⁰⁸ "IFSCA and CEEW sign MoU to cooperate on sustainable finance", PIB, as accessed on 17th April 2023

¹⁰⁹ "Sovereign Green Bonds of Rs.16,000 crore proposed to be issued in the current FY for mobilising resources for green infrastructure projects", PIB, as accessed on 17th April 2023

¹¹⁰ Harnessing Green Hydrogen, NITI Aayog, accessed on 17 April 2023

¹¹¹ Cabinet approves National Green Hydrogen Mission, Ministry of New and Renewable Energy, accessed on 17 April 2023

¹¹² "Carbon Capture, Utilization and Storage (CCUS) Policy Framework and its Deployment Mechanism in India", NITI Aayog, accessed on 17 April 2023

¹¹³ "India holds the key to hitting global climate change targets. Here's why", World Economic Forum, 19 January 2023, accessed on 18 April 2023

- According to the Global CCS Institute (GCI), India currently has only four¹¹⁴ Carbon Capture and Storage (CCS) facilities and as per the latest GCI Indicators, its policy and storage indicators are also among the lowest (at just 4 and 36 respectively¹¹⁵, out of 100). However, the government is taking strong initiatives to expedite its adoption. For instance,
 - The Ministry of Petroleum and Natural Gas has initiated efforts to create opportunities for development of CCS/ Carbon Capture Utilisation and Storage (CCUS) through a draft roadmap. In 2022, NITI Aayog also published a study that proposed a policy framework to enable the same.

However, concerns related to high costs and lack of dedicated research facilities have led to delays in the growth of CCS/CCUS in the country. The U.S. which accounts for more than 60¹¹⁶ per cent of global CO₂ capture capacity and about 50 per cent of all planned capacity — can significantly support India in achieving its potential. Furthermore, conversion of CO₂ to ethanol and methanol presents an attractive engagement opportunity for the two countries as the U.S. holds extensive experience with CCUS-based ethanol production. Existing engagements via the U.S.-India Low Emissions Gas Task Force (part of the SCEP) can facilitate the deployment of this technology.

E-mobility

Transportation accounts for about 13 per cent¹¹⁷ of India's total CO₂ emissions (as of May 2022), representing the third highest Greenhouse Gas (GHG) emitting sector. Electrification holds significant promise to decarbonise transportation and achieve the country's ambitious climate goals. By pursuing an electric mobility pathway (India's e-mobility goal includes achieving 30 per cent¹¹⁸ electrification in total vehicle fleet by 2030), India can save about 64 per cent¹¹⁹ of expected energy demand from passenger mobility and reduce 37 per cent of carbon emissions in 2030. While EV uptake has been slow (a 0.1 per cent share of the global market), the country is seeing an uptick in demand and is set to become a large market for two- and four-wheelers, and electric public transport. To fast-track the development, achieve scale and to achieve its targets, India is leveraging learnings from the U.S. (third largest¹²⁰ EV market worldwide) to achieve its targets. To that end, the two countries have already made some headway in this space.

- The Centre for Strategic & International Studies (CSIS) and U.S.-India State and Urban Initiative have facilitated cross-collaboration between the U.S. and Indian stakeholders.
 - For instance, in 2022, the Government of India and the State of California established the California-India ZEV Policy programme to enable the transition to Zero-Emission Vehicles (ZEVs) in India by addressing policy strategies to support ZEV uptake, investment strategies to spur the development of the industry, and providing access to more research.
 - As part of the partnership, the Government of India and University of California Davis's Institute of Transportation Studies also launched the India ZEV Research Centre in 2022 with an aim to achieve the aforementioned objectives.

India has aggressive plans to transform its energy sector and use energy as a structural enabler to reduce emissions from other sectors. While it has made strong efforts in this direction, it can certainly adopt best practices and learnings from a more mature energy market of the U.S. The U.S., along with its private sector and research institutions, is well-placed to collaborate with Indian companies and national and subnational agencies to facilitate the transition across the energy value chain.

