



Industry Report on the E-Paper Display Solution Industry

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CIC Introduction, Methodologies, and Assumptions

- China Insights Consultancy is commissioned to conduct an analysis and to produce a report on the E-paper display industry. The report commissioned has been prepared by China Insights Consultancy independent of the influence of the Company or any other interested party.
- China Insights Consultancy, originally established in Hong Kong, is a Shanghai-based investment consulting company whose services include industry consulting services, commercial due diligence, strategic consulting, and so on. CIC's consultant team has been tracking the latest market trends in sectors such as finance and services, agriculture, chemicals, consumer goods, marketing and advertising, culture and entertainment, energy and industry, healthcare, TMT, transportation, etc., and has the most relevant and insightful market intelligence in the mentioned industries.
- The information and data collected by CIC have been analyzed, assessed, and validated using CIC's in-house analysis models and techniques. Primary research was conducted via interviews with key industry experts and leading industry participants. Secondary research involved analyzing data from various publicly available data sources, such as the National Bureau of Statistics of PRC, and various industry associations.
- The market projections in the CIC Report are based on the following key assumptions: (i) the overall social, economic, and political environment worldwide is expected to remain stable during the forecast period; (ii) related key industry drivers are likely to continue driving growth in the smart IoT E-paper display solution market during the forecast period, such as advancement of technology and infrastructure, supportive policies, and increasing downstream demands, etc.; and (iii) there will be no extreme force majeure or unforeseen industry regulations in which the market may be affected in either a dramatic or fundamental way during the forecast period.
- All statistics are reliable and based on information available as of the date of this report. Other sources of information, such as governments, industry associations, or marketplace participants, may have provided some of the information on which data or its analysis is based. Certain amounts and percentage figures included in this report have been subject to rounding adjustments.
- All the information about the Company is sourced from the Company's own audited report or management interviews. China Insights Consultancy is not responsible for verifying the information obtained from the Company.

Terms and Abbreviations (1/4)

8D Report a structured problem-solving report used in manufacturing and quality management to address and correct defects. It documents the eight disciplines: Team formation, Problem description, Containment actions, Root cause analysis, Corrective actions, Implementation, Preventive measures, and Congratulation/Closure. Widely used in e-paper display production to resolve recurring issues and improve quality

ACeP Advanced Color ePaper, a full-color e-paper display technology developed by E Ink that enables each pixel to produce a wide color gamut using a single layer of electrophoretic ink. ACeP achieves color rendering through electronically controlled pigment movement, offering high visibility, low power consumption, and a reflective, paper-like appearance suitable for applications such as signage and information displays

ACF anisotropic conductive film, a film-type adhesive material containing conductive particles, which enables electrical conductivity primarily in one direction while remaining electrically insulating in other directions. It is used to form electrical and mechanical connections between components in the assembly of electronic paper display modules and other electronic products

AOI automated optical inspection, a kind of technology that uses cameras and image processing to detect defects or verify quality in electronic assemblies

black-and-white e-paper display module e-paper display modules supporting black and white colors only

COG chip-on-glass, a packaging technology in which an integrated circuit chip is directly mounted and electrically connected onto the glass substrate of an e-paper display. This method reduces module thickness and improves electrical performance

Class 1,000 cleanroom Class 1,000 cleanroom refers to a cleanroom where the number of particles ≥ 0.5 microns does not exceed 1,000 per cubic foot of air, making it ten times cleaner than Class 10,000 cleanroom

Class 10,000 cleanroom Class 10,000 refers to a cleanroom where the number of particles ≥ 0.5 microns does not exceed 10,000 per cubic foot of air

customer retention rate the percentage of our existing customers in the immediately preceding period which remain as our customers in the current period

driver IC an integrated circuit that controls the operation of an e-paper display module, managing pixel activation, signal timing and data processing

E4 product entry-level e-paper modules designed for basic display scenarios, featuring sunlight readability and low power consumption. They are particularly suitable for applications such as retail promotional boards and electronic shelf labels. Key features include the use of E Ink Spectra 3000 technology from E Ink Holdings, enabling three-color display options of (a) black, white and red or (b) black, white, and yellow

Terms and Abbreviations (2/4)

E5 product	mid-to-high-end e-paper module series offering multi-color display capabilities. The core definition is a functional product designed for IoT and commercial display scenarios, featuring a four-color e-paper display module in black, white, yellow, and red. Key features include the adoption of E Ink Spectra 3100 technology, breaking the traditional limitations of black-and-white e-paper to achieve vivid and saturated four-color displays, meeting the needs of commercial advertising and signage for eye-catching visual effects
EC adhesive	edge coating adhesive, an adhesive material applied to the edges or periphery of electronic components or display modules, which provides mechanical reinforcement and protection against environmental factors such as moisture and dust during or after the assembly process
“electronic shelf label” or “ESL”	electronic shelf labels, also known as electronic price tags, these are electronic display devices that replace traditional paper price tags. They are connected to computer databases via wired or wireless networks to display product prices and related information
EPD	e-paper display, a reflective, low-power display technology that uses electrophoretic or other bistable mechanisms to render text and images in a paper-like manner. EPDs maintain displayed content without continuous power, offer high readability under ambient light, and are commonly used in e-readers, electronic shelf labels, and digital signage
e-paper display module	the core component of e-paper technology, integrating e-ink film, driving circuits, and substrate layers. It features ultra-low power consumption, paper-like display performance, and bistability
four-color e-paper display module	e-paper display modules supporting four colors: black, white, red, and yellow

FOG	flex-on-glass, a process to establish electrical interconnection and mechanical bonding between the flexible printed circuit and the glass substrate within the e-paper display module
FPC	flexible printed circuit, a flexible circuit board used in e-paper display modules to connect the display panel with driver circuits, allowing bendable or compact wiring designs
“FPL” or “e-ink film”	front plane laminate, being the topmost layer of an e-paper display module made of laminated front-plane materials and used to form the image-displaying surface which directly determines the display performance
full-color e-paper display module	e-paper display modules supporting six basic colors (black, white, red, yellow, blue, green) and capable of rendering full-color images through image processing
IoT	Internet of Things, a network of interconnected devices embedded with sensors, software, and connectivity that enable them to collect, exchange, and act on data without requiring direct human intervention
ITO	Indium Tin Oxide, a transparent, conductive oxide material made of indium oxide and tin oxide, commonly used in touchscreens, displays and solar cells

Terms and Abbreviations (3/4)

large-size e-paper display module

e-paper display modules larger than 6 inches

LCD

liquid-crystal display, a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers to display information

medium-size e-paper display module

e-paper display modules ranging from 4 to 6 inches (inclusive of 4 and 6 inches)

multi-color e-paper display module

e-paper display modules supporting more than four colors: black, white, red, and yellow

OCA

Optically Clear Adhesive, a transparent adhesive used to bond optical components, such as touch panels, display modules, and cover lenses, without affecting light transmission

OLED

organic light-emitting diode, a type of light-emitting diode in which the emissive electroluminescent layer is an organic compound film that emits light in response to an electric current

OTFT

organic thin film transistor, a thin-film transistor technology based on organic semiconductor materials. Unlike traditional inorganic semiconductors (such as silicon), OTFTs feature flexibility, lower cost, and suitability for large-area fabrication

OTP

one-time programmable, a type of memory or integrated circuit configuration that can be programmed once and retains the programmed data permanently. In e-paper displays, OTP may store calibration parameters, panel-specific data, or factory settings

PI a-Si

polyimide with amorphous silicon, a flexible display substrate made of polyimide coated with an amorphous silicon thin film, commonly used for thin-film transistors in e-paper and LCD modules

PCB

printed circuit board, a board made of insulating material with conductive pathways printed or etched onto it, used to mechanically support and electrically connect electronic components

PET film

Polyethylene Terephthalate film, a strong, transparent, and flexible polyester film widely used for packaging, electrical insulation, and protective Applications

protective film

a functional film mainly made of polystyrene. It provides anti-glare performance, high-level moisture barrier (to prevent e-ink from dampness), and UV blocking capability, thereby extending the lifespan of e-paper modules

Terms and Abbreviations (4/4)

PPM	Failures Per Million, a quality metric used to measure the number of defective or failed units in a production process per one million units produced or delivered
RTV	room-temperature vulcanizing, a type of silicone adhesive or sealant that cures at room temperature. In e-paper display manufacturing, RTV is used for sealing, bonding, or protecting components without requiring high-temperature processes
small-size e-paper display module	e-paper display modules smaller than 4 inches
SMT	surface-mount technology, a method for producing electronic circuits in which components are mounted or placed directly onto the surface of printed circuit boards. SMT allows for higher component density, improved manufacturing efficiency, and enhanced electrical performance compared to through-hole assembly
Spectra 6	E Ink Spectra 6 is based on the E Ink Spectra technology platform and utilizes blue, white, red, and yellow particles to deliver six vibrant and saturated colors. By enhancing the color spectrum and applying advanced color imaging algorithms, it provides full-color display capabilities to improve product advertising and marketing effectiveness. It is widely applicable to scenarios such as digital signage, smart healthcare, smart retail, and hospitality
Spectra 3100”	E Ink Spectra 3100 is a four-color e-ink system that uses black, white, red, and yellow particles to deliver four vibrant and saturated colors, enabling the display of rich and diverse information and content. Spectra 3100 shortens image refresh time and expands the temperature range for yellow and red particles, meeting the needs of diverse application environments in retail stores

TFT	thin film transistor, a semiconductor device made by depositing thin layers of materials on a substrate, commonly used to precisely control pixels in display technologies
TFT Substrate	thin film transistor substrate is the core driving component of an e-paper display module. It is essentially a glass substrate integrated with TFT circuits, enabling precise control of pixel switching and signal transmission
three-color e-paper display module	e-paper display modules supporting three colors, either (a) black, white and red, or (b) black, white and yellow
Vcom Pad	an electrode pad in an LCD used to draw out and connect the common voltage (Vcom), typically linked through silver paste or other conductive materials

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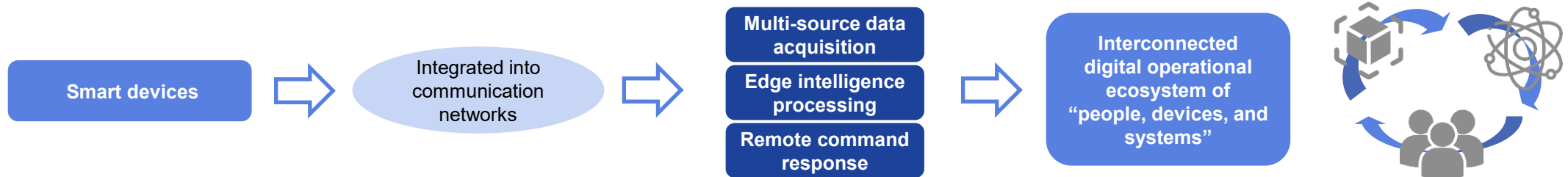


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Overview of the Global Smart Device Industry

Development and Evolution of the Smart Device Market

- With the continuous improvement of smart devices and the rapid enhancement of device connectivity, smart devices—equipped with sensing, computing, and execution—are being increasingly integrated into communication networks, enabling multi-source data acquisition, edge intelligence processing, and remote command response, progressively constructing a collaborative and interconnected digital operational ecosystem of “people, devices, and systems”. Widely used in smart retail, cities, homes, and wearables, they are driving the “Internet of Everything.” As AI, LPWAN, and edge computing mature, these devices have evolved from single-point sensing to system-level collaboration and intelligent decision-making, becoming key components of next-generation IT systems.



Global Green Transition Accelerates Smart Adoption in Digital and Paperless Solutions

- E-paper stands out among mainstream displays for its ultra-low power, paper-like visuals, eye-friendly experience, slimness, durability, and flexibility. Unlike power-hungry LCDs and OLEDs, it maintains images in static mode with near-zero power, reducing energy use and extending battery life—supporting green, energy-efficient IoT deployment. With policy support, OTFT advancements, and rising demand for flexible, low-power displays, e-paper is set to expand across commercial and consumer applications.



Smart retail



Education and e-reading



Smart transportation



Smart healthcare



Logistics and warehousing

Comparative Analysis of Flat Panel Display Technology

Overview of the Four Mainstream Display Technologies for Tablets

	E-paper	LCD	LED	OLED
Working Principles	Uses electrophoretic or electrochromic/reflective mechanisms, where charged particles move under an electric field to form images.	Liquid crystals between polarizers control light under an electric field, producing color images with a backlight.	Each pixel is made of RGB LEDs that emit light directly, forming images by controlling their brightness or on/off state.	Organic materials between electrodes emit light directly when voltage is applied, without a backlight.
Feature Comparison	Paper-like, sunlight-readable, flicker-free, near-zero static power.	Good color reproduction and high resolution; wide applicability and strong stability.	Extremely bright, outdoor-visible, supports large or modular displays.	Vivid colors and fast response, suitable for dynamic images/videos; wide viewing angles.

