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EUCLUSTERS MATCHMAKING EVENTS

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**EU-India**

#ECCPMatchmaking

EUROPEAN CLUSTER COLLABORATION PLATFORM

European Commission

GOVERNMENT OF KARNATAKA Dept. of E, IT & Bt

BENGALURU TECH SUMMIT

GBI GLOBAL BUSINESS INROADS CONSULTING EXCELLENCE DELIVERED

# Contents

# I. Extract from the Input Paper on the cluster policy landscapes and collaboration opportunities in the European Union and India

*Source: ECCP*

## 1.1 Key insights from the Input paper on clusters policy landscapes in EU and India and latest trends

This section provides key insights building on the Input Paper developed in October 2024, in view of the EU-India Matchmaking event under the European Cluster Collaboration Platform (ECCP) and shows later trends in India's strategic fields.

***Economic profile of India and trade with the EU***

- India's economy experienced a significant growth in the last decades, with a rapid expansion of its GDP. Today, India is one of the fastest growing economies in the world, despite the significant regional economic disparities, with GDP per capita ranging from €570 to €5,800.
- The expansion of the **services sector** in the country is the main factor driving economic growth, accounting for 54.7% of its gross value added (GVA): this allowed India to become a global outsourcing hub, especially in IT and software services, thanks to its large pool of skilled IT professionals, with relatively low labour costs. In this context, Bangalore emerged as the Silicon Valley of India for the strong agglomeration for software and became home to some of the largest software companies worldwide. Computer services remain the largest segment regarding service exports, accounting for 46% of total service exports, followed by professional consulting, transport, travel, and insurance and financial services.
- In 2023, India's industrial sector contributed 27.6% of GVA and 24.1% of total employment, with key sectors being manufacturing, construction, energy, and mining. The manufacturing sector is dominated by the automobile and pharmaceutical industries, while other important sectors include chemicals, electronics, metals, textiles, and more. The EU is India's largest trading partner, with trade in goods totalling EUR 115 billion in 2022, and key value chains for EU-India cooperation include aerospace, digital, energy, health, mobility, and textiles.

***Cluster landscape and policies: collaboration opportunities with EU27***

- India's industrial clusters can traditionally be found mainly in chemicals and petrochemicals, automobile and automobile components, drugs and pharmaceuticals and consumer appliance sectors. However, IT and software are also forming their own significant clusters.
- Clusters are understood as major agglomerations of businesses, research facilities and other relevant stakeholders in a certain location. These clusters can span multiple States and include multiple cities. The clusters are complemented by Special Economic Zones (SEZs).
- India has continuously developed its cluster policy portfolio to support the collaboration and innovation efforts of SMEs. At the core of the Ministry of Micro, Small & Medium Enterprises' (MSME) cluster policy mix are the MSE-CDP programme, the SFURTI scheme and the MSME Testing Centres. MSME-DFOs and ASPIRE are seen as further parts of the cluster policy portfolio in an evaluation report by the National Productivity Council (2021).

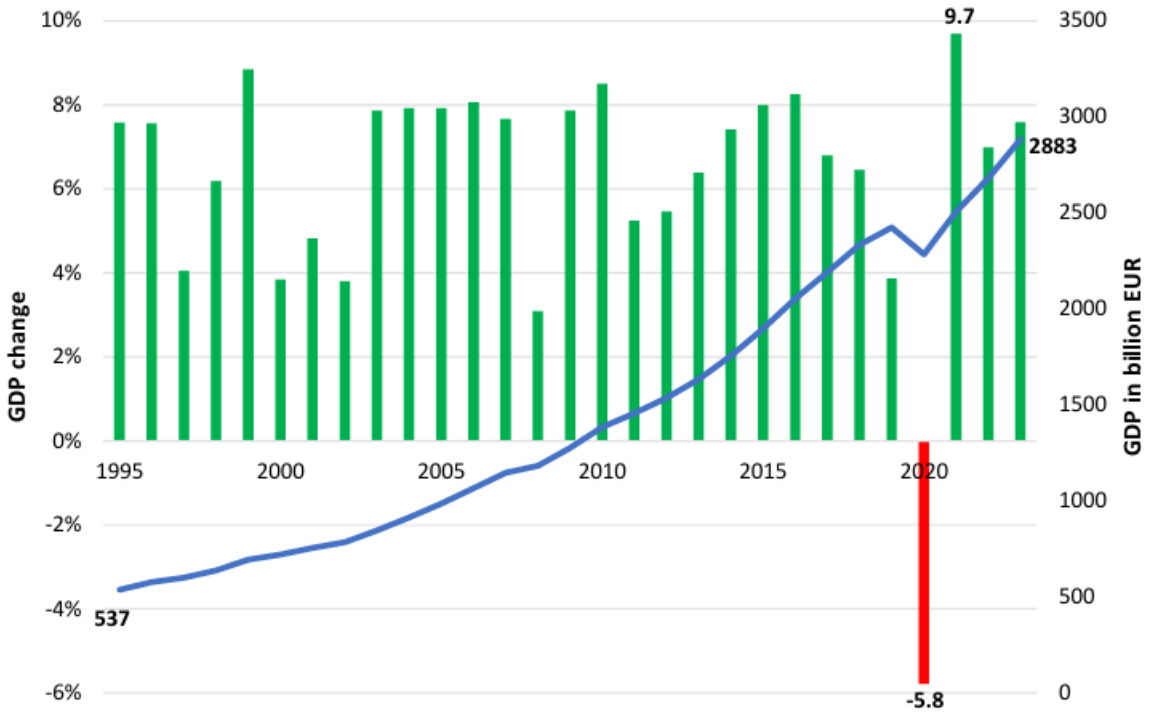
## 1.2 India's economic profile and strategic areas

With a population of 1.43 billion in 2023[1] (World Bank), India is the most populous country and the largest democracy in the world. India's demography and economy expanded in parallel, positioning the country as one of the fastest-growing economies worldwide. The growth that India experienced in the past two decades, has also led the country to make remarkable progress in reducing extreme poverty. Today, India is emerging as a global player; however, certain challenges persist: inequality in consumption increases, child malnutrition has remained high and employment, despite evident improvement, remains concerning in terms of the quality of jobs and the low participation of women in the workforce.

As shown by Figure 1, from 1996 onwards, India's economy has experienced a strong growth period: with an average annual growth rate above 6%, the GDP increased more than fivefold over the last 30 years. The only shortcoming was registered during the COVID-19 pandemic, when the country faced a recession period.

[1] World Bank, Population, total – India, 2024. Available here: Population, total - India | Data

***Figure 1: GDP in constant 2015 EUR (line) and growth rate (bars)***

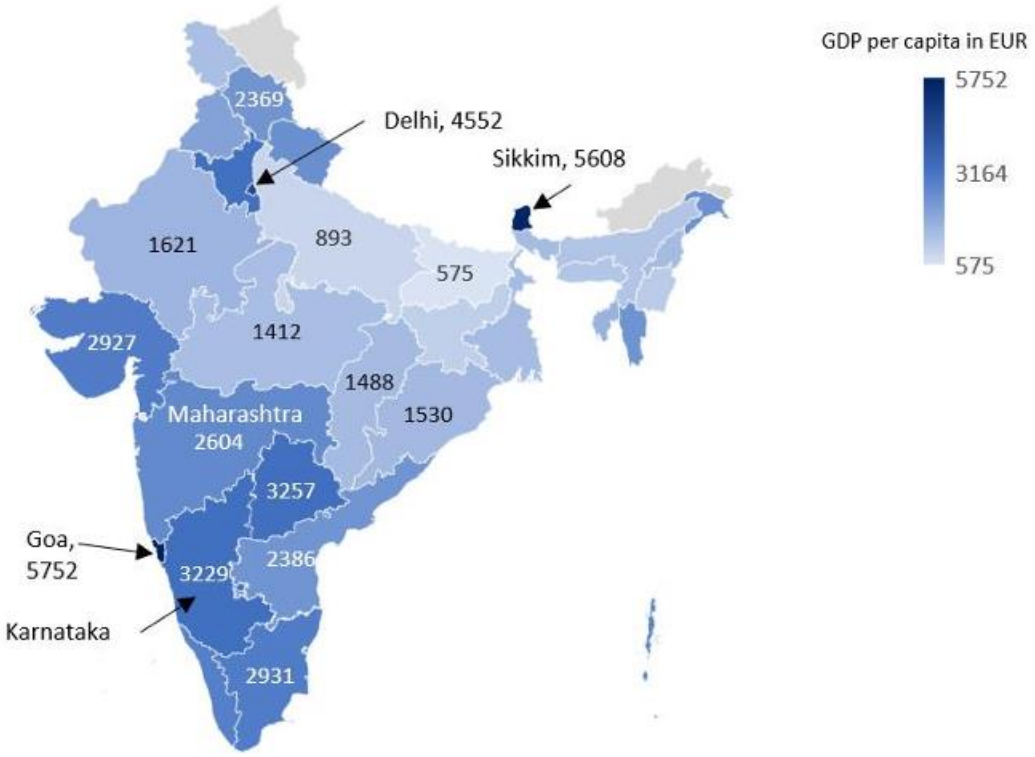



*Source: ECCP (2024), own calculation based on The World Bank. Note that the figures were converted into EUR using the average INR/EUR conversion rate for 2015 based on Eurostat.*

Although the significant increase in India's GDP, the situation appears fragmented when looking at GDP per capita across its states (see Figure 2): in 2022, GDP per capita ranged from EUR 570 in Bihar to EUR 5,800 in Goa. The capital region of Delhi recorded the third highest GDP per capita at EUR 4,600 in the same year, highlighting economic disparities between different regions. [2]

[2] Government of India, 2024. Available here: Per Capita net State domestic product at current prices

***Figure 2: GDP per capita by State in EUR (2022)***




*Source: ECCP (2024), own calculation based on Government of India. Note that the figures were converted into EUR using the average INR/EUR conversion rate for 2015 based on Eurostat*

As per economic complexity, India ranked 42nd out of 133 countries in the Economic Complexity Index in 2021, which measures the diversity and sophistication of an economy's export.[3] India's ECI score is also the highest in the South Asian region, with neighboring countries like Sri Lanka, Pakistan, and Bangladesh ranked 77th, 94th, and 101st respectively. This underscores India's competitive edge and the increasing sophistication of its economy relative to others in South Asia.