¹¹⁴ "Facilities Database", Global CCS Institute, accessed on 17 April 2023

¹¹⁵ "Policy Indicator and Storage Indicator Database", Global CCS Institute, accessed on 17 April 2023

¹¹⁶ "CCUS in Clean Energy Transitions", International Energy Agency, accessed on 17 April 2023

¹¹⁷ "India E-Mobility Financing Programme", Green Climate Fund, accessed on 17 April 2023

¹¹⁸ "Department of Economic Affairs (DEA), Ministry of Finance adopts E-Mobility Programme", Ministry of Finance, accessed on 17 April 2023

¹¹⁹ "India Leaps Ahead: Transformative Mobility Solutions for All", Rocky Mountain Institute, accessed on 17 April 2023

¹²⁰ "Electric Vehicles – Analysis", International Energy Agency, accessed on 17 April 2023

07

Aerospace & Defence (A&D)

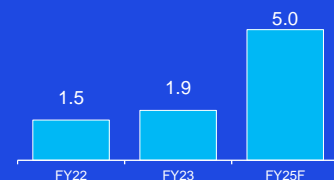


Aerospace & Defence (A&D)

Key takeaways

- The increased demand for national security, rising passenger traffic and increased expenditure on national security will lead to a higher growth in the sector
- In FY23, India's defence exports include 85 countries and have grown by over 10 times in the last few years
- The government has launched various training and innovation centres to boost technological advancement
- India and the U.S. have also signed the initiative on Critical and Emerging Technology (iCET), which aims to expand the strategic partnership in technology and drive defence industrial cooperation between the two countries

A&D exports (USD billion)



Note: Includes only export by defence public sector undertakings.
Source: Ministry of Defence, India Brand Equity Foundation (IBEF)

India holds a unique position in the global A&D landscape, having the world's third largest¹²¹ military budget and seventh largest civil aviation market^{122,123}. Increase in demand for defence services, with rising concerns of national security, growing passenger traffic, increasing military and defence expenditure, and a robust A&D ecosystem is likely to propel the sector.

Defence manufacturing is a key area of focus for the Indian government, and by FY25, India is targeting to achieve a defence manufacturing turnover of USD22 billion¹²⁴. In FY23, India's defence export base comprised of 85 countries with exports showing a 10-times growth in the last few years¹²⁵. The A&D sector has seen some major developments, investments, and governmental support to achieve these targets.

¹²¹ "Personnel vs. capital: the Indian defence budget", IISS, 14 April 2023, as accessed on 18 April 2023

¹²² "The Sky's the Limit: India's Growing Aviation Industry", Invest India, February 2023, as accessed on 13 April 2023

¹²³ "English Translation of Remarks by Prime Minister, Shri Narendra Modi at the virtual meeting with the President of France", PIB, 14 February 2023, as accessed on 25 February 2023

¹²⁴ "Raksha Mantri invites investors & foreign OEMs to be part of Indian defence sector to integrate into global supply chains", PIB, 20 October 2022, as accessed on 25 April 2023

¹²⁵ "Aatmanirbharta on the rise: Defence exports reach an all-time high of approx. Rs 16,000 crore in Financial Year 2022-23; Over 10-times increase since 2016-17; India exporting to over 85 countries", PIB, 1 April 2023, as accessed on 25 April 2023

Growth drivers^{126,127,128,129,130,131,132}

Increasing military and defence expenditure

The Ministry of Defence (MoD) was allocated **USD72 billion[^]** in the Union Budget 2023-24, with a capital allocation of around **USD20 billion** for modernisation of the defence services, **a rise of 6.7 percent over FY23**. This is expected to boost domestic manufacturing.

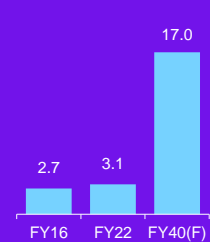
Emergence of foreign OEMs and MSMEs

Under the MoD's jurisdiction, the A&D sector has **16 Defence Public Sector Undertakings (DPSUs), 100+ tier-1 OEMs and Foreign OEMs (FOEMs), and 18,000 MSMEs**, which support the end-to-end manufacturing and value chain.

