

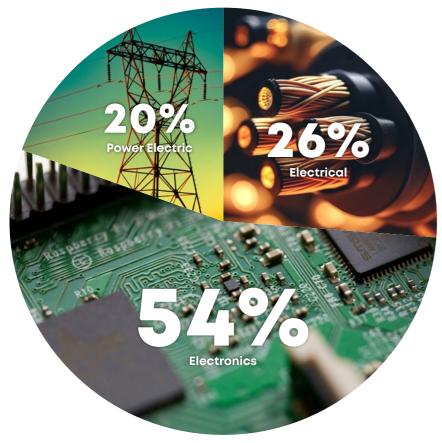
E&EASALEADING SECTOR OF THE COUNTRY

The electronics and electrical industry is pivotal to Thailand's economy, contributing significantly to GDP while driving technological advancement, exports, and job creation. In 2023, Thailand's E&E manufacturing industry produced a total of 97.94 billion USD worth of electrical, electronic, and power electric products, marking a 6.23% increase year on year in production output value.¹

As a key player in Southeast Asia's manufacturing hub, Thailand benefits from a robust ecosystem of electronics production, fueling economic growth and enhancing global competitiveness, positioning it as a preferred destination for investment and innovation in the digital age.

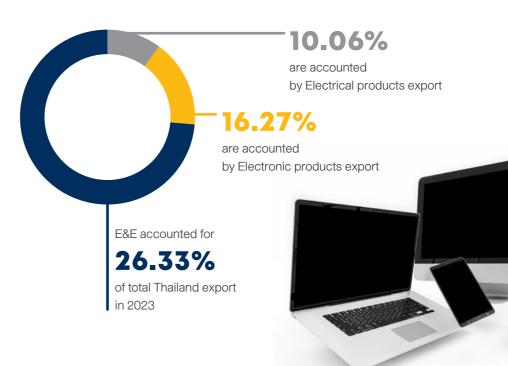
Domestic Product in 2023 by Product Sector

Total Value
97.94



Source: ¹Thaieei

EXPORTOFE&EPRODUCTS FROM THAILAND



Top three E&E exported products in 2023 with percentage share of E&E export value

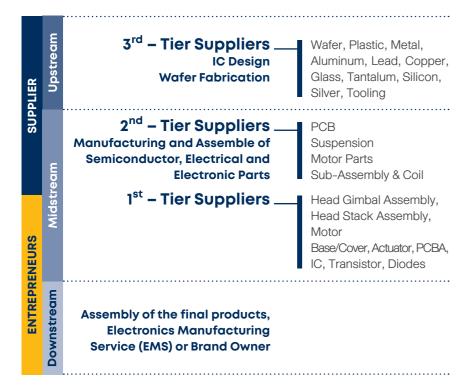
15.51% Computer parts and components
12.55% Integrated Circuited (IC)
7.13% Air conditioner

The E&E sector is tremendously crucial to Thailand's economy, accounting for over a fourth of Thai exports¹. Among the top three exported products are computer parts and components, integrated circuits, and air conditioners². Additionally, Thailand holds a significant global position as a producer of HDDs (Hard Disk Drives), ranking as the world's second-largest HDD exporter with a market share of 22.4% in 2022³.

Air conditioners stand out as the third most valuable export product in the E&E industry, and notably, Thailand leads among electrical product exports. In 2022, Thailand emerged as the world's second-largest exporter of air conditioners, with a value of approximately 7 billion USD and a 11.6% share of the global total export⁴.

Source: ¹Ministry of Commerce, ²Thaieei, ³SCB EIC, ⁴worldstopexports

STRUCTURE OF **THAILAND'S E&E VALUE CHAIN**



The E&E industry in Thailand encompasses a comprehensive supply chain, divided into three key components: suppliers, entrepreneurs, and the support sector. Firstly, the supplier sector comprises manufacturers, categorized into three tiers based on their position in the production line, either upstream or midstream. Third-tier suppliers manufacture upstream goods like plastics, wafers, glass, and raw materials. Midstream products are generated by second-tier and first-tier suppliers. Entrepreneurs, the second sector, represent the final product brand owners responsible for assembling and marketing the end products. The support sector, the final component, comprises other relevant agents to the industry, including financial services, educational institutes, and government agencies.