[3] Atlas of Economic Complexity, Country & Product Complexity Rankings, 2024. Available here: https://atlas.cid.harvard.edu/rankings

The Indian economy and its robust growth are mainly driven by the wide expansion of the **services sector** that accounts for 54.7% of its Gross Value Added (GVA)[4], employing, however, only 29.7% of the active working population in 2023. A key factor behind the growth of the IT sector is India's large pool of skilled IT professionals, coupled with relatively low labor costs, positioning the country as a global hub for outsourcing. In this context, Bangalore is referred to as the Silicon Valley of India, home to some of the largest software companies in the world.[5] **Computer services remain the largest segment regarding service exports, accounting for 46% of total service exports**, followed by **professional consulting**, **transport**, **travel**, and **insurance and financial services**. Looking at future prospects, key sectors with a high potential to contribute to the Indian economy and driving high productivity include **digital services in automation**, **cloud computing**, **cybersecurity**, **mobile technology**, **artificial intelligence**, **3D printing**, **Internet of Things (IoT)**, **big data analytics**, and **social media**.

The **industry sector** contributes 27.6% of the GVA, while accounting for 24.1% of total employment in 2023.[6] India is emerging as a global leader also in **manufacturing**, thanks to its strategic geographical location – between Africa, the Middle East and East Asia – and geographical features, the large and young labor force, and the vast domestic market. A key industry in the manufacturing sector is the **automobile industry**, with the city of Pune that established itself as a hub for automobile, and auto component manufacturing in India.[7] While **manufacturing accounts for 14.3% of GVA** - including key industries such as chemicals, electronic systems, paper and packaging, metals and mining, textiles and apparel - **construction accounts for 8.9%**, **energy for 2.5%** and **mining for 2%**. The **pharmaceutical industry** also plays a prominent role, **accounting for over 20% of the global generics supply** by volume and 60% of the global vaccine supply.[8]

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[4] Government of India, 2024. Data available here: Statement_12_01092024.xls
[5] Ketels et al., The India Cluster Panorama Report, 2023. Available here: The 2023 India Cluster Panorama - Report - Faculty & Research - Harvard Business School
[6] Government of India, Periodic Labour Force Survey (PLFS), 2024. Available here: AnnualReport_PLFS2023-24L2.pdf
[7] Ketsel et al., The 2023 India Cluster Panorama Report. Institute for Competitiveness, 2023. Available here: The 2023 India Cluster Panorama - Report - Faculty & Research - Harvard Business School
[8] EY, Pharma and healthcare for India@100: a century of change on the horizon, 2023. Available here: https://www.ey.com/en_in/insights/health/pharma-and-healthcare-for-india-100-a-century-of-change-on-the-horizon

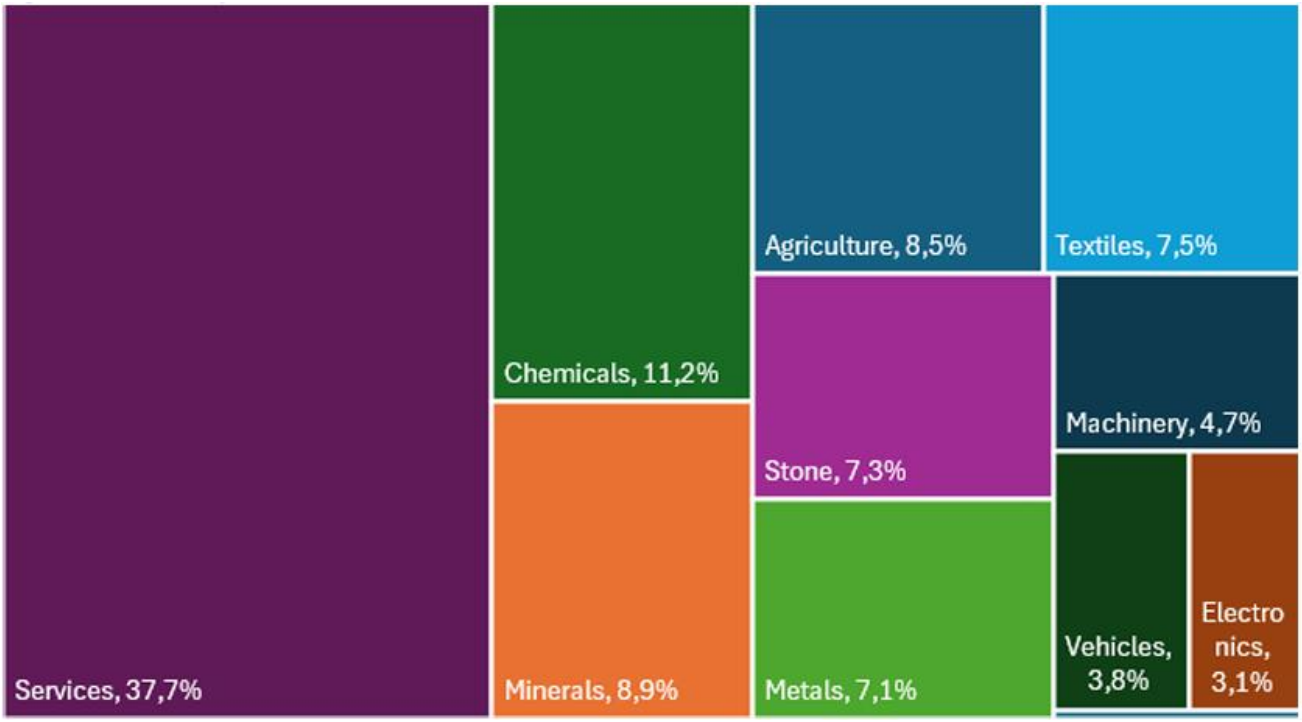
The **agricultural sector** contributes only 17.7%, but employes 46.1% of the workforce.[9] This discrepancy can be explained by the low productivity of the sector: Indian agriculture is largely underdeveloped in terms of technologies and innovation, with farmers heavily impacted and facing significant challenges. Half of the farmers experience a lack of access to basic equipment to perform their work three-quarters of them are highly vulnerable to pests and adverse weather, and 50% of farmers does not have access to formal financing options.[10] Although India faces challenges in the agricultural sector, it is nevertheless highly diversified: for instance, India is the world's largest producer of milk, coconuts, black tea and ginger, while being the second largest producer of fruits and vegetables, rice, wheat, groundnuts, and cashews.

Looking back at the Atlas of Economic Complexity, Figure 3 shows the export share of each sector that reflects the structure of key sectors in India. Almost **40% of India's total exports consist of services, with the ICT sector accounting for 30.1% of these exports**. Alone, the ICT industry contributes to one-third of the country total exports, underlining the role of India as a prominent competitor in digital services.

***Figure 3: Indian export shares in 2021***

[9] Government of India, Periodic Labour Force Survey (PLFS), 2024. Available here: AnnualReport_PLFS2023-24L2.pdf

[10] McKinsey, How agtech is poised to transform India into a farming powerhouse, 2024. Available here: https://www.mckinsey.com/industries/agriculture/our-insights/how-agtech-is-poised-to-transform-india-into-a-farming powerhouse




*Source: ECCP (2024). Own calculation based on Atlas of Economic Complexity.*

In terms of performance in innovation, India ranks 39th among the 133 economies featured in the Global Innovation Index 2024 (GII) – against 48th in 2020. The GII ranks world economies according to their innovation capabilities based on approximately 80 indicators, grouped into innovation inputs and outputs. In a nutshell, the GII seeks to capture the multidimensional facets of innovation in a country. At the same time, India ranks 1st among the 38 lower-middle-income group economies and among the 10 economies in Central and Southern Asia.[11]

***Figure 4: India's innovation system (Innovation inputs) - Global Innovation Index 2024***

[11] WIPO, Indian ranking in the Global Innovation Index 2024. Available here: India Ranking in the Global Innovation Index 2024.


*Source: [Global Innovation Index 2024]*

India's innovation system, as depicted in the Global Innovation Index (GII) 2024, reflects a multifaceted approach to fostering innovation through various input factors. The GII evaluates numerous aspects across different countries, with inputs such as education expenditure, R&D, university rankings, and venture capital forming the foundation of a nation's innovation ecosystem. India's progress in these areas showcases its commitment to building a robust environment for innovation. As Figure 4 above illustrates:

- the **expenditure on education** reached 4.63% of GDP in 2021, marking an increase from prior years and placing India 50$^{th}$ globally. This growing investment highlights India's efforts to strengthen human capital, which is essential for sustaining long-term innovation. However, there is room for growth, especially when compared to countries ranking higher in education spending.

- **Graduates in science and engineering** accounted for 29.33% of India's total graduates in 2022, despite a slight decrease from the previous year. This is a relatively high percentage, ranking India 25th globally, reflecting the strong focus of the country on technical fields and the economic performance of the services sector, as previously described.
- **Researchers per Million Population** accounted for 260.38 full-time equivalents (FTE) per million people as of 2020, representing a modest increase. With a rank of 83, this indicator shows that while India has made progress, there's still significant room to bolster its research capacity, particularly in fields where expertise can directly impact technological and scientific advancements.
- The **gross expenditure on research & development** amounted to 0.65% of GDP in 2020, placing it 54th globally. This small decrease from previous levels signals a need to strengthen investment in R&D, particularly as R&D spending is directly correlated with breakthroughs and the development of high-value technologies.
- **QS University Ranking**, measuring the quality and competitiveness of India's top universities. The average score for India's top three universities was 46.63 in 2023, placing it at rank 24 worldwide. This ranking reflects India's relative strength in higher education institutions, which serve as important hubs for knowledge generation, innovation, and training future innovators.
- **Venture Capital (VC) received** dropped by 63.22% in 2023 compared to the previous year. Nevertheless, India highly ranked 6th globally due to India's significant startup ecosystem.

Two additional indicators in the 2024 GII are the **domestic industry diversification** ranking 16th globally in 2021 and reflecting the variety and breadth within India's industrial landscape – which can stimulate resilience and innovation by enabling cross-sectoral collaboration and reducing dependency on any single industry – and the **knowledge-intensive employment**, representing in 2023 11.72% of total employment and ranking India at 103rd; this indicator shows the extent to which India's workforce is engaged in high-skilled, knowledge-driven roles.