Rising air traffic

- In FY23, domestic air passenger traffic increased by about **60 per cent YoY to 136 million**. Furthermore, both domestic and international passenger traffic is expected to increase by **more than 20 per cent YoY in FY24**. To meet the increased demand, Indian carriers plan to add 132 aircraft by FY24.
- Freight traffic is also expected to reach 17 Million Metric Tonnes (MMT) by FY40. To cater to the rising air traffic, India is expected to increase the number of airports to 190-200 by FY40, as compared to 129 in FY22. To cater to the rising air traffic, the Government of India aims to create 220 new airports by 2025, in addition to the existing 148 operational airports (as of March 2023).

Freight traffic (MMT)



Note: [^]Exchange rate as on 1 February 2023 of USD1 = INR82.69 is used to convert INR to USD.

Government initiatives to promote domestic manufacturing

Reduction of import dependence, infrastructure improvements, development of expertise in designing and manufacturing critical components, and skilling are few of the focus areas. The Indian government has undertaken various strategic initiatives over the years to stimulate the country's defence manufacturing ecosystem, promote infrastructural development, and encourage foreign and domestic investments.

- To empower domestic defence manufacturing**, the government has taken a lot of initiatives.
 - Government has increased the allocation of the defence capital procurement budget from the domestic industry, from 68 per cent in FY23 to 75 per cent for FY24¹³³. The government has also set a target of being 70 per cent self-sufficient in weaponry by 2027¹³⁴.

- Policies such as Defence Acquisition Procedure 2020 have been implemented and others such as draft Defence Procurement Manual 2021, draft Defence Production and Export Promotion Policy 2020 are being discussed under the 'Aatmanirbhar Bharat' initiative, to achieve this target.
- The Union Budget 2022-23 had also earmarked 25 per cent of the defence R&D budget for allocation to start-ups and private players¹³⁵.
- The government had introduced four positive indigenisation lists with a total of 411 items¹³⁶ earmarked for Indian industry and DPSU lists to minimise imports by DPSUs. The lists include items that shall be indigenously manufactured in the future and shall only be allowed to be procured domestically beyond the indicated timelines.

¹²⁶ Defence Public Sector Undertakings, About Us, Department of defence production, Ministry of Defence, Government of India website, as accessed on 13 April 2023

¹²⁷ "Domestic aviation industry is on a recovery path as the passenger traffic was 60% higher in FY23", IBEF, 13 April 2023, as accessed on 25 April 2023

¹²⁸ "Air traffic to grow 20% in FY24 as Indian carriers add 132 aircraft: Report", IBEF, 21 March 2023, as accessed on 13 April 2023

¹²⁹ "Defence gets Rs 5.94 lakh crore in Budget 2023-24, a jump of 13% over previous year", PIB, 1 February 2023, as accessed on 13 April 2023

¹³⁰ "Consultative Committee of Ministry of Civil Aviation Meets", PIB Delhi, 13 March 2023, as accessed on 25 April 2023

¹³¹ "Govt sets a target of creating 220 new airports by 2025 informs, Civil Aviation Minister Jyotiraditya Scindia in LS", All India Radio, 23 March 2022, as accessed on 25 April 2023

¹³² "INDIA AVIATION-SKILLS OPPORTUNITIES", International Trade Administration, 11 September 2022, as accessed on 25 April 2023

¹³³ "Record 75 per cent of defence capital procurement budget earmarked for domestic industry in FY 2023-24, announces Raksha Mantri at 14th Aero India", PIB, Ministry of Defence, 15 February 2023, as accessed on 13 April 2023

¹³⁴ Defence manufacturing industry report, IBEF, November 2022, as accessed on 13 April 2023

¹³⁵ "Union Budget 2022-23", PIB, 1 February 2022, as accessed on 18 April 2023

¹³⁶ "Self Reliance in Defence Sector", PIB, Ministry of Defence, 19 December 2022, as accessed on 25 April 2023

- SRIJAN, an indigenisation portal to enable indigenisation by Indian defence industry including MSMEs was established.

All these initiatives will help drive domestic manufacturing and reduce import requirements.