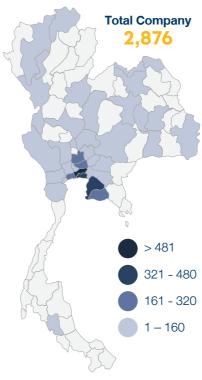
Source: Department of Intellectual Property

DEMOGRAPHIC OF THAILAND'S E&E INDUSTRY

update as of March 2024

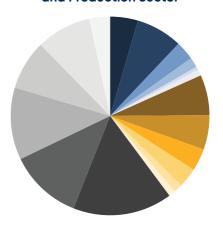
The Thai E&E industry is geographically dispersed across the country, with a significant concentration of companies in the Bangkok metropolitan area and the Eastern Economic Corridor (EEC) area, hosting 1,786 and 680 companies, respectively. E&E companies are spread across 37 provinces, ensuring widespread economic impact. Notably, 60.33% of these companies are smallsized, with medium and large companies sharing similar proportions. Smaller companies predominantly specialize in electrical parts production, while larger companies are more inclined towards electronic product manufacturing.

Company by Province



Source: Thaieei

Company by Size and Production Sector



18.15%
4.5%
7.4%
3.3%
1.7%
0.5%
1.0%
21.52%
6.6%
5.6%
3.6%
3.1%
1.5%
1.1%
60.33%
16.3%
11.9%
11.8%

Supporting Services

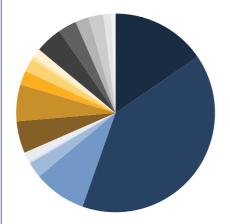
Trader

Other

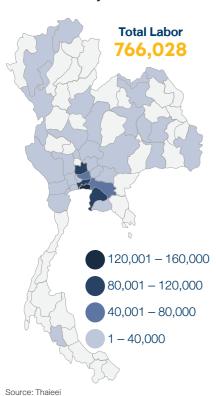
8.0%

8.9% 3.4% Similarly, the workforce in the E&E industry is concentrated in the Bangkok metropolitan region, the EEC, and Ayutthaya province. Two-thirds of employees are engaged with large companies, contrasting with only 14.16% working in small companies. Although a greater number of companies specialize in electrical parts production, half of the workforce is employed by electronic companies, while approximately a quarter are in the electrical parts sector.

Labor by Company's Size and Production Sector



Labor by Province



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Large Company	68.02%
Electrical Parts	15.6%
Electronics	39.3%
Electrical	8.6%
Supporting Services	2.6%
Trader	0.3%
Other	1.6%

Medium Company	17.81%
Electrical Parts	5.3%
Electronics	6.1%
Electrical	2.3%
Supporting Service	2.1%
Trader	0.6%
Other	1.5%

Small Company	14.16%
Electrical Parts	4.5%
Electronics	3.0%
Electrical	2.3%
Supporting Services	2.4%
Trader	1.3%
Other	0.7%

TRANSFORMATION TO BECOME A MORE MODERN AND INNOVATIVE INDUSTRY

Thailand is transforming toward modern technology and a smart economy. This transformation results in an increase in demand for IoT, smart electronic devices, and robotics/Al. The value of the IoT market revenue in Thailand is expected to double from 2022 to 2028¹.

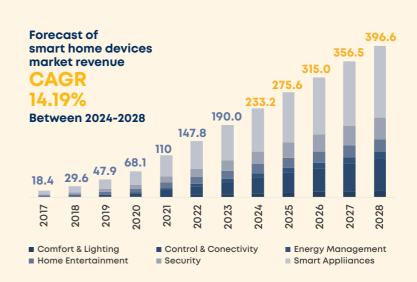
The growth of the smart home device market also highlights this trend. Thailand's smart home market has expanded rapidly, integrating seamlessly into people's daily lives. Within seven years, from 2017 to 2023, the market revenue increased tenfold. It is expected to continue this trajectory, doubling the 2023 market revenue by 2028, which would be more than 13 times larger than a decade ago¹.

Thus, there are opportunities to produce E&E products to serve both consumers and manufacturers' domestic demand.