- Traditional flat panel displays predominantly serve mainstream consumer electronics. In contrast, e-paper is primarily deployed in commercial and enterprise applications, such as electronic shelf labels (ESLs) and digital signage. In these commercial environments, large-scale deployment of LCD or OLED screens is generally cost-prohibitive and impractical due to higher unit costs, constant power consumption, and susceptibility to screen burn-in. E-paper perfectly addresses these commercial needs through superior cost-effectiveness, ultra-low power consumption (bistable display), and long-term durability.
- Within the consumer electronics sector, LCD, LED, and OLED technologies dominate the mass market by fulfilling demands for high contrast, vibrant colors, and high refresh rates. E-paper, however, targets a specific, complementary niche focused on eye protection, paper-like reading and writing experiences, and extended battery life. These specialized user needs cannot be effectively met by standard light-emitting displays.
- Given their distinct technological characteristics, e-paper and traditional flat panel displays serve different market segments. Rather than competing directly, they act as complementary technologies within the broader display industry, making the threat of substitution from LCD, LED, and OLED products inherently limited.
- The e-paper display industry has been rapidly changing and evolving and has been driven at various times by the emergence and development of other display technologies, as the widespread adoption of other digital smart terminals

Comparative Analysis of Flat Panel Display Technology

Comparative Analysis of Flat Panel Display Technologies

	Technical Characteristics									Commercialisation Progress	
	Emission Principle	Power Consumption per Unit Area (mW/inch)	Eye Comfort	Flexibility	Refresh Rate	Contrast Ratio	Response Speed	Brightness	Lifespan	Environmental Friendliness	Applications
E-paper	Reflective	0.1~1.0 (Near-zero power in static display)	No blue light, no flicker, readable under sunlight	√ (Achievable with flexible substrate technology)	Low (<10Hz)	Medium (depends on specific electrochemical implementation)	Slow (only suitable for static display) 100-500ms	Ambient light-dependent	Long (no burn-in issue)	High	E-tags, conference displays, bus stop boards, e-readers
LCD	Transmissive	150	Risk of backlight, blue light, and flicker	×	High (up to 60-240Hz)	Medium (affected by polarizer and backlight)	Fast 1-20ms	Medium (may reflect outdoors)	Relatively long (50k-100k hours)	Low	Monitors, medium-sized TVs, industrial instruments
LED	Self-emissive (Point Light Source)	>700	Strong blue light and point light source stimulation	×	High (up to hundreds of Hz)	High (depends on backlight and color processing)	Very Fast <1-5ms	Extremely High (sunlight-resistant)	Long (100k+ hours)	Relatively Low	Indoor/outdoor advertising displays, backlit signage
OLED	Self-emissive (Surface Light Source)	120~150	Presence of blue light, partial use of PWM flicker	√	High (up to 60-120Hz)	Very High (true black, infinite contrast)	Extremely Fast <0.1ms	Relatively High	Medium (30k-50k hours)	Relatively Low	Smartphones, wearable devices, in-vehicle displays

Notes:

(1) Environmental friendliness is determined primarily with reference to the power consumption per unit display area under typical usage and the emission mechanism of each technology.

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Definition and Classification of E-Paper Related Solution Industry

Industry Overview

- With global digitalization and sustainability trends, IoT devices are rapidly increasing, driving demand for low-power, high-visibility, and flexible displays.
- Smart IoT e-paper solutions, offering ultra-low power, sunlight readability, eye-friendliness, and flexibility, are becoming the core display medium for a green digital ecosystem. Widely used in e-shelf labels and e-readers, they are also expanding into smart office, smart education, smart logistics, and smart transportation, shaping both application solutions performance and innovations in form factor and human-machine interaction.



Sustainability



Innovative Interaction

Definition

E-paper related solutions industry encompasses display solutions, application solutions, and supporting services, providing an integrated hardware-software ecosystem. Unlike LCD, LED, or OLED, e-paper consumes minimal energy during refresh and maintains static images at near-zero power, reducing energy use. Its reflective design also enables paper-like readability, lightweight form factors, and comfortable long-duration viewing.

Classifications

E-Paper Related Solution Industry

By Size

Small

<4 inches

Medium-Large

4-6 inches

Large

>6 inches

By Display Type

Black & White

Three/Four-
Colour

Multi-Colour

Technological Development Paths and Trends in the E-Paper Related Solution Industry

Technological Development

At its core, the display technology underpinning e-paper related solution is a reflective, passive technology, which relies on ambient light for visibility. It is non-emissive, and only consumes power when updating the image. Its fundamental operating principle involves modulating the reflection and absorption of ambient light to achieve a reading experience virtually indistinguishable from that of traditional paper.

Key Technology R&D Trends

1



Color Performance



- The mainstream application currently centers on three- and four-color schemes, which are predominantly used in electronic shelf labels and have recently begun to expand into smart retail and smart office. The principal technical challenges in this area involve the precise control of charged pigment particles, ensuring color stability, and optimizing driving voltage. Future advancements in materials and driving technology are expected to enhance production yields and reduce costs for multi-color products, thereby accelerating their adoption across downstream applications.

2

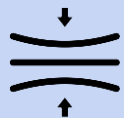


Size Variants



- Evolving application solutions demanding higher information capacity and expanded interactive scenarios are driving a shift from small displays towards medium and large-sized panels, consequently expanding their use from price tags into advertising signage and others. Through upgrades in driving technology, process optimisation, and economies of scale, the unit cost for these larger sizes is on a continuous downward trajectory.

3

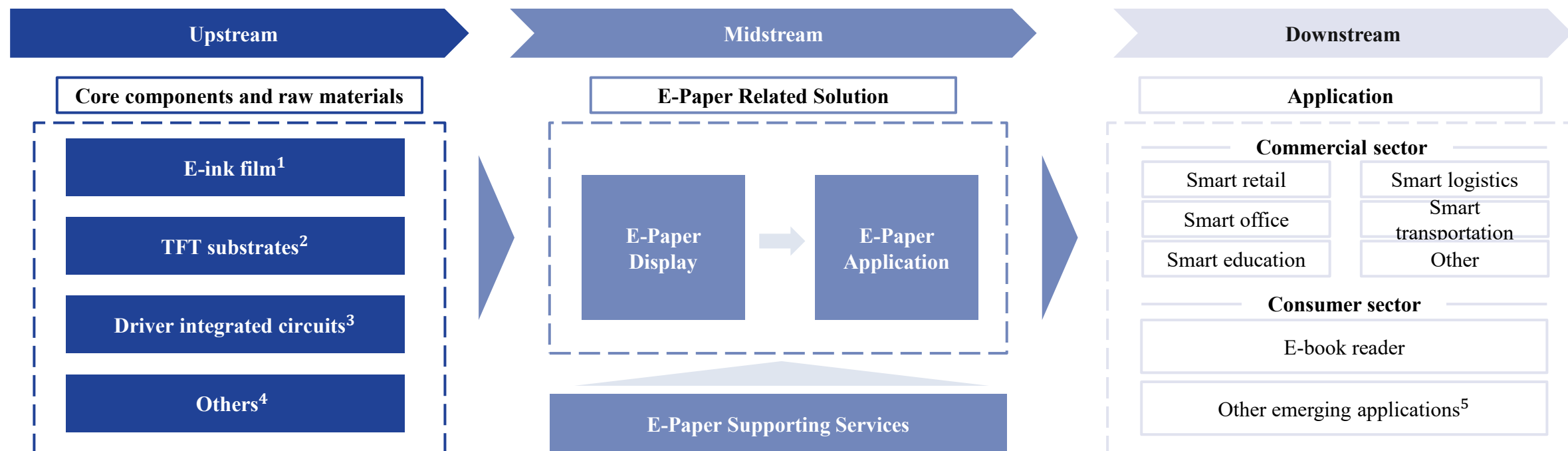


Flexible Display



- Leveraging the innate flexibility of e-paper film by substituting glass substrates with flexible alternatives enables the development of bendable and foldable applications, thereby unlocking new possibilities for wearable technology and foldable screen applications.

Industry Chain of E-Paper Related Solution Industry



Notes:

(1) E-ink films function as flexible, low-power display layers made of millions of microcapsules filled with positively charged white and negatively charged black particles suspended in fluid. (2) TFT substrates are active-matrix backplane substrates that enable pixel-level addressing and voltage storage to generate and maintain the required local electric fields. (3) Driver integrated circuits convert system data and timing into the required gate/source drive signals and waveforms to refresh and control the panel. (4) Others refer to structural components, PS protective films, FPC flexible circuit boards, etc. (5) Emerging areas refer to wearable devices, smart homes, etc.

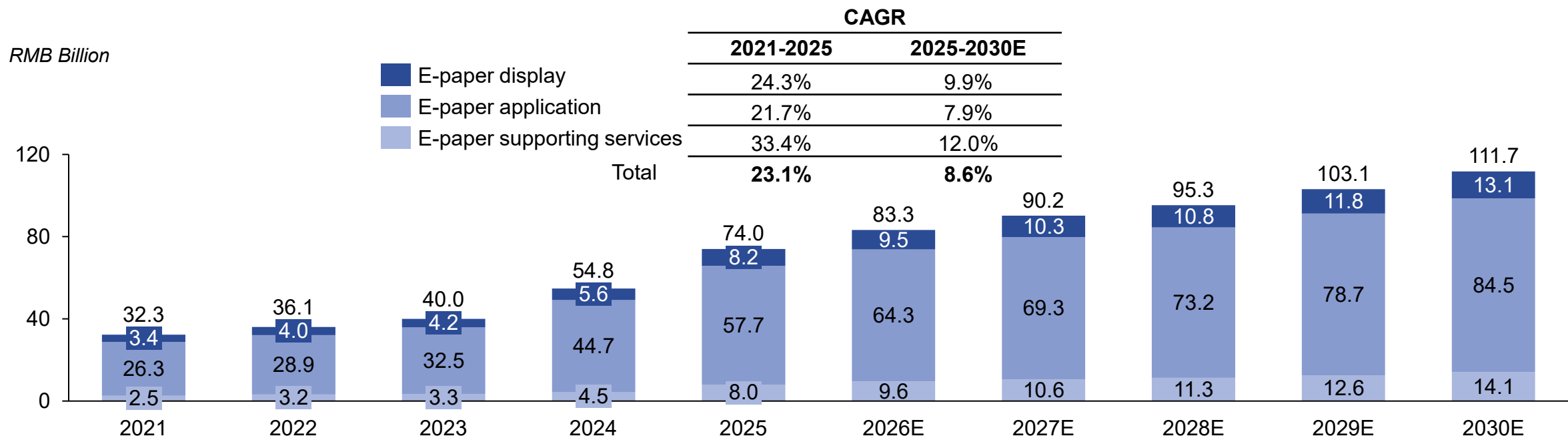
- The global industry chain for e-paper display solutions is segmented into three core tiers. The upstream sector supplies E-ink film, TFT substrates, driver integrated circuits, and other core components and raw materials of e-paper related solutions industry.
- The midstream sector focuses on the manufacturing and service of E-Paper related solutions, transforming upstream materials and components into display solutions, then manufacturing them into E-Paper devices, ultimately providing stable products and services to the downstream customers in commercial sector and consumer sector.
- The downstream sector includes application scenarios, spanning commercial fields such as smart retail, smart office, smart education, smart logistics, and smart transportation, as well as consumer-facing products like e-book readers and other emerging applications.
- Fast-growing sectors such as smart education, smart offices, and smart logistics are opening up new opportunities, with e-paper increasingly applied in areas such as warehouse management systems and interactive smart home displays further driving market demand.

Key Downstream Application Scenarios of E-Paper Display Solution Industry

	Applications	Specific application scenarios		Application types
Commercial sector	Smart retail	 - Chain supermarkets - Real-time price updates - Multi-dimensional information display - Low carbon emission and cost saving	- Convenience stores - Cost saving - Multi-dimensional information display 	E-paper label E-paper sign
	Smart office	 - Meeting signage - Office nameplates - Staff ID boards		E-paper office Tablets
	Smart education	 - E-textbooks - Intelligent notebooks - E-learning tablets		E-paper learning tablets
	Smart logistics	 - Electronic shipping labels - Intelligent logistics tags - E-ink parcel labels		E-paper tags
	Smart transportation	 - Electronic (e-paper) bus stop signs - Scenarios such as digital license plates		E-paper transportation signage
Consumer sector	E-book reader	 - Paperless reading - Paperless office		E-paper readers
	Other	 - Wearable devices - Smart homes		E-paper display screens...