- **To promote technological advancement and skill development in the A&D sector**, the Union Government has also set up 108 training centres¹³⁷ accredited by the Aerospace and Aviation Sector Skill Council (AASSC) across India and has launched schemes such as Innovations for Defence Excellence (iDEX), which is expected to foster innovation and technological development in the country by engaging MSMEs, start-ups, and R&D institutes, among others. iDEX was also given an additional allocation of USD14 million¹³⁸ in the Union Budget 2023-24¹³⁹. Further, the Government has established a Technology Development Fund (TDF) which is being administered by the Defence Research and Development Organisation (DRDO). The fund shall concentrate on promoting self-reliance and creating a conducive ecosystem for MSMEs. It will be utilised to enable financial support for technological development of defence applications.
- The government has also **established two defence industrial corridors (DICs)** in Uttar Pradesh and Tamil Nadu, which are expected to satisfy the infrastructural needs of the sector and attract an investment of USD1.3 billion in each DIC by 2024-25¹⁴⁰. As of **April 2023**, there has already been an investment of over **USD303 million (INR25 billion)** in the Uttar Pradesh corridor and **USD480 million (INR39 billion)** in the Tamil Nadu corridor¹⁴¹. Moreover, there are eight ongoing government-led projects in the A&D sector with an investment opportunity of USD1.1 billion across India¹⁴².
- The government has also **revamped the licensing and FDI policy** in 2020 by simplifying the industrial licensing process with extended validity period and allowing 74 per cent FDI via automatic route (from earlier 49 per cent)¹⁴³ for certain acquisition categories in the defence sector. Doing away with the requirement of industrial license for parts and accessories of defence equipment has proved beneficial for the industry. For aviation, the limit is 74 per cent for brownfield project and 100 per cent for others. This is expected to help ensure predictability, transparency, and ease of doing business and further increase foreign capital flows.
- In addition to the Central government, various state governments have also implemented initiatives for the promotion of the A&D sector. For instance, the government of Tamil Nadu provides incentive packages to promote A&D parks as a part of their A&D industrial policy 2022¹⁴⁴. The government has also planned an investment of USD630 million (INR50 billion) over a 10-year period to drive initiatives for the development of the A&D industry in the state. Initiatives include establishing centres of excellence and development of industry-specific training facilities in association with industry partners, setting up of research and development facilities, and establishment of a corpus fund for new ventures in the A&D industry.
- Inter-governmental initiatives such as the U.S.-India iCET also aim to present opportunities for industry players in both countries to drive cooperation in research and development and production. The bilateral defence industrial cooperation roadmap aims to drive the joint development and production of defence technologies and provide a platform for connecting Indian and U.S. start-ups.

¹³⁷ "No new proposals for aviation skill development centres by AAI, accreditation to private partners under consideration", ETGovernment, 28 March 2023, as accessed on 13 April 2023

¹³⁸ Note: Exchange rate as on 1 February 2023 of USD1 = INR82.69 is used to convert INR to USD.

¹³⁹ "iDEX gets Rs 116 crore, an enhancement of 93% over 2022-23, to further foster innovation", PIB, Ministry of Defence, 1 February 2023, as accessed on 13 April 2023

¹⁴⁰ Defence manufacturing industry report, IBEF, November 2022, as accessed on 13 April 2023

¹⁴¹ DDP Dashboard (Figures converted at 1 USD = INR 82)

¹⁴² Defence manufacturing sector, Invest India website, as accessed on 13 April 2023

¹⁴³ "Increasing FDI ceiling in the defense sector to 74 per cent via automatic route", UNCTAD, 17 September 2020, as accessed on 24 April 2023

¹⁴⁴ Tamil Nadu Aerospace and Defence Industrial Policy 2022, Uploads, Tamil Nadu Industrial Development Corporation Limited website, as accessed on 13 April 2023

U.S.–India defence ties

U.S. and India have a history of strong partnership in defence and space. In 2016, the U.S. titled India as their ‘major defence partner’. Both countries have also signed a defence technology and trade initiative to improve cooperation in developing defence capabilities. In 2020, India and the U.S. also signed deals worth over USD3 billion¹⁴⁵, which primarily included the trade of helicopters for India’s defence forces.