Thai IoT market Revenue Forecast

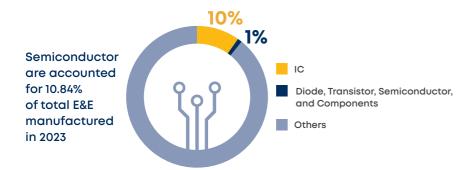




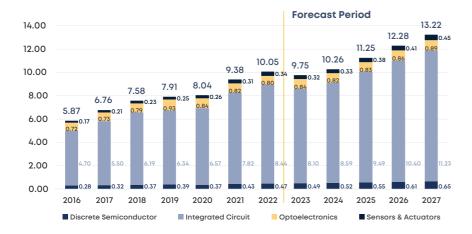


Source: ¹Statista

SEMICONDUCTOR AS A KEY DRIVER OF **E&E INDUSTRY**



Thailand's semiconductor industry has recently played a significant role in the Thail economy. Semiconductor products in Thailand can be divided into two types: Integrated Circuits (IC) and Diodes, Transistors, Semiconductors, and Components. ICs represent the majority of the Thai semiconductor market, valued at 9,595.66 million USD in 2023, compared to 1,023.93 million USD for Diode, Transistor, and Component values. In terms of value, IC products have experienced steady growth since 2020, reaching their peak in 2023, and are expected to continue growing¹.



The semiconductor market in Thailand is expected to rise steadily from 2023 to 2027 across all products. Total revenue is forecasted to increase from 9.75 billion USD in 2023 to 13.22 billion USD in 2027. Integrated Circuits (IC) will remain a major semiconductor product during this period ².

Source: ¹Thaieei, ²Statista

SHARE OF THAI SEMICONDUCTOR **EXPORTS ON THE GLOBAL** STAGE



Thailand accounted for 2.65% of global total semiconductor devices export and 1.76% of total import in 2022¹

Top three exported destination of Thai semiconductor products in 2021²

1	Hongkong	24%
%	Hongkong	24%

ASEAN (combined)	24%
, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	



Not only are semiconductors important for Thailand's economy, but Thailand is also demonstrating its significance in both the regional and global semiconductor device markets as an important exporter and a significant importer¹.

The largest destination for Thai semiconductor products in terms of exports is Hong Kong, with a 24% share, followed by the USA at 15%. ASEAN also represents a significant market, with combined semiconductor imports from Thailand comprising over 24% of the total export. Among ASEAN countries, Singapore is the largest destination, accounting for a 10% share of the total semiconductor exports².

Source: ¹oec.world, ²Trade Policy and Strategy Office

OPPORTUNITIES FROM THAILAND'S **SEMICONDUCTOR SECTOR**

Thailand presents opportunities for producing semiconductor products due to the increasing demand from domestic use, particularly in the IC market.

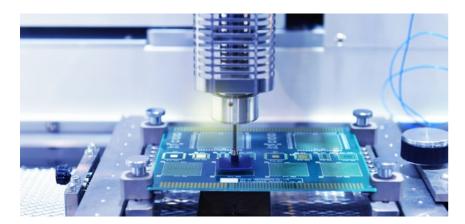
In 2023

Only **0.12%** of IC domestic product were sold domestically and accounted for just 0.06% of total used in domestic market



2.08%

28% of Diodes. Transistor, Semiconductor. and Components domestic product were sold domestically and accounted for 12% of total used in domestic market



Thai semiconductor production also has an opportunity to advance into more complex sectors within the semiconductor value chain. As of 2023, most semiconductor products produced in Thailand were exported, and nearly 100% of the ICs used in the domestic industry were imported, despite Thailand being a major player in the global IC market. A similar situation also exists in the Diodes, Transistors, Semiconductors, and Components market, with 28% of the products used domestically, accounting for 12% of the domestic use value. This indicates opportunities to expand Thai production to manufacture products that meet the country's domestic needs.

Thailand Opportunity Outsourced Assembly **Outsourced Assembly** and Test (OSAT) and Test (OSAT) **Back End** (***) Assembly, packaging Dicing process and packaging Dicing process and packaging & testing <10 nm (advance node) <10 nm (advance node) **Front End** Wafer fabrication #**9**#

Current Global Value Chain

With the industry's involvement in the global supply chain, Thailand has the capability to expand its involvement in other areas, including:

> **Enhancement of Outsourced Assembly and Test to offer chip** package services, chip assembly, and chip testing at similar levels of complexity.

Extension of its chip manufacturing services to include silicon wafer manufacturing (front-end processes).

