



**INDUSTRY FOCUS:**  
**MANUFACTURE OF  
ELECTRICAL &  
ELECTRONICS**

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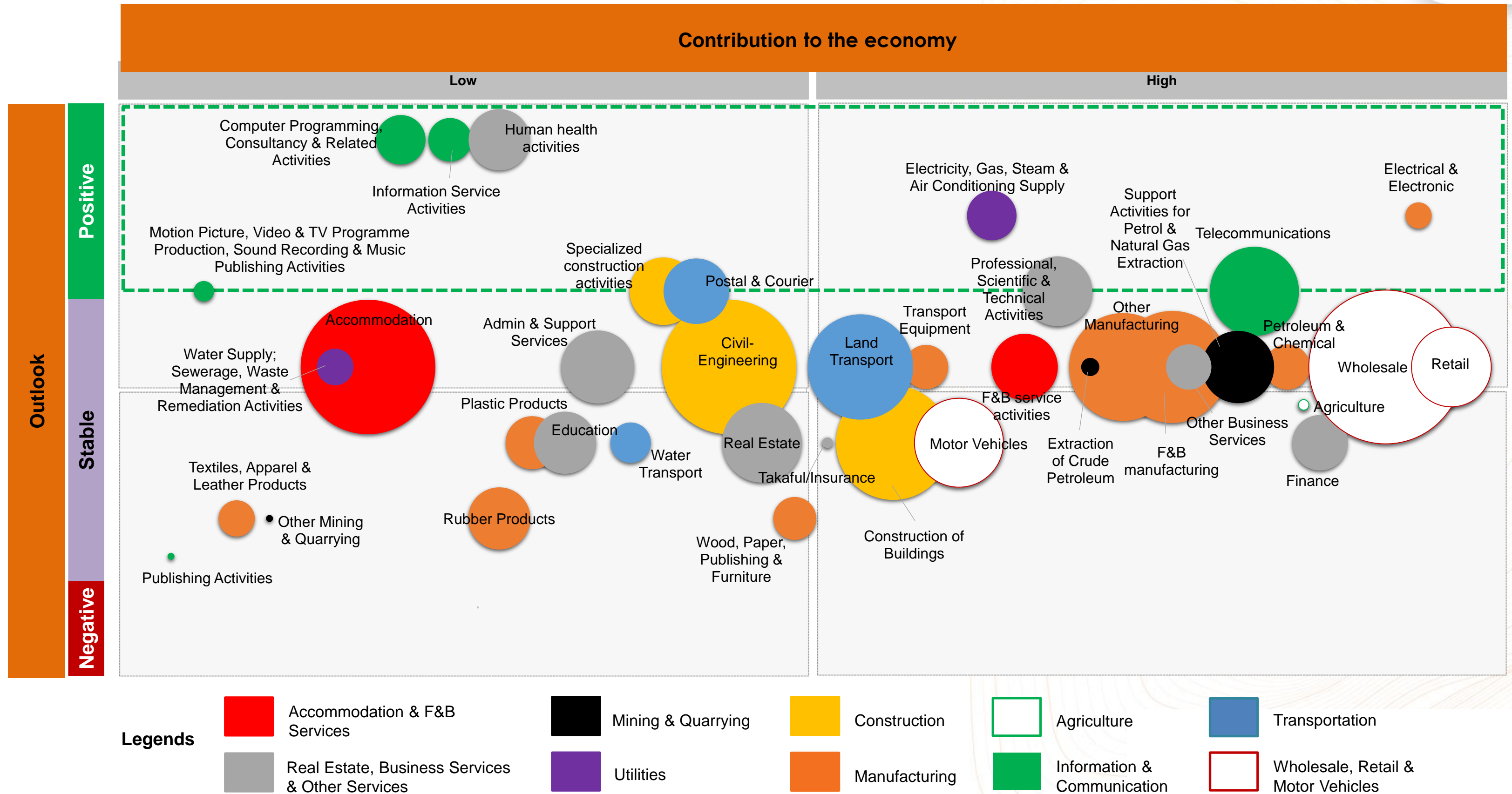
KEMENTERIAN PEMBANGUNAN  
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## **Industry Focus: Manufacture of electrical & electronics**

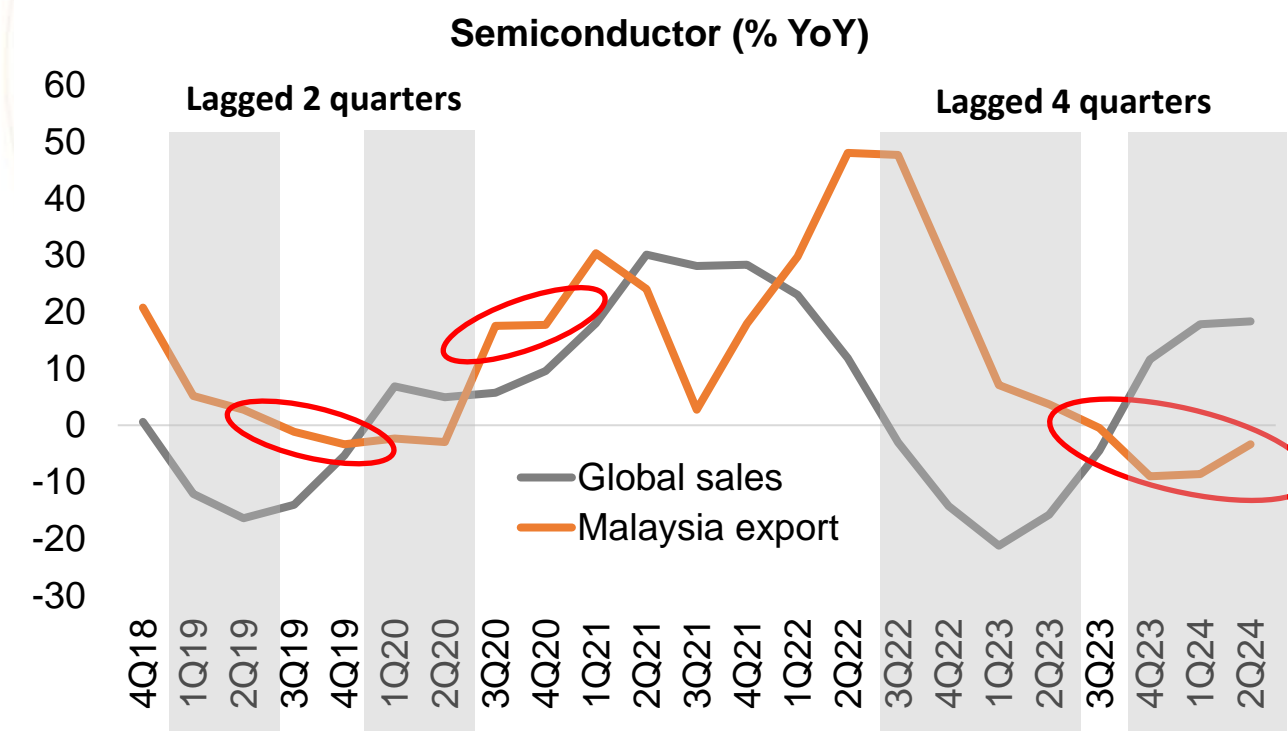


Sub-Sector	Outlook
Electrical Manufacturing	Positive
Electronics Manufacturing	

### Summary

- Global Electrical & Electronics (E&E) export** stood at USD3.6 tri in 2022 (average 2017-2019: USD2.7 tri) and had expanded by an annual 8% on average from 2017 - 2022.
- Of which, **global semiconductor export makes up 35% of total global E&E export**, and it posted a **robust annual growth of 12.4% on average** from 2017 - 2022 vs non-semiconductor at 5.2%.
- Global semiconductor sales** is forecasted to **recover by 16.0% YoY** in 2024 (2023: -8.2% YoY) and set to expand by a **CAGR of 10% between 2023 to 2030**.
- Malaysia's ranking** in terms of value of **semiconductor export came in at top 5 globally** in 2022 (2017: no 7), surpassing the EU and US.
- Domestically**, E&E is **the largest sub-sector in the manufacturing industry**, expanding to 27% share of manufacturing GDP in 2023 (average 2017 - 2019: 23%).
- Malaysia's E&E sector is **export oriented**. By **export products, E&E makes up the largest share at 40% of total export in 2023** (2017 - 2019: 37%). Of which, semiconductor is the biggest component of E&E export at 67% share.
- Malaysia's E&E players are **concentrated in the Assembly, Test and Packaging (ATP) segment**. Similarly, semiconductor players are concentrated in the **semiconductor back end** (low-value added), particularly ATP and Electronic Manufacturing Services (EMS) segment.
- Malaysia is poised to become the largest data center market in ASEAN** with capacity of 3,221 MV by 2028, up 12 times from 2023 (280 MV). Given that around **93%** of total development cost of a data center is related to E&E products, **SMEs from the E&E manufacturing industry and IT vendors (services) may benefit**.

### Malaysia semiconductor export is on recovery path



- Between 1Q 2019 to 2Q 2020, Malaysia's semiconductor export started to contract 2 quarters after global semiconductor sales contracted. The trend was similar for recovery.
- Recent times, Malaysia's semiconductor sales lagged 4 quarters of global trend. As such, Malaysia's semiconductor sales will likely turnaround to positive growth in 4Q 2024.