U.S.-India engagements	Initiatives and case examples
Supply chain enhancement in collaboration with Indian partners	<ul style="list-style-type: none"> • A U.S.-based defence and commercial aerospace manufacturer announced partnership with an Indian manufacturer operating in industries such as automotive and aerospace, to manufacture and supply commercial airplane interiors. This will enable the Indian player to gain the position of a tier-1 supplier to the U.S.-based manufacturer. • U.S. and Indian defence manufacturers have collaborated to develop next generation military vehicles for India and global markets and have integrated multiple Indian suppliers into their global supply chain.
Skill development for promoting the domestic industry’s growth	<ul style="list-style-type: none"> • As part of skill development initiatives, several U.S. companies have also trained many people in aerospace manufacturing and maintenance through research partnerships with Indian institutes. • In 2022, a U.S.-based defence and commercial aerospace manufacturer, and a UK-based manufacturing technology organisation, in collaboration with a non-profit organisation in India, launched a skilling programme for training youth for employment in aerospace manufacturing. • In 2020, a major U.S.-based aircraft engine manufacturer partnered with a Maintenance, Repair and Overhaul (MRO) services provider in India in an attempt to bring advanced MRO capabilities to India, which were previously conducted only by international MRO hubs.
Driving the domestic A&D export capabilities	<ul style="list-style-type: none"> • India’s A&D exports have drastically increased by around 27 per cent in FY22 since FY18¹⁴⁶, wherein U.S., France, Israel and Russia are the top export destinations. U.S. OEMs have contributed significantly to this growth. • For instance, a key U.S.-based aerospace and defence player has collaborated with industrial manufacturers in India to facilitate multi-million-dollar exports from India.

¹⁴⁵ “India, U.S. sign defence deals worth over \$3 billion”, The Hindu, 25 February 2020, as accessed on 13 April 2023

¹⁴⁶ “In charts | India’s defence exports at record high, but here’s a reality check”, Live mint, 3 April 2023, as accessed on 13 April 2023

Opportunities for U.S. companies in the Indian A&D ecosystem

Manufacturing partnerships

Geopolitical sensitivities, secondary sanctions and supply chain disruptions have reduced the weapon exports of Russia from 22 per cent in 2013-2017 to 16 per cent in 2018-2022¹⁴⁷ resulting in an enormous opportunity for other countries to elevate their exports.

MRO opportunities

A growing domestic aircraft fleet, availability of low-cost engineering talent, and government initiatives such as the new MRO policy announced in 2021 for the civil aviation sector, which aims to reduce constraints such as land availability and royalties.

Flourishing drone market

India is the fastest growing drone market and it is expected to reach USD6.69 billion by 2025^{148,149}. A growing drone market along with favourable government initiatives such as PLI schemes, introduction of multiple grants, Unmanned Aircraft System Traffic Management (UTM) policy framework, and the release of Drone Rules 2021, which facilitates ease of doing business in this space.

For deepening the industrial cooperation between the U.S. and India, the two nations are constantly seeking avenues to jointly research, develop, and create warfighting capabilities with the goal of co-development and co-production.



¹⁴⁷ "Trends in International Arms Transfers, 2022", Stockholm International Peace Research Institute (SIPRI), March 2023, as accessed on 18 April 2023

¹⁴⁸ "Indian drone industry reaching the skies", IBEF Blog, 12 October 2021, as accessed on 18 April 2023

¹⁴⁹ The Indian Drone Market Report, Drone Industry Insights, as accessed on 18 April 2023

Way forward



Engagement on forums

Enhanced engagement on bilateral and multilateral forums' (CEOs' forum, Commercial dialogue, SCEPT, ICET, QUAD, etc.) to expand strategic partnerships with various governments, businesses and institution in both countries.



Enhance trade

With global supply chains also facing headwinds in the recent past, a strong cooperation from the part of the U.S. and India is critical to ensure better market access.



Accelerating technology cooperation

India-U.S. partnership can leverage technical expertise in India and design technologies at a competitive price across sectors like pharma, aerospace, drones, patented drugs.



Workforce of the future

India and U.S. can work on research, more student and researcher mobility and promote entrepreneurship. They can also look at heightened Science, Technology, Engineering and Mathematics (STEM) exchanges to drive innovation.



Infusing more ENERGY in the partnership

India's focus on achieving net-zero goals by 2070 is opening new horizons for the Indo-U.S. collaboration.



Responsible supply chains

India and U.S. together can embed environmentally responsible principles into the supply chain networks.

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