To complete this overview, the figure below illustrates Singapore's top performers in innovation, with a focus on global corporate R&D investors from India and India's top universities ranking:

***Figure 5: India's innovation top performers – Global Innovation Index 2024***

### 2.3.3 Global corporate R&D investors from India

| Rank | Firm | Industry | R&D | R&D Growth | R&D Intensity |
|---|---|---|---|---|---|
| | | | [mn EUR] | [%] | [%] |
| 107 | TATA MOTORS | Automobiles & Parts | 2,087 | 26 | 5 |
| 707 | SUN PHARMACEUTICAL INDUSTRIES | Pharmaceuticals & Biotechnology | 261 | 8 | 5 |
| 849 | DR REDDY'S LABORATORIES | Pharmaceuticals & Biotechnology | 208 | 12 | 7 |
| 892 | RELIANCE INDUSTRIES | Chemicals | 196 | 54 | 0.2 |

Source: European Commission's Joint Research Centre (https://iri.jrc.ec.europa.eu/scoreboard/2022-eu-industrial-rd-investment-scoreboard).
Note: European Commission's Joint Research Centre ranks the top 2,500 firms by R&D investment annually.

### 2.3.4 QS university ranking of India's top universities

| Rank | University | Score |
|---|---|---|
| 149 | INDIAN INSTITUTE OF TECHNOLOGY BOMBAY (IITB) | 51.70 |
| 197 | INDIAN INSTITUTE OF TECHNOLOGY DELHI (IITD) | 46.10 |
| 225 | INDIAN INSTITUTE OF SCIENCE | 42.10 |

*Source: Global Innovation Index 2024*

In conclusion, India's remarkable economic expansion and industrial diversification have bolstered its position as a key global player with considerable innovation potential. While the country demonstrates strengths in areas such as a diverse industrial landscape, substantial exports in services and ICT, and a thriving startup ecosystem, there are ongoing challenges. Addressing issues like regional economic disparities, quality of employment, and underutilized innovation capacity in research and development remains critical. With sustained investments in education, R&D, and technology, India is well-placed to further enhance its economic complexity and global competitiveness

# II. EU trade with India: prospects for EU27 linkages, partnerships and agreements

India was among the first countries worldwide establishing diplomatic relations with the European Economic Community (EEC), forerunner of the EU as we know it today, in 1962. In 1994, the EU-India Cooperation Agreement allowed to build a multi-tiered institutional architecture that eventually upgraded in an enhanced "Strategic Partnership" in 2004. In 2022, trade between the EU and India grew to €115.4 billion, after negotiations renewed in 2021 for a comprehensive trade agreement, following an 8-year stall since 2013.

## 2.1 Overview of the trade structure of EU-India

The Strategic Partnership Agreement signed in 2004, resulted from the recognition of the potential of both India and the European Union. In 2007, the negotiations for a Free Trade Agreement (FTA) between India and the EU officially called *Bilateral Trade and Investment Agreement (BTIA)*, kicked off. Nevertheless, five years of negotiations spanning 17 rounds brought no meaningful consensus to be reached due to technical disagreements from both sides. The negotiations for a Free Trade Agreement in goods and services resumed in 2021. The EU-India FTA negotiations aim to achieve the following objectives:

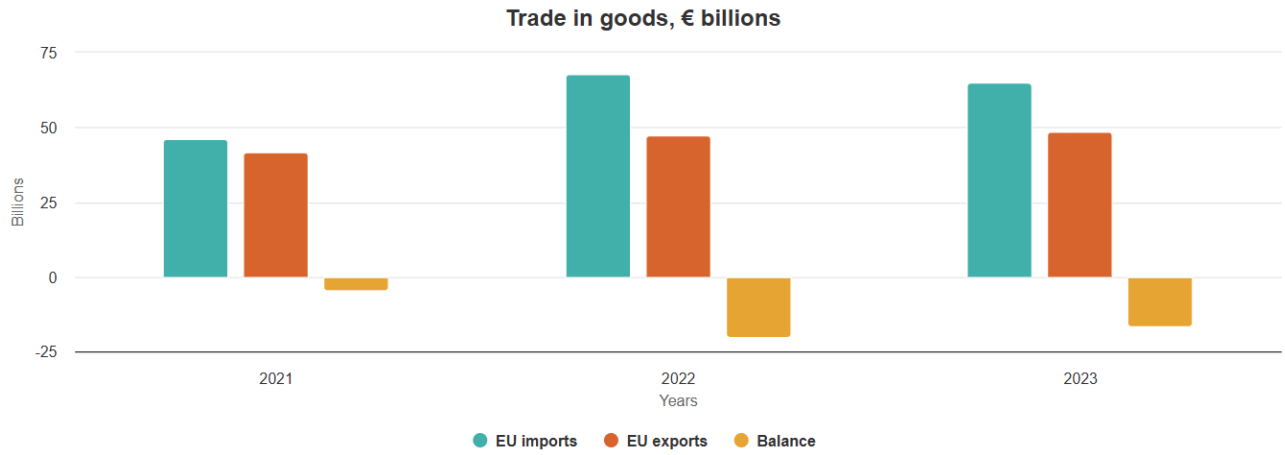
- **Remove barriers** to let EU enterprises grow their exports, particularly for the small and medium-sized ones
- **Increase competition and growth** by opening up public procurement markets for services
- Ensure the **protection of geographical indications** to safeguard unique products and identities
- **Pursue ambitious commitments** on trade and sustainable development for the promotion of sustainable and responsible economic growth
- **Ensure the agreed rules are enforceable** to guarantee compliance with the agreement.

In addition to this, the European Union presented a new draft text on capital movement, payments and transfers, as well as temporary safeguard measures.

According to a briefing published by the European Parliamentary Research Service and how illustrated by the ECCP Input Paper on India, **EU-India bilateral trade in goods was valued at €115.3 billion** (€47.6 billion in exports and €67.6 billion in imports), despite the asymmetry in the trade relationship between the two parties: on the one hand, **the European Union is India's second largest trading partner in goods** (10.8%), behind the United States (11.1%) and ahead of China (9.9%). On the other hand, **India ranks 10th among EU's largest trading partners** – in 2022, 2.1% was the percentage of EU total trade in goods, behind China (16.2%), the US (14.7%) and the UK (10%).[12] Recent data from the European Commission illustrates that in 2023 trade in goods between EU and India accounted to €124 billion – 12.2% of total Indian trade, topping the USA (10.8%) and China (10.5%). Overall, **trade in goods between EU and India has increased by almost 90% in the last decade**.

[12] European Parliamentary Research Services (EPRS), EU-India Free Trade Agreement. Briefing. International Agreements in Progress, 2024. Available here: EU-India free trade agreement

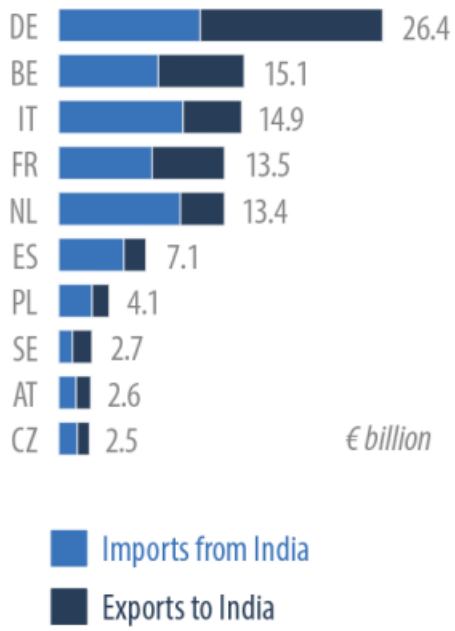
***Figure 6: EU-India trade in goods, € billions***




*Source: European Commission (2024)*

The figure below shows **the three largest importers** from India in the EU in 2022: Germany (€8.6 billion), Italy (€6.6 billion) and Belgium (€6.1 billion). At the same time, the **three largest exporters** to India in the same year were again Germany (€12.5 billion), France (€8.3 billion) and Belgium (€6.1 billion).

***Figure 7: India's top EU trade partners (2022)***




*Source: India – Economic indicators and trade with EU, EPRS*

In 2022, 84.7% of EU exports to India included:

- Manufactured goods e.g., machinery, vehicles (43.3%)
- Other manufactured goods (27.9%)
- Chemicals (16.2%)
- Primary goods (9%).

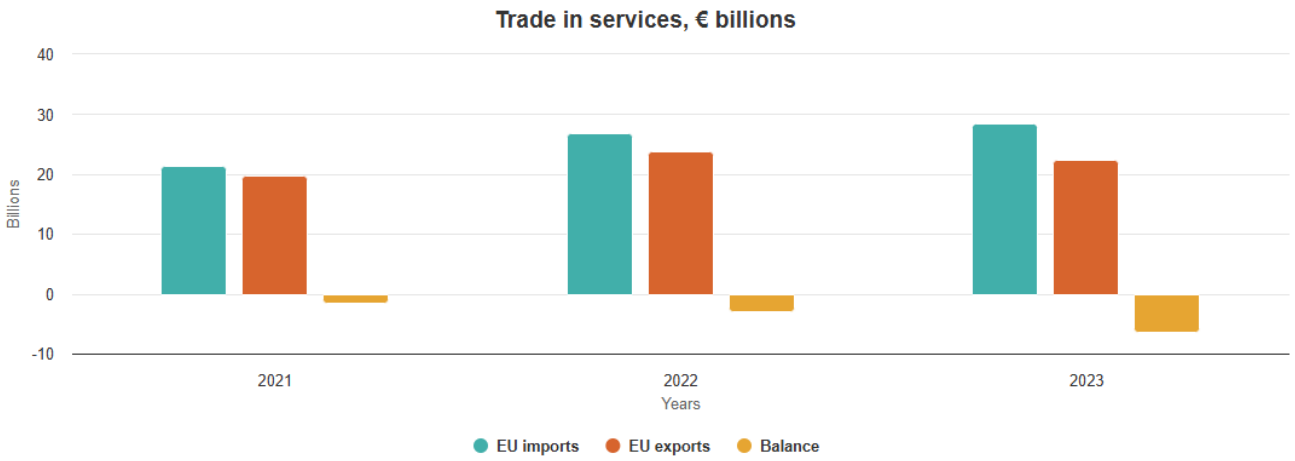
Contrarily, in 2022, the 83% of EU imports from India were also manufactured goods including machinery and vehicles (21.3%), chemicals (18.1%)[13] and primary goods (16%).[14]

According to Goldman Sachs Research, no country's services export grew as fast as India, with the exception of Singapore[15] and Ireland, and this is shown by evident numbers: between 2005 and 2023, there has been a $285 billion growth of India's services (from $53 to $338 billion), forming a tenth of the national GDP of the country and exceeding that of India's exports of goods.[16]

[13] As reported by the EPRS briefing, when looking at the figures, the main category is 'other manufactured goods' with 44.1 %. However, at face value this result can be distorting, as this category groups several others with small percentages.
[14] European Parliamentary Research Services (EPRS), EU-India Free Trade Agreement. Briefing. International Agreements in Progress, 2024. Available here: EU-India free trade agreement
[15] See EU-Singapore Matchmaking Event 2024 Info Pack on ECCP website. Available here: EU-SG_MME24_InfoPack_final.pdf
[16] Goldman Sachs, How India's services economy became a world leader, 2024. Available here: https://www.goldmansachs.com/insights/articles/how-india-services-economy-became-a-world-leader

In 2023, as shown by the graph below, the trade in services between EU and India reached €50.8 billion in 2023, up from €30.4 billion in 2020. By 2021, this figure was reported as €19.2 billion for EU services exports to India and €20.7 billion for imports from India. The main sectors driving this trade flow included **transport, telecommunications/IT, other business services, travel**: together, these sectors account for over 80% of EU services exports to India and more than 90% of EU services from India.