Market Size of Global E-Paper Related Solution Industry

Market Size of Global E-paper Related Solution Industry, in Terms of Revenue, 2021-2030E



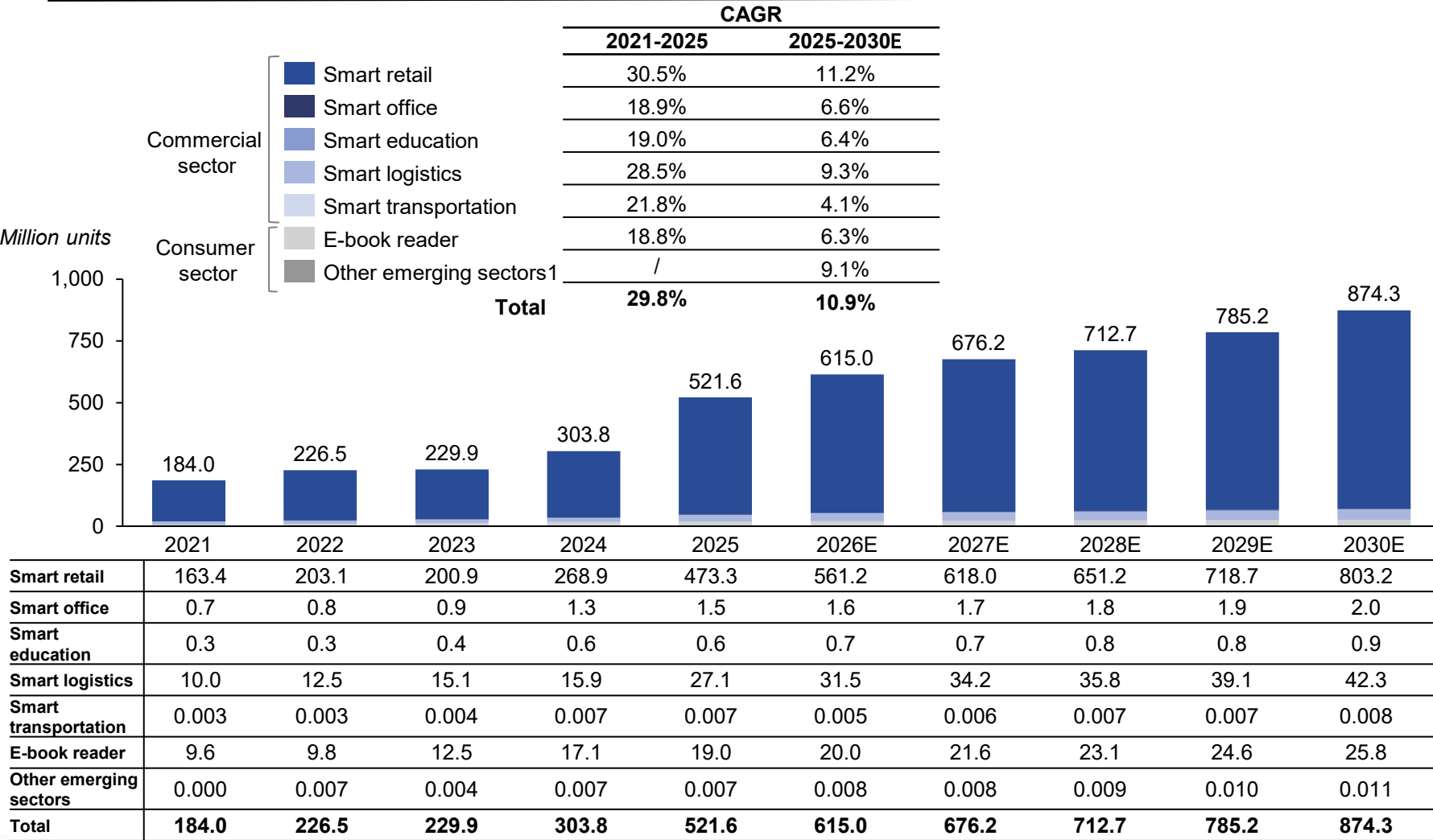
Note: The global e-paper related solution market includes the e-paper display market, the e-paper application market, and the e-paper supporting services market. In 2025, their respective proportions were 11.1%, 78.1%, and 10.8%.

Key Findings

- In 2021, the global market size for e-paper related solution was RMB32.3 billion. Accelerated iteration of core e-paper technologies and the increasingly synergistic effects within the industry’s upstream and downstream supply chains has driven this market to RMB74.0 billion by 2025, representing a CAGR of 23.1% for the period. With continued breakthroughs in low-power display technology and the accelerating commercial deployment of smart application scenarios, this market is poised to unlock further growth potential and application value. Consequently, the market size is forecast to reach RMB111.7 billion by 2030, achieving a CAGR of 8.6% during the period.

Market Size of Global E-Paper Display Industry by Downstream Applications

Market Size of Global E-paper Display Industry, in Terms of Sales Volume, by Downstream Applications, 2021-2030E



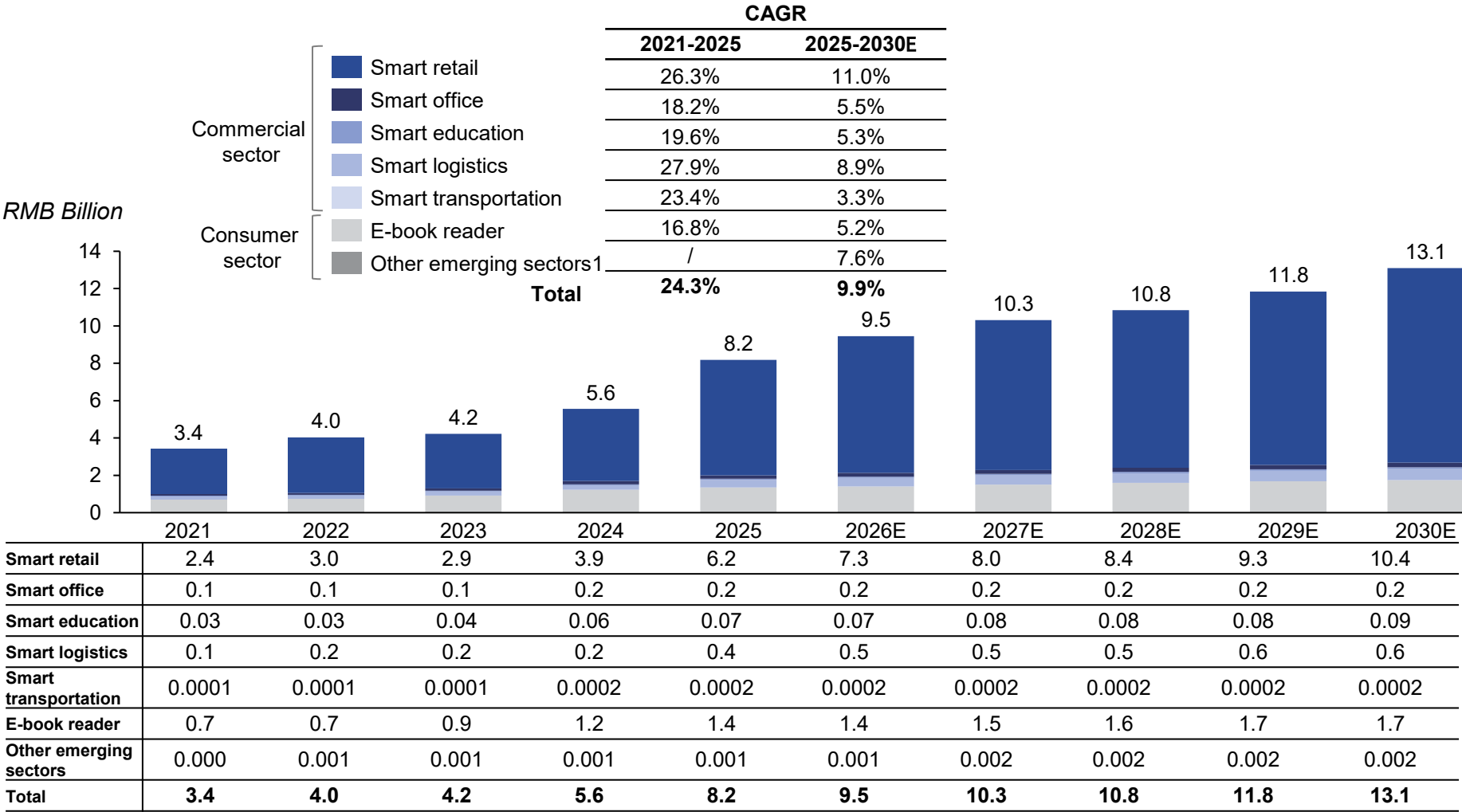
Key Findings

- In 2025, the global sales volume for e-paper display reached 521.6 million units. Driven by increasing demand for low -power, paperless display solutions and supportive environmental and digitalisation policies, it is projected to grow to 874.3 million units by 2030, representing a CAGR of 10.9% for the period.
- In particular, the global commercial e-paper display market reached a sales volume of 502.5 million units in 2025 and is projected to grow to 848.4 million units by 2030, achieving a CAGR of 11.0% for this period. The smart retail segment continues to hold the largest market share within the global commercial e-paper display market. In 2021, the sales volume for in global smart retail was 163.4 million units, a figure which has increased to 473.3 million units by 2025, representing a CAGR of 30.5% for the period. As the digital transformation of the global retail industry continues to deepen, the sales volume of global e-paper display in the smart retail segment is forecast to reach 803.2 million units by 2030, with a CAGR of 11.2%.
- Concurrently, within the global consumer e-paper display market, benefited from the continued proliferation of e-reader devices, sales volume reached 9.6 million units in 2021 and has increased to 19.0 million units by 2025, representing a CAGR of 18.8% for the period. In the future, while the rate of adoption for e-reader tablets is expected to gradually moderate, this segment is anticipated to reach a sales volume of 25.9 million units by 2030, driven by steady growth in global demand for low-carbon reading solutions. This projected growth corresponds to a CAGR of 6.3% for the period.

Notes:
(1) Emerging areas refer to wearable devices, smart homes, etc.
(2) Only revenue-generating display solutions are included in these statistics.

Market Size of Global E-Paper Display Industry by Downstream Applications

Market Size of Global E-paper Display Industry, in Terms of Revenue, by Downstream Applications, 2021-2030E



Key Findings

- The global E-paper Display industry shows continuous growth from 2021 to 2030, with total market size increasing from approximately RMB3.4 billion in 2021 to RMB13.1 billion in 2030, as shown in the chart. Commercial-sector applications — such as smart retail, smart office, smart education, and smart logistics — remain the primary growth drivers, with smart retail being the largest and consistently expanding segment. On the consumer side, the e-book reader market is expected to remain relatively stable, while other emerging sectors contribute additional incremental growth. Overall, the industry maintains a strong CAGR of about 24.3% for 2021-2025 and around 9.9% for 2025-2030.

Market Drivers of Global Smart IoT E-paper Display Solution Industry

1

The global expansion of green, low-carbon, and digital requirements is generating sustained growth momentum



- As the global economy accelerates its transition towards a green, low-carbon, and sustainable development model, governments worldwide are implementing policies to reduce carbon emissions and advocate for paperless operations, thereby fuelling the continued expansion of environmentally conscious consumption. In comparison to traditional displays, e-paper display, with their defining characteristics of ultra-low power consumption, absence of light pollution, and reusability, have emerged as a leading low-carbon and environmentally friendly alternative. A prime example of this adoption is the electronic shelf label, which has already achieved initial widespread penetration in the global retail sector and is now progressively expanding into applications such as office environments, education, logistics, and smart transportation systems.

2

Accelerated technological iteration and enhanced product capability



- The production processes for e-paper display are undergoing continuous refinement, leading to consistent breakthroughs in production yield. This advancement effectively reduces unit costs and is fostering the development of a more standardized supply chain, which collectively propels their large-scale adoption across downstream applications. Concurrently, breakthroughs in the technology, spanning dimensions such as size, display characteristics, and flexibility, are enabling diversification of their applications. Use cases are expanding beyond traditional e-readers and price tags into a growing number of emerging sectors, including smart transportation and smart logistics. This ongoing diversification is providing sustained impetus for market growth.

3

Supportive policies drive green display technology and market development



- Governments in Europe, North America, and China have successively announced clear carbon neutrality and carbon peak targets, providing both policy and financial support for green display technologies. Europe is promoting the adoption of low-power consumption display technologies, such as e-paper, through Extended Producer Responsibility (EPR) schemes. The United States leverages standards such as the Electronic Product Environmental Assessment Tool (EPEAT) to guide enterprises in developing low-energy, recyclable e-paper technologies. In China, underpinned by its "dual carbon" goals, multiple policies have been introduced to support the e-paper industry. For example, the "Notice on Issuing the Action Plan for Steady Growth in the Electronic Information Manufacturing Industry (2023-2024)" (《關於印發電子信息製造業2023-2024年穩增長行動方案的通知》) explicitly includes e-paper as a key solution for paperless substitution, encouraging the adoption of green technology in retail, education, and other scenarios and further proposes to promote the application of e-paper in new smart-terminal, culture, tourism, landscape and commercial display fields, and to support e-paper in accelerating paperless substitution applications. Furthermore, the "Outline of the Strategy for Expanding Domestic Demand (2022-2035)" (《擴大內需戰略規劃綱要(2022-2035年)》) emphasized innovation and application in new display technologies. Driven by this confluence of policy and societal pressures, green display technology is accelerating its commercial deployment and is poised to transition from being policy-driven to a mainstream commercial requirement.

Market Trends of E-Paper Display Industry

Development Trend

Key Analysis

Rapidly growing downstream demand for medium and large-sized e-paper, and continuously expanding new application scenarios



- The current market is still predominantly characterized by small-sized products such as price label and name tag, etc, which accounted for 89.1% of the global sales volume for e-paper display in 2025. However, fuelled by rising downstream requirements for greater information capacity and cost reductions achieved through economies of scale, medium and large-sized products are emerging as a critical growth driver for the e-paper industry. These larger displays combine reading comfort with adaptability, finding broad application potential in emerging fields such as retail price tags, smart transportation, and smart logistics, which are mainly medium to large-sized e-paper application scenarios. From 2025 to 2030, the global market for medium and large-sized e-paper display is projected to achieve a CAGR of 36.8%, with its volume expanding from 56.9 million units in 2025 to 272.5 million units in 2030.

Technological evolution centers on colorization, video capability, flexibility, and deep smart devices integration



- Beyond traditional black/ white/ red and black/ white/ yellow tri-color e-paper, the industry has successfully developed technologies supporting four to six color, as well as multi-color capabilities based on platforms such as ACeP in recent years, demonstrating a clear and sustained trend towards advanced color performance. Furthermore, products manufactured using flexible substrates possess the capability to bend and fold, aligning perfectly with emerging consumer demands for foldable screens and wearable technology. In the age of smart devices, the inherent characteristics of ultra-low power consumption and wireless updating allow these products to remotely refresh pricing or inventory information in retail stores, dynamically update departure information in smart transportation systems, and visually synchronize temperature, humidity, and routing data in smart logistics, solidifying their status as a preferred display for smart devices.