## OPPORTUNITIES

### Upcycle in E&E approved investment

- E&E approved investment **grew >3x** to RM262.7 bil (12<sup>th</sup> Malaysian Plan mid-term review 2021-2023) from RM71.4 bil (11MP 2016-2020)
- Malaysia is poised to become the **largest data center market in ASEAN** with planned capacity of 3,221 MV by 2028, up 12 times from 2023 (280 MV)

### Govt support to boost semiconductor industry

- Govt will provide **RM25 bil fiscal** injection (~1.4% of GDP) to move up the semiconductor industry value chain under National Semiconductor Strategy 2030
- **Higher net trade in semiconductor** (2023: +RM166.2 bil vs 2017: +RM28.8 bil)

### Global semiconductor sales to recover and double by 2030

- Sales is expected to recover in 2024, up by 16.0% YoY (2025f: 12.5%), and is anticipated to continue expanding by a CAGR of 10% from 2023 – 2030 (2016 - 2023: 6.5%)

### Western countries move away from China

- As Western countries move away from China (amid the US-China technology war), Malaysia can grab the opportunity as **alternative producers**

## CHALLENGES

### E&E exports is shifting away from PCs and consumer electronics to semiconductors

- Share of Malaysia's PC export shrank to 9% in 2023 from 30% in 2010. Manufacturers & its suppliers (i.e PC and consumer electronic) may face difficulties if do not diversify their business model/products

### Capital intensive, high barriers to entry

- Minimal investment allocation by global players into Malaysia may limit opportunity. **Less than 3%** of the total **global USD2.3 tri capital expenditure** for 2024 - 2032f is expected to flow into Malaysia
- A semiconductor fabrication facility (or 'fab') can cost ~USD10 bil (RM43.7 bil) according to Intel

### Few local Original Brand Manufacturer (OBM) to support the industry

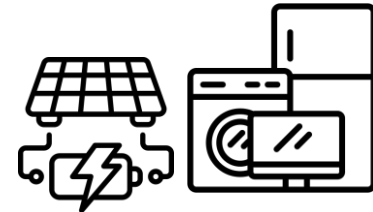
- Malaysia's E&E players have greater presence in the original equipment manufacturer (OEM) and assembly, testing & packaging (ATP) segment
- ATP only accounts for 6% of the global semiconductor ecosystem

### Increasing US onshoring activity, a longer-term risk to Malaysia's E&E

- US's plan to increase domestic production (fab capacity is projected to triple by 2032) will pose downside risks to Malaysia in the longer term as the E&E value chain can be outsourced to nearer countries such as India and Mexico

## What is Manufacture of Electrical and Electronics (E&E) and its products

### Electrical



- Distribution boards
- Control panels
- Switching apparatus
- Transformers



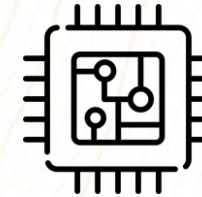
- Lighting
- Cable and wires
- Primary cell and batteries
- Solar cells and modules



- Air conditioners
- Household appliances

Note: List non-exhaustive

### Electronics



#### Component

- **Semiconductors** (integrated circuit (IC), light-emitting diode)
- Passive components (capacitors, resistors, diodes, etc)
- Printed circuit boards
- Precision plastic parts & metal stamped parts



#### Consumer

- Audio video products (TV receivers, infotainment products, speakers, cameras & electronic games)

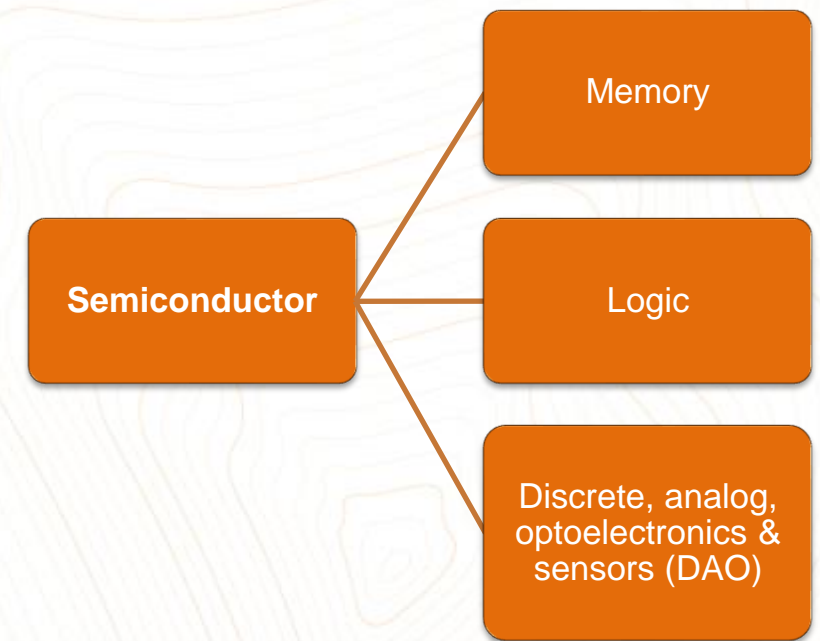


#### Industrial

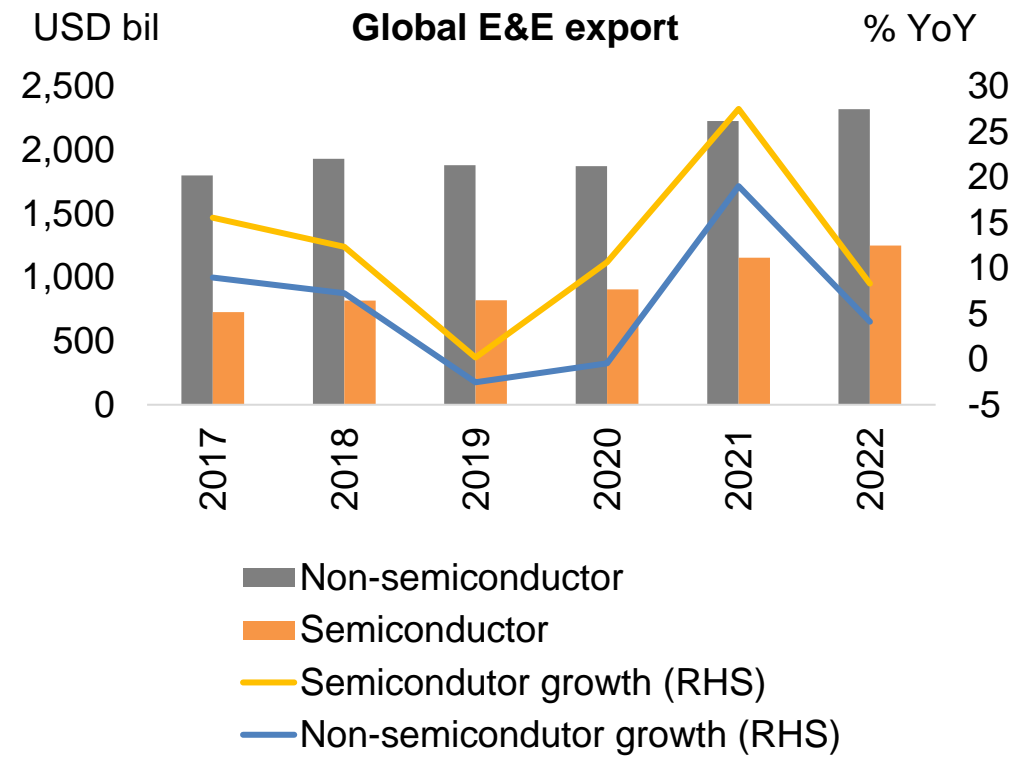
- Computers & computers peripherals
- Data storage
- Telecommunications equipment
- Office equipment, (printer etc)
- Box-built products for industrial applications (medical devices etc)



Semiconductor is the largest share of Malaysia's E&E export, at **67%** in 2023 (average 2017-2019: 56.4%)