***Figure 8: EU-India trade in services, € billions***




*Source: European Commission (2024)*

Furthermore, the analysis conducted under ECCP, in view of the India Matchmaking Event 2024, identifies several value chains that are particularly relevant for trade between the European Union and India and exhibits potential for further cooperation.

These value chains can be linked to the following **seven key Industrial ecosystems**[17], which can be key areas for further cooperation between the EU and India, through Cluster programs and complementary to other government initiatives:

- **Aerospace & Defence**
- **Digital**
- **Electronics**

[17] The concept of the EU Industrial ecosystem has been introduced as part of the "A new industrial strategy for Europe" of the European Commission to provide an analytical tool which is not related to a fixed nomenclature. for more information on the industrial ecosystems see https://www.clustercollaboration.eu/in-focus/industrial-ecosystems

- **Energy Intensive Industries**
- **Health**
- **Mobility-Transport-Automotive**
- **Textiles**.

For a broader overview of EU business & value chains with India, consult the ECCP Input Paper on the cluster policy landscape and collaboration opportunities in the European Union and India.

## 2.2 EU-India key partnerships, agreements for trade and beyond

Over the last two decades, the European Union and India have established a range of programs and institutions to increase and intensify their economic innovation linkages in key sectors. Beyond the overarching Free Trade Agreement, there are several initiatives the EU and India jointly undertook. The subchapters below illustrate some of them.

### 2.2.1 EU-India clean energy and climate partnership

The EU and India are among the main CO2 emitters in the world, while being global leaders on climate action. India is now a leader in the promotion of renewable energy and fixed ambitious targets in terms of electricity-generation capacity from renewable sources. The increased cooperation between EU and India is based on sectoral partnerships such as clean energy, water and urban development.[18] Both the EU and India want to reduce their dependency on energy imports, to diversify their energy supply, and to increase energy efficiency and the share of renewable energy.

The **India-EU Clean Energy and Climate Partnership** was announced at the EU-India Summit on 30th March 2016, with the objective of **reinforcing the cooperation on clean energy and the implementation of the Paris Agreement**. This partnership was reconfirmed in the joint statement at the EU-India Summit in 2017 and with the commitment reaffirmed in the 2020 Summit, by agreeing to work closely together in a framework post-2020. This cooperation contributes to **delivering reliable, sustainable and affordable energy systems, while bringing**

[18] European Parliament, EU-India: cooperation on climate, Briefing (2020). Available here: EU-India: Cooperation on climate

**together energy technology sectors from both sides**. Both the Joint Declaration EU-India on clean energy and climate partnership and the 2017 Joint Statement on clean energy and climate change refer to the establishment of a climate change dialogue between India and the European Union, supporting the dialogue through working groups and events in areas of mutual interest, to advance the goals of the United Nations (UN) Climate Change Convention and the Paris Agreement.[19]

In addition to the abovementioned partnership, in 2016, the EU and India also established the India-EU Water Partnership, formalized through a Memorandum of Understanding and focusing on water reuse, cleaning, solar pumping, irrigation, and building resilience to floods and droughts – issues that are closely related to climate change and the transition to clean energy.

### 2.2.2 Partnership on smart and sustainable urbanization

In 2017, a **Joint Declaration on a Partnership for Smart and Sustainable Urbanization** was adopted by the Prime Minister of India and the European Commission. This thematic partnership aims to **address the challenges posed by rapid urbanization in India through collaborative efforts focused on sustainable development**. Moreover, it seeks to **support smart and sustainable cities**, **promotes investments in sustainable urbanization, climate action and disaster risk reduction in cities**. Key actions under this partnership are implemented through a series of Joint Action Plans e.g., 2019-2020, 2021-2022, that focus on the **development of an effective solid waste management and treatment**, the **promotion of circular economy**, the **development of effective water supply & sewage system** and **innovation in housing**. This partnership brings together European and Indian institutions, EU member states and Indian states, cities, businesses and civil society, to address challenges emerging from rapid urbanization in India. The further strengthening of this partnership was endorsed during the 15th Summit in 2020 through the *EU-India Strategic Partnership: A Roadmap to 2025*.[20]

[19] Delegation of the European Union to India and Bhutan, EU-India Clean Energy and Climate Partnership, 2020. Available here: cecp_updated_1.pdf
[20] European Commission, EU-India Partnership on Smart and Sustainable Urbanization. Available here: Inforegio - EU – India Partnership on Smart and Sustainable Urbanization

### 2.2.3 EU-India connectivity partnership

The **EU-India Connectivity Partnership** was adopted in 2020 as part of the EU Global Gateway and underlines the relevance of India as a geopolitical partner, as well as the mutual interest of both India and the European Union in sustainable connectivity. In fact, both are committed to **fostering connectivity dialogue and projects, emphasizing key aspects such as social, economic, fiscal, climate and environmental sustainability**.

This Partnership seeks to support sustainable, digital, transport and energy networks, including the flow of people, goods, services, data and capital, in an equitable and inclusive perspective. Moreover, it endorses facilitating **large-scale private investments in sustainable connectivity** and commitment to implementing relevant international standards, to ensure a level playing field for companies and to **ensure reciprocal access to markets**. Policy dialogues in key areas such as smart and sustainable urbanization, water, circular economy etc. are regularly undertaken in the framework of the Partnership implementation. Over 20 years, the EU and India have built strong ties in digitalization, with a Joint Working Group on ICT and a cyber-dialogue in place. The EU also collaborates with India's think-tank *NITI Aayog* on AI, data governance, and digital technologies. In trade, both sides prioritize a transparent, non-discriminatory regulatory environment, while under the European Green Deal, the EU aims to decouple economic growth from resource use, with green hydrogen playing a key role in cutting emissions.[21]

### 2.2.4 Investment protection Agreement and the Agreement on geographical indications

In the framework of the negotiations of the Free Trade Agreement, the EU and Indian leaders decided to launch separate negotiations on an Investment Protection Agreement. These negotiations are focused on **providing investors from both sides with a predictable and secure investment environment** through commitments on:

- Non-discrimination

[21] Delegation of the European Union to India and Bhutan, Global Gateway and the EU-India Connectivity Partnership. Creating links, not dependencies. Available here: Global Gateway and EU-India connectivity Partnership.pdf

- Protection against expropriation without compensation and unfair treatment of investors and their investments, while preserving the right to regulate
- Transfer of returns.

Additionally, the negotiations seek to put into place an effective and state-of-the-art dispute settlement mechanism to enforce such rules.[22]

In the framework of these negotiations, the Agreement on geographical indications will also be a point of discussion, as both India and the EU share similar values in protecting their geographical indications. This Agreement will support communities and **help preserve the cultural and culinary heritage of both parties, ensuring too simplified access to quality products for consumers** and promoting EU and India's geographical indications globally.

### 2.2.6 EU-India Trade and Technology Council (TTC)

Announced by the European Commission in 2022 and launched in 2023, the EU-India Trade and Technology Council (TTC) is the second endeavour of this kind, after the one launched with the United States (US), aiming at **increase bilateral cooperation**, **boost bilateral trade and investment** – in the context of the Free Trade Agreement negotiations – and **capitalise on both parties' strengths to guarantee their industrial and technological leaders while preserving their shared values**.

For the European Union, the TTC with India complements with all the partnerships already signed with some Asian countries in 2022 and in 2023, e.g., Japan, Singapore, South Korea, to address issues linked to the digital divide and to strengthen a fair and inclusive digital environment for all. According to experts,[23] the TTC serves as a joint effort to place EU and India closer while reducing EU's independence on China and India's reliance on Russia. A 2023 report[24] by the

[22] European Commission, EU-India Free Trade Agreement, Investment Protection Agreement and Geographical Indications Agreement. Webpage available here: EU-India
[23] Real Instituto Elcano, The EU-India Trade and Technology Council: opportunities and challenges ahead, 2023. Article available here: The EU-India Trade and Technology Council: opportunities and challenges ahead - Elcano Royal Institute
[24] Clingendael Institute, Kranenburg V., Okano-Heijmans M., How strategic tech cooperation can reinvigorate relations between EU and India, (2023). Available here: Report_Strategic_tech_cooperation_between_EU_India.pdf

Netherlands Institute for International Relations Clingendael underlines some opportunities for both EU and India to enhance the cooperation on the front of **military technologies**, **technology and data governance**, **semiconductors**, **batteries and data**, as well as India and EU's **supply chain restructuring**.

The current configuration of the TTC embeds three working groups focusing on:

1. **Strategic technologies, digital governance and digital connectivity** – this launched three significant initiatives, namely the Global Partnership on Artificial Intelligence (GPAI), the EU-India Memorandum of Understanding on semiconductors, and a work on increasing interoperability between the two parties' Digital Public Infrastructure (DPI).
2. **Green and clean energy technologies** – this working group identified three areas of cooperation that are **renewable and low-carbon hydrogen**, **batteries for electric vehicles**, and **standards**. Moreover, in the framework of the EU-India Summits previously organised and the 2020 EU-India Strategic Partnership, the two sides expanded their cooperation by implementing joint work on wastewater treatment, wastewater to energy and on waste to hydrogen.
3. **Resilient value chains, trade and investment** – foreseeing common efforts for the establishment of common principles of cooperation by identifying specific supply chains and mechanism for the screening of foreign direct investments (FDIs). In this regard, the two sides agreed to deliver the work on four focus areas: **resilient value chains**, **market access issues**, **exchange of information for the screening of FDI**, and **multilateral trade issues**.[25]

### 2.2.7 Europe India Chamber of Commerce & Industry

The Europe India Chamber of Commerce & Industry (EUICCI) is a business advocacy organisation promoting bilateral trade and economic relations between the European Union and India and providing services to businesses and industry to facilitate trade and investment between the two economic blocs. Founded in 2021, the EUICCI members are leading entrepreneurs and professionals, business houses, law firms, large corporates, SMEs, industry associations, bilateral chambers of commerce who have contributed to the development of India and Europe. Furthermore, the Chamber of Commerce represents many different industries

[25] European Parliament briefing, EU-India Trade and Technology Council, 2024. Available here: EU-India Trade and Technology Council

across Europe and India as diverse as **banking**, **pharmaceutical**, **energy manufacturing**, **construction** and professions like **law** and **accountancy** and works closely with institutions such as Diplomatic Missions, European Parliament, European Commission, various trade and investment promotion agencies, think tanks, universities, technology, research and innovation bodies etc. With a vast network of national and bilateral chambers of commerce, trade bodies, Think Tanks and such institutions, EUICCI provides the primary and vital connection between business and the governments.