> Thailand could expand into chip manufacturing with sizes larger than 10 nanometers, which represents less advanced technology compared to the cutting-edge, but still holds significant market value.



Source: SCB FIC

Source: Thaieei

SUPPORTING FACTORS: POLICIES FOR THAILAND'S E&E INDUSTRY

The Thirteenth National Economic and Social Development Plan (2023-2027)

Milestone 6: Thailand is an ASEAN's hub for digital and smart electronics industry

The Thai government recognizes the importance of the Thai E&E industry and the opportunities available for its growth. To support the development of the industry, several plans have been initiated. In Milestone 6 of the Thirteenth National Economic and Social Development Plan (2023 - 2027), one of the core strategies for the Thai economy aims to establish Thailand as ASEAN's hub for the digital and smart electronics industry, with three main targets:



Restructuring the manufacturing and service sectors towards an innovation-based economy by expanding the current electronics industry and shifting towards the smart electronics industry and shifting towards the smart electronics industry with a focus on manufacturing key parts in the ASEAN supply chain, which will be of high value and high demand on future markets, together with boosting the digital industry's competitiveness.



Developing human capital for the new global era by creating a capable workforce in the smart electronics and digital service industry.

Enhancing Thailand's capability to cope with changes and risks under the new global context by encourage the use of digital technology in diverse sectors and dimensions.



Source: NESDC, Thaiee



The Office of Industrial Economics announced an action plan for smart electronics industry development phase 1 (2023-2027) to promote Thailand to become the center of electronic devices and smart electronics manufacturers in ASEAN and obtain their own technology by 2027 with four target groups including, **Smart Home, Smart Factory, Smart Hospital & Health, and Smart Farm.**

2 Targeted Indicator

Smart electronics export value increase to account for 60% of total E&E export value by 2027

Smart electronics R&D investment are no less than 1% of GDP from industrial sector by 2027

3 Main Measure

To enhance the competitiveness of the existing smart E&E industry and encourage the development of new ones.

To stimulate demand and create domestic smart E&E consumption by defining or supporting government procurement to use smart E&E devices in government projects.

To create and develop the ecosystem for the smart E&E industry by developing high-skilled labor and infrastructure to support the expansion of the industry.

Source: The federation of Thai Industries

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SUPPORTING FACTOR: FACILITIES AND PLATFORMS

Several platforms and facilities have been established to support the research and innovation development of the E&E industry, with most of them being supported by government agencies.



Industrial IoT and Data Analytics (IDA) Platform¹

A cooperative project between the National Science and Technology Development Agency and private sector partners that collects data from IoT devices installed on machines throughout the manufacturing chain. The aim of this project is to help firms digitalize manufacturing, increase production efficiency, and conserve energy.



NETPIE²

NETPIE is an IoT cloud-based platformas-a-service that seamlessly connects IoT devices by transferring the complexity from application developers or device manufacturers to the cloud.



Source: ¹NECTEC, ²PTEC

PTEC1

A center for the testing, certification, calibration, training, inspection, and site survey of electrical and electronic products.

SUPPORTING FACTOR: RESEARCH INSTITUTES

Thai government agencies have established institutes to study advancements in the Thai E&E industry. These institutes focus on both technology research and information research to help propel the industry forward.



Thai Microelectronics Center: TMEC¹

A research institute under NECTEC focusing on the research and development of sensor and silicon-based electronic devices. The areas of research include Micro Electro-Mechanical Systems (MEMS), ISFET Platform, Wafer-level Sensor Prototyping, Integrated Circuits (IC), Surface Technology, and Microfluidic Devices.



Electrical and Electronics Institute²

An independent institute established by the Ministry of Industry with the aim of driving the usage of domestic products, expanding the export market, and providing quality and reliable insights into the E&E industry data.



Thailand Digital Valley (IoT & Digital Innovation Institute)³

The goal is to attract investments in EECd by building confidence and motivation, fostering collaboration between the private sector, education institutions, and the government on 30 acres in EECd. This initiative aims to create a digital ecosystem and open platform for startups, particularly in FinTech, AgriTech, TourismTech, HealthTech, EduTech, and GovTech.

Source: The federation of Thai Industries

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SUPPORTING FACTOR: HUMAN RESOURCES

Thailand consistently produces a high number of higher education graduates each year. Among them, over sixty thousand graduated in the field of science and engineering, especially in areas related to the E&E industry such as electrical engineering, mechanical engineering, electronics engineering, chemistry, and physics. As a result, Thailand has a substantial number of skilled laborers to drive the development of the E&E industry and help the country thrive in this field.