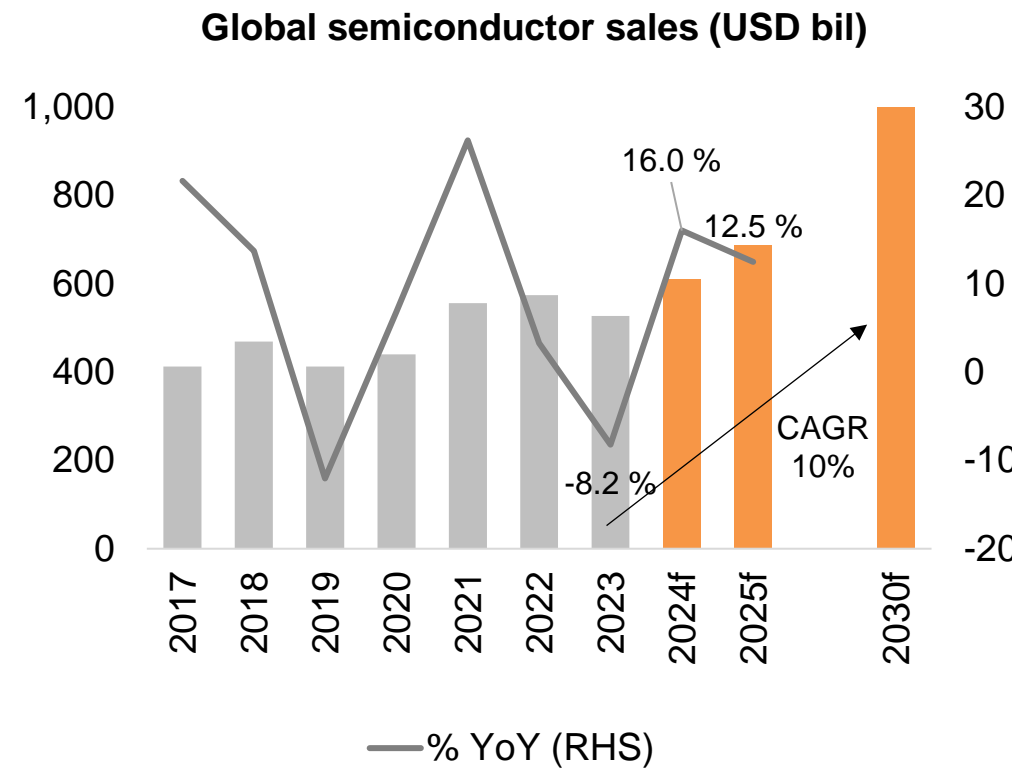


### Robust global E&E export growth



- **Global E&E export** stood at USD3.6 tri in 2022 (average 2017 - 2019: USD2.7 tri) and had expanded by an annual 8% on average from 2017-2022.
- By segment, non-semiconductor makes up the lion share, at 65% to total global E&E export in 2022, while semiconductor at 35%.
- Nonetheless, **growth in the semiconductor segment has consistently outpaced that of non-semiconductor since 2015**, which raised its share of semiconductor from 27% in 2015 to 35% in 2022.
- **Top 3 E&E exporters** in 2022 were China (USD1.3 tri) followed by Taiwan (USD246.0 bil) and South Korea (USD210.4 bil). Malaysia ranked 8<sup>th</sup> globally (USD128.2 bil).

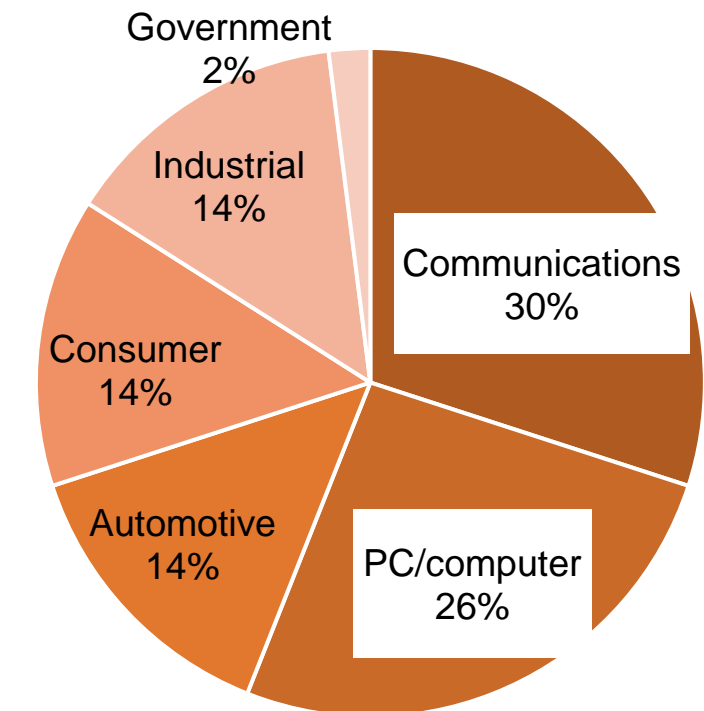
### Global semiconductor sales to almost double by 2030



- **Global semiconductor** sales stood at USD526.9 bil in 2023, where it **contracted by 8.2% YoY**. Still, **it was above the 2017-2019 historical averages** of USD431.1 bil.
- Going forward, **sales is expected to recover in 2024**, up by **16.0% YoY** and continuing into 2025 by 12.5% YoY.
- The industry anticipates a **better CAGR of 10% from 2023 - 2030** (2016 - 2023: 6.5%).

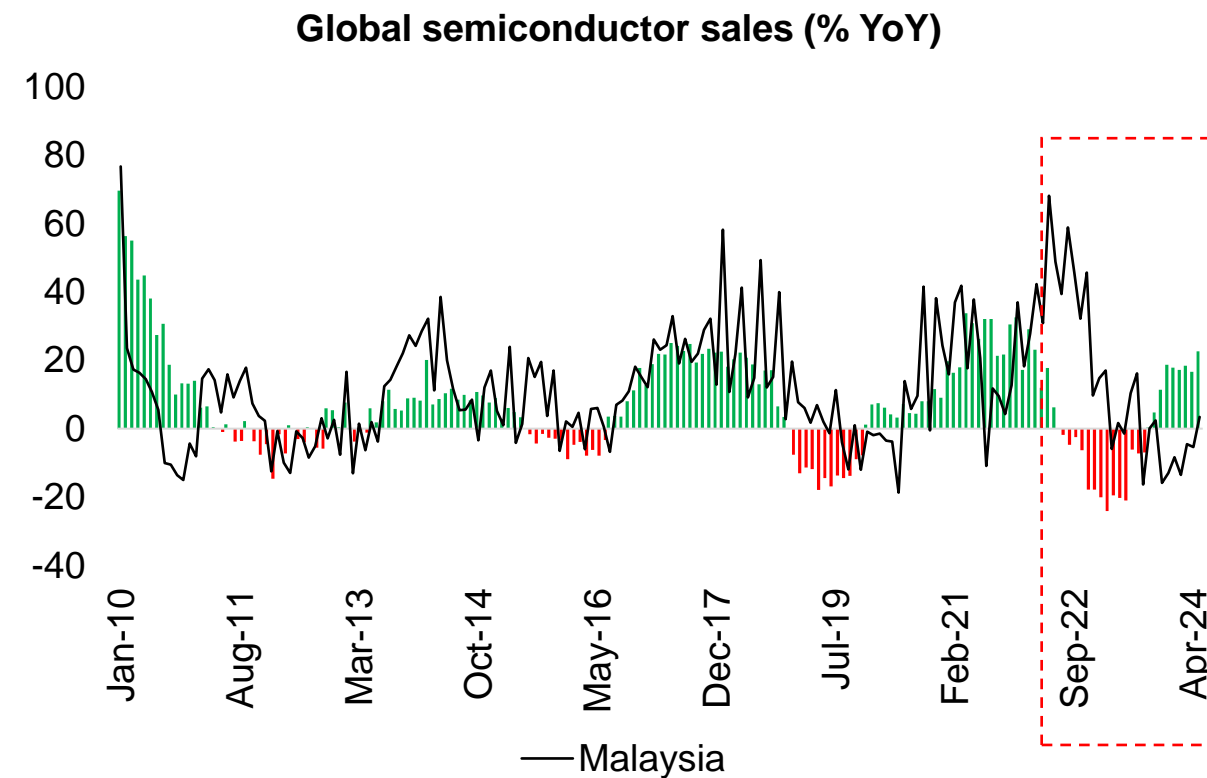
### Half of global semiconductor sales are for communication and PC/computer

#### Global semiconductor sales breakdown by application in 2023 (% share)



- By application, semiconductor was largely used for:
  - ❑ **Communication** (30% of total sales)
  - ❑ **PC/computer** (26%)
  - ❑ **Automotive** (14%)
  - ❑ **Consumer** (14%)
  - ❑ **Industrial** (14%)
  - ❑ **Government** including military end use (2%)

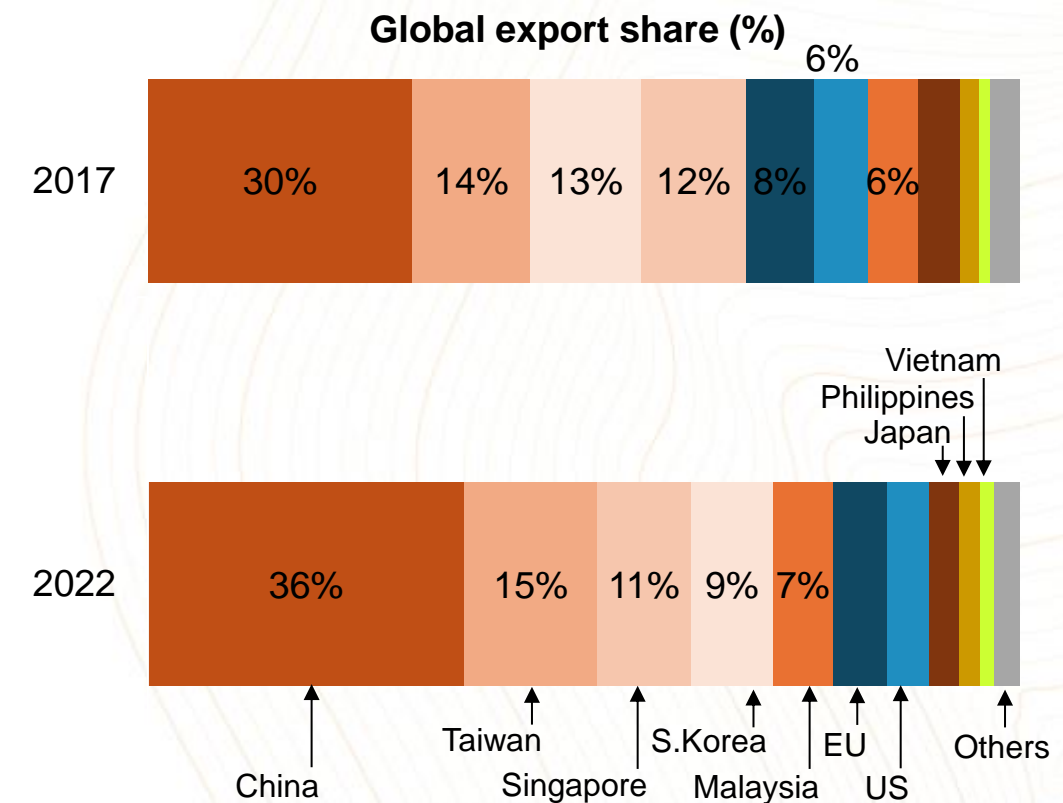
### Upcycle in global semiconductor sales to push Malaysia's E&E export



Note: Green bars for positive growth and red bars for negative growth

- After contracting for 14 straight months, the global semiconductor sales entered an **upcycle trend** since Sep 2023 (0.4% YoY).
- In 1Q 2024, global semiconductor **sales surged** by 17.8% YoY (1Q: 11.6%), leading to an increase in global E&E export of 4.6%.
- The **upcycle in global semiconductor sales were driven by integrated circuits (IC) memory** (6.9ppt) and **IC logic** (0.6ppt), cushioning the drop in discrete, analog, optoelectronics and sensors (DAO) segment (-2.9ppt).