### 2.2.8 The European Business and Technology Centre (EBTC)

The European Business and Technology Centre (EBTC) is a project advisory organization facilitating business-to business and research cross-border collaboration between India and the European Union. It is part of the Enterprise Europe Network (EEN) and is closely linked to Eurochambers, the Association of European Chambers of Commerce and Industry. It operates sector-specific industry "clusters" that bring together stakeholders from both Europe and India that work as platforms for business collaboration and policy development. Members can be individual businesses, cluster organizations and public agencies. There are three EBTC clusters in the following sectors:

- **Transport**: focusing on sustainable mobility (including e-mobility and alternate fuels), railways, ports and aviation.
- **Aviation**: focusing on green aviation, strengthening EU-Indian value chains, operating in the key areas of sustainability, infrastructure, and safety & operations.
- **Sports**: focusing on the development of sports infrastructure, coaching and talent development, environmental & financial sustainability.

# III. India and the cluster landscape's overview

## 3.1 India cluster policies and programs

*Source: ECCP*

India's industrial clusters reflect the economic structure of the country, as they can traditionally be found mainly in the chemical and petrochemical sectors, automobile, drugs and pharmaceutical and consumer appliance sectors.

Figure 9 shows a map of the **geographical distribution of India's major industrial clusters** which are understood in India as a major agglomeration of businesses, research facilities and other relevant stakeholders in a certain location. Clusters are complemented by Special Economic Zones (SEZs) with the most important ones created by the central government and located along the coast in the capital city metropolitan area.

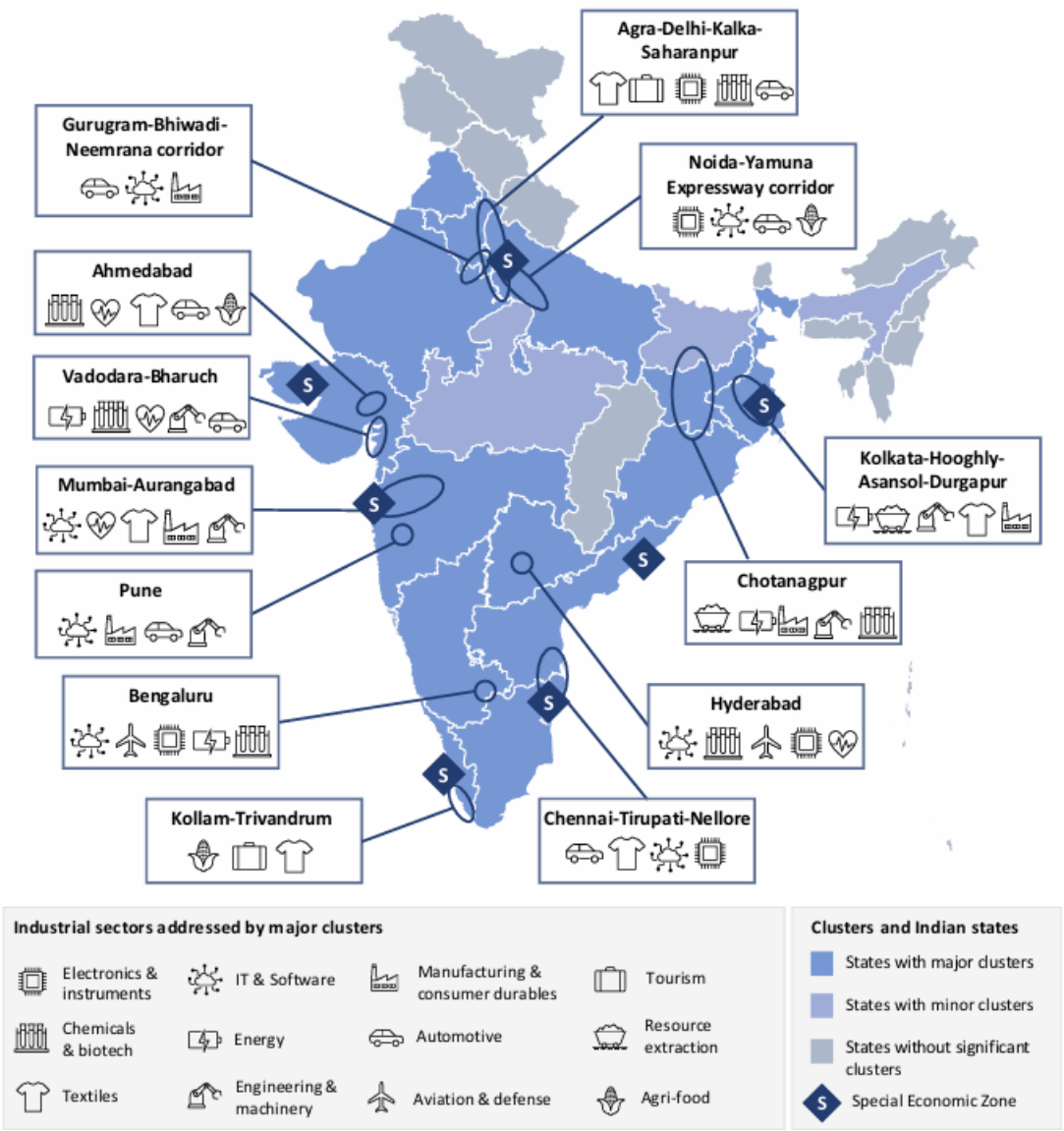
The Indian Cluster Observatory defines industrial clusters as follows:

> *Industrial regions are those places where industries have concentrated as a result of favorable geo economic circumstances. These are places where a sizable portion of the populace works in the manufacturing sector, which operates on a sizable scale.* ***The Indian clusters which are having at least 100 enterprises and a combined minimum turnover of INR 100 million is classified as a minor Indian cluster. Clusters that are several folds above the minimum mark and drive the bulk of the Indian export contributing to the GDP are referred to as the major Indian industrial cluster****.*[26]

The map in Figure 10 provides an overview of India's industrial clusters and their leading sectors, which are often interrelated and support mutual development. For instance, the **Chotanagpur cluster** is focused on heavy industry that links raw materials extraction, energy generation, manufacturing, and engineering. **Pune**, on the other hand, is an IT and software hotspot that is at the same time home to manufacturing, automotive and machinery industries.

[26] Global Business Inroads, 2024.

***Figure 10: map of India's major industrial clusters***




*Source: ECCP Input Paper. Own elaboration based on Global Business Inroads (2024)*

## 3.2 The state of play of cluster policy in India

*Source: ECCP*

The policy portfolio in India has continuously been developed in order to support the collaboration and innovation efforts of SMEs. The programs at the core of the Indian cluster policy are:

- **Micro & Small Enterprises Cluster Development (MSE-CDP)**: it is India's main cluster program managed by the Ministry of Micro, Small & Medium Enterprises. The goal of this program is to support with grants groups of medium sized enterprises in clusters as well as government agencies to finance Common Facility Centers and Infrastructure Development. More specifically, it provides support in two main areas: Common Facility Centers (CFCs) and Infrastructure Development.
- **Scheme of Fund for Regeneration of Traditional Industries (SFURTI)**: the Ministry of Micro, Small & Medium Enterprises here promotes cluster development with the objective of organizing traditional artisans and industries into clusters to support their long-term competitiveness and sustainability. In addition to this, the scheme aims at:
    - Providing **sustained employment** for traditional industry artisans and rural entrepreneurs
    - Equipping traditional artisans of the associated clusters with **improved skills and capabilities through training and exposure visits**
    - Making **provision for common facilities** and improved tools and equipment for artisans
    - **Strengthening the cluster governance systems** with the active participation of the stakeholders, so that they can gauge the emerging challenges and opportunities and respond to them in a coherent manner.
- **MSME Testing Centers (MSME-TCs)**: it supports Micro and Small Enterprises by providing them with laboratory infrastructure for testing their programs to conform to national and international standards. Testing centers were established in New Delhi, Mumbai, Kolkata and Chennai.
- **MSME Development and Facilitation Offices (MSME-DFO)**: there are 32 MSME-DFO and 27 branches established across all Indian states and provide a wide range of business support services including consultancy for entrepreneurs, skill development programs, energy conservation, quality control and upgrade, expert promotion and market survey.
- **Scheme for Promotion of Innovation, Rural Industry & Entrepreneurship (ASPIRE)**: this scheme aims at setting up a network of incubation and

technology centers to promote innovation and entrepreneurship to strengthen the competitiveness of MSME sector, predominantly in the rural and underserved areas, and to promote innovation and accelerate entrepreneurship by imparting skill development programs for creating employment opportunities in the agro rural sector.

A key example drawn from the ECCP Input Paper on cluster policy in India is the **Karnataka Global Capability Center (GCC) Policy 2024-2029**, a sub-national cluster program:

> The Karnataka Global Capability Center (GCC) Policy 2024-2029 is **a comprehensive state-level policy program to develop the State's innovation ecosystem through a broad set of instruments**. In order to realize its vision of becoming a "preeminent Global Innovation Hub", the government of Karnataka will establish three new technology parks (Global Innovation Districts), a new Centre of Excellence for Artificial Intelligence including an AI Skilling Council, a dedicated government unit for supporting GCCs, a GCC Acceleration and Investment Council and focus on R&D in the engineering sector by promoting industry academia links, new government-industry funding channels and IP creation and retention in Karnataka. One key goal is also to develop local innovation systems beyond Bengaluru and develop them into strong contributors to the State's overall innovation ecosystem. In general, Global Capability Centers or Global in-House Centers (GICs) have been facilities set up by multinationals to offshore specific business functions within the context of their global operations, covering increasingly more business areas such as IT, finance, human resources, R&D, supply chain management, risk management, customer support and others. In India, these GCCs or GICs have often clustered and evolved into innovation hubs and Centers of Excellence (CoE). As a recent analysis of the GCC sector showed, Bengaluru is the most important location for GCCs in India with a third of all Indian GCCs, holding further growth potential for the future.[27]
>
> Bengaluru's GCCs hold a significant presence in key industries building on its strengths as a digital hub, such as retail, banking, financial services and insurance (BFSI), healthcare & life sciences and manufacturing. Beyond Bengaluru, other places in Karnataka are emerging as business and innovation clusters, namely Mysuru, Mangaluru, Hubballi-Dharwad-Belagavi (HDB) Cluster, Tumakuru, Shivamogga Cluster and Kalaburagi.