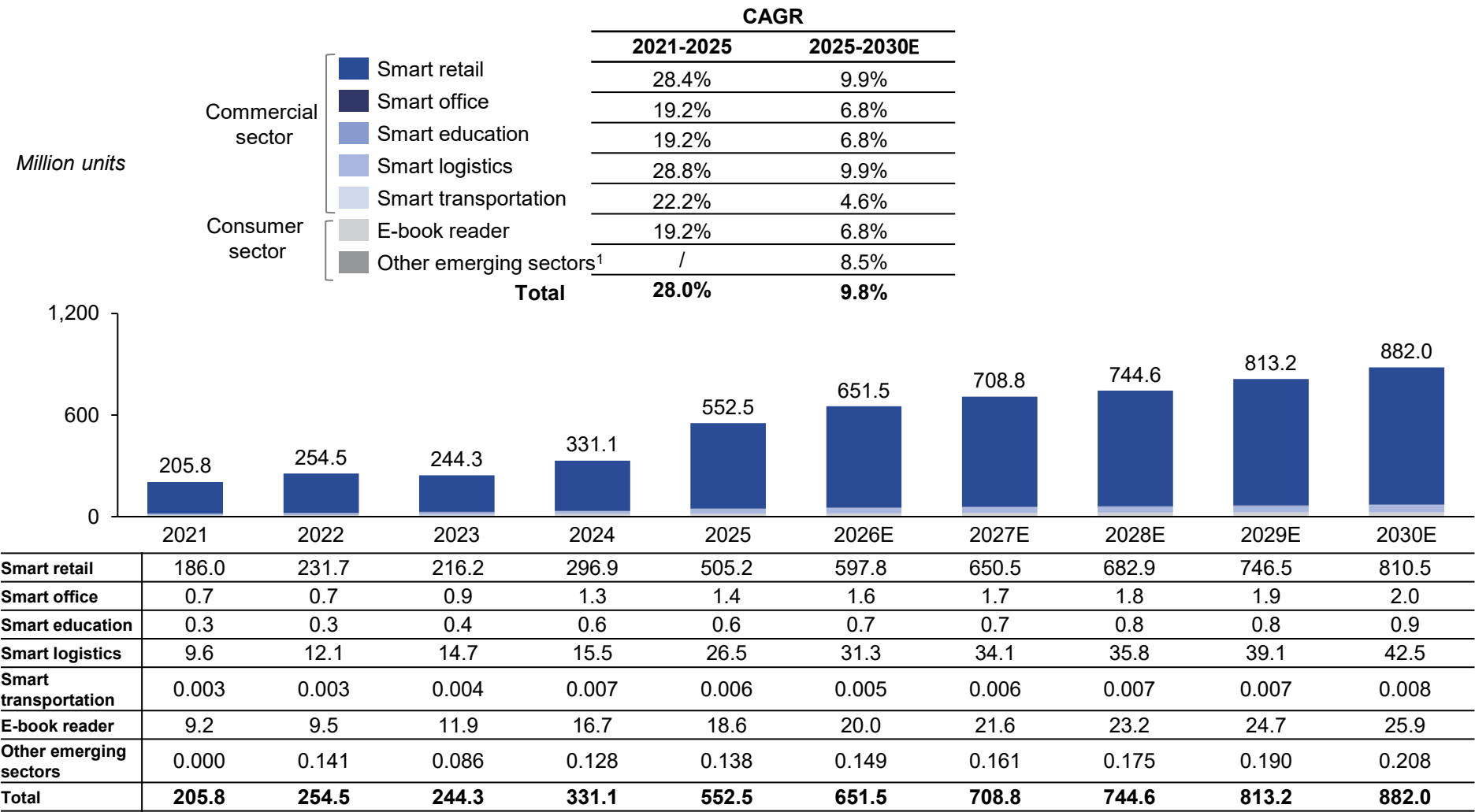
Increasing market concentration with leading players gaining more prominent advantages



- Firstly, technological barriers to entry continue to rise. Established players have constructed a formidable intellectual property moat through extensive patent portfolios covering critical components such as e-ink film, driver integrated circuits, and TFT substrates. Secondly, the advantages of economies of scale are becoming increasingly pronounced. Leading manufacturers achieve substantial cost reductions through vertical integration of their supply chains and the implementation of highly automated production lines. Finally, downstream manufacturers, particularly those in the commercial sector, exhibit a strong preference for partnering with major suppliers that can guarantee consistent product quality and reliable delivery.

Market Size of Global E-Paper Application Industry by Downstream Applications

Market Size of Global E-paper Application Industry, in Terms of Sales Volume, by Downstream Applications, 2021-2030E



Key Findings

- Global sales of e-paper application reached 552.5 million units in 2025. This figure is projected to grow to 882.0 million units by 2030, representing a CAGR of 9.8% for the period.
- In particular, global sales of commercial e-paper application reached 533.8 million units in 2025 and are projected to grow to 855.9 million units by 2030, achieving a CAGR of 9.9% for this period. The smart retail sector continues to represent the core application domain within the global commercial e-paper application market. Sales of these application in smart retail amounted to 186.0 million units globally in 2021 and has increased to 505.2 million units by 2025, corresponding to a CAGR of 28.4%. As the global retail ecosystem progressively evolves towards intelligent operations and data-driven management, the sales volume of global e-paper application in the smart retail segment is forecast to reach 810.5 million units by 2030, representing a CAGR of 9.9%.
- Concurrently, the global consumer market for e-paper display is demonstrating robust growth, underpinned by an expanding user base for e-reader devices. Sales in this segment reached 9.2 million units in 2021 and has increased to 18.8 million units by 2025, representing a CAGR of 19.4% for the period. In the future, the steady expansion of the paperless work environment is anticipated to become the primary growth driver for this market. Consequently, sales of global consumer e-paper display are forecast to reach 26.1 million units by 2030, achieving a CAGR of 6.8%.

Notes: (1) Emerging areas refer to wearable devices, smart homes, etc.

Market Drivers of E-Paper Application Industry

1

The imperative for low-carbon energy efficiency and extended battery life



- Against the backdrop of the global push for “Carbon Neutrality” strategic goals, there is a stringent requirement for electronic devices to drastically reduce their energy consumption . The ultra-low power consumption characteristic of e-paper application perfectly aligns with this market imperative. Consequently, e-paper application are positioned as the ideal technological pathway to replace traditional high-power display and propel green, low-carbon transformation across numerous industries.

2

A virtuous cycle driven by technological maturation and ecosystem expansion

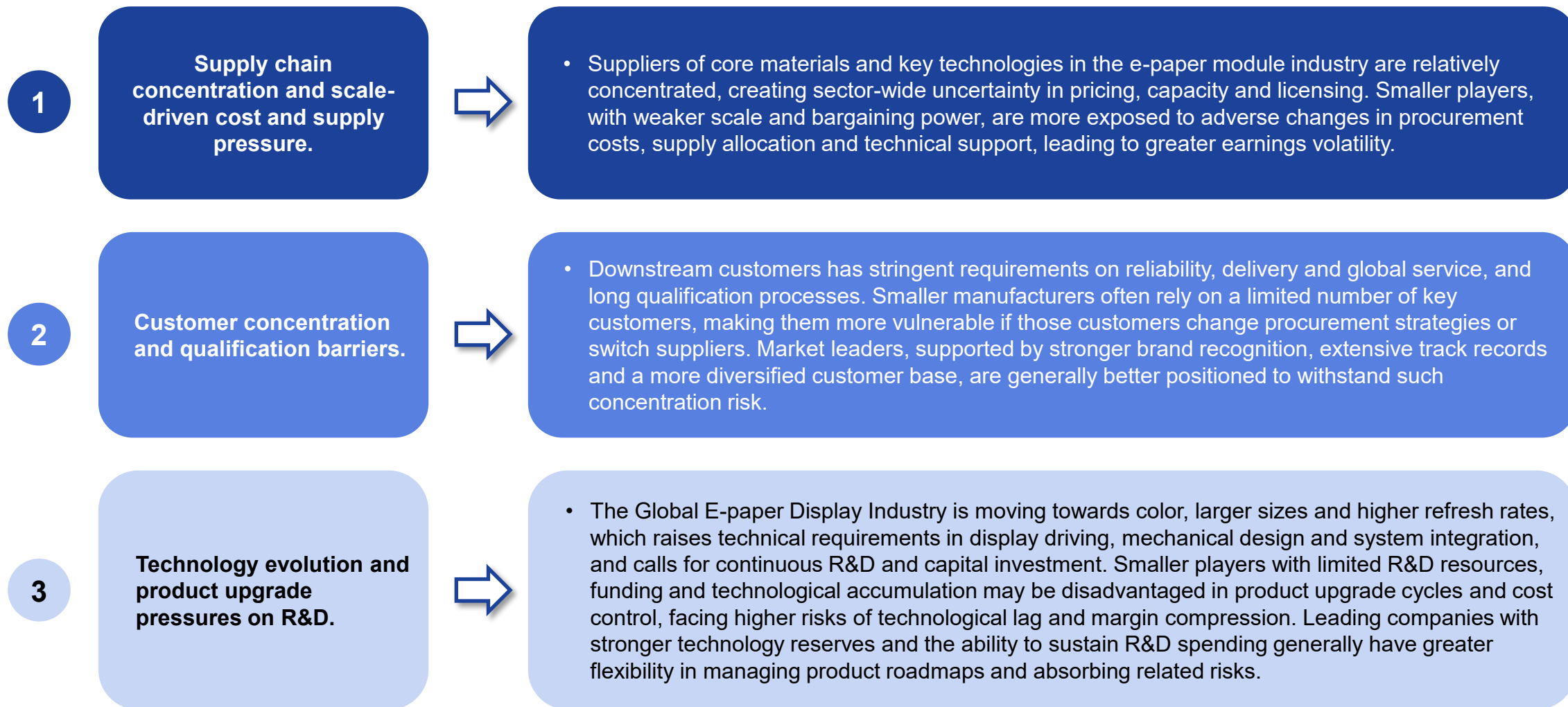


- In recent years, e-paper application have achieved significant breakthroughs in refresh rate, color performance, and flexible/bendable form factors, substantially broadening their application boundaries. The maturation of technology has lowered the barriers to application, while the expansion of the ecosystem has stimulated innovative vitality. The virtuous cycle formed by these two factors is collectively driving the industry towards greater diversification and scale.

Market Trends of E-Paper Application Industry

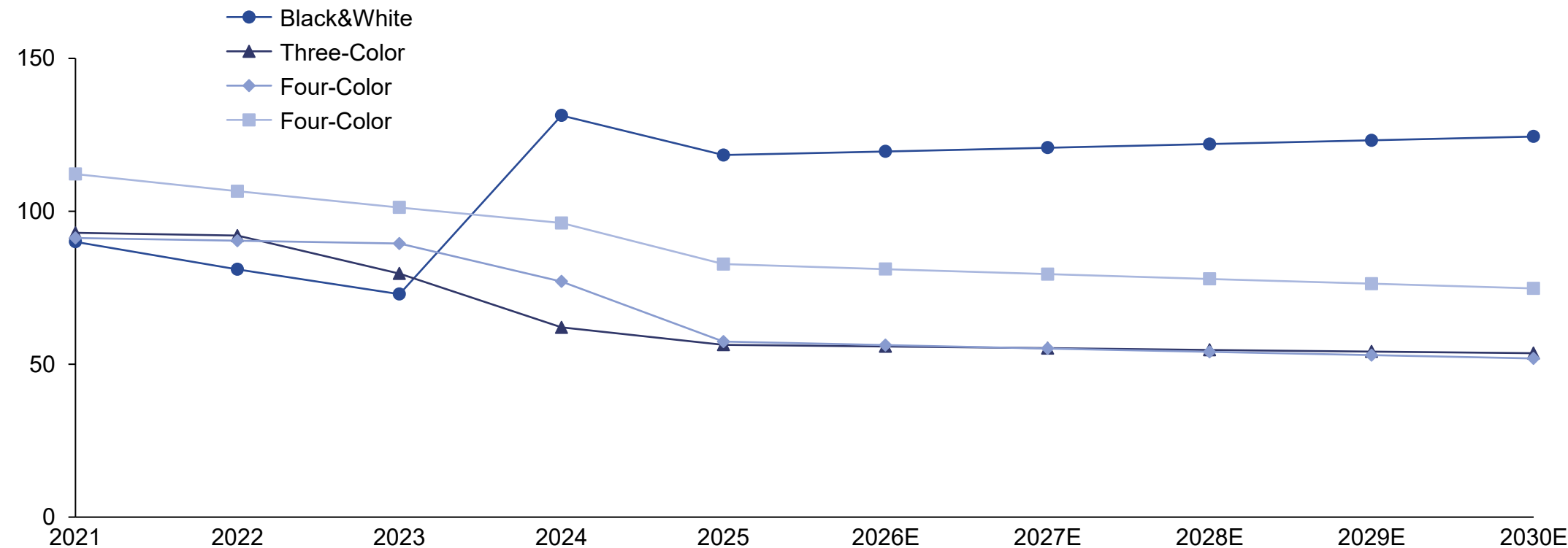
Development Trend		Key Analysis
The trend towards larger sizes and colorization		Commercial e-paper application are reshaping the business display ecosystem through technological breakthroughs in medium/large-sized formats and color performance. Regarding larger sizes, the industry is moving beyond the traditional application boundaries of e-paper. Leading players, through optimized display technology and production processes, have achieved breakthroughs in mass production. This enables these larger application to meet the demands of diverse scenarios such as retail shelf labels and conference room displays, significantly increasing information capacity while simultaneously reducing deployment and maintenance costs. In terms of colorization, the evolution from three/four-color systems towards multi-color technology has resulted in a display quality that much more closely resembles printed material, dramatically enhancing the visual experience and marketing impact.
The trend towards high-value-added products		The commercial e-paper application sector is evolving towards higher value-added offerings, progressively building a comprehensive ecosystem of value-enhancing services. Manufacturers are effectively enhancing customer satisfaction and improving response times by expanding into high-value application scenarios, such as healthcare and education, and by providing customized and differentiated products. This integrated service ecosystem, which spans the entire industry chain, serves to further broaden the value proposition of commercial devices.
Diversification of application scenarios		With the maturation of OTFT technology for integration into devices, the performance of e-paper backplanes and substrate materials has been substantially enhanced. This advancement in flexible design further supports the continued volume expansion into downstream application scenarios. Leading players in the industry are subsequently exploring emerging fields such as digital wallets and wearable devices. The accelerated adoption of flexible product designs and their deployment across multiple scenarios is driving a sustained increase in market penetration rates.