### Malaysia is among the world's largest semiconductor exporters



- Despite trade tension between the US and China, **China dominates in the semiconductor space**, which improved from 30% of global export in 2017 to **36%** in 2022.
- Similarly, Taiwan (15%) and **Malaysia** (7%)'s shares also enlarged during the same period.
- **Malaysia's ranking also improved to the top 5 globally** (2017: no 7), surpassing the EU and US's export value in 2022.
- Nevertheless, **US's plan to increase domestic production** (fab capacity is projected to triple by 2032) will pose **downside risks to Malaysia** as the E&E value chain can be outsourced to nearer countries such as India and Mexico.



### Malaysia's E&E players are concentrated in the ATP segment

Segments	Industrial				
	Electrical	Electronic Components	Consumer Electronics	Computer Equipment	Communication Equipment
Research and Development (R&D)	Low Presence	Low Presence	Low Presence	No Presence	No Presence
Design	Medium Presence	Medium Presence	Low Presence	Low Presence	No Presence
Manufacture of components	High Presence	Low Presence	Low Presence	Low Presence	High Presence
Assembly, Test and Packaging (ATP)	High Presence	High Presence	High Presence	High Presence	Medium Presence

#### Medical equipment (under Industrial electronic sector)

1. Malaysia is the **largest market for medical devices in the ASEAN** region with an estimated total market size of USD1.8 bil.
2. **Over 90% of the medical devices manufactured are exported** to US, Germany, Singapore, Japan & Belgium.
3. Malaysia's medical devices market is forecasted to expand at a CAGR of 9.5% between 2023 to 2028, according to BMI.

#### ATP segment

1. Depends on contracts/orderbooks from brand owners
2. Operate based on volume
3. Low profit margin

## Semiconductor segment

## Semiconductor players in Malaysia

Global ecosystem 100%

59%

Design

IC Design

35%

Front End

Wafer  
Fabrication

6%

Back End

OSAT

Assembly, test &  
packaging (ATP)

Electronic  
Manufacturing  
Services (EMS)



Note:  
OSAT = Outsourced Semiconductor Assembly & Test

### Presence of industry players in the E&E industry

#### Northen

Penang, Kedah (Kulim, Sungai Petani), Perak (Ipoh)

**Industry:** IC/ packaging/ test design, semiconductor front end & back end, component/ module/ system/ devices/ EMS, products & equipment, LED, Solar

#### Central

Klang Valley, Negeri Sembilan, Melaka

**Industry:** IC/ packaging/ test design, semiconductor front end & back end, component/ module/ system/ devices/ EMS, products & equipment, LED, Solar

#### Eastern

Pahang, Terengganu, Kelantan

**Industry:** LED, Solar, products & equipment

#### Southern

Johor (Johor Bahru, Muar)

**Industry:** semiconductor back end, component/ module/ system/ device/ EMS, products & equipment

#### Sarawak

Kuching

**Industry:** semiconductor back end, component/ module/ system/ devices/ EMS, Solar



- **SMEs accounted for 89% of E&E market share.**
- But SMEs contributed **only ~9.0%** of the overall industry **value-add.**
- This is because of the **capital-intensive nature of this industry** which poses a challenge for SMEs.

### E&E associations/ market in Malaysia and their respective members

#### Electrical and Electronics Association of Malaysia



- There are **165 members** that are involved in manufacturing E&E products

#### Malaysia Semiconductor Industry Association



- There are **296 members** listed on their website

#### E&E Directory/ Marketplace Malaysia



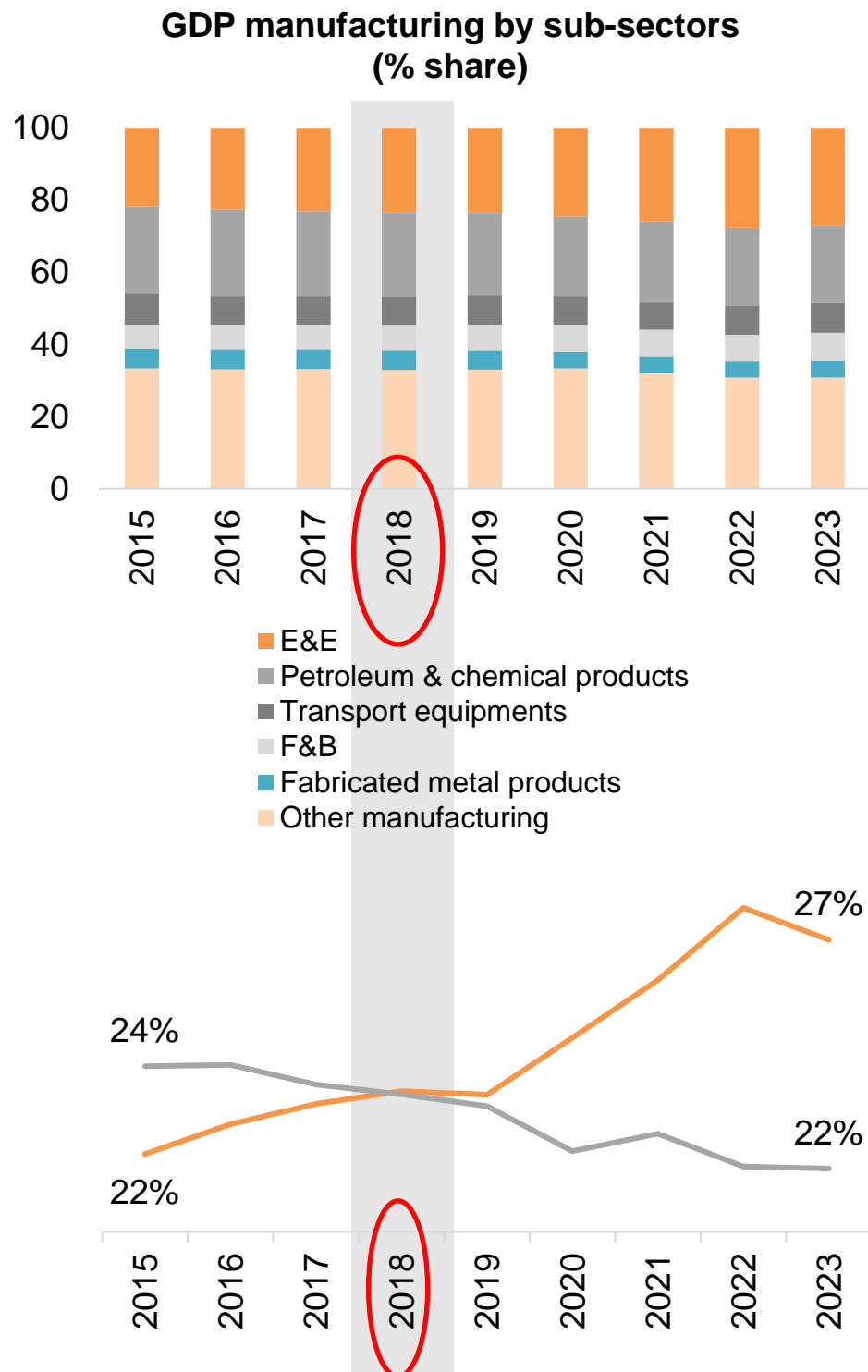
- Malaysia E&E Discovery provides a list of E&E industry players in Malaysia



- EEMM is a B2B online marketplace portal specifically developed for the E&E industry