[27] ECCP, Input paper on the cluster policy landscapes and collaboration opportunities in the European Union and India, 2024. Available here: ECCP_3rdCountry_India_InputPaper_final_cover.pdf

## 3.3 Major and minor Indian clusters

This section provides an overview of major and minor industrial clusters in India. It can be also found as an annex in the ECCP Input Paper aforementioned

| | | |
|---|---|---|
| 1 | **Mumbai-Aurangabad** (Shipping, IT, Pharma, Textiles, Consumer durables) | Mumbai, the world's 12th wealthiest city, is India's financial, commercial and entertainment capital, accounting for 5% of India's GDP and 70% of capital transactions in the country. Jawaharlal Nehru Port, popularly called JNPT, is India's largest container port, facilitating 40% of Indian container volumes. Mumbai Aurangabad corridor houses many IT, pharmaceuticals, textiles and consumer durable units. Aurangabad is also emerging as an automobile manufacturing and engineering hub. |
| 2 | **Pune** (IT and Manufacturing) | Accounting for almost one-fifth of the industrial investment in India, the city and its industrial areas are well established hubs for automobile, consumer durables and IT and engineering. It is the most developed automobile ecosystem of India and has a noteworthy concentration of German, American, Korean and Chinese companies. This city is also among the prime markets in India for the development of light industrial parks and warehouses. Pharmaceuticals and food processing are other important sectors. The city was ranked second in Mercer's Quality of Living Index, 2023 for Indian cities. |
| 3 | **NH48, Gurugram-Bhiwadi-Neemrana corridor** (India's oldest automobile cluster) | NH48, connecting Delhi with Mumbai, houses several industrial clusters such as Gurugram, Manesar, Bhiwadi, Bawal, Neemrana and Ghilot, especially in the vicinity of NCR. Along with Western Dedicated Freight Corridor, it has emerged as the conceptual spine of the Delhi-Mumbai Industrial Corridor. Gurugram Manesar-Bawal belt is the largest automobile ecosystem in India, accounting for half of 4-wheeler manufacturing. Gurugram is an IT and startup hub, and home to more than half of the Fortune 500 companies. Neemrana hosts 55+ Japanese companies in its successful Japanese Industrial Township. FMCG, ESDM, and ceramic and glass are other notable sectors along the highway. |
| 4 | **Noida-Greater Noida Yamuna Expressway** | India's largest electronics manufacturing zone, it accounts for 40% of India's mobile manufacturing |

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| | (India's electronics manufacturing corridor) | and more than half of mobile component manufacturing. It hosts the biggest cluster of Chinese factories in India, along with notable Korean and Japanese presence. Automobile OEMs and ancillaries, IT and food processing also have a noteworthy presence in this zone. The Jewar international airport, planned to be the biggest aerotropolis in India and Delhi's second international airport, is expected to be operational by 2024. |
| 5 | **Bengaluru** (Silicon Valley of India, Biotech, Avionics, Defense and Space) | A startup, IT and R&D capital of the world, Bengaluru is home to 70% of India's chip designers, 60% of India's machine tools production, 400+ global R&D centers and 2/5ths of India's IT exports. It is also a hub for aerospace, textiles, and biotechnology sectors. The capital city of India's pioneer state for niche segment policies such as India's first Electric Vehicle and Energy Storage policy, Startup policy, AVGC (Animation, VFX and Gaming) policy, among many others, it is also headquarters to some of India's largest Public Sector Undertakings like Hindustan Aeronautics Limited (HAL), National Aerospace Laboratories (NAL), Indian Space Research Organisation (ISRO) and Bharat Earth Movers Limited (BEML). |
| 6 | **Chennai, Tirupati-Nellore** (Automobile, Textiles, Software, Leather products, Software and IT) | Tamil Nadu is the state with the largest number of factories in India, and its capital city Chennai is the largest industrial and commercial center of South India. The city hosts 3 of India's 12 major ports, which makes it India's closest point of call for major manufacturing ecosystems such as China, Korea, Taiwan, Japan & ASEAN. 1/3rd of India's automobile manufacturing industry is concentrated here, with notable presence across engineering, textiles and garments, leather products, software and IT enabled services as well. Chennai, together with Tirupati (an emerging Electronics cluster) and Nellore-Chittoor (home to Sricity: India's largest industrial park in South India), is known as the tri-city industrial growth corridor. |
| 7 | **Hyderabad** (Innovations in Manufacturing) | Hyderabad, popularly nicknamed Cyberabad, has emerged as the second Silicon Valley of India, after Bengaluru. It boasts of being home to the largest campuses (outside the US) of technology giants such as Apple, Amazon, Facebook, Microsoft, Uber, Google and Qualcomm. The State also has niche policies such as Drone Policy, Data Center Policy, IoT policy, IMAGE (Innovation in Multimedia, |

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| | | Animation, Gaming and Entertainment) policy, Innovation policy among others, to boost its status as an innovation and IT powerhouse. Accounting for 1/3rd of global vaccine production and two-fifths of domestic pharmaceuticals production, the city is also an established pharmaceuticals and biotechnology hub. Other notable sectors include aerospace and defense, and ESDM. |
| 8 | **Ahmedabad** (Pharma, Chemicals, Textiles, Automobiles and Food Processing) | India's first heritage city, Ahmedabad is an established industrial base for chemicals, textiles, pharmaceuticals and food processing. Led by Suzuki Motors and Honda, Mandal-Becharaji industrial belt, along with neighbouring Sanand, is expected to become India's largest automobile hub post completion of expansion plans. It is the largest city of the State with the longest coastline and highest number of ports. GIFT (Gujarat International Finance Tec-city), is India's only International Financial Services Center (IFSC) trying to compete with financial centres like Singapore, Hong Kong and Dubai. |
| 9 | **Kolkata-Hooghly-Asansol Durgapur Industrial cluster** (Jute, Textiles, Coal, Steel, Power) | The Hooghly River runs alongside the industrial area of Kolkata-Hooghly, with industries also present in the western Midnapur region. The river's location made it ideal for establishing an inland river port at the heart of this industrial zone. Factors like nearby coal mines (Raniganj and Jharia), agro-raw materials (jute, indigo, tea), abundant water, affordable labor, and export facilities spurred rapid growth here. Kolkata's role as British India's capital (1773–1911) further attracted industrialists. This region now hosts over 10,000 factories employing more than 2 million people, producing jute, silk, cotton textiles, engineering goods, pharmaceuticals, automobiles, and more. Major industrial centers include Naihati, Bhatpara, Shamnagar, Serampore, Titagarh, Rishra, Kolkata, and Haora. |
| 10 | **Chotanagpur Industrial Cluster (**Iron and Steel, Mineral, Fertilizers) | Jharkhand, Odisha, Southern Bihar, and western West Bengal make up this industrial area. It is frequently referred to as the "Ruhr of India" due to the significant concentration of the iron and steel sector. Minerals, both solid and non-metallic, and fossil fuels are abundant in this area. The Damodar Valley Company provides power. The provinces of Bihar, Jharkhand, Odisha, Uttar Pradesh, and West Bengal are huge sources of cheap labour. Asansol, Bokaro, Burnpur, Durgapur, Kulti, Jamshedpur, and |

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| | | Raurkela are the principal Iron and Steel producing cities in the area. Other significant manufacturing hubs in the area include Ramgarh and Bhurkunda for the glass industry, Ranchi for HMT, Chittranjan for locomotives, Sindri for fertilizer, and Chittranjan for locomotives. |
| 11 | **Agra-Delhi-Kalka-Saharanpur Industrial Cluster** (Textiles, Tourism, Scientific Instruments, Electronics and Strategic Goods, Chemicals, Fertilizers) | The principal industrial hubs are located in Agra (textiles, tourism), Ambala (scientific instruments), Chandigarh (electronic and strategic goods), Delhi (textile, chemical, drugs, pharmaceutical, light machine, electronic goods, food processing), Faridabad (engineering), Ghaziabad (synthetic fiber, chemicals, electronics, pharmaceuticals, agricultural equipment, iron & steel, cycle tyre, and tubes), Gurgaon (automobiles), Kalka (paper, wood-work, sugar, textile, and food-processing). |
| 12 | **Vadodara-Bharuch cluster** (Power Engineering and Chemicals Cluster) | Accounting for more than one-third of India's power transmission & distribution equipment manufacturers, the region also has a vibrant manufacturing landscape spanning sectors like chemicals, pharmaceuticals, engineering and automobile. The Dahej Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) zone is India's most active and successful, and is one of the best locations for red category industries. OPaL's (ONGC Petro Additions Limited) unit at Dahej is the largest petrochemical plant in India. Indian Oil Corporation's second largest refinery is also located here, which is expected to become India's largest refinery, post completion of expansion plans by 2023. |
| 13 | **Kollam-Trivandrum cluster** (Agri-food, Tourism, Light industry) | This industrial zone encompasses the districts of Thiruvananthapuram, Kollam, Alwaye, Ernakulam, and Alappuzha. The industrial landscape of this region is primarily grounded in plantation agriculture and hydropower resources. Specializing in agricultural goods processing and market-oriented light industries, this area stands apart from the mineral-rich belts found elsewhere in the country. Significant industries in this region include cotton textiles, sugar production, rubber processing, manufacturing of matchboxes, glass production, chemical fertilizers, and businesses centered around fish-based products. The region also boasts notable contributions in food processing, paper manufacturing, coconut coir products, aluminum production, and cement manufacturing. Key industrial centers within this |

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| | | region include Kollam, Thiruvananthapuram, Aluva, Kochi, Alappuzha, and Punalur. The area also has, like Kerala in general, a strong tourism sector. |