Graduate in 2021 in Field of Sciences and Engineer

Unit: billion USD

40,348



21,926



Top Graduated in Related to E&E field



Electrical Engineering **5,586**



Mechanical Engineering

4,449



Electronics Engineering

ngineering **1.547**



Chemicals 2,420



Physics **1,633**

BOI'S INCENTIVES ON E&E INDUSTRY

The BOI has announced the Five-Year Investment Promotion Strategy (2023-2028) on December 8, 2022, which is enforced from January 3, 2023, to attract companies with expertise or seeking to establish investments in targeted areas.

There are three main incentive including corporate income tax (CIT) exemption, other tax incentives, and non-tax incentives.

CIT exemptions period is vary depending on the activity or sector of the investment, lasting up to 13 years while Other tax incentives and non-tax incentives are applicable to all activities promoted under the scheme.

Other tax incentives, including

- exemption of import duties on machinery.
- exemption of import duties on raw materials used in production for export.
- exemption of import duties on raw materials used in research and development (R&D).

There are four non-tax incentives available for promoted companies, including

- permits to own land.
- permits to bring skilled workers and experts into the kingdom for investmentpromoted activities.
- permits for foreign nationals to enter the Kingdom for studying investment opportunities.
- permits to remit money abroad in foreign currency.

All promoted activities are subject to specific conditions announced by the BOI that must be complied with.

"Semiconductor and Advanced Electronics" Workforce Development Project³

Government Agencies









Private Sector Companies







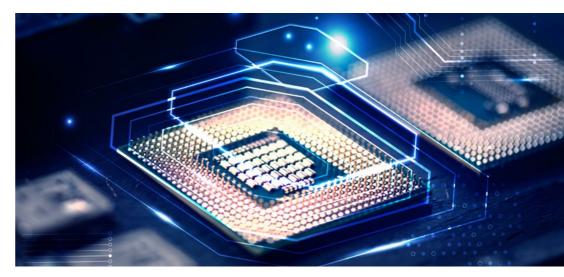








Source: STEMplus, MHESI, ³NXPO, ⁴Khon Kaen University



Source: BO

	Activities	Promotion Group	CIT Exemption Period	Note	Activities	Promotion Group	CIT Exemption Period	Note
Electronic design i.e. microelectronics, optoelectronics or embedded systems			bedded systems	2. Manufacture of electronic prod	ucts, devices	and parts		
		A1	8 years without limit on the CIT exempted	Additional conditions must be compline	2.14 Manufacture of audio-visual products and parts	A3, A4	3-5 years	CIT exempt period depend on PCBA manufactured
2. Manufacture of electronic products, devices and parts				2.15 Manufacture of office electronics and parts	A3, A4	3-5 years	CIT exempt period depend on if whether PCBA manufacturing include in the same project	
2.1	Manufacture of wafer	A1+	13 years without limit on the CIT exempted	Project must have production process as approved by the Board	Manufacture of telecommunication devices and wireless-system devices	A3,A4	3-5 years	CIT exempt period depend on activity details. Additional conditions must be compline
2.2	Manufacture or test of semiconductors and integrated circuits (IC)	A2,A3	5-8 years	CIT exempt period depend on capital investment. Additional conditions must be compline	2.17 Manufacture of electronic measuring instruments and parts 2.18 Manufacture of power supply, converter, inverter or charger	A3, A4	3-5 years	CIT exempt period depend on if whether PCBA manufacturing include in the same project
2.3	Manufacture of electronic passive components	A2,A3, A4	3-8 years	CIT exempt period depend on capital investment and activities detail. Additional conditions				Additional conditions must be compline
	i.e. resistors, capacitors and inductor			must be compline		A3, A4	3-5 years	CIT exempt period depend on activity details. Addition specific conditions must be compline
2.4	Manufacture of circuit board and/or parts	A2,A3,B	0-8 years					
2.5	Manufacture of printed circuit	A3,A4,B	0-5 years		2.19 Manufacture of products using microtechnology	A2	8 years	Additional conditions must be compline
	board assemblies (PCBA) and downstream products from PCBA in the same project.				Manufacture of other electronics products and parts	В	0 year	
2.6	Manufacture of printed electronics	A2, A4	3-8 years	CIT exempt period depend on				
				numbers of material use. Additional conditions must be compline	3.1 Manufacture of electrical	A4	3 years	Only Air conditioners, refrigerators, freezers, washing and drying
2.7	Manufacture of parts, data storage and memory storage	A2, A3, A4	3-8 years	CIT exempt period depend on activity details. Additional conditions must be compline	appliances			machines and must have high energy efficiency compline with ministry of energy standard.
2.8	Manufacture of energy storage	A1, A2, A3, B	0-8 years (without limit on the CIT exempted)		3.2 Manufacture of parts, connecting devices and electrical wires	A4, B	0-3 years	CIT exempt period depend on activity details. Additional conditions must be compline
2.9	Manufacture of flat panel displays and parts	A3, B	0-5 years		3.3 Manufacture of transformers	A4	3 years	Project must have coil winding process
2.10	Manufacture of electro-magnetic products and parts	A4	3 years		3.4 Manufacture of circuit breakers	A4, B	0-3 years	CIT exempt period depend on activity details. Additional conditions must be compline
2.11	Manufacture of parts, peripheral devices and signal cables	A2, A3, A4, B	0-8 years	CIT exempt period depend on activity details. Some activities must have production process as approved by the Board	3.5 Manufacture of compressors and/or motors for electrical appliance	A4	3 years	Project must have coil winding process or fabrication of stators or rotors in the project.
2.12	Manufacture of parts or equipment for solar-powered products	A2	8 years	Project must have production process and product must have energy yield as approved by the Board	3.6 Manufacture of other electrical appliances, devices and part	В	0 year	
2.13	Manufacture of smart electrical appliances and smart electronics	A2-A3	5-8 years	CIT exempt perioddepend on capital investment. Additional conditions must be compline				