Threats and Challenges of Global E-paper Display Industry



Price Index of Global E-Paper Display Solutions Industry (1/2)

Price Index of Global Small-Size E-Paper Display Solutions Industry, by Color, 2021-2030E



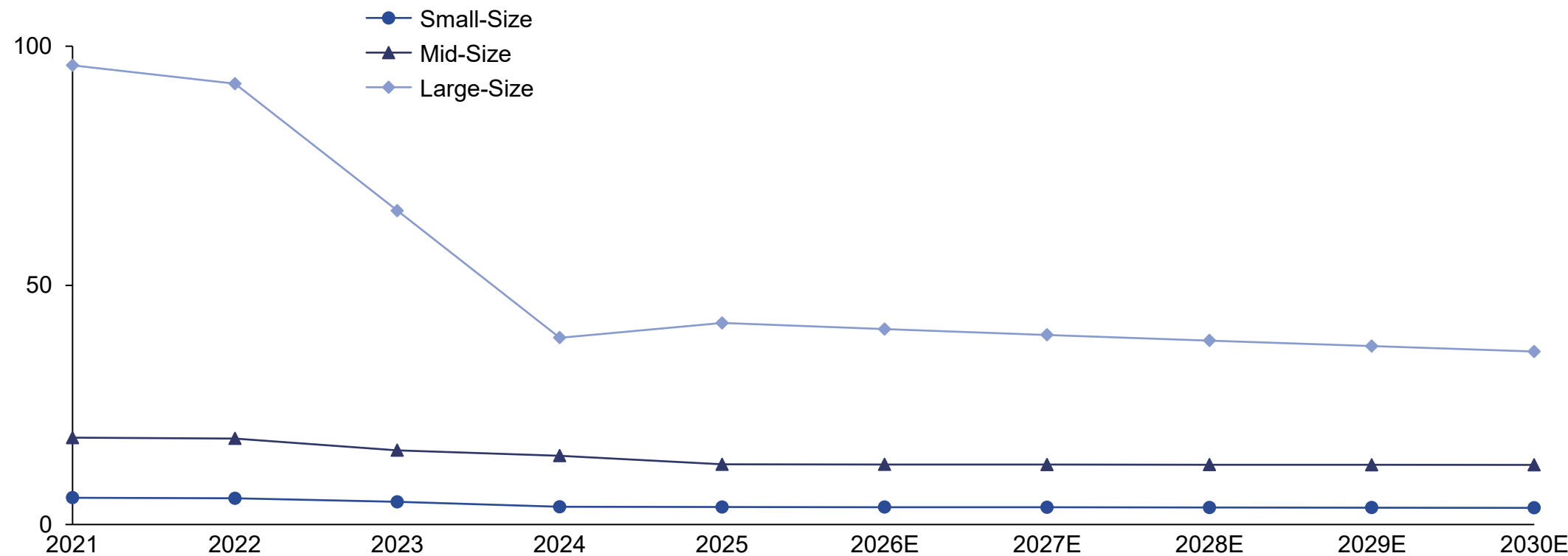
Key Findings

- The overall average selling prices of small-size e-paper display solutions exhibit a long-term downward trend driven by economies of scale, process maturation and intensifying competition, which collectively support ongoing cost reductions across the industry. Black&White small-size e-paper display solutions has experienced a price uplift due to demand spikes arising from concentrated procurement by downstream customers.

Notes: (1) The price index of global small-size e-paper display solutions industry is based on the average price of Black & White global small-size e-paper display solutions in 2021, which is set as 100.

Price Index of Global E-Paper Display Solutions Industry (2/2)

Price Index of Global Three-Color E-Paper Display Solutions Industry, by Size, 2021-2030E



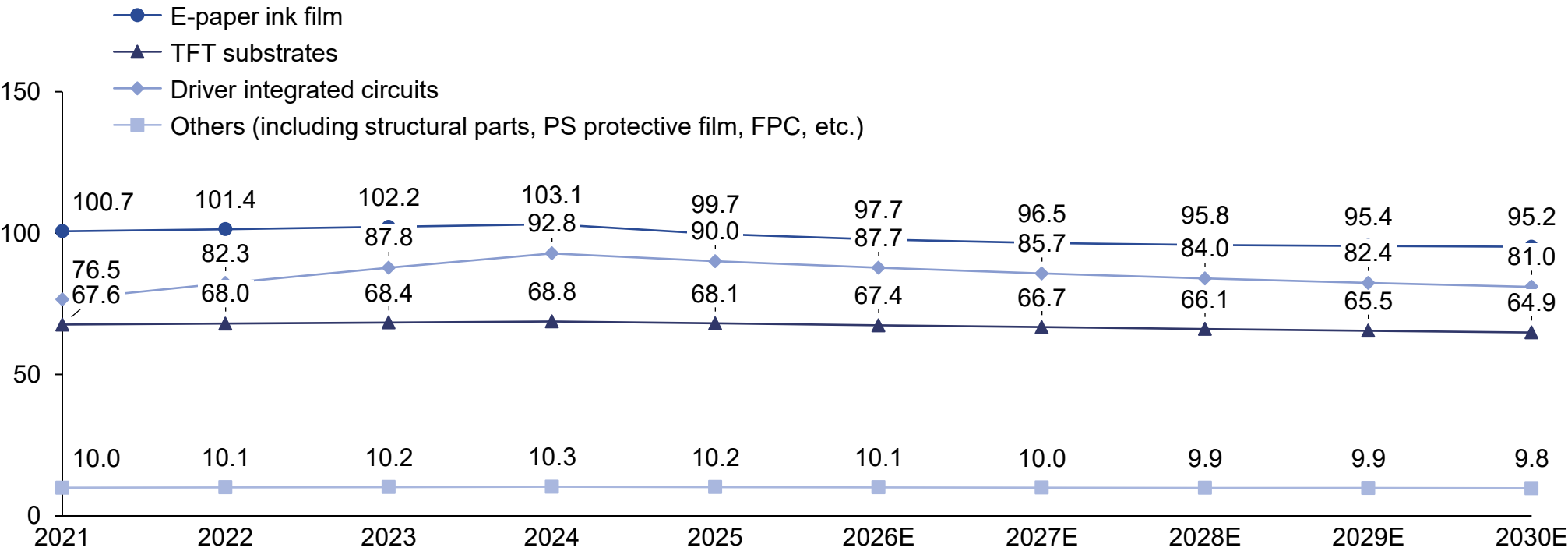
Key Findings

- Overall, three-color e-paper display solutions generally decline and then stabilize, driven by scale effects, yield and process improvements, and intensifying competition. Large-size ASPs fall the most as early pricing reflected ramp-up constraints, lower panel utilization and higher process complexity; as capacity and yields improved, prices declined sharply from 2021 to 2024, and then stabilized with a modest rebound as costs approached a floor and specification upgrades provided support.

Notes: (1) The price index of global three-color e-paper display solutions industry is based on the average price of large-size global small-size e-paper display solutions in 2021, which is set as 100.

Price Index of Raw Materials in the Global E-Paper Display Industry

Price Index of Raw Materials in the Global E-Paper Display Industry, 2021-2030E



Key Findings

- The raw materials of Global e-paper display industry includes e-ink films, TFT substrates, driver integrated circuits and others. With the intensification of market competition and the expansion of production capacity, the overall price of E-ink films is expected to show a downward trend. TFT substrates have remained broadly stable with only minor cyclical fluctuations, benefiting from mature production processes and sufficient panel capacity. Driver integrated circuits rose during periods of semiconductor supply demand imbalance and process migration, then gradually eased as foundry capacity and inventories normalised. Other auxiliary materials such as structural parts, protective films and FPCs first increased with demand growth and product specification upgrades, and subsequently softened slightly as upstream capacity expanded and competition intensified.

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Competitive Landscape of the Global E-Paper Display Industry

Global Smart IoT E-Paper Display Solution Upstream, Midstream, and Downstream Manufacturers

Category	Characteristics	Representative Companies
Upstream Manufacturers	• Leading in technology IP and product portfolio: Represented by E Ink, which controls core e-paper processes, color and flexible technologies, and licenses or supplies panels to global OEMs.	
Midstream Manufacturers	• Fast productization & cost/capacity advantage: Domestic firms excel in module integration, system products, and rapid delivery, turning e-paper panels into commercial devices quickly. • High tech intensity: Midstream requires expertise in module design, assembly, and encapsulation; electrophoretic displays dominate, with color module mass production accelerating.	
Downstream Manufacturers	• Specialized in niche markets: Focus on industrial, retail, and digital signage applications, emphasizing long-term stability and ultra-low-power deployment.	

Key Findings

- In 2025, the global e-paper display industry was highly concentrated, with the top five players accounting for approximately 82.0% of sales. Leading manufacturers offer diverse e-paper solutions—monochrome, multi-color, flexible, and segment code and prism—widely deployed across commercial and consumer applications. Recent recovery in electronic shelf label demand has accelerated inventory reduction, further concentrating shipments among top players.
- Mainland China and Taiwan, China dominate the market, with Mainland manufacturers representing over 90% of the share, and leading Chinese firms expected to further consolidate market share as demand grows.

Top Five Global E-Paper Display Manufacturers

Ranking of Top Five Global Manufacturers in E-paper Display Industry, in Terms of Revenue, 2025

Ranking	Name of Company	Sales of smart IoT e-paper display solution (RMB billion)	Market share (%)
1	Company A	2.7	33.3%
2	The Company	1.7	20.8%
3	Company B	1.4	17.1%
4	Company C	0.5	5.7%
5	Company D	0.4	5.2%
Top five total		6.7	82.0%
Total		8.2	100.0%

Notes:

(1) Company A, established in China in 1993 and listed on the Shenzhen Stock Exchange in 2001, is a company providing products and services related to IoT innovation, sensors and solutions, MLED, and integrated smart medical and engineering development, with semiconductor display as its core business.

(2) Company B, established in China in 2015, is a company providing one-stop services for the smart IoT application ecosystem, focusing on the research and development, production, and sales of e-paper display modules.

(3) Company C, established in China in 2012 and listed on the Shenzhen Stock Exchange in 2019, is a company engaged in the research and development, design, production, and sales of customized LCD devices and e-paper display modules, among other optoelectronic display products.

(4) Company D, established in China in 2010 and listed on the Shanghai Stock Exchange in 2022, is a company primarily engaged in PMOLED, e-paper, and silicon-based OLED, providing comprehensive IoT applications.

Key Findings

- In 2025, the Company ranked second among the world's top five manufacturers of e-paper display by revenue, securing a market share of 20.8%.
- The players faced intensified competition from approximately 10 to 20 manufacturers in this sector.

Top Five Global Commercial E-Paper Display Manufacturers

Ranking of Top Five Global Manufacturers in Commercial E-paper Display Industry, in Terms of Revenue, 2025

Ranking	Name of Company	Coverage of Top Five Global Commercial E-paper Application Manufacturers	Sales of commercial E-paper Display (RMB billion)	Market share (%)
1	The Company	100.0%	1.7	24.9%
2	Company A	60.0%	1.6	23.9%
3	Company B	100.0%	1.4	20.5%
4	Company C	60.0%	0.5	6.7%
5	Company D	20.0%	0.4	6.1%
Top five total			5.6	82.2%
Total			6.8	100.0%

Key Findings

- In 2025, the Company ranked first among the world’s top five manufacturers of commercial e-paper display by revenue, achieving a market share of 24.9%. Furthermore, the Company maintains commercial relationships with all of the global top five commercial e-paper application customers, demonstrating a highly diverse and resilient client portfolio.

Entry Barriers in the E-Paper Display Industry (1/2)

Barriers of customer resources of leading players



- Within the global e-paper display industry, leading companies have established a dominant position in terms of revenue, customer coverage, and brand recognition, leveraging their first-mover advantage and economies of scale. Their customer base encompasses major global brands and channel partners, with whom they maintain long-term, stable collaborative relationships. This extensive and highly loyal client network not only ensures steady growth for existing business but also provides these leading players with a natural advantage when pursuing new potential partnerships, further reinforcing their formidable customer resource barriers.