*Source: Global Business Inroads, 2024*

On the other hand, minor Indian industrial clusters include:

| | | |
|---|---|---|
| 1 | **Kanpur-Lucknow Industrial Areas** | This Industrial Region is known for cotton, wool, and jute textiles, leather goods, fertilizers, chemicals, drugs, pharmaceuticals, electric goods, and light machinery. |
| 2 | **Assam valley Industrial Areas** | This region has the industries of petrochemical, jute and silk textiles, tea-processing industry, paper, plywood, match, and food processing industries. Important industrial centres are Bongaigaon, Dlbrygarh, Digboi, Guwahati, Noonmati and Tipsukia. |
| 3 | **Darjeeling-Siliguri Industrial Areas** | This region is known for the production of the tea processing industry and tourism. |
| 4 | **North Bihar and Eastern Uttar Pradesh Industrial Areas** | This Industrial Region is known for sugar, cement, glass, jute, fertilizers, locomotive, paper, and food processing are main industries. The main industrial centers are Allahabad, Dalmianagar (Bihar), Gorakhpur, Patna, Sultanpur, and Varanasi. |
| 5 | **Indore-Ujjain Industrial Region** | The main industries are cotton textile, chemicals, drugs, electronic and engineering goods, and food processing. |
| 6 | **Amritsar Jalandhar-Ludhiana Industrial Areas** | This Industrial Region is known for sports goods, cotton and woolen, textiles, hosiery, food processing, and tourism. |
| 7 | **Nagpur-Wardha Industrial Areas** | Textiles, engineering, chemicals, and food processing are the main industries of this region. The main industries are Iron and Steel, ship-building, fertilizer, rice-milling, cotton textile, sugar, fish processing, engineering, and chemicals. The main industrial centers are Guntur, Machlipatnam, Rajamundry, and Vishakhapatnam. |
| 8 | **Dharwar-Belgaum Industrial Areas** | Cotton textile, chemicals, spices packing, and food processing are the main industries. |
| 9 | **Goa Industrial Region** | Comparatively small in size, yet Goa has successfully emerged in terms of setting up industries that contributes to India's export that includes iron ore, pharmaceuticals formulations, electronics and communication devices, confectionaries, passenger buses, health and hygiene products. |

*Source: Global Business Inroads, 2024*

# IV. A glance to the focus areas of the EU-India Matchmaking Event 2024

## 4.1 Biotech

India's biotechnology industry has been experiencing significant growth and is positioned as one of the major players in the global biotech landscape. More specifically, **India is among the top 12 destination for biotechnology worldwide and the 3rd largest destination for biotechnology in Asia Pacific** with the sector crossing an estimation of $150 billion in 2024 and $300 billion by 2030. [28]

The growth of the Indian biotechnology sector is fueled by rising demand both at the domestic and the international levels, and is categorized into:

- **Biopharmaceuticals** – standing out as the largest segment and accounting for a substantial 62% of the market, valued 58% billion. India has established itself as a major supplier of low-cost drugs and vaccines globally, particularly excelling in the field of biosimilars. The country boasts the highest number of biosimilar approvals in its domestic market, securing its position as a leader in this crucial area.
- **Bio agriculture** – generating $10.5 billion as another significant contributor to India's bioeconomy and estimated to reach $20 billion in 2025. With nearly 55% of Indian terrain under agriculture and allied activities, India is one of the largest producers of Bt-cotton and has the 5th largest area of organic agricultural land globally. Bio agriculture, consisting of Bt cotton, pesticides, marine biotech, and animal biotech has the potential, according to experts, to double its contribution to $20 billion by 2025, indicating substantial room for growth and innovation in agricultural biotechnology.
- **Bio industrial** – focusing on industrial processes and waste disposal, is emerging as a noteworthy player in the India bioeconomy. Although smaller than biopharmaceuticals and bio agriculture, this sector is gaining traction as industries increasingly seek biotechnological solutions for sustainability and efficiency.
- **Bio IT and services** – accounting for the 10% of the market and valued at $9.3 billion. India's strong capabilities in contract manufacturing, research, and clinical trials have made it an attractive destination for global

[28] Invest India, Snapshot India – Soaring towards a $300 Bn in BioEconomy. Available here: Biotechnology Industry in India – Biotech Sector Analysis

pharmaceutical and biotech companies. The country hosts the highest number of US FDA-approved plants outside the United States, a testament to the quality and reliability of its biotech infrastructure.

Recent trends in India's biotech landscape paint a picture of a dynamic and evolving industry: the sector is supported by a vibrant ecosystem including **800+ core biotech companies**, **over 6000 biotech start-ups** currently operating and expectations of this number growing **more than 10,000 by 2025**. Infrastructure development is also accelerating, with **74 bio-incubator centers** created through the Department of Biotechnology and Biotechnology Industry Research Assistance Council (DBT-BIRAC), along with four industry c6lusters.

According to Invest India, growth drivers in the sector are

- **Demographic advantage:**
  - +1 million skilled biotech workforces
  - Pan India Start College Mentorship Program by DBT, as part of the key actions implemented by the Indian government to promote science and strengthening scientific research and innovation efforts in India.
- **Infrastructures:**
  - 74 bio-incubation centers created through DBT-BIRAC
  - 4 industry clusters in Kalyani, Pune, Bangalore and Delhi NCR (National Capital Region)
- **Government acting as an enabler to improve Ease of Doing Business (EoDB):**
  - Critical policy initiatives e.g., Make in India, Startup India, Atmanirbhar Bharat Abhiyan (boosting domestic manufacturing capacity) and formulation of the National Biotechnology Development Strategy 2021-2025
- **Focus on research and development:**
  - Favorable government policies e.g., Draft R&D Policy 2021, PLI Schemes and Clinical trial rules propelling India to be the *pharmacy of the world*.
  - Investments of $1 billion in R&D in 2022.
- **Epidemiological factors:**
  - Increasing population and lifestyle changes
  - Government expenditure on healthcare up to 2.1% of GDP in fiscal year, with a target of 2.5% of the country's GDP by 2025.[29]

[29] Ibid.

## 4.2 Digital

India's digital transformation has become a cornerstone for fostering economic growth, social inclusivity and environmental sustainability, standing out as a trusted global technology leader in the past two years, and demonstrating resilience in a constantly changing landscape. **India's revenues in the technology industry are estimated to reach US $254 billion in 2024, and exports poised to touch US $200 billion mark**.[30] In particular, the strong focus on Engineering Research & Development (ER&D) allows to position India as a global tech hub for cutting-edge solutions, as part of a robust ecosystem fostering innovation across diverse sectors.

The fact that India is the fastest-growing economy in the world is closely related to technological adoption and accelerated economic growth. The demand for technology is growing across businesses, with advanced technologies offering avenues for growth and efficiency, such as **automating tax filing**, **using blockchain for secure financial transactions** and **digitalizing government processes**. According to the Deloitte India Pre-Budget Survey 2024[31], more than 90% of businesses are adopting technologies such as AI, machine learning and IoT – the most widely used include the deployment of chatbots, virtual assistants and machine learning algorithms. The accelerated technology adoption and growth in India is driven by multiple factors, such as government initiatives, subsidies and incentives fostering innovation and increased technology adoption, complemented by policies encouraging foreign investments to build a solid foundation for India's capabilities in terms of skills and infrastructure.

The **Digital India Program**, launched in 2015 by the Indian Government and covering multiple projects of various Central Ministries/Departments and States and Union Territories (UTs), has been a cornerstone of India's digital transformation, designed to transform the country into a digitally empowered society and knowledge-based economy. This vision is being put into action through three key pillars: **robust digital infrastructure**, **accessible government services** and **empowered citizens**. Key achievements include:

- Initiatives like Aadhaar and widespread broadband access have made digital services more accessible nationwide, also in rural areas. The program promotes high-speed internet and digital literacy through extensive training and Common Services Centers (CSCs)

[30] Deloitte, Deloitte technology trends 2024: India perspective, April 2024. Available here in-technology-deloitte-tech-trends-2024-india-10.04-noexp.pdf
[31] Deloitte Pre-Budget Survey 2024. Available here: Deloitte India: Pre-Budget Survey 2024 Analysis

- Platforms like DigiLocker, UMANG, and GeM simplify public services access, improve government transparency, and support data-driven policy.
- AI and IoT being exploited to support agriculture, healthcare and urban management, enhancing productivity and transparency. The government invested in AI and blockchain centers and partnered with tech companies like Google and Microsoft to foster skills and data infrastructure.
- Initiatives such as PMGDisha are aimed at training millions of people in digital skills, engaging citizens to fully engage in the digital economy.[32]

An additional element of the Indian digital ecosystem are **start-ups**, which stand at the forefront of driving digital transformation by developing innovative solutions tailored to address local needs and challenges and by leveraging cutting-edge technologies to create products that enhance efficiency and improve the quality of life. In this regard, the Indian Government has been crucial in supporting start-ups through dedicated initiatives such as Start-up India. Launched in 2016, this initiative has rolled out several programs with the objective of supporting entrepreneurs, building a robust startup ecosystem and **transforming India into a country of job creators instead of job seekers**. These programs are managed by a dedicated Startup India Team, which reports to the Department for Promotion of Industry and Internal Trade (DPIIT). Examples of key initiatives and projects under Start-up India are BHASKAR, National Startup Awards, MAARG, Startup India Investor Connect, State Ranking Framework, Seed Fund Scheme and SCO.

From a talent standpoint, factors such as software exports, tech workforce, tier-2 city expansion, government assistance, and improved infrastructure are solidifying **India's evolving value proposition as a reliable and skilled tech talent pool**. Increased emphasis on **attracting and retaining the best talent pool** and giving them the best developer experience is central to creating a compelling narrative for continued growth and leadership in the global tech landscape.

Finally, one outstanding example in the digital and innovation sector is **Karnataka**, *the knowledge capital of India*, which benefits of the largest AI talent pool in India, with the 50% of AI/ML professionals in the country: 20,000+ automotive engineers, 20,000+ chip designers, 10,000+ aeronautical engineers and 100,000 PhDs. Karnataka has also been recognized by NASSCOM and Zinnov as the quarter of India's digital talent that counts 52 universities, 234 engineering colleges and 1,777

[32] Invest in India, Digital India: Revolutionising the Tech Landscape, 2024. Available here: Digital India: Revolutionising the Tech Landscape

public and private Industrial Training Institutions (ITIs). Furthermore, stakeholders in the sector are supported in advancing innovation by the Government of Karnataka through four key pillars: **futuristic policies** – targeting policies on IT, data center, startup and also on biotech, **institutional support/ecosystem development**, **foundational/marquee** and **outreach & engagement**.