Note: Click on the logo for further details

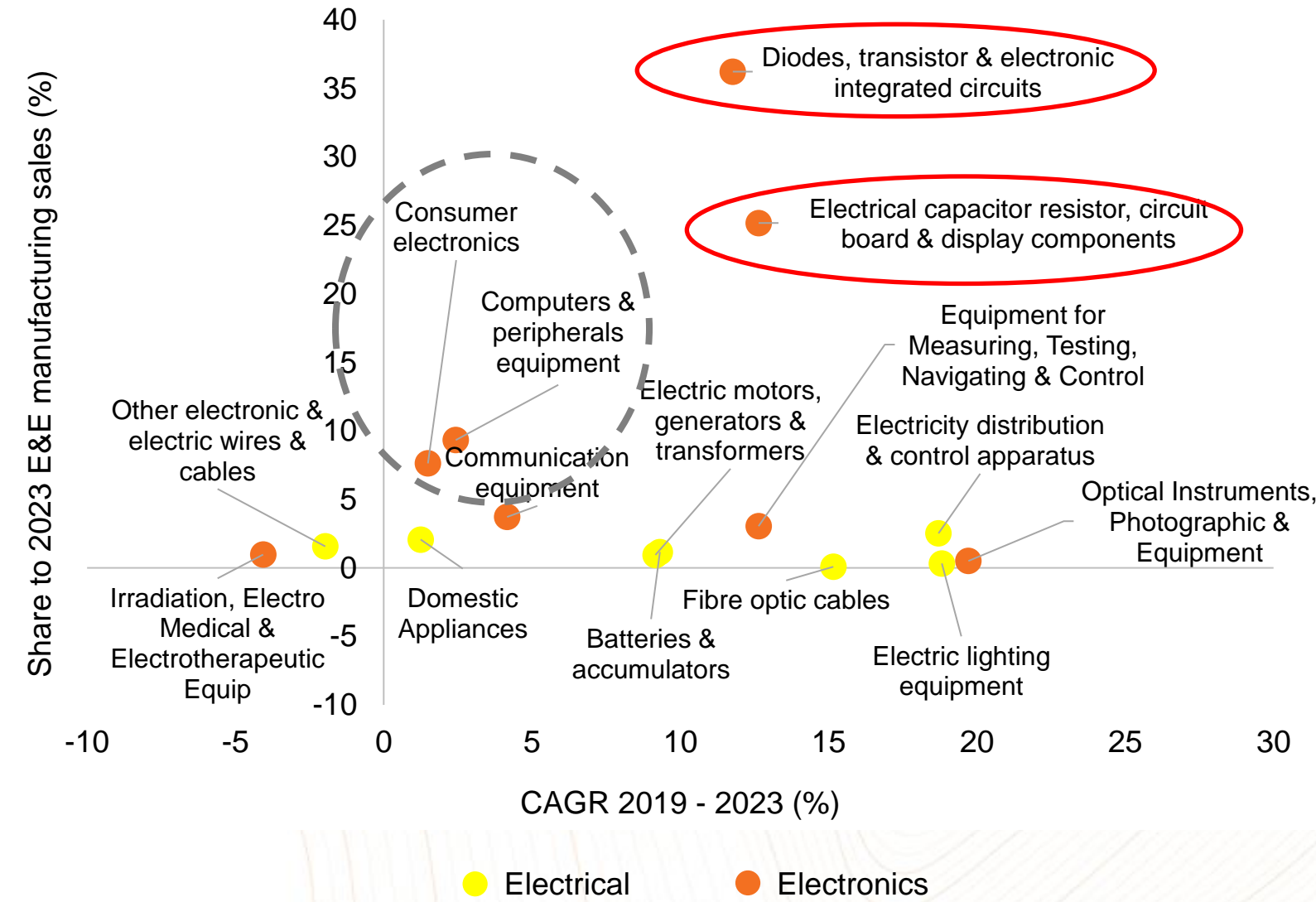
### E&E is the largest sub-sector of the manufacturing industry



- In 2023, E&E manufacturing (27% share) was **the largest manufacturing sub-sector**, followed by petroleum and chemical products (22%) and transport equipment (8%)

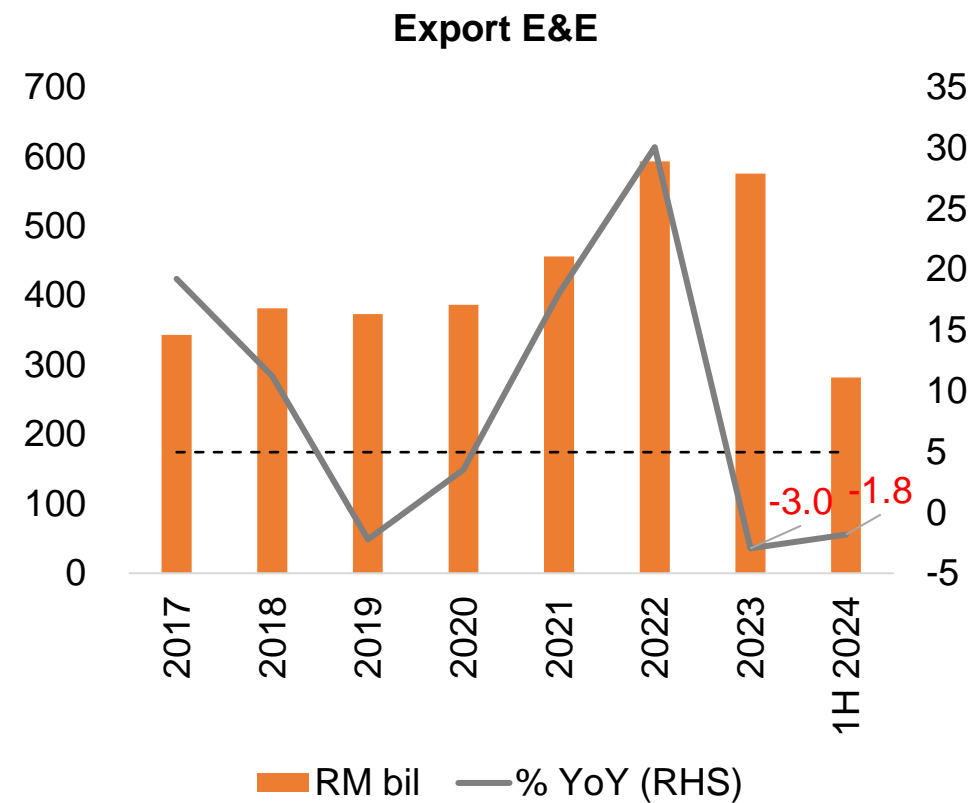
- Prior to 2018, petroleum and chemical products was the largest share of manufacturing.
- Since 2018**, E&E had overtaken the petroleum & chemical products sub-sector, growing from 22% share in 2015 to 27% in 2023.

### Almost all of E&E manufacturing sales posted growth



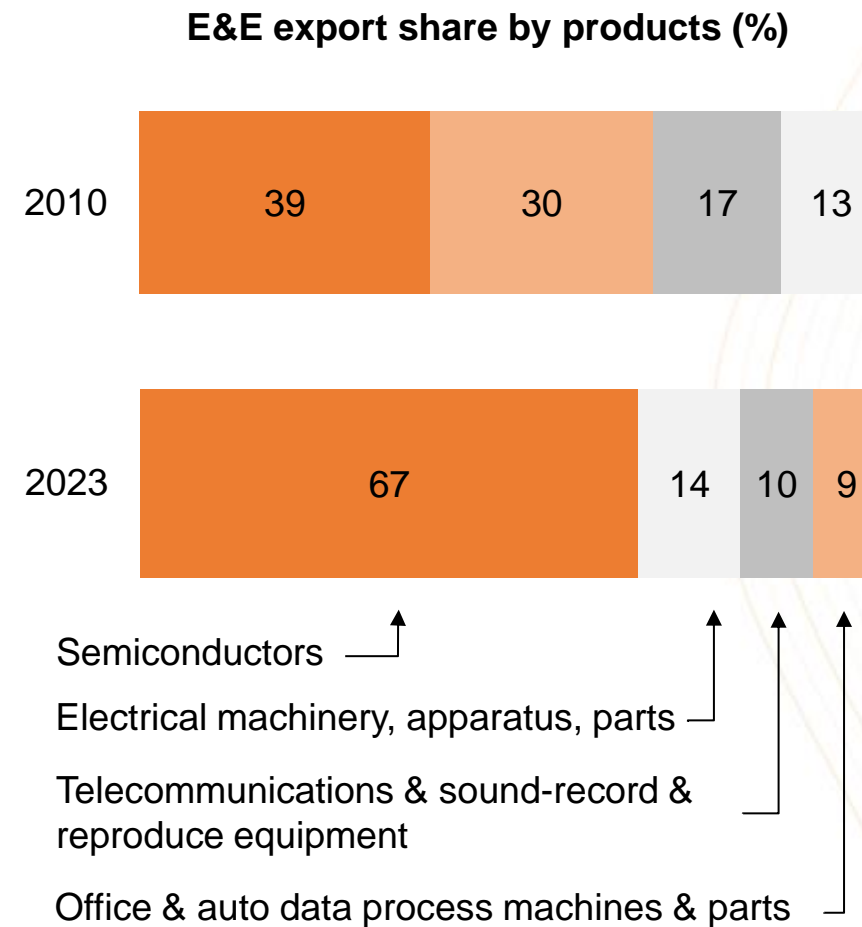
- The **largest share of E&E manufacturing** is dominated by **diodes, transistor & electronic IC (36.2%)**, **electrical capacitor resistor, circuit board & display components (25.2%)**
- Meanwhile, the **fastest growth rate (CAGR)** was **optical instruments, photographic & equipment (19.7%)**, followed by **electric lighting equipment (18.8%)**, and **electricity distribution & control apparatus (18.7%)**.
- Low CAGR growth was recorded for **PC (2.4%)** and **consumer electronic (1.5%)** as manufacturer shifts away into **semiconductors (11.8%)**.

