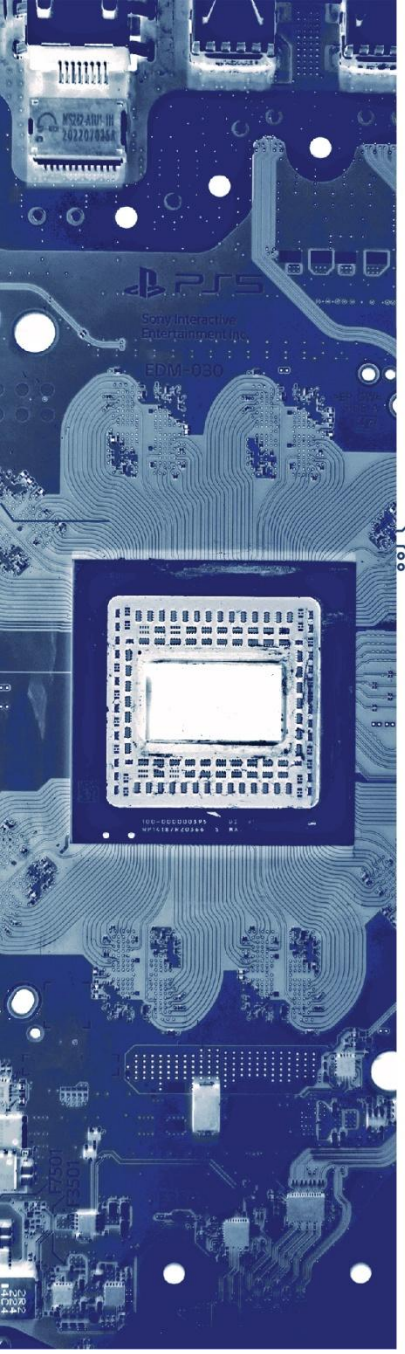

PREPARED FOR:

THPCA

PRISMARK PRESENTATION

August 21, 2025

From PCB to AI Server Building Thailand's Role in the High-Performance Computing Era

PRISMARK PARTNERS LLC · EST. 1994

130 Main Street, Cold Spring Harbor, NY 11724

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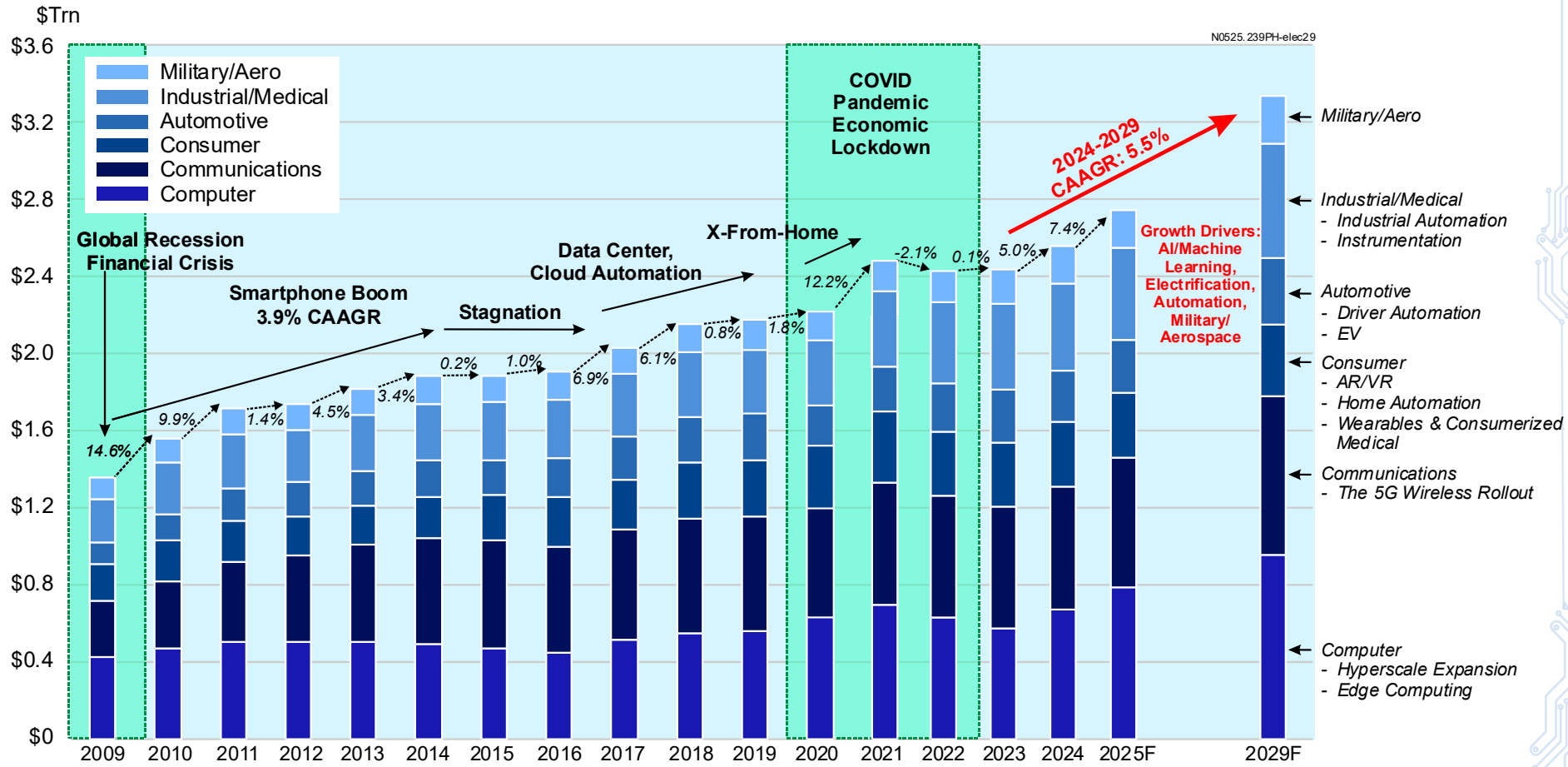
A HISTORY AND FORECAST OF THE ELECTRONICS INDUSTRY



- New growth drivers over the next 5-10 years are led by AI infrastructure and edge devices, automotive electrification, robotics, and military/aerospace markets.