Barriers of industrial chain synergies



- Within the global e-paper display industry, leading players have established significant synergistic advantages through deep, strategic partnerships with key upstream material suppliers and core downstream customers. Conversely, leading downstream brand customers demonstrate a strong preference for deep collaboration during the new product introduction phase, facilitating rapid market validation and scalable deployment. This end-to-end synergistic advantage throughout the entire industrial chain equips leading companies with the capability to maintain continuous leadership in both established and emerging markets, creating a formidable barrier that is exceptionally difficult for potential new entrants to overcome.

Barriers of supply chain management



- An advanced, efficient, and stable supply chain management system is critical for suppliers of e-paper display. Leading players in the sector have established dedicated supply chain management centers, creating a comprehensive, multi-dimensional system that encompasses supplier evaluation, raw material procurement, and quality testing. Furthermore, leveraging their stable customer base and strong industry standing, these leading players are typically able to negotiate more favorable commercial terms with core customers regarding delivery and payment cycles. This includes securing shorter payment terms and achieving rapid fulfillment of large-volume orders, thereby significantly enhancing their working capital liquidity and operational stability.

Barriers of cost control and efficiency optimization



- The e-paper display industry is characterized by high economies of scale and significant cost sensitivity. Leading enterprises, leveraging years of accumulated experience, have established sophisticated production management systems and process optimisation capabilities. They achieve substantial unit cost reductions through volume purchasing, automated production lines, and improved production yields. Furthermore, these leading players engage in joint development with customers during the R&D phase to reduce trial-and-error costs, implement flexible manufacturing and supply chain collaboration to enable rapid changeovers and efficient delivery during production, and utilize their stable customer relationships to shorten payment cycles.

Entry Barriers in the E-Paper Display Industry (2/2)

Barriers of core technology and independent R&D capability



- The e-paper display sector is a technology-intensive industry characterized by rapid iterative development, which places significant demands on a company's R&D prowess and process expertise. Through long-term accumulation, leading enterprises in the industry have established systematic R&D platforms and comprehensive patent portfolios. This foundation not only enables them to effectively control production yields, operational efficiency, and raw material utilization in mass production but also allows for sustained investment in cutting-edge fields such as novel driving architectures, flexible display materials, and low-power consumption technologies. This sustained advantage further solidifies a dual barrier encompassing both advanced technology and superior research and development capabilities.

Barriers of capacity and intelligent quality control system



- Production efficiency, product quality, and economies of scale are of critical importance to manufacturers of e-paper display. Leading players leverage expanded production capacity to amortize fixed R&D costs, creating a significant price advantage and ultimately establishing a virtuous cycle of “capacity driving orders, and orders justifying further capacity expansion.” Concurrently, mature process systems and intelligent production workflows are essential to effectively manage the quality and precision challenges inherent in the mass production of e-paper module products across various size specifications.

Barriers of organizational management and digital capability



- The e-paper display industry is characterized by rapid technological iteration and high customer demand for customisation, placing exceptional demands on a company's strategic planning, management systems, and R&D execution. Leading enterprises in the sector not only possess multidisciplinary professional teams with deep, long-term expertise in the field but also leverage sophisticated management structures and digital operation platforms to achieve highly efficient coordination across R&D processes, supply chain management, project delivery, and customer service.

Appendix (1/6)

1. The company produces the world's first OTFT-based flexible e-paper display with 180° bending capability and a curvature radius of less than 3mm. The company was also the first manufacturer globally to achieve mass production of a curved e-paper touchscreen hardware wallet using OTFT technology. The company has successfully achieved the large-scale mass production application of OTFT technology in e-paper products and was the first in the world to achieve mass production of OTFT-based flexible e-paper products.
2. The company covers 100% of the world's top five commercial e-paper display terminal manufacturers.
3. The company is the only e-paper display provider with four production bases, including overseas production base. The global commercial e-paper display segment accounted for 83.5% of the overall global e-paper display market in 2025 in terms of revenue, underscoring the company's market position in the industry. The company had the largest number of production bases in the global e-paper display industry.
4. The company has the technology of ultra-low-power e-paper solution with 0.1mW standby consumption, delivering medical-grade endurance.
5. The company established its own e-paper R&D team, becoming one of the earliest companies in mainland China to enter the e-paper display industry In 2008.
6. The company is a prominent player in the global electronic paper, or e-paper, display industry mainly engaged in the development, production and sales of e-paper display modules. The company's customer acceptance rates outperform the industry average.
7. In 2010, the company signed a strategic agreement with E Ink Holdings, a global leader in e-paper display technology, covering joint R&D and capacity supply to secure supply chain stability, cost competitiveness, and accelerate innovation. E Ink Holdings, the company's largest supplier in each year during the Track Record Period, is a global leader in e-paper display technology.
8. As the world accelerates its transition toward green and low-carbon development, demand for digitalization and paperless displays in smart devices continues to rise.
9. Among mainstream display technologies, e-paper stands out with unique advantages -ultra-low power consumption, paper-like texture, eye-friendly experience, thinness, shatter resistance, and bendability. Compared with LCD and OLED, which rely heavily on backlighting and consume more energy, e-paper is inherently better suited to the evolution of smart IoT terminals. Its ultra-low power profile also aligns perfectly with the objective of global carbon-neutral strategy.
10. With continued policy support for low-carbon digital infrastructure, progress inflexible e-paper enabled by OTFT technology, and the growing demand for flexible, energy-efficient display solution technologies in smart devices.
11. By optimizing cutting techniques and intelligent layout algorithms, the company significantly enhanced the utilization rate of medium- and large-sized e-ink films. This breakthrough, which has been granted a national utility patent, pioneering a brand new cost-reduction pathway for global e-paper display providers. The company is the first in the industry to introduce the FPL master sheet inspection system, effectively boosting master film inspection efficiency and production yield.
12. Given the sensitivity of core e-paper materials to environmental temperature and humidity, the company has built an environmental control system spanning the entire value chain from raw material transportation, storage and production.
13. E-paper's attributes are more closely aligned with the prevailing trends in smart application solution development.
14. The rise of smart IoT has served as the backbone of e-paper technology application, driving continuous growth in the end-use products and application scenarios of e-paper display modules. The company is well positioned to take advantage of the thriving market opportunities.

Appendix (2/6)

15. In the future, as the computational power of smart application solutions increases and user interfaces become more diverse, e-paper will continue to gain traction as a display solution that successfully marries functionality with environmental adaptability. It is poised for deeper integration into critical application scenarios such as smart offices, smart education, and green logistics. Consequently, e-paper will solidify its role as a pivotal enabling technology, allowing smart devices to meet their core objectives of environmental sustainability, operational efficiency, dynamic information display, and extended battery life.
16. E-paper is suitable for rollable, thin, and lightweight smart application solution form factors.
17. In comparison to alternative display solutions, e-paper holds significant advantages in power consumption management, eye-comfort, and environmental sustainability. These characteristics make it particularly well-suited for smart devices where energy efficiency and persistent display capabilities are paramount.
18. Amid a competitive landscape of coexisting display technologies, e-paper tablets are achieving steadily increasing penetration within the global market for static application solutions. Measured by sales, their market penetration rate has increased from 8.3% in 2021 to 12.9% by 2025. This growth is being driven by sustained demand across key application scenarios such as electronic shelf labels, paperless office solutions, smart transportation systems, and other low-power application solution devices. As these sectors continue to expand, e-paper is well-positioned for large-scale adoption across an even broader range of downstream applications. Consequently, its market penetration is forecast to rise further, reaching 13.0% by 2030.
19. E-paper related solutions impart interactive capabilities to smart devices, allowing them to simulate human sensory functions to achieve environmental perception, information comprehension, and user interaction.
20. These nodes can interact seamlessly with backend management systems and inventory sensors to achieve real-time synchronization and updates of pricing, promotional information, and stock status. The global retail industry is accelerating its digital transformation, with electronic shelf labels gaining wider adoption.
21. These retailers possess unified information systems and a strong propensity for digital transformation, creating a robust foundation for the large-scale deployment of electronic shelf labels. As global retail digitalization enters a more advanced phase, and in tandem with rising labor costs and increasingly stringent carbon emission regulations, electronic shelf labels, as a solution offering dynamic information updates, low power consumption, and green energy efficiency, are poised to accelerate their penetration into emerging markets. Consequently, manufacturers from China, leveraging their comprehensive supply chains and competitive pricing advantages, are progressively capturing a larger share of the global market.
22. The company is in a saturated market with fierce competition. the supply of key upstream raw materials for the e-paper industry (e.g., e-ink film) is highly concentrated.
23. E Ink Holdings' market dominance in the procurement of e-ink films, with over 90% revenue market share in 2025. E Ink Holdings is widely recognized as the originator and commercial leader of electrophoretic e-paper technology and the principal global supplier of e-ink film used in e-readers, electronic shelf labels, signage, and other applications. E Ink Holdings dominates the global e-ink film industry primarily due to its proprietary electrophoretic display technology and extensive patent portfolio, which create high entry barriers for competitors. Its products deliver proven and mature performance in terms of contrast ratio, refresh rate, zero-power image retention, environmental durability and long-term reliability. These qualities are long-validated by the market and fully meet our requirements for high performance (such as key performance metrics of drive stability and batch-to-batch consistency) and provide better safeguards for the quality and efficiency of our mass production of modules. E Ink Holding's first-mover advantage and long-term partnerships with major e-reader brands and retailers have secured market leadership which makes it almost inevitable for e-paper display module producers like us to first come to E Ink Holdings (and its distributors) over other suppliers.

Appendix (3/6)

24. Other than E Ink Holdings (and its distributors), OED Technologies, which possesses the necessary technology and production capacity to meet the Group's requirements at potentially comparable terms, accounted for substantially all of the remaining market share of the global e-ink film industry in terms of revenue in 2025.
25. The company's features lower customers' entry barriers and enable rapid adoption of e-paper technology across diverse application scenarios, including museums, retail malls, photo studios, and other public venues.
26. The global commercial e-paper display segment accounted for 83.5% of the overall global e-paper display market in 2025, in terms of revenue, underscoring the company's market position in the industry.
27. In the overall e-paper display value chain, the company's e-paper display module can be viewed as a semi-finished product as it needs to be integrated into the e-paper display end-product to deliver its full functionality. The e-paper display end-product may take different forms depending on its downstream applications.
28. The company was the first company globally to deploy e-paper display products in the intelligent robotics sector, achieving a first-mover edge in both technological innovation and real-world commercial deployment, thereby establishing a differentiated competitive advantage. In 2023, the company became the first provider globally to deploy e-paper display products in the field of intelligent robotics.
29. With ongoing advances in technology and the broadening of application scenarios, e-paper has evolved beyond its traditional uses in smart retail and e-reading, steadily expanding into a variety of emerging industries and niche markets. This expansion not only fuels sustained growth across the sector but also creates significant opportunities for the company.
30. With a recovery in downstream demand — particularly for e-paper price tags — industry inventory levels have been rapidly reduced, and sales volumes have become increasingly concentrated among top-tier suppliers, resulting in a stable yet increasingly consolidated competitive landscape.
31. The company have demonstrated strong market competitiveness.
32. For commercial e-paper displays, the company offers a comprehensive product portfolio covering full-size, full-color, and flexible formats, together with diverse and flexible delivery models.
33. In the global e-paper display solutions industry, the overall average selling prices of small-size e-paper display solutions exhibit a long-term downward trend, driven by economies of scale, process maturation, and intensifying competition, which collectively support ongoing cost reductions across the industry. Black-and-white small-size e-paper display solutions have experienced a temporary price uplift due to short-term demand spikes arising from concentrated procurement by downstream customers.
34. The company is taking the lead in the industrial mass production and application of fast-refresh color e-paper display modules, demonstrating the company's pursuit of technological advancement.
35. In particular, the company's products offer distinct advantages in operating temperature range and adaptability. In addition to standard ranges for black-and-white modules (0–50°C) and three-/four-color modules (0–40 °C), the company's product portfolio includes wide-temperature modules capable of operating from -20 °C to 60 °C, and the company was one of the first in the market to adopt such a feature.