### E&E export still in contraction, but performance better than historical level



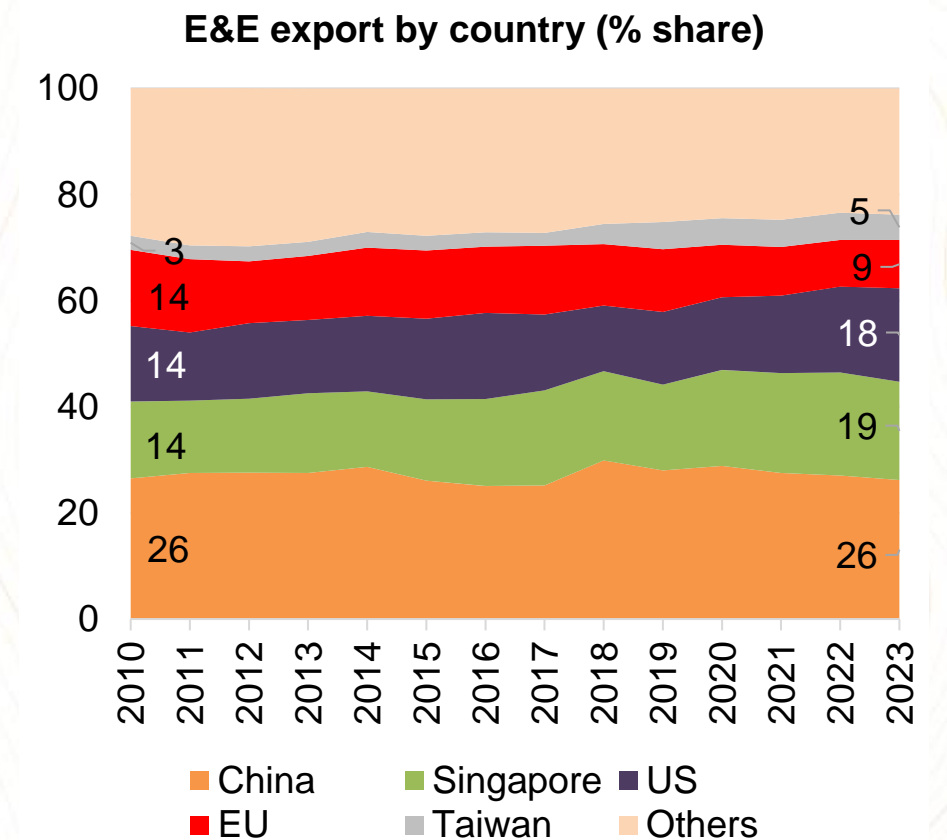
- **E&E contributed the largest export share of 40.4%** in 2023, followed by petroleum and chemical products (15.1%) and liquefied natural gas (4.2%).
- **Contractions in E&E export was milder** in 1H 2024 at -1.8% YoY (2023: -3.0%). This was dragged by telecommunications & sound-record & reproduce equipment at -8.7% YoY, semiconductor at -5.9% and electrical machinery, apparatus, parts at -0.8%.
- **Compared to historical level**, 1H 2024 came in at RM281.6 bil, above the 1H averages of 2017 - 2019 (RM174.3 bil).

### Shift away from PC and consumer electronics to semiconductors



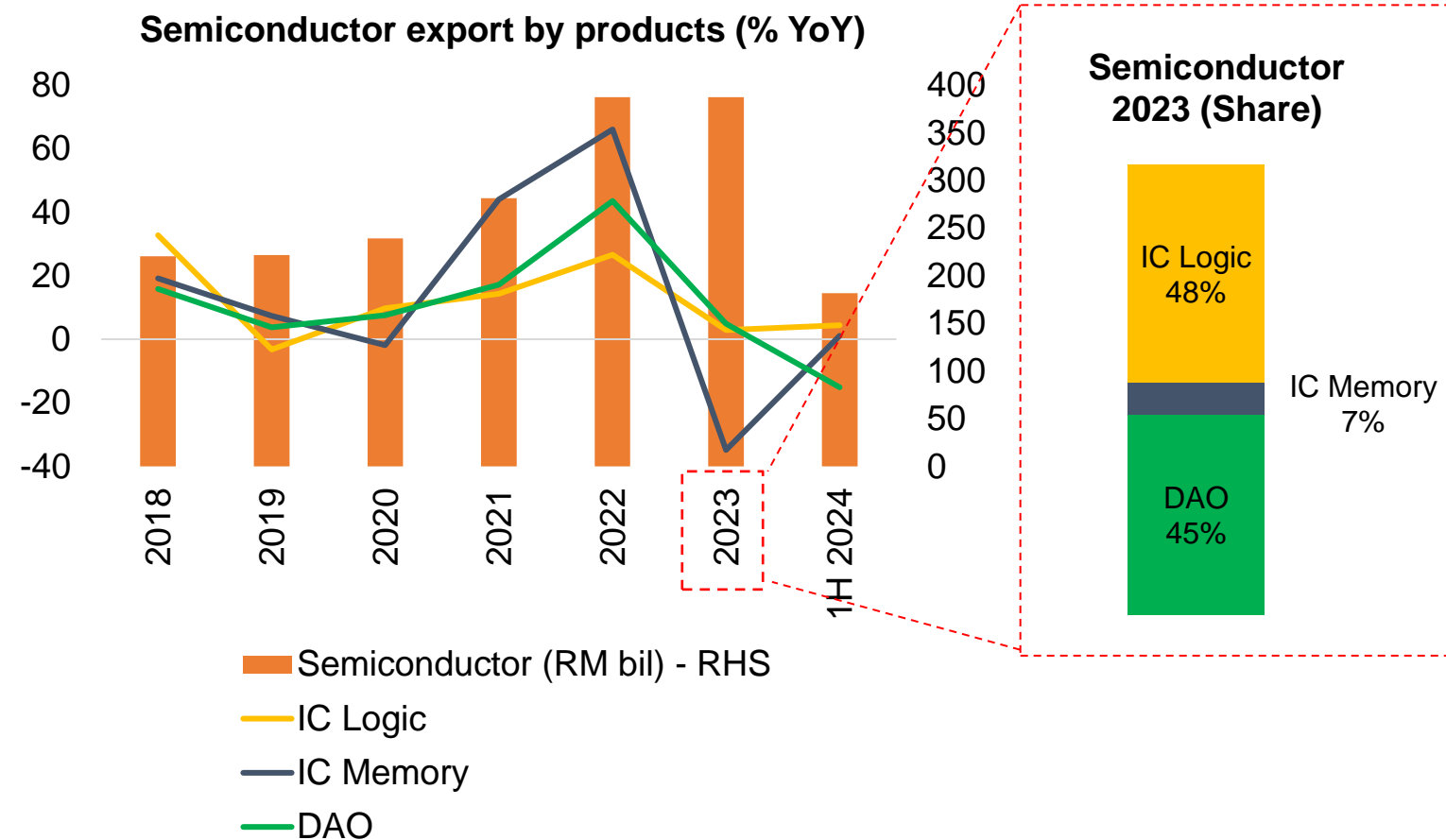
- In 2023, semiconductor makes up **the biggest component of E&E export at 67% share**.
- Since 2016, **E&E export has shifted away from PC and consumer electronics**, resulting in semiconductors having a greater proportion to total E&E compared to non-semiconductors.
- Semiconductor posted **faster growth** of an annual 11.2% on average from 2010 – 2023 vs non-semiconductor (2.8%).

### 3/4 of total E&E export for 5 major destinations



- **1/4 of Malaysia's exports of E&E were shipped to China** in 2023, followed by Singapore (18.5%) and US (17.6%).
- While share of **E&E export to China has stagnated for the past decade, export share to Singapore, the US and Taiwan climbed**. With western countries' **move away from China** (US-China technology war), Malaysia can grab the opportunity as alternative producers.
- Nevertheless, Malaysia has to be mindful as we will be exposed to **downside risk** if US imposes blanket tariff targeting Chinese goods produce in foreign country (i.e. Malaysia).

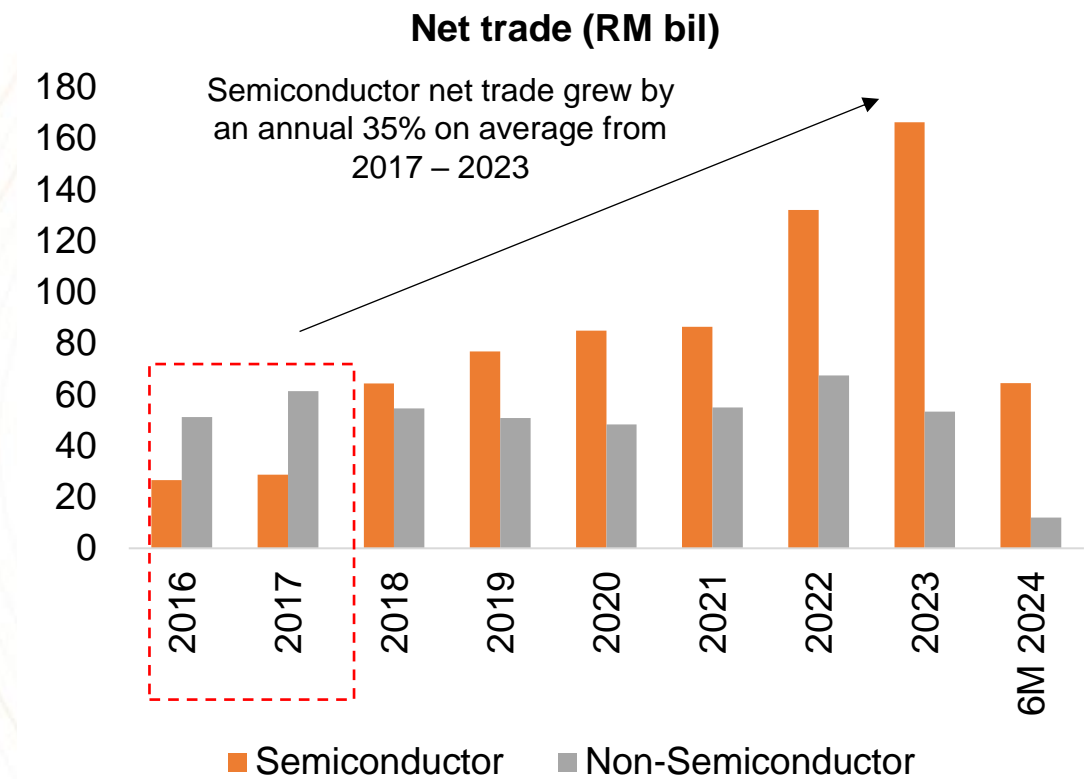
### Uneven recovery but semiconductor exports stay above historical level



- **Malaysia's** semiconductor export **contracted** by 5.9% YoY in 1H 2024 (1H 2023: +5.3%) to a record RM181.6 bil (1H averages of 2017 – 2019: RM97.2 bil)
- By products, IC logic **grew** 4.4% YoY in 1H 2024, IC memory (1.1%). These were in line with global recovery trend.
- However, DAO segment **slumped** by -15.1% YoY, dragging down the overall semiconductor export.