ELECTRONIC SYSTEMS MARKET FORECAST

	$Bn	2022	'23/'22	2023	'24/'23	2024	'25F/'24	2025F	2029F	CAAGR '24-'29*
	PC	269	-16.0%	226	3.5%	234	5.6%	247	284	3.9%
Computers	*Server/Data Storage*	210	-4.8%	200	45.5%	291	36.1%	396	495	11.2%
	Other Computer	151	-2.5%	147	-2.8%	143	2.8%	147	175	4.1%
	Mobile Phones	392	-0.7%	390	6.8%	416	2.4%	426	535	5.2%
Communication	*Wired Infrastructure*	150	7.3%	161	-3.4%	156	5.7%	165	198	4.9%
	Wireless Infrastructure	86	-5.8%	81	-9.9%	73	4.8%	77	93	4.9%
	TV	94	-7.9%	87	0.7%	87	-2.6%	85	78	-2.3%
Consumer	*AudioVideo/Personal*	142	0.6%	143	1.0%	144	4.5%	151	174	3.8%
	Other Consumer	101	-1.6%	99	-1.1%	98	3.9%	102	118	3.8%
Automotive		252	11.8%	282	-4.8%	268	1.2%	272	342	5.0%
Industrial		290	5.9%	307	1.8%	312	4.7%	327	414	5.8%
Medical		131	5.1%	138	4.7%	144	5.3%	152	181	4.7%
Military/Aerospace		161	6.8%	172	8.7%	187	6.4%	199	251	6.1%
	Total	***$2,428***	***0.1%***	***$2,431***	***5.0%***	***$2,554***	***7.4%***	***$2,743***	***$3,337***	***5.5%***

**Assumes constant currency exchange rate*
Updated May 15, 2025

0525.239Abes

DEVELOPMENT OF DECENTRALIZED AND PARALLEL ELECTRONICS SUPPLY CHAIN

- We are in the early stages of the next major geographical shift – the end of China as the primary location for electronics manufacturing and investment over the past 20 years
  - Geo-political tension
  - Supply chain issues during pandemic reinforced learnings from other natural disasters
  - Rising costs of manufacture in coastal China
  - China government focuses on and supports advanced manufacturing, such as mature semiconductors, and facilitates excessive supply capacities
  - US, EU trade actions
    - Advanced semiconductor manufacturing support
    - Enforcement of restricted sourcing policies – PCBs and others
- While not as consistent as the year 2000 transition, incremental but substantial investments are being sited outside China
  - Thailand, Vietnam, and Malaysia – common destinations for new components fab
  - Mexico and India seeing continued growth for systems assembly
  - Beginnings of reshoring for wafer fabrication (US Chips Act, EU and Japan actions)
  - Limited reshoring beyond semiconductor front-end
- Increased China investment in face of technology restrictions – development of parallel supply chains in semiconductor and other critical industries
- This shift has a major impact on the systems and PCB assembly markets and significant implications for semiconductor, PCB, and other components manufacturing

0724.239skc

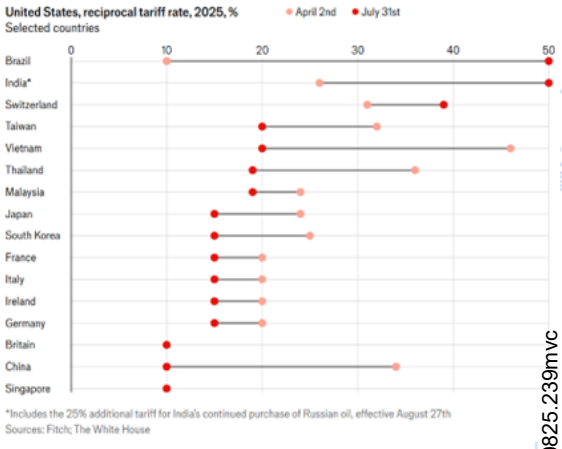
TRADE DEALS WITH THE US

- About one dozen trade deals have been announced, but these are more political pledges rather than legal commitments
  - Usually trade deals take years to negotiate and result in lengthy, legally binding documents
  - New trade deals are vague announcements with few details and no legal standing
  - Differences in interpretation already apparent, and US tariffs have not been reduced
  - US says (brief) documents will be ready soon but “president reserves the right to adjust tariff rates if he judges the other side has reneged on its commitments”
  - Legal challenges of Trump’s authority are still going through courts, though at the end tariffs are almost certainly coming
  - Further sector-focused tariffs still coming, and these have recognized legal standing

- Typical structure of trade deals aim to boost US manufacturing capacity and US exports
  - Raise tariffs on imports into the US
  - Reduce tariffs and non-tariff trade barriers on US exports
  - Some deals include announcements of investments in US manufacturing
  - Some deals include announcements of specific purchases, such as energy, military and aircraft products
  - Some deals include clauses on penalties for trans-shipments of Chinese products

- Why do countries take the deals?
  - Negotiated tariff rates are lower than threatened, but far higher than previous rates
  - Maintain access to US market, often the largest market
  - Secure continued explicit or implicit military protection by the US
  - For some to secure supplies of US energy products and even rare earth materials
  - Generate good will with Trump administration

Exports to US as % of Country’s GDP	
Mexico	27.5%
China	2.5%
Canada	18.8%
Germany	3.5%
Japan	3.8%
Vietnam	29.9%
S. Korea	7.2%
Ireland	17.9%
India	2.3%
Italy	3.3%



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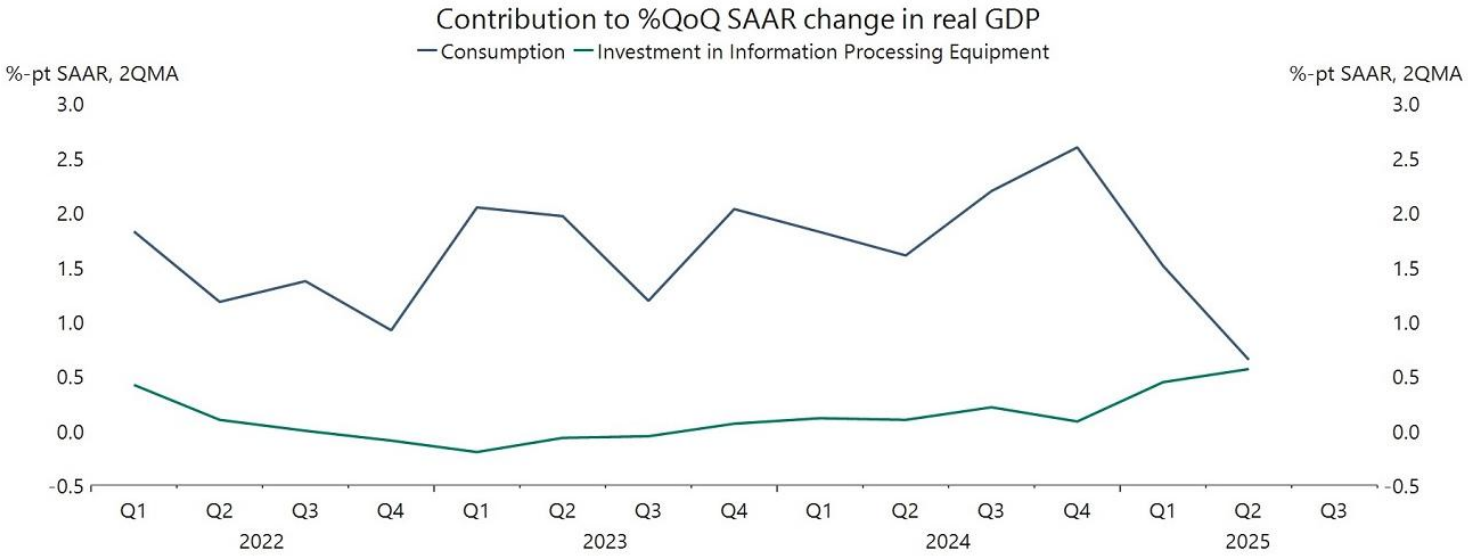
AI IS DRIVING THE US ECONOMY