BOI OVERSEAS OFFICES



Head Office, Office of the Board of Investment

555 Vibhavadi-Rangsit Road., Chatuchak, Bangkok 10900, Thailand Tel: (+66) 2553 8111 | Fax: (+66) 2553 8222 | Email: head@boi.go.th

Los Angeles

Thailand Board of Investment, Los Angeles Office, Royal Thai Consulate-General, 611 North Larchmont Boulevard, 3rd Fl, Los Angeles, CA 90004 USA Tel: +1 323 960 1199 Fax: +1 323 960 1190 Email: boila@boi.go.th

New York

New York
Thailand Board of Investment,
New York Office,
7 World Trade Center, 34th Fl., Suite F 250
Greewich St., New York,
NY 10007 USA
Tel: +1 212 422 9009
Fax: +1 212 422 9119

Email: nyc@boi.go.th

Thailand Board of Investment, Stockholm Office: Östermalmstorg 1, 4th Floor 114 42 Stockholm, Sweden Tel: +46 8 5025 6558, +46 8 5025 6559 Fax: +46 8 5025 6500 E-mail: stockholm@boi.go.th

Frankfurt

Thailand Board of Investment, Frankfurt Office: Investment Section Royal Thai Consulate-General Liebfrauenberg 26, 60313 Frankfurt am Main, Federal Republic of Germany Tel: +49 069 9291 230 Fax: +49 069 9291 2320 E-mail: fra@boi.go.th

Paris

Thailand Board of Investment, Paris Office, Ambassade Royale de Thailande 8, Rue Greuze 75116,

Paris, France
Tel: +33 1 5690 2600-1
Fax: +33 1 5690 2602
Email: par@boi.go.th



www.boi.go.th

Mumbai Thailand Board of Investment, Mumbai Office, General Express Tower, 12th Fl, Barrister Rajni Petel Marg, Nariman Point, Mumbai, Maharashtra 400021 Tel: (91 22) 2204 1589-90 Fax: (91 22) 2282 1525 Email: mumbai@boi.go.th

Thailand Board of Investment, Osaka Office, Royal Thai Consulate General. Bangkok Bank Building, 7th Fl, 1-9-16 Kyutaro-Machi, Chuo-Ku, Osaka 541-0056 Japan Tel: +81 6 6271 1395 Fax: +81 6 6271 1394 Email: osaka@boi.go.th

Tokyo

Thailand Board of Investment, Inaland Board of Investment