Appendix (4/6)

36. The selling prices of the company's products were generally in line with market prices during the Track Record Period.
37. The rise of eco-conscious and digital-first workplaces is accelerating the widespread adoption of e-paper technology.
38. In addition to the purchase of e-ink films directly from E Ink Holdings, the main players in the market also procured e-ink films from a number of other suppliers which also procured such raw materials directly or indirectly from E Ink Holdings. Such arrangements with e-ink films procurement are not uncommon for the e-paper display industry given E Ink Holdings' market dominance in the area of e-ink film supplies.
39. Leveraging the company's core strengths in e-paper R&D and manufacturing, the company deeply integrates technology, application scenarios, and sustainability, positioning itself as a comprehensive e-paper display technology and products provider rather than merely a display module supplier.
40. Downstream customers in the industry generally adopt stringent evaluation and verification standards for both suppliers and their products.
41. E-paper display market leaders build a strong and invisible customer barrier through deep collaboration with global clients, customized solutions, and long-term supply agreements, driven by the high stability requirements of downstream applications. It is not uncommon for e-paper display module providers to derive a relatively large portion of their revenue from a few customers, and the company's partnerships with leading companies such as Solum reflect a common and strategic commercial approach. The top five players in the e-paper display downstream market accounted for more than 80% of market share in 2025 in terms of revenue.
42. Among the various end-sectors for e-paper applications, the smart retail sector generally accounts for the largest usage of small-size e-paper display modules.
43. This was in line with the product iteration and transition trend whereby four-color products gradually replaced three-color products as the primary product type targeting the smart retail sector.
44. For e-paper display modules, the different combination of module size and number of colors for display primarily depends on the requirements of different downstream applications. For instance, ESLs, which need to display product diversity and attract customer attention to key items, tend to favor multi-color displays as opposed to monochrome (black and white) displays. In contrast, industrial control applications, which place greater demands on response speed, temperature range, and other industrial performance metrics not heavily hinging on colourful visual impact, tend to prefer monochrome displays. Separately, in terms of module size, the smart retail sector in general utilizes small-size e-paper display modules (such as in the case of ESLs) whereas sectors such as smart transportation and smart education typically utilize larger-size modules.
45. Company C and Company D, adopted certain low-price strategies. Low-price competition has a limited impact on the Group's business, primarily because customers generally prioritize product stability and consistency. From the customers' perspective, price is seen as an indicator of quality, and they also place significant emphasis on production capacity alignment and delivery reliability.
46. Manufacturers generally do not have minimum supply agreements with E Ink Holdings and do not sign any long-term agreement with E Ink Holdings, such arrangements are in line with industry practices as major suppliers such as E Ink Holdings generally adjust their capacity allocation according to the year's order size.

Appendix (5/6)

47. Three-color products remain the mainstream in the global e-paper display industry due to a more mature supply chain and relatively lower costs, while four-color products, driven by the ongoing shift toward color, offer stronger capabilities in information encoding and promotional presentation. Compared to three-color products of either the combination of black/white/red or black/white/yellow, four-color products have richer color performance covering all such four colors to enable more differentiated and targeted content display for more precise and nuanced information presentation. For instance, in retail settings of ESLs, black can indicate the original price, red can be used to highlight the promotional price and yellow can be for further information such as product specifications or promotional terms. The introduction of the additional color dimension helps enhance visual experience and marketing impact. Moreover, four-color products also feature improvements in refresh rate and adaptability to a wider temperature range, making them suitable for more complex scenarios in smart retail and smart home, etc.
48. In particular, the haziness, thickness, hardness, rate of water resistance and light transmittance rate of PS protective films are factors which will affect the average unit prices of PS protective films. The usage of different types of PS protective films will also affect the unit price. On the other hand, it is also submitted that the place of manufacturing of the PS protective films will also cause variations in the average unit prices. The PS protective film supplied by leading companies are manufactured outside the Chinese mainland, while those supplied by other suppliers are manufactured in the Chinese mainland. Assuming the same technical specifications PS protective films manufactured in the Chinese mainland would have a lower average unit price compared to those manufactured outside of the Chinese mainland.
49. PS films (Protective sheet) adopting a hot-melt film structure entail higher material costs due to the inclusion of hot-melt adhesive and more complex processes, comparing to conventional PSA structure.
50. The company has been historically at the forefront of, or kept pace with, its industry peer companies in the launch of advanced or upgraded products (such as three-color and four-color products).
51. To efficiently serve its global customers, the Company has established four production and R&D bases, together with multiple offices across China and overseas, which provide comprehensive customer service targeting markets in Europe, America, Asia, among others.
52. Driven by the continued colorization of e-paper display solutions and the rising demand for always-on, ultra-low-power, outdoor-readable and low-maintenance visual interface, the addressable market demand for full-color e-paper display solutions is expected to be tangible.
53. The Company is one of the few players globally with a first-mover advantage in the field of flexible e-paper technology and mass commercialization.
54. In 2021, the Company launched the construction of Jiaying headquarters production base which commenced full operation in 2023 and was the world's largest e-paper display module production base as of the Latest Practicable Date in terms of both gross floor area and number of production lines.
55. Due to the highly specialized nature of electrophoretic e-paper technology and the lack of widely available substitutes for e-ink film, it is common practice in the e-paper industry for manufacturers, including us, to source e-ink film exclusively from E Ink Holdings (including its distributors), which is recognized as the originator and global leader in this technology.

Appendix (6/6)

56. Given the technical complexity, stringent quality requirements, and concentrated upstream supply of key raw materials such as e-ink film, procuring from E Ink Holdings ensures consistent product quality, stable supply, and alignment with industry standards. Furthermore, to secure manufacturing capacity and maintain centralized management of critical components, reliance on a limited number of strategic suppliers, particularly E Ink Holdings, is in line with prevailing industry practice. This is because there are variations in material formulations, driving waveforms and process parameters among different e-ink film suppliers. To maintain production process stability and product consistency, module manufacturers typically prefer to establish deep collaboration with a single primary supplier and optimize their processes around that supplier's material system. This practice is relatively common within the industry and helps reduce costs and risks associated with switching between multiple material suppliers.

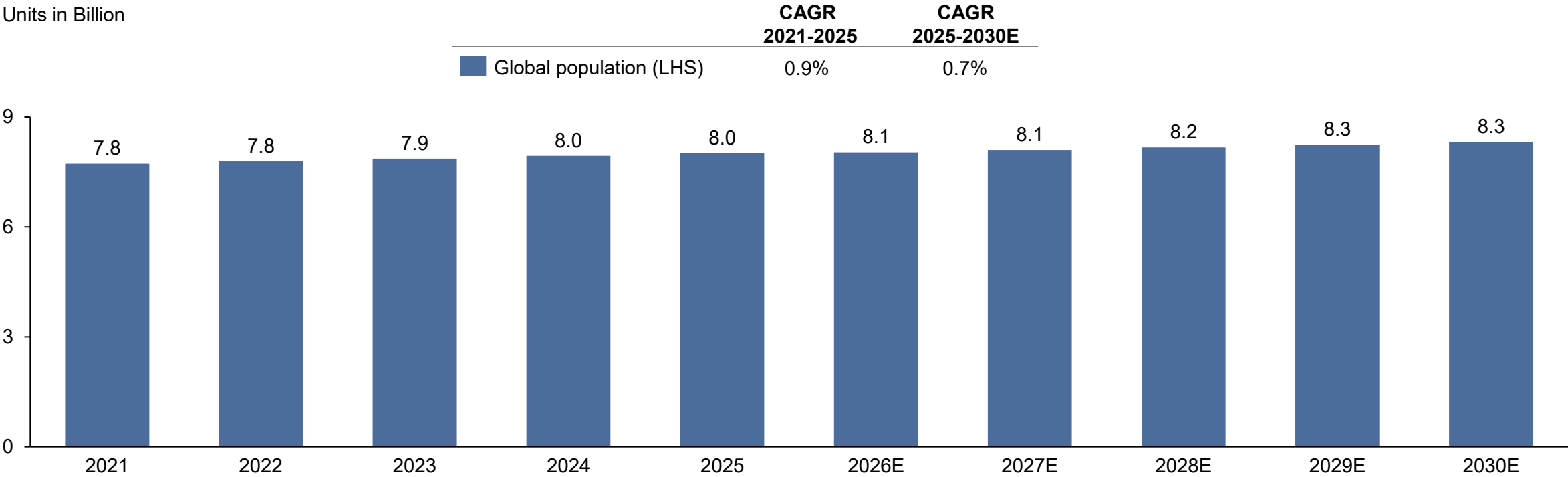
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Global population is projected to continue growing at a gradually slowing pace.

Global population, 2021-2030E

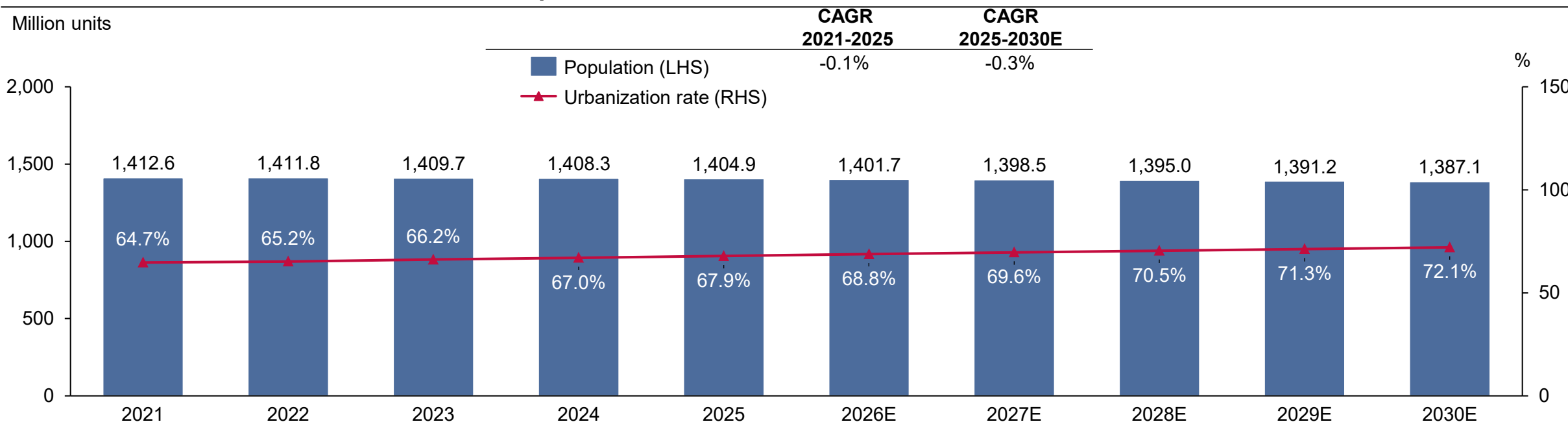


Key analysis

Global population growth is entering a phase of gradual deceleration, reflecting long-term shifts in fertility patterns, aging demographics, and urbanization. While the total number of people worldwide continues to rise, the pace of this growth is slowing, suggesting that many countries — especially in Asia and Europe — are approaching demographic maturity. This trend carries significant implications for global development, as slower population expansion can ease pressure on resources and infrastructure, but may also lead to labor shortages and increased dependency ratios in aging societies. Policymakers and international organizations will need to adapt to these evolving dynamics by planning for balanced growth, social support systems, and innovation in productivity to sustain economic momentum in the face of demographic transitions.

Despite the low population growth due to the one-child policy, China’s population size remains globally significant.

Population and Urbanization, China, 2021-2030E

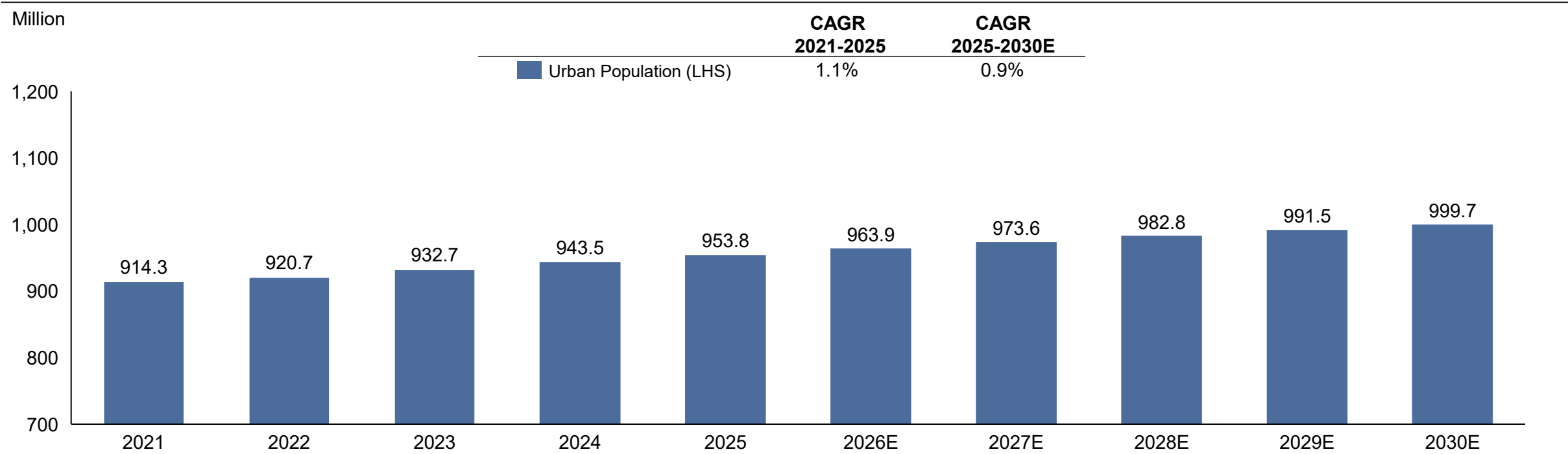


Key analysis

- China's population and urbanization data highlight the intricate nature and diverse aspects of its economic and social progress. As the world’s most populous country, China accounts for a considerable proportion of the global population, facing both challenges and opportunities brought by its large demographic scale. Affected by demographic structural shifts, China’s total population has witnessed a gradual downward trend in recent years. It is projected that China's population will decline from 1,412.60 million in 2021 to 1,387.1 million in 2030 with a negative compound annual growth rate. Meanwhile, the urbanization rate will climb steadily from 64.7% in 2021 to 72.1% by 2030.
- This suggests that more people will migrate from rural to urban areas in the coming years, fueling urban economic development but also posing challenges in areas such as urban planning, infrastructure development and social security. China's population and urbanization figures have far-reaching implications for economic and social development. As total population gradually decreases and urbanization accelerates, the demand for resources will increase, as will the pressure on the ecological environment.