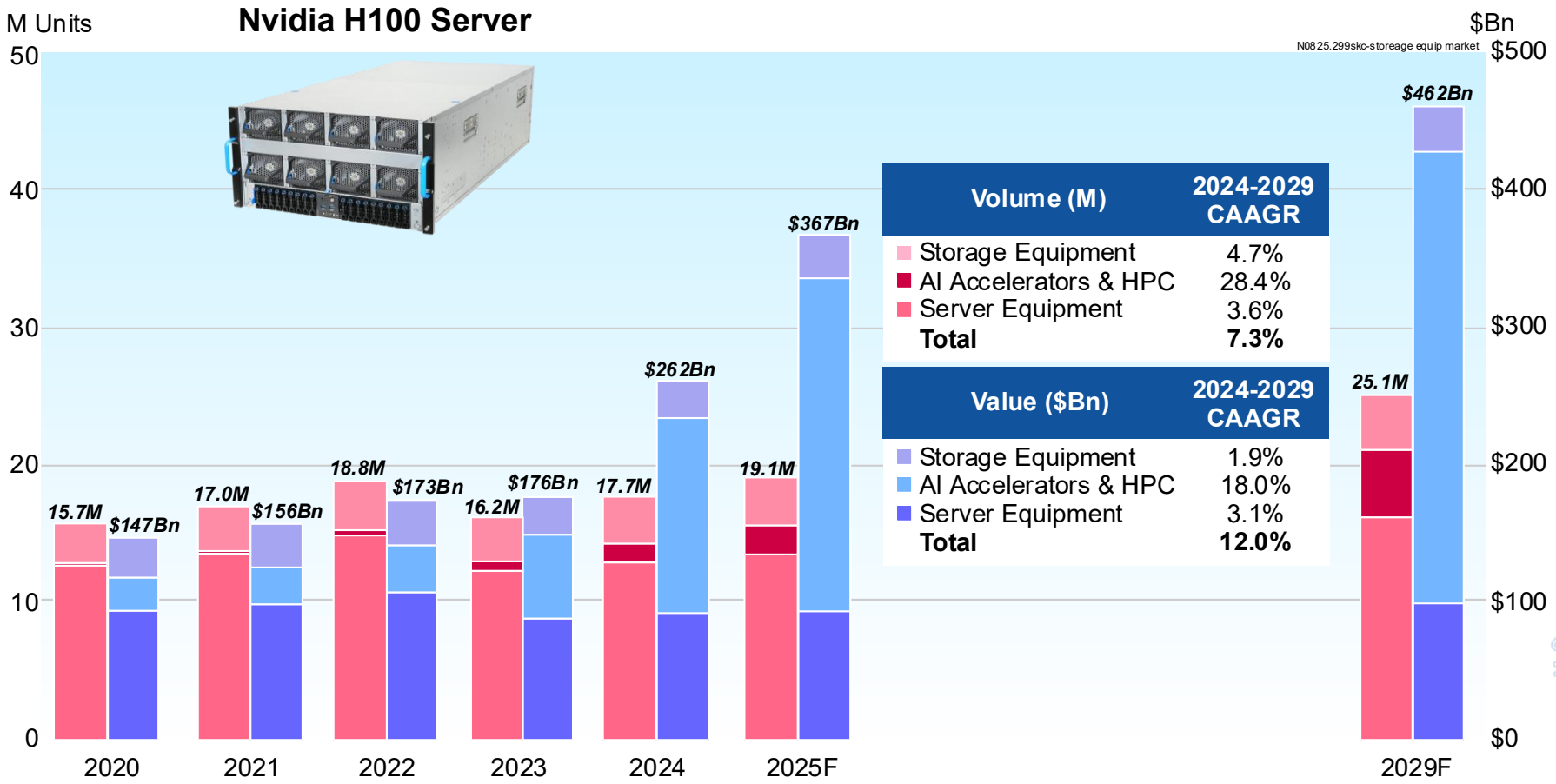
- Consumer spending accounts for roughly 70% of US GDP
  - Private consumption is usually the key driver of GDP growth
  - But in H1 2025, growth in consumer spending declined to 0.4% YoY
- AI "winner-takes-all" mindset has seen incredible increase in AI capex
  - Big 4 US AI companies spent about $70Bn quarterly in IT, primarily AI data centers
  - Since Q1 2023, IT investment increased by 23%, after inflation, while GDP increased just 6%
  - AI CAPEX growth might extend through 2026
- BEA data shows that IT equipment purchases contributed 1pp to the 3% Q2 GDP growth rate
  - In H1 2025, IT investment contributed almost half of the 1.2% GDP growth, almost the same as consumer spending
  - Consumer spending's impact on US economy has fallen, while AI capex' impact has increased