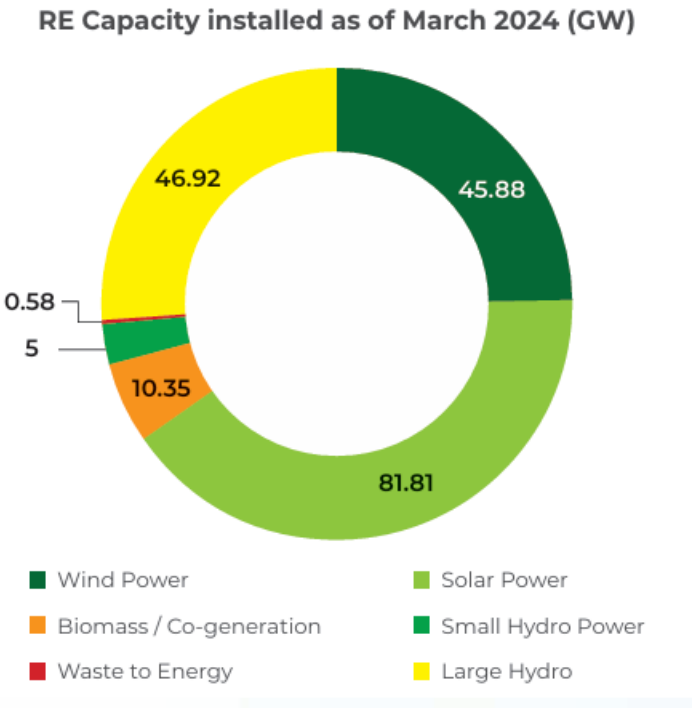
## 4.3 Green tech

The growth of green technologies, which are employed to produce goods and services with reduced carbon footprints, presents expanding economic prospects. The impact of climate change is projected to be most severe in developing countries, where vulnerable populations often lack the resources to adapt effectively and risk failing to benefit from these opportunities.

India's green energy sector is equipping to foster significant progress, with reforms being underway during the last decade, resulting in a doubling of total installed capacity from renewable sources in the past five years. On a global scale, **India now ranks 4th for total renewable power capacity, 4th in wind power capacity, 5th in solar power capacity**. Moreover, India assumed the presidency of the 13th Assembly of the International Renewable Energy Agency (IRENA)[33]

[33] EY, Ministry of New and Renewable Energy (MNRE), India's Green Hydrogen Revolution. An ambitious approach, 2024. Available here: doc2024510336301.pdf

***Figure 10: Renewable Energy capacity installed as of March 2024 (GW)***




*Source:* EY, MNRE, India's Green Hydrogen Revolution. An ambitious approach, 2024

As Figure 10 shows, as of March 2024, renewable energy sources in India, including large hydropower, have a combined installed capacity of 190.57 GW. The country reached 9.83% growth in renewable energy additions in 2022, with the capacity increasing by 128% since 2014.

In alignment with Sustainable Development Goal 7 (SDG 7: ensuring access to affordable, reliable, sustainable, and modern energy for all), India aims to achieve **energy independence by 2047**[34] and to be a **net zero emitter by 2070**. Since its pledge made in Glasgow at COP26 in 2021, India increased its efforts by unveiling new policies and regulatory actions for the development of technologies to meet that target.[35] India's road to "net zero" by 2070 include actions in renewables, electric vehicles, green hydrogen, biofuel, carbon capture & storage and carbon credit trading with the following key overarching targets:

- Reducing the emission intensity of GDP by 45% by 2030, compared to 2005 level

[34] Invest India, Developing Countries on Green Tech Revolution, 2023. Available here: Developing Countries on Green Tech Revolution
[35] Citi Group, India Clean Energy: Progress & Policy, 2023. Available here: India Clean Energy: Progress & Policy

- Raising the share of non-fossil-fuel-based generation capacity to 50% by 2030
- Increasing carbon sink coverage by 2.5-3.Obn tones of CO2 equivalent, by 2030
- Reduce projected carbon emissions by 1 billion tons from 2021 till 2030.

For what specifically concerns the Indian **renewable energy sector**, policies in this field focused on increasing the contribution of renewables to the overall energy mix, witnessing significant change in the past years, thanks to the **ambitious target of 500 GW of non-fossil-fuel-based capacity by 2030 set by the government**. The share of renewables in installed power generation capacity increased to 30% in FY2023, compared to 10% in FY 2010.

To achieve the set targets by 2047 and 2070, India is also betting on the deployment of **green hydrogen** as a key element offering potential in energy storage, industry fuel replacement, clean transport and decentralized power. The National Green Hydrogen Mission, launched in 2022, seeks to make India a leading green hydrogen producer, reduce fossil fuel dependence, boost exports, building manufacturing capabilities, and foster economic growth and job creation through investments in research and development.[36]

As per the **electric vehicles** (EVs), the Indian government pushed their adoption through dedicated policies over the years.

> According to Citi researchers,[37] electric vehicles are cost competitive in the ridesharing and 2-wheeler categories, where high usage, coupled with government incentives, leads to significant cost savings. However, when it comes to ICE vehicles (*Internal Combustion Engine*) have a significantly lower total cost ownership compared to EVs. Electric buses have a higher life-cycle cost compared to their ICE counterparts but could still see better adoption in public transport with adequate push from the central and state gov'ts. As a consequence, two-wheelers are expected to see rapid adoption of EVs, while key impediments to higher EV adoption include high upfront cost, range anxiety, regulatory issues and import dependence – specifically for India risking being overly reliant on Chinese battery supply chain.

[36] India Government, National Green Hydrogen Mission. Available here: National Green Hydrogen Mission| National Portal of India
[37] *Ibid.*

Indian Railways has also made significant progress in reducing its carbon footprint and fuel costs and is committed to achieving a 'net-zero' carbon emissions status by 2030. One of its key initiatives toward **decarbonization is the complete electrification of the railways' broad-gauge network**, transitioning from diesel-powered locomotives to electric ones to eliminate carbon emissions and decrease reliance on fossil fuels.

## 4.4 Advanced manufacturing

Manufacturing is emerging as an integral pillar in India's economic growth and projected to be one of the fastest growing sectors, given to well performing areas such as automotive, engineering, chemicals, pharmaceuticals and consumer durables – as recalled in the first chapter of this Info Pack. Technological advancements have stimulated innovation with digital transformation, gaining an edge in this competitive market. In fact, the India manufacturing sector is transitioning towards automated and process-driven manufacturing, expecting to improve efficiency and productivity. India is gradually progressing on the road to Industry 4.0 through the Government of India's initiatives like the **National Manufacturing Policy** which aims to **increase the share of manufacturing in GDP to 25 percent by 2025**.

India's manufacturing sector is expected to reach US $1 trillion by 2025-2026, led by Gujarat, Maharashtra and Tami Nadu, fueled by investments in automobile, electronics, and textile industries. Additional government initiatives such as Make in India and *PLI (Production-Linked-Incentives) schemes* drive growth, attracting FDI and enhancing industrial infrastructure. Moreover, the Department for Promotion of Industry and Internal Market of the Indian Government is boosting India's startup ecosystem and manufacturing sector by developing incubators to foster innovation, enhance competitiveness, create jobs and reinforce the country's self-reliance and global trade position.[38]

Some of the major investments and developments in the manufacturing sector in India include:

- Sansera Engineering Limited has signed a Memorandum of Understanding with the Karnataka government to invest US $251 million in a new manufacturing facility in Ramanagara, aiming to create 3500 jobs and

[38] IBEF – India Brand Equity Foundation, Manufacturing Sector in India. Available here: Manufacturing Industries in India & its Growth | IBEF

enhance production capacity in automotive and non-automotive sectors in the next years.

- Google is set to begin manufacturing Pixel smartphones in India, specifically in Tamil Nadu, in collaboration with Foxconn and Dixon Technologies. This production aims to cater primarily to export markets in Europe and the US.
- Union Minister of Education and Skill Development & Entrepreneurship, Dharmendra Pradhan inaugurates Rashtriya Udyamita Vikas Pariyojana under Skill India Mission, empowering PM SVANidhi beneficiaries with comprehensive 22-week entrepreneurship training, including theoretical and practical components, in collaboration with Flipkart and focusing on 40% women participation.[39]

Another initiative of the Indian government, specifically from the Ministry for Heavy Industries & Public Enterprises, is Smart Advanced Manufacturing and Rapid Transformation Hubs or **SAMARTH Udyog Bharat 4.0** to enhance competitiveness in the capital goods industry. They have created demonstration centers or hubs called **Common Engineering Facility Centers (CEFCs)** to spread awareness about Industry 4.0 among Indian manufacturing companies. This is expected to increase competitiveness of the manufacturing sector in the capital goods market. With impetus on developing industrial corridors and smart cities, the Government aims to ensure overall holistic development of the nation.

Machine learning and artificial intelligence are also playing a role in the manufacturing sector, due to their deep integration paving the way for the era of smart factories. According to the NASSCOM report on India Industry 4.0 Adoption, **digital technologies will account for 40% of total manufacturing expenditure by 2025** as compared to 20% of expenditure in 2021, encompassing the entire spectrum of factory automation, from the initial stages of manufacturing, including raw material sourcing, to the seamless dispatch of finished products. India's manufacturing sectors, including electronics, chemicals, pharmaceuticals, and textiles, are advancing through **AI-driven automation**, **quality control**, and **smart factory technologies**. AI enhances production accuracy in electronics and pharmaceuticals, while Computer-Aided-Design and Computer-Aided-Manufacturing CAD/CAM optimizes textile manufacturing. The industrial robotics market is growing, with AI-powered robots boosting production efficiency. Companies like Hyundai Motors use Augmented Reality (AR), Virtual Reality (VR), and deep learning for defect detection and quality improvement. Smart sensors, RFID, blockchain, ERP systems, and 3D printing help streamline inventory, reduce

[39] *Ibid.*

downtime, and support supply chain resilience, fostering a more efficient manufacturing ecosystem. [40]

These advancements reflect India's commitment to transforming its manufacturing landscape into a globally competitive, technology-driven sector that will drive economic growth, foster job creation, and solidify the nation's role as a leading manufacturing hub in the world.

[40] Invest India, Manufacturing 4.0: India's AI-Powered Industrial Revolution, 2024. Available here: Manufacturing 4.0: India's AI-Powered Industrial Revolution

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