The urbanization rate has steadily increased, creating a substantial market for industries including digital retail.

Urban population and urbanization rate, China, 2021-2030E

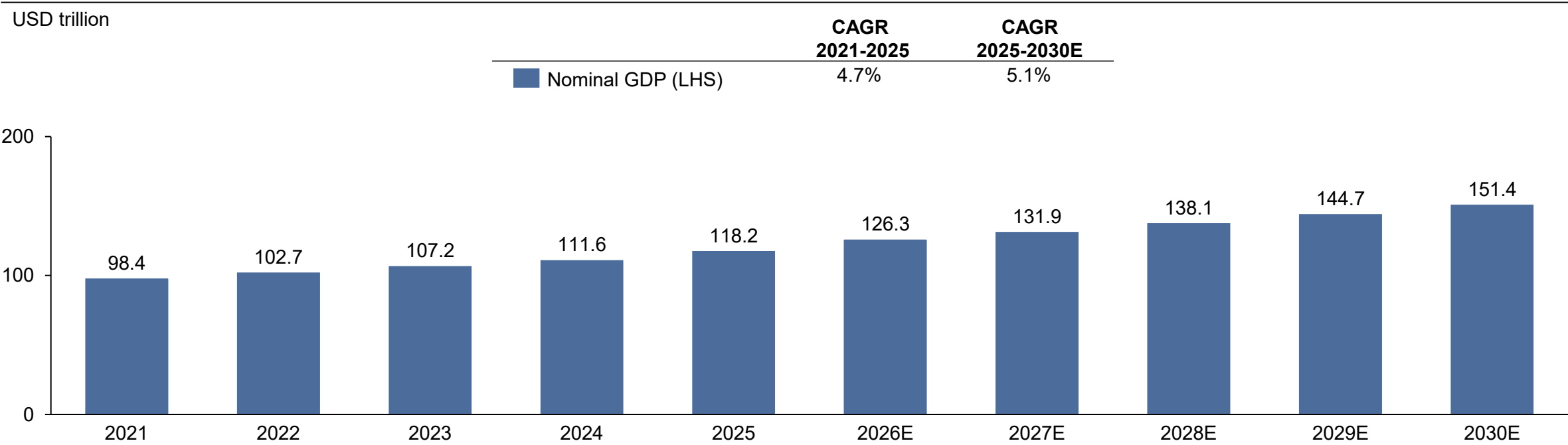


Key analysis

- China presently ranks as one of the world's most populous countries. Starting from 2021, China's total population shows a gradual declining trend, falling from 1,412.6 million in 2021 to 1,387.1 million in 2030. Driven by continuous socioeconomic development, China's urban population keeps expanding consistently, rising from 914.3 million in 2021 to 999.7 million in 2030. Meanwhile, China's urbanization rate maintains a steady upward momentum, climbing from 64.70% in 2021 to 72.1% in 2030 and gradually narrowing the gap with developed economies.
- This increasing urbanization is driven by various factors, including abundant economic opportunities in urban areas, improved public infrastructure, and supportive government policies for balanced urban development. As more rural residents migrate to cities, it brings both opportunities and challenges to China's social and economic operation. It requires scientific and sustainable urban planning, optimized infrastructure layout, and improved social welfare systems to accommodate the expanding urban population and ensure stable long-term development.

The world’s nominal GDP witnessed continuous growth from 2021 to 2025, and is expected to maintain a steady expansion trend in the future.

Nominal GDP, World, 2021-2030E

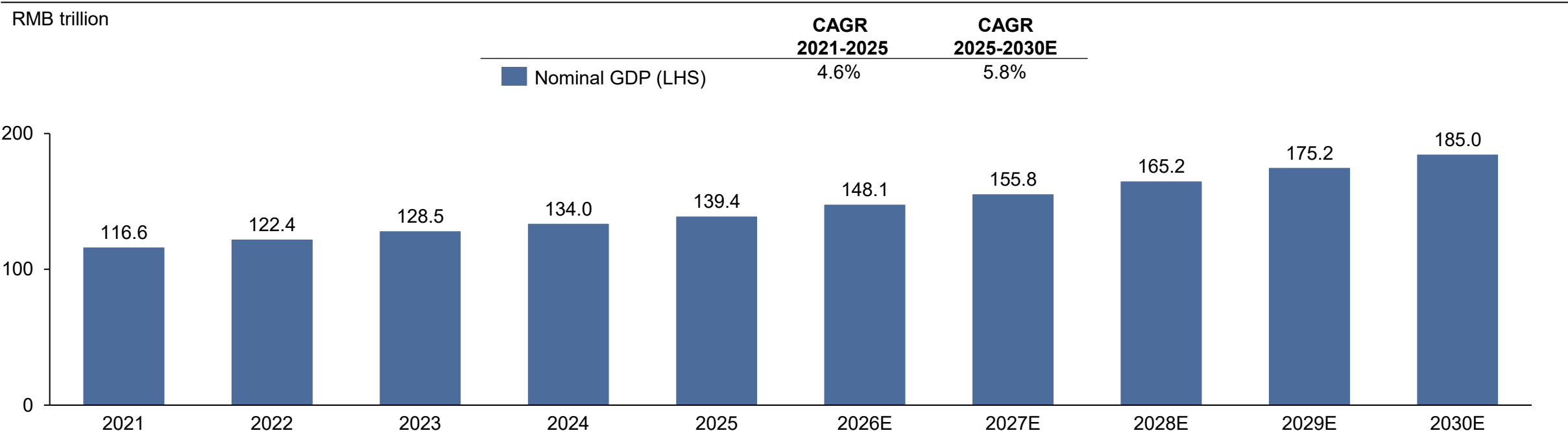


Key analysis

- The global economy has shown steady growth in recent years, with its nominal GDP rising from USD 98.4 trillion in 2021 to USD 118.2 trillion in 2025 and is projected to reach USD 151.4 trillion by 2030. From 2025 to 2030, the world’s nominal GDP is expected to maintain a stable expansion trend.
- The global economic outlook is currently facing several challenges. Persistent geopolitical frictions and regional conflicts have brought market volatility and restrained global economic expansion. In addition, lingering inflationary pressures and demographic aging in major economies have constrained consumption and production activities. Despite these challenges, the global economy continues to benefit from technological innovation and industrial upgrading, which could drive long-term economic expansion. The advancement of multilateral cooperation and global trade liberalization also presents opportunities for sustained growth of the world economy.

China's nominal GDP has maintained a steady upward trend since 2021, and is projected to keep expanding at a solid pace in the long run.

Nominal GDP, China, 2021-2030E

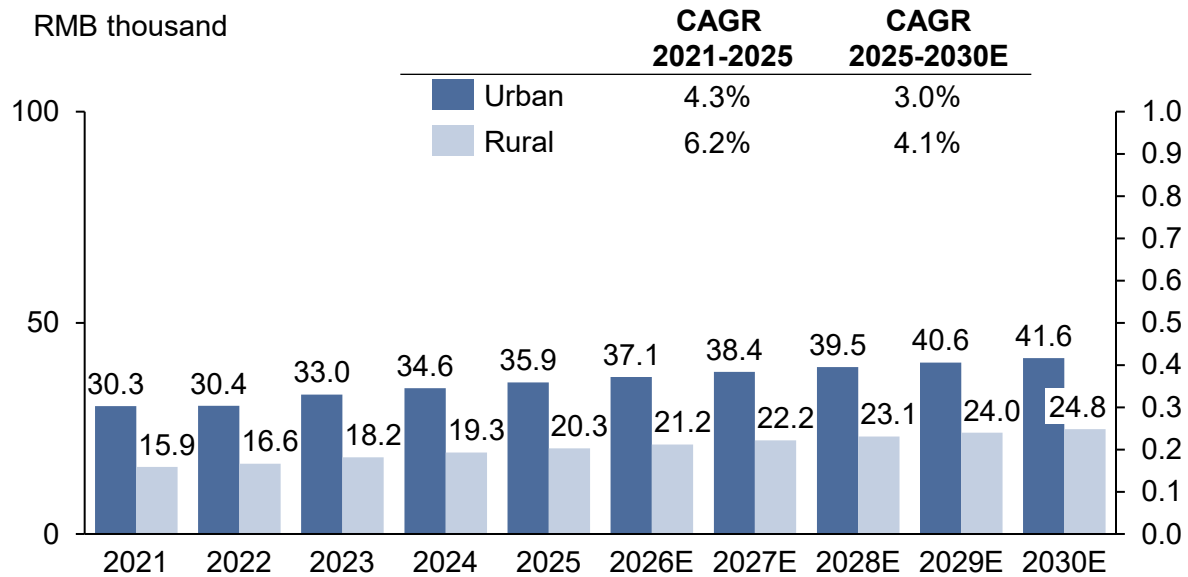


Key analysis

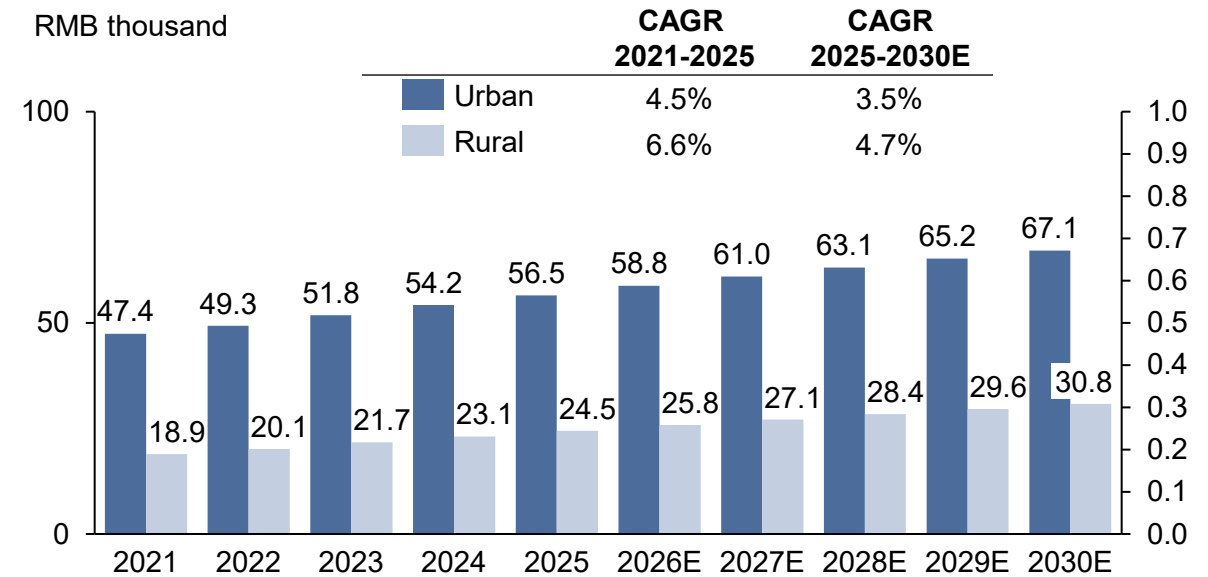
- China's overall economic volume has continued to grow in recent years, with its nominal GDP rising from USD 116.6 trillion in 2021 to USD 139.4 trillion in 2025, and is expected to hit USD 185.0 trillion by 2030. From 2025 to 2030, China's nominal GDP will follow a gentle and sustainable expansion path, maintaining stable growth momentum over the decade.
- China's economic development still faces notable structural challenges. Demographic shifts and ongoing industrial transformation exert certain pressure on economic scale expansion. In addition, a complex external environment and uncertain international trade conditions add hidden risks to domestic economic operation. Despite these headwinds, China is accelerating technological innovation and fostering strategic emerging industries, which will act as core drivers to underpin the continuous growth of nominal GDP. Further market-oriented reforms and expanded opening-up will also unlock new room for long-term economic expansion.

Urban and rural per capita consumption rose; despite urbanization shifts, higher incomes drive increased consumer spending.

Per capita consumption expenditures in China, urban and rural, 2021-2030E



Per capita disposable income in China, urban and rural, 2021-2030E



Key analysis

- In 2025, the per capita consumption expenditure of urban and rural residents both achieved year-on-year growth. Urban residents' per capita consumption rose by 3.8% YoY to RMB 35.9 thousand, while rural residents' per capita consumption increased by 5.1% YoY, reaching RMB 20.3 thousand in the same period. In terms of disposable income, urban residents recorded a 4.3% YoY rise to RMB 56.5 thousand in 2025, and rural residents posted a 5.8% YoY growth, arriving at RMB 24.5 thousand.
- The ongoing increase in consumption expenditure is the direct result of rising per capita disposable income. This growth in income has mainly been driven by the rapid development of the Chinese economy and the continuous upgrading of China's manufacturing sector, along with a structural shift in the mainstay of development, from the primary and secondary sectors to the tertiary sector. Growing purchasing power and consumption upgrades in both urban and rural areas suggest a stronger level of consumer confidence and sustainable internal circulation, thus giving rise to the new retail and logistics industry. It provides tremendous development potential for China's consumer and FMCG industries.
- The compound annual growth rates of per capita disposable income and consumption expenditure for both urban and rural groups are expected to gradually decline in the future due to lower birth rates and an ageing population. Despite this, disposable income and expenditure levels will still grow steadily, driven by the globalization of trade, productivity gains and the internationalization of the Renminbi.



Thanks!

June 2026

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