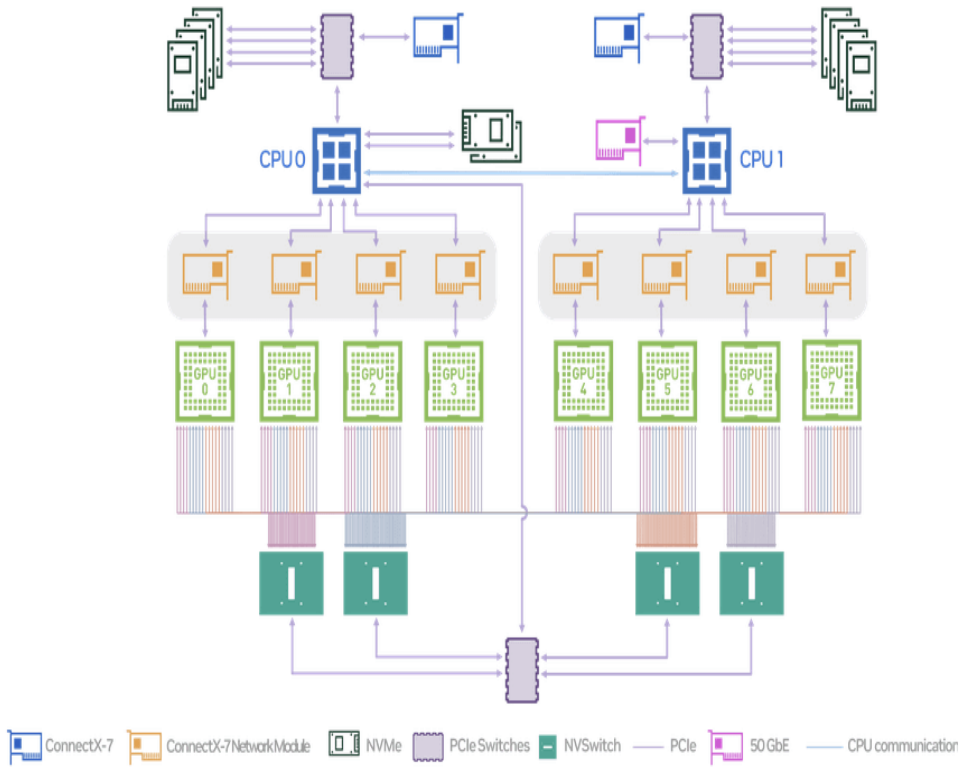
SAAR: Seasonally Adjusted Annual Rate of GDP
Source: BEA via Apollo

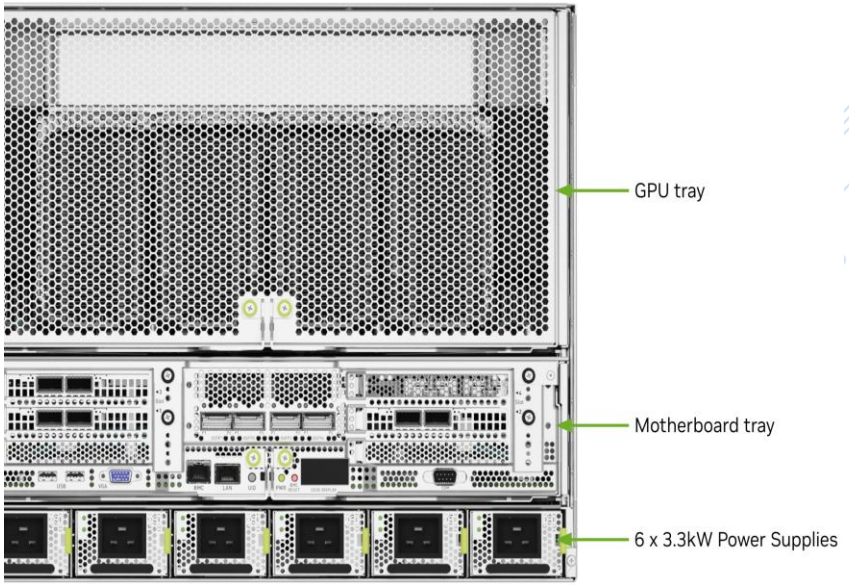
SERVER, STORAGE AND AI EQUIPMENT MARKET

AI Infrastructure is experiencing explosive growth and is driving development in new technologies, products, and supply chains.



NVIDIA DGX H100 SYSTEM

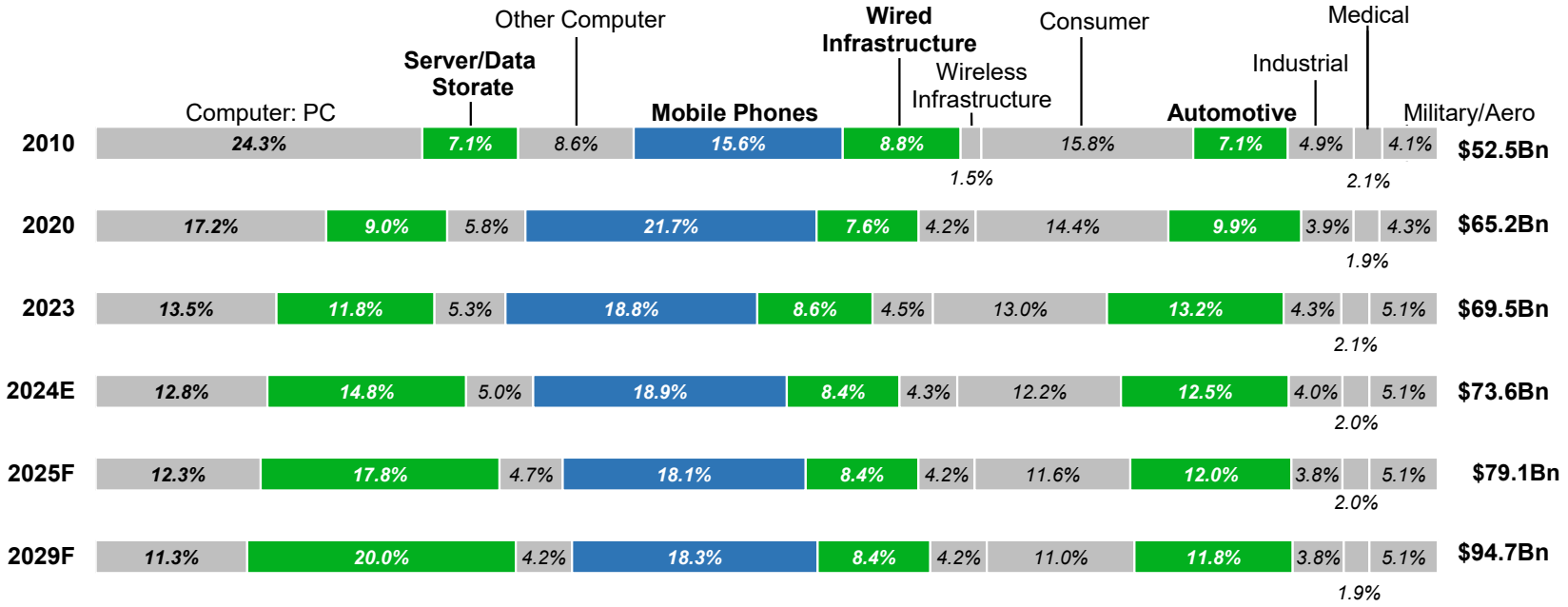




ɔut tab with System Serial Number

- Computing: 2* X86 CPU, 8*GPU
- Networking: 4* NV Switch, 8*ConnectX NIC for GPU Cluster + 2 ConnectX NIC for storage (+1 optional 50Gb NIC)
- Memory: 2TB per 32DIMM
- Storage: M.2 PCIe for 1.92TB NVMe boot drives