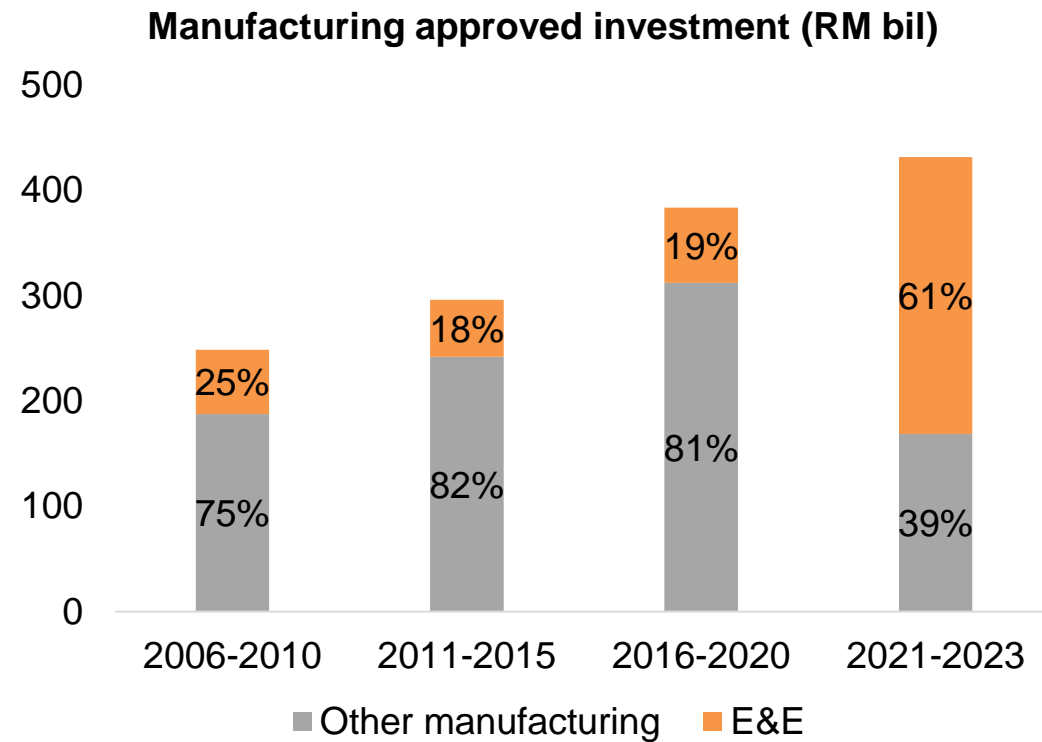
Note:  
DAO = discrete, analog, optoelectronics and sensors

### Semiconductor net trade outpaced non-semiconductor since 2018



- **Malaysia's semiconductor net trade** showed a robust performance, with an annual 35% increase on average from 2017 – 2023.
- This hinted that the **country is moving in the right direction towards higher value-added activity** supported by a surge in global demand, coupled with trade diversion (US-China trade tension since 2018).
- **Since 2018, semiconductor net trade had also outpaced non-semiconductor.**
- Non-semiconductor net trade remains muted likely due to shifts within the E&E segment, switching focus from PC and consumer electronics into semiconductors.
- Nonetheless, some non-semiconductor products still recorded **high export growth** such as **electrical transformers, static converters and inductors** (an annual 15.3% on average from 2017 – 2023), **batteries and related products** (14.6%), and **phone and related products** (12.9%).

### Upcycle in E&E's approved investment

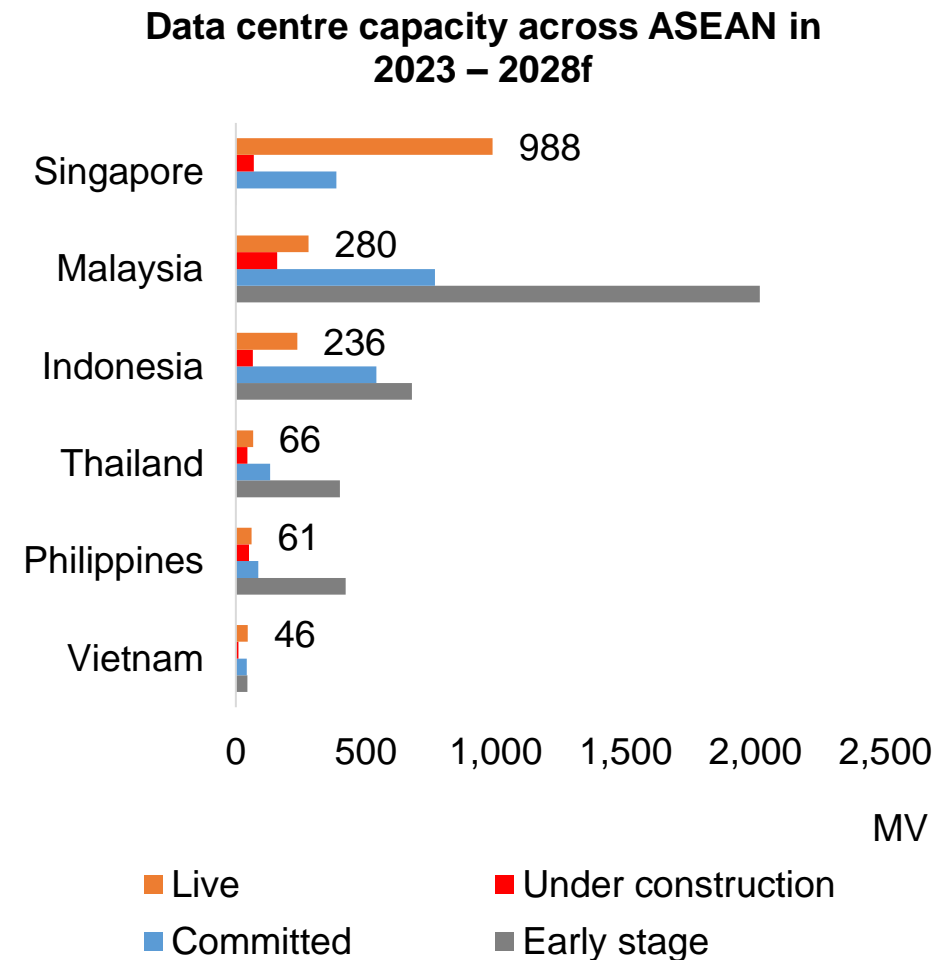


Notes:

- 9<sup>th</sup> MP (2006-2010)
- 10<sup>th</sup> MP (2011-2015)
- 11<sup>th</sup> MP (2016-2020)
- 12<sup>th</sup> MP (2021-2025)

- Manufacturing approved investment between 2021-2023 (mid-term review) has already **surpassed previous Malaysia plans** (MP) although it has 2 more years to complete the 12<sup>th</sup> MP (2021 – 2025).
- This is driven by **robust E&E investment, growing more than 3x to RM262.7 bil (MTR 2021 – 2023)** from RM71.4 bil (2016 – 2020).

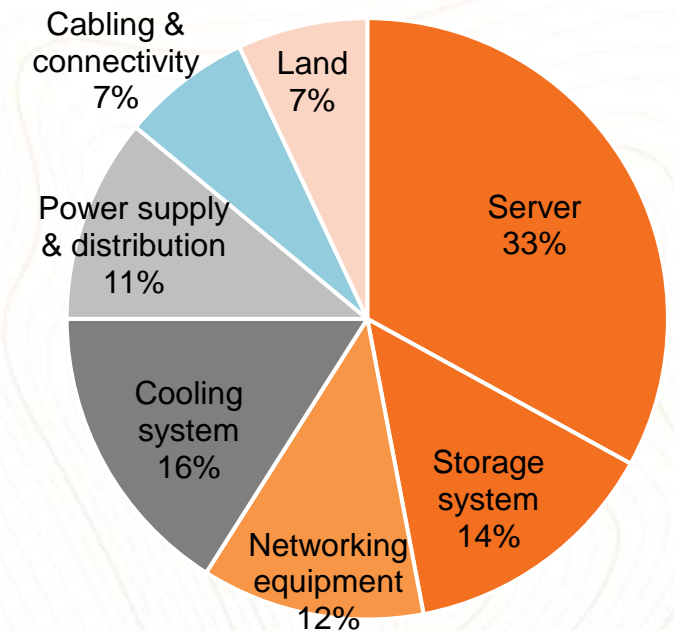
### Malaysia to be the largest data center hub in ASEAN by 2028, a boost for E&E



- As of 2023, live data centers in Malaysia stood at 280 megawatt (MV), ranked as the **2<sup>nd</sup> largest market in ASEAN** after Singapore (988 MV).
- By 2028, Malaysia is poised to become the largest data center market in ASEAN** with capacity of 3,221 MV, up 12 times and surpassing Singapore of 1,455 MV and Indonesia 1,519 MV (figures includes live, under construction, committed and early stage).