TOTAL PCB AND SUBSTRATE DEMAND BY APPLICATION



$M	2020	2023	2024	2025F	2029F	2024/2023	2024-2029F CAAGR
Computer: PC	$11,210	$9,391	$9,429	$9,665	$10,679	0.4%	2.5%
Server/Data Storage	**$5,876**	**$8,201**	**$10,916**	**$14,357**	**$18,921**	**33.1%**	**11.6%**
Other Computer	$3,801	$3,661	$3,649	$3,702	$3,959	-0.3%	1.6%
Mobile Phones	$14,150	$13,085	$13,886	$14,243	$17,329	6.1%	4.5%
Wired Infrastructure	$4,958	$5,955	$6,153	$6,619	$7,990	3.3%	5.4%
Wireless Infrastructure	$2,771	$3,118	$3,177	$3,334	$3,973	1.2%	4.6%
Consumer	$9,366	$9,129	$8,972	$9,183	$10,377	-0.2%	3.0%
Automotive	$6,457	$9,153	$9,195	$9,435	$11,205	0.5%	4.0%
Industrial	$2,543	$2,871	$2,918	$3,032	$3,556	-2.4%	4.0%
Medical	$1,263	$1,440	$1,500	$1,557	$1,807	4.2%	3.8%
Military/Aerospace	$2,824	$3,514	$3,770	$3,992	$4,864	7.3%	5.2%
Total	**$65,218**	**$69,517**	**$73,565**	**$79,128**	**$94,661**	**5.8%**	**5.2%**

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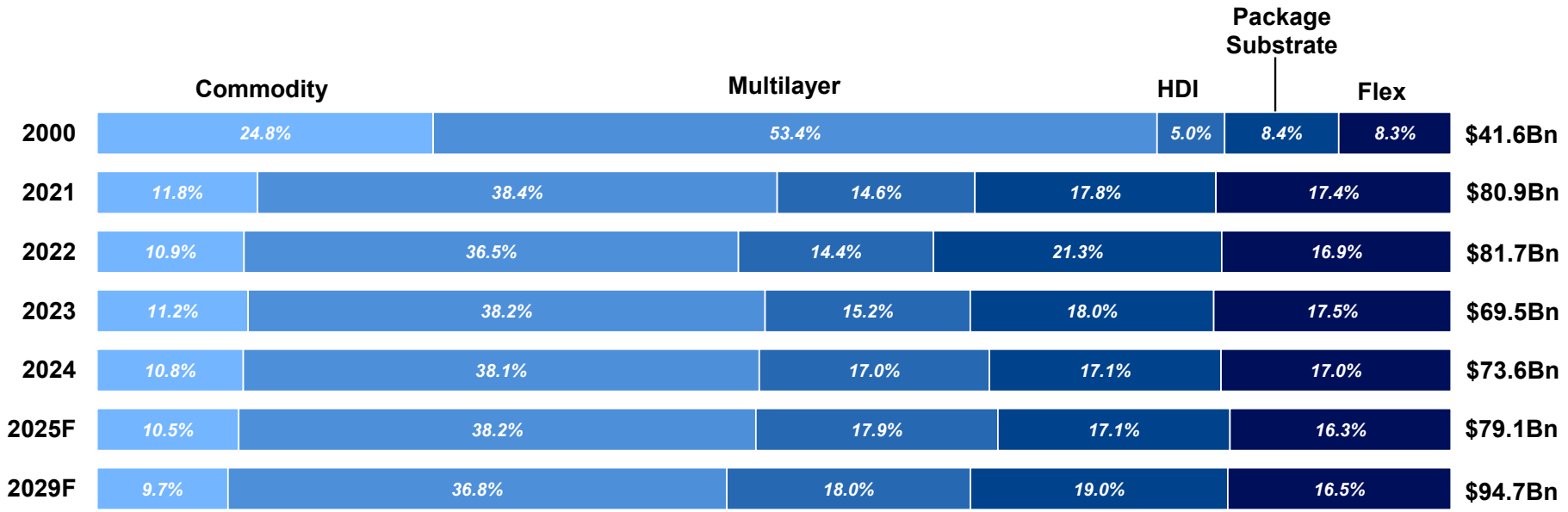
CHANGES IN PCB MARKET PRODUCT MIX



	2000	2020	2021	2022	2023	2024	2025F	2029F	2024-2029 CAAGR
Commodity	$10,324	$7,911	$9,589	$8,875	$7,757	$7,947	$8,281	$9,149	2.9%
Multilayer	$22,217	$24,763	$31,053	$29,846	$26,534	$27,994	$30,223	$34,873	4.5%
HDI	$2,074	$9,874	$11,811	$11,763	$10,536	$12,518	$14,134	$17,037	6.4%
Package Substrate	$3,505	$10,188	$14,410	$17,415	$12,498	$12,602	$13,566	$17,985	7.4%
Flex	$3,450	$12,483	$14,058	$13,842	$12,191	$12,504	$12,924	$15,617	4.5%
TOTAL	**$41,570**	**$65,219**	**$80,920**	**$81,740**	**$69,517**	**$73,565**	**$79,128**	**$94,661**	**5.2%**

n0525.044skc-nktmix

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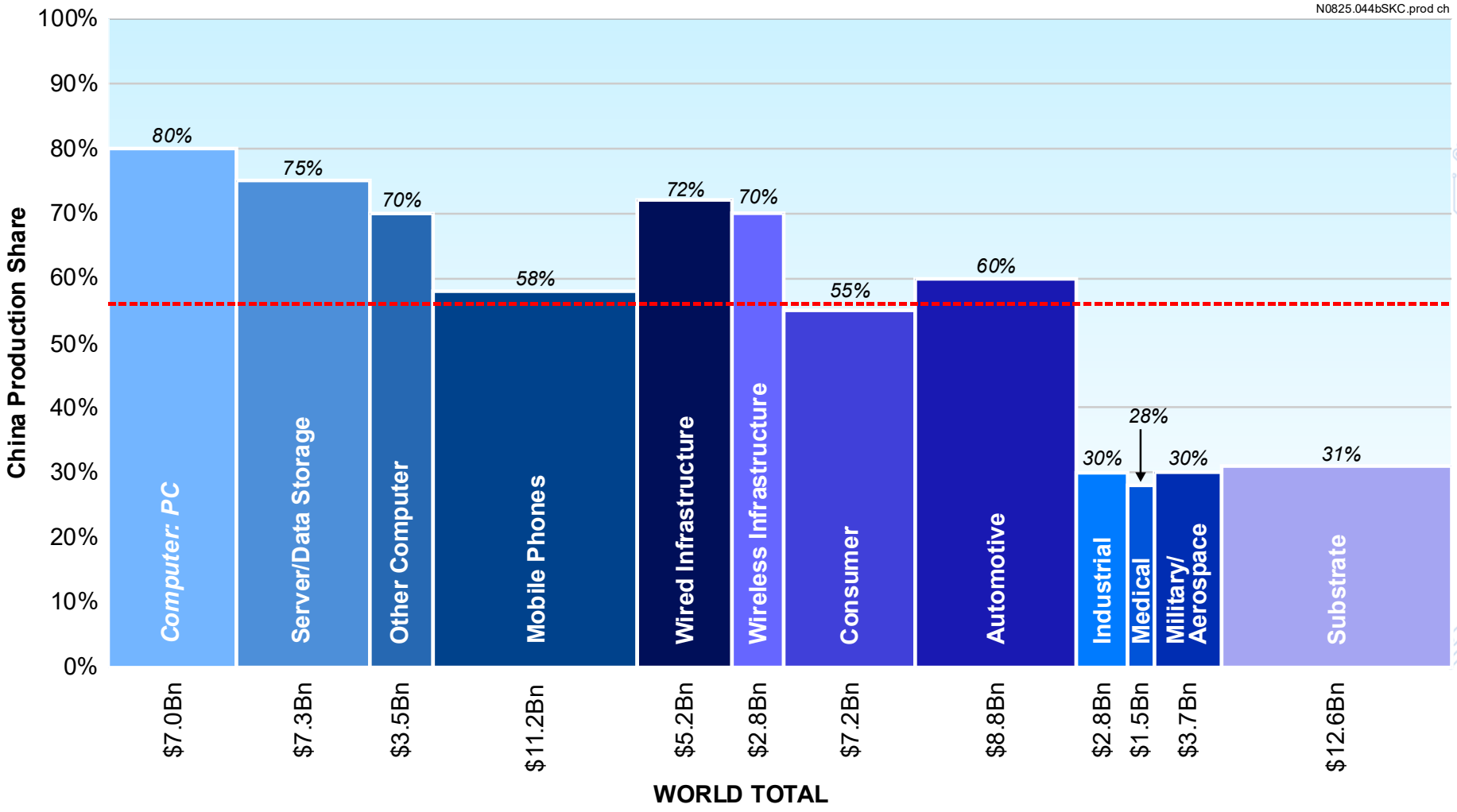
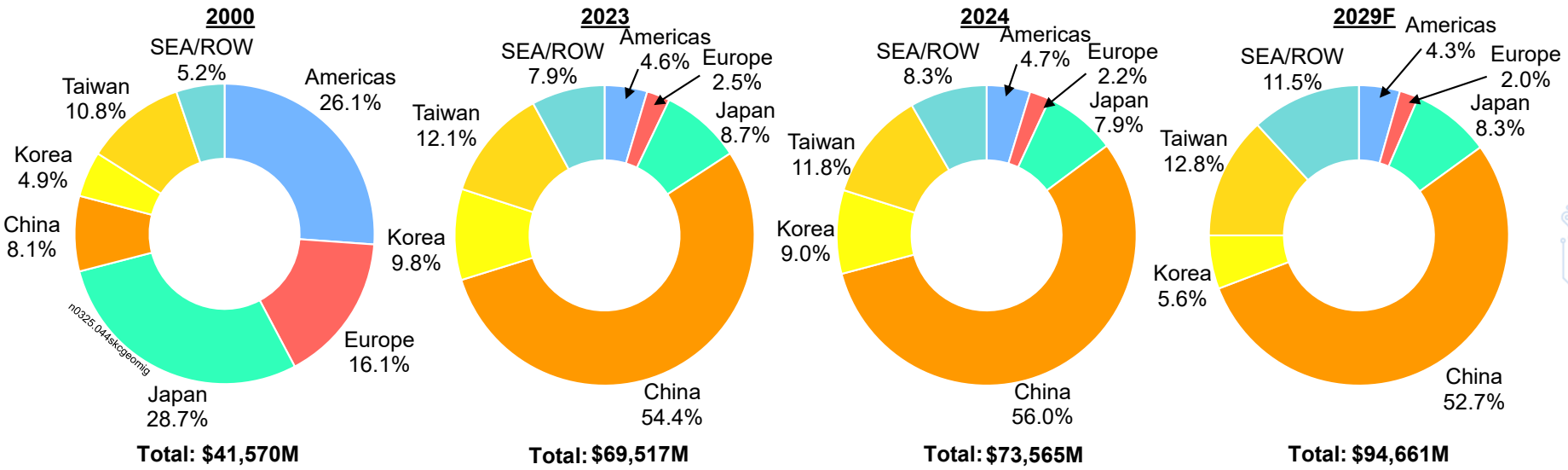
ASSESSMENT OF 2024 APPLICATION SHARES OF PCB PRODUCTION IN CHINA

Growing geo-political tensions and rising Chinese labor costs are encouraging global PCB customers to minimize their supply chain risks and to reduce their China exposure.



GEOGRAPHIC MIGRATION OF PCB PRODUCTION



	2000	2022	2023	2024	2025F	2029F	2024/2023	2024-2029 CAAGR
Americas	$10,852	$3,369	$3,206	$3,493	$3,642	$4,075	9.0%	3.1%
Europe	$6,702	$1,885	$1,728	$1,638	$1,707	$1,863	-5.3%	2.6%
Japan	$11,924	$7,280	$6,078	$5,840	$6,180	$7,855	-3.9%	6.1%
China	$3,368	$43,553	$37,794	$41,213	$44,700	$49,704	9.0%	3.8%
Korea	$2,053	$9,052	$6,737	$6,631	$6,771	$8,139	-0.8%	4.2%
Taiwan	$4,510	$11,121	$8,406	$8,669	$9,337	$12,127	3.1%	6.9%
SEA/ROW	$2,161	$5,480	$5,567	$6,081	$6,792	$10,898	8.4%	12.4%
Total	**$41,570**	**$81,740**	**$69,517**	**$73,565**	**$79,128**	**$94,661**	**5.8%**	**5.2%**

THAILAND PCB INDUSTRY CHALLENGES AND OPPORTUNITIES

- The Thailand PCB industry is currently undergoing significant transformation, facing operational challenges while also benefiting from emerging structural opportunities.

- Industry Challenges
  - Demand Weakness
  - Intensified Competition
  - Workforce Issues:
  - Higher Production Costs
  - Supply Chain Constraints

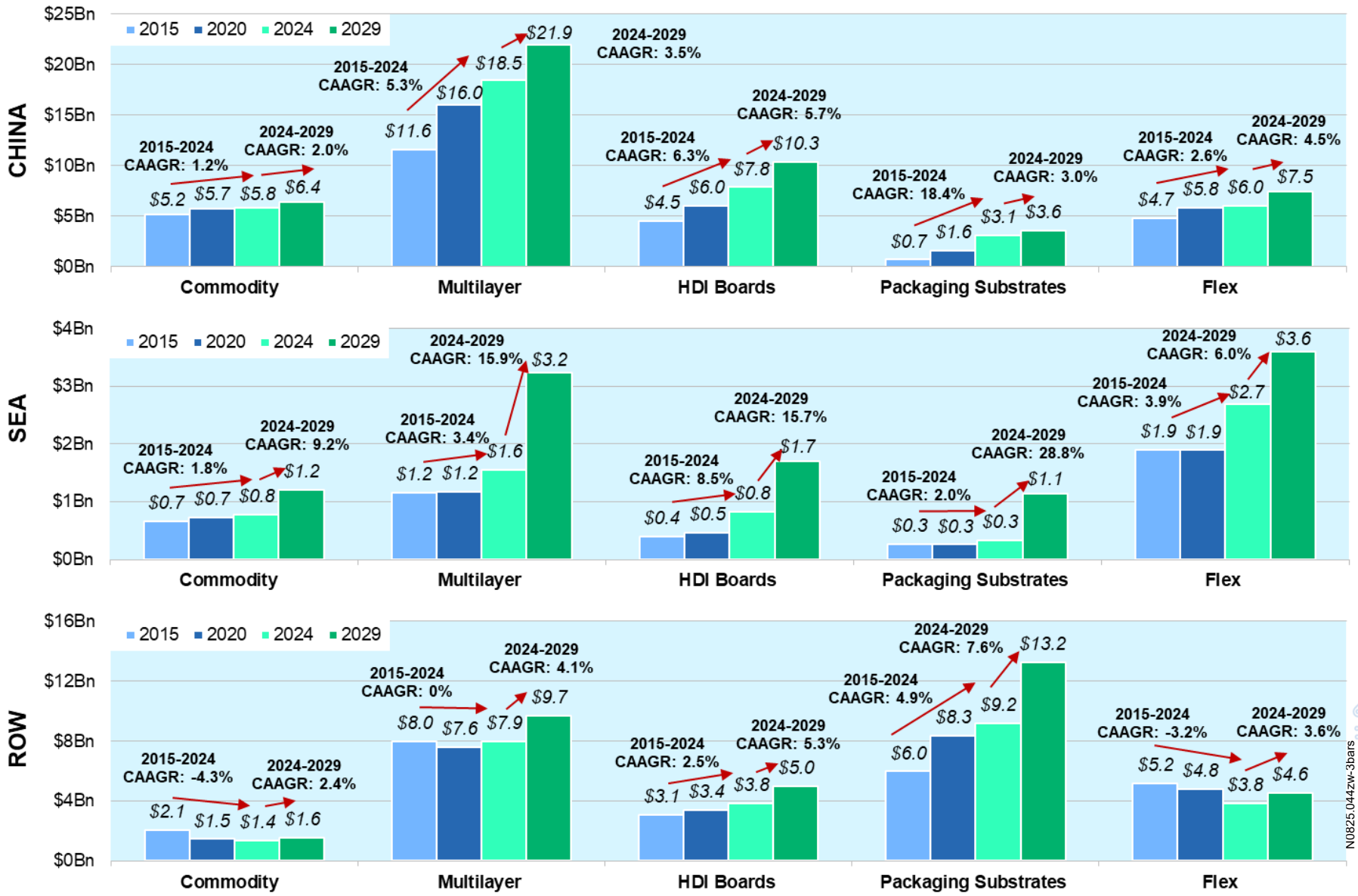
- Opportunities Ahead
  - Geopolitical Diversification: OEMs are shifting supply chains from China to Southeast Asia, benefiting Thailand.
  - High-Growth Applications: Demand is rising for advanced PCBs in AI servers, satellite communications, and high-speed networking.
  - Cost Advantages: While costlier than China, Thailand remains more cost-competitive than Japan, Korea, and possibly Taiwan, making it attractive for premium PCB production.

CURRENT STATE OF THAILAND PCB INDUSTRY

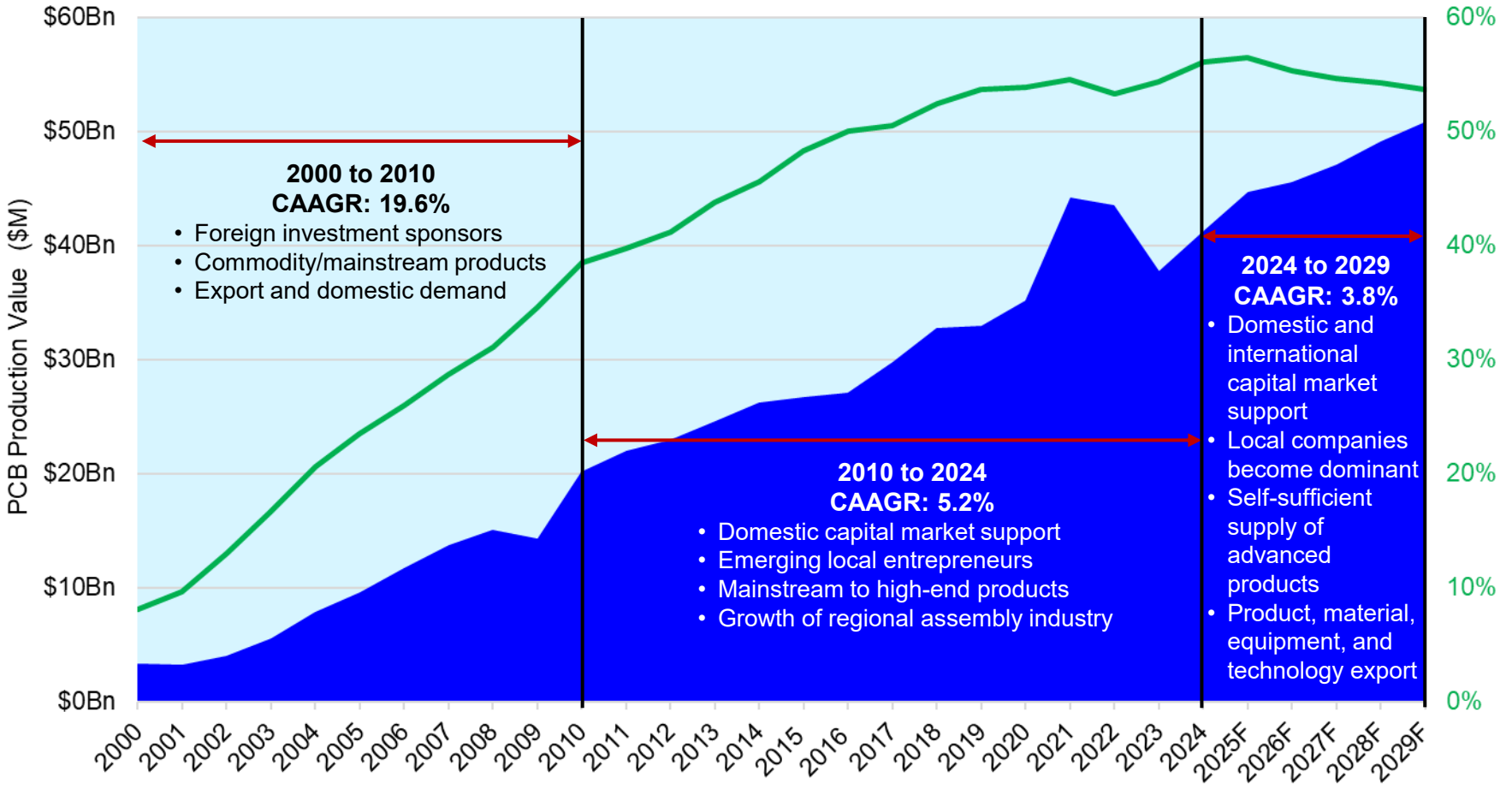
- Leading players like KCE and APEX face pressure from new PCB shops such as Wus, ASK, Welgao, First Quality, GCE, Compeq, Dynamic and others.
  - Many new entrants have achieved volume production capabilities but are still struggling due to:
    - Weak end-market demand.
    - Low utilization rates.
    - High material and logistics costs.
    - Shortage of trained engineers and production talent.
- Most emerging shops are proceeding cautiously, keeping their expansion plans but avoiding aggressive investments.

- Material Supply:
  - Local production of laminates and chemicals is limited and basic.
  - Advanced materials are mostly imported at a premium.
- Equipment Support:
  - Limited local equipment manufacturing capabilities.
  - High service costs due to reliance on overseas engineers.
  - Profitability challenges for equipment suppliers, as they face price parity constraints against China and Taiwan.

PCB SUPPLY CHAIN TRANSFORMATION



PCB MANUFACTURING INDUSTRY DEVELOPMENT IN CHINA



	IPO Companies	Initial IPO Capital (RMB Bn)	Total Capital from Equity Market (RMB Bn)
PCB	48	42.2	105.1
Material	28	25.2	45
Equipment	8	6.6	14.0
Environmental	2	2.9	4.1
Total	**86**	**76.9**	**168.2**

Source: CPCA, Prismark

STRATEGIC DEVELOPMENT OF THAILAND PCB INDUSTRY

The **Critical Success Factors for a Competitive Manufacturing Industry**

- **Customers** – Strong demand from OEMs, ODMs, and EMS companies.
- **Technology** – Advanced capabilities to meet evolving product requirements.
- **Production Capacity** – Sufficient scale and flexibility to support volume growth.
- **Human Talent** – Skilled engineers, technicians, and management.
- **Capital** – Access to funding for investment and innovation.

The growth of Thailand's PCB industry also relies on similar critical factors.

Customer Ecosystem

- Attracting leading ODM and EMS companies to set up assembly operations in Thailand will accelerate local PCB production.
- Careful selection of target customers is essential to align with market trends and local strengths.
- Priority Segments
  - AI hardware
  - High-speed networking
  - Optical module assembly
  - Automotive electronics

STRATEGIC DEVELOPMENT OF THAILAND PCB INDUSTRY

- **Capital Investment**
  - The PCB industry requires significant capital for capacity expansion and technology upgrades.
  - Investment sources should include:
    - Internal profits from operations.
    - External financing, including equity and bond markets.
  - Lessons from Taiwan and China show that active equity markets can accelerate industry growth by funding:
    - New production facilities.
    - Next-generation PCB technologies.
- **Infrastructure & Supplier Ecosystem**
  - The growth of the PCB industry creates opportunities for:
    - Material suppliers (laminates, chemicals, specialty substrates).
    - Equipment manufacturers.
    - Consumable providers.
  - Building a robust local supplier base will:
    - Reduce reliance on imports.
    - Lower costs.
    - Enhance Thailand's competitiveness as a PCB manufacturing hub.

THE POTENTIAL IS HERE

- Overview of SEA PCB Production
  - Southeast Asia (SEA) is projected to become the third-largest — and potentially the second-largest — printed circuit board (PCB) production hub globally within the next 5 to 10 years.
  - Among SEA countries, Thailand stands out as the leading PCB manufacturing center.
- Investment Trends (2024–2025)
  - In 2024 and 2025, the majority of PCB industry investments are concentrated in China and SEA.
  - Thailand, in particular, is emerging as a strategic hub due to increasing capabilities and growing demand from high-tech sectors.
- Thailand's Expected Technical Capabilities (Next 5 Years)
  - Thailand is expected to develop advanced PCB manufacturing capabilities and establish production for:
  - High Layer Count (HLC) Multilayer Boards (MLB)
    - With capabilities up to 24+ layers.
  - Conventional & Advanced HDI Boards
    - For consumer electronics, automotive, and PC applications.
  - HLC + HDI Boards
    - For AI servers, satellite systems, and networking infrastructure.
  - Advanced Flexible Printed Circuit (FPC) Products
    - Targeting applications in automotive electronics and AI edge devices.

THE POTENTIAL IS HERE

- **Demand Drivers**
  - Increasing demand for high-layer-count MLBs and HDI boards is driven by:
    - US satellite suppliers
    - AI server OEMs
    - Cloud Service Providers (CSPs)
  - These companies are pursuing risk diversification away from single-region dependencies.
  - Thailand is also well-positioned to capture additional PCB opportunities in:
    - AI edge devices
    - Automotive electronics

- **Market Growth Potential**
  - Prismark estimates that the server/storage, networking, and satellite PCB markets will exceed $7 billion within the next five years.
  - Thailand is projected to secure a significant share of this growth.
  - Importantly, only China and Thailand are currently expanding HLC and HLC + HDI manufacturing capacities.

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