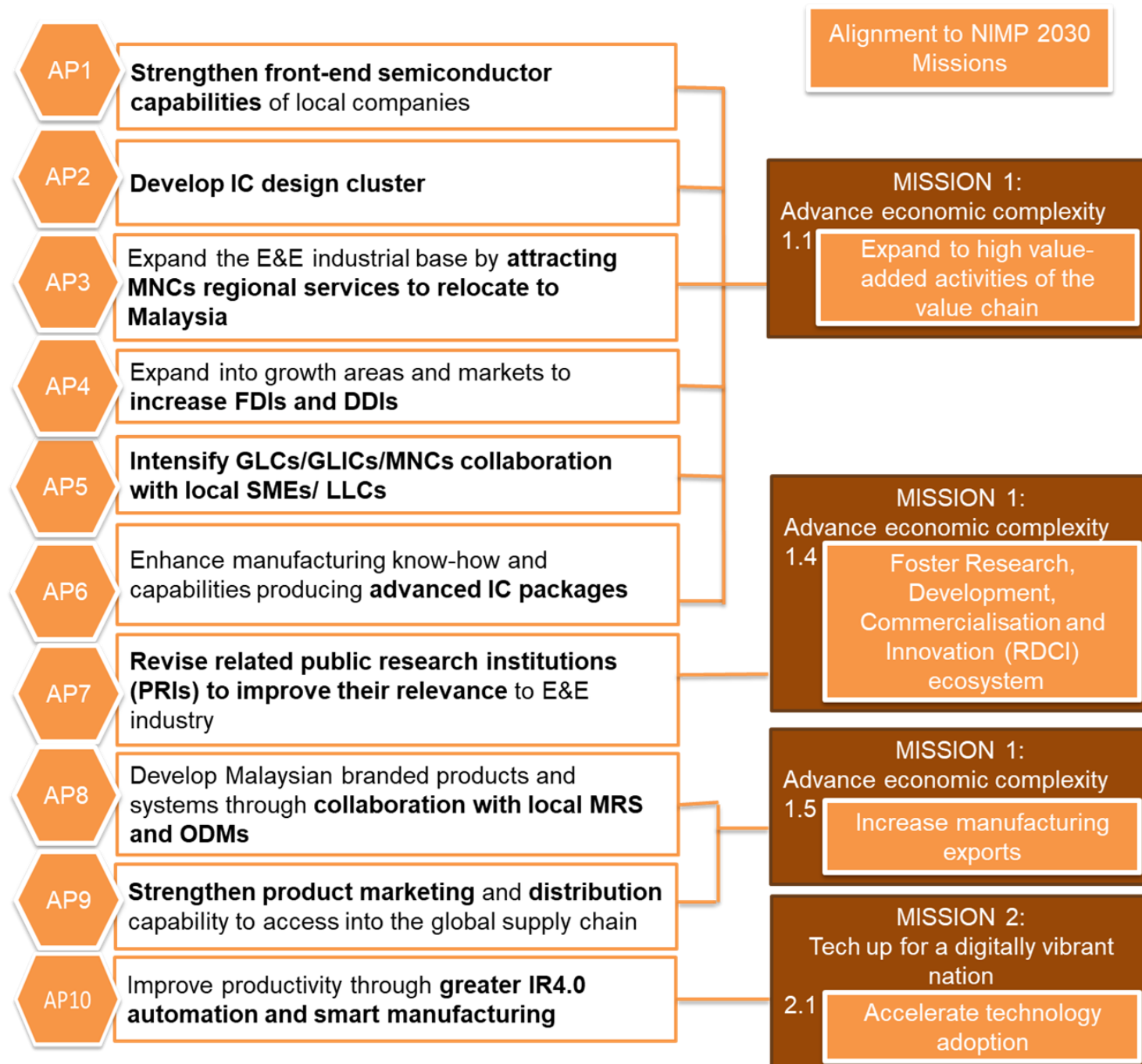
### Data center infrastructure requires E&E products

**Breakdown of infrastructure needs for data center (by cost)**



- ~93% of total cost is related to E&E products.**
- E&E manufactures may benefit** from data center in terms of supplying products such as **networking, cooling, power supply and distribution, cabling & connectivity.**
- However, **server & storage** (47% share) are mostly owned by MNCs (i.e Intel, Seagate, IBM, Asus, Nvidia, Cisco etc), which **are likely being imported.**
- IT vendors** (services) may grab the opportunity to **supply and maintain data centers' server and storage systems.**

### Strategies under National Industrial Master Plan (NIMP) 2030 for E&E Industry



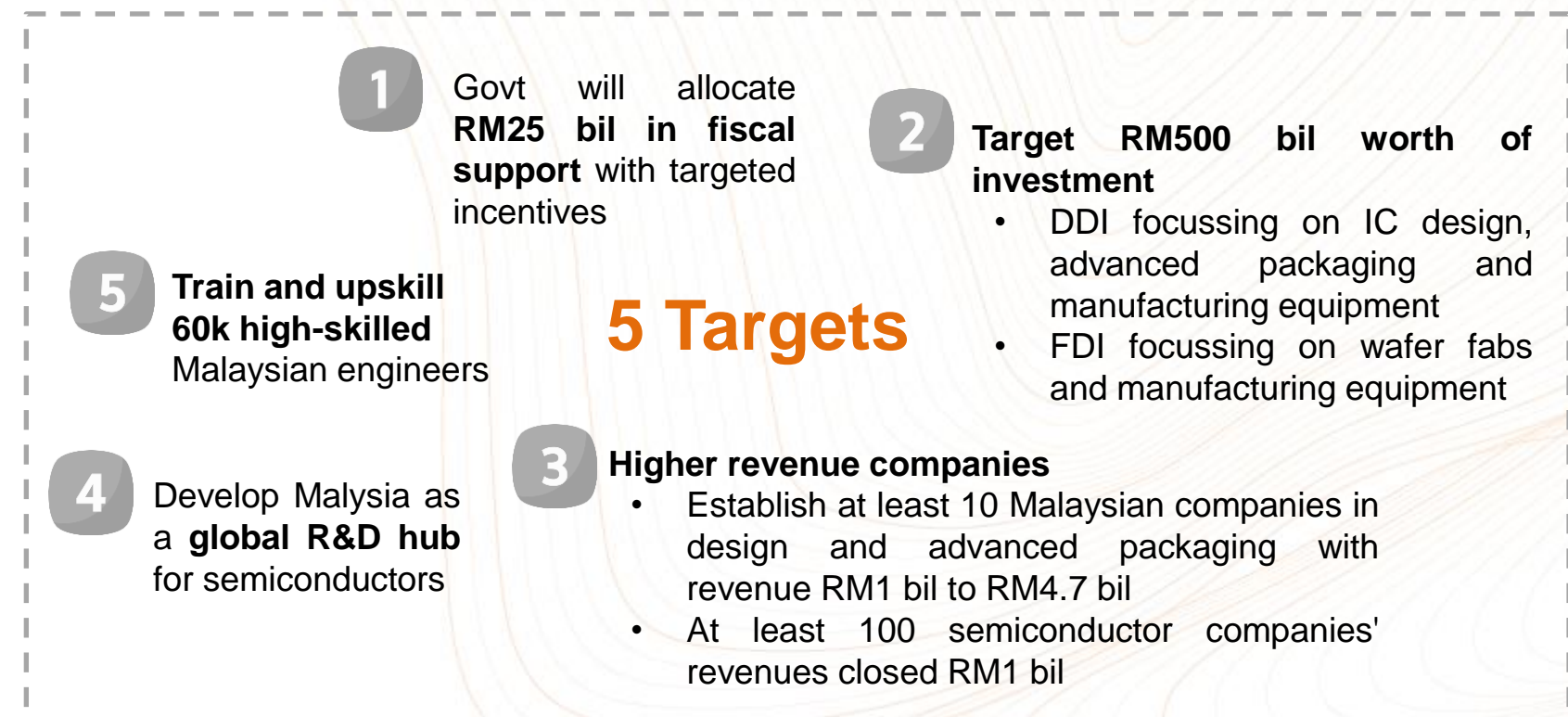
Notes:

- |   |                                     |
|---|-------------------------------------|
| 1. Large Local Companies (LLC)          | 4. Foreign Direct Investment (FDI)  |
| 2. Manufacturing Related Services (MRS) | 5. Domestic Direct Investment (DDI) |
| 3. Original Design Manufacturer (ODM)   |                                     |

### National semiconductor strategy

## 3 Phases

- 1 Building on Foundations**
  - Modernisation of OSAT services, with moves towards advanced packaging
  - Growing existing fabs and pursuing FDI to expand capacity in trailing chips, particularly power chips
  - Develop local chip design champions
- 2 Moving to the Frontiers**
  - Pursuing cutting edge logic and memory chip design, fabrication and testing to integrate purchaser of these chips
  - Integrate local design champions into ecosystem of advanced fab companies
- 3 Innovating at the Frontier**
  - Doubling down by supporting the development of world-class Malaysian Semiconductor Design, Advanced Packaging & Manufacturing Equipment firms
  - Attract buyers of advanced chips to pursue advanced mfg in Malaysia



## 5 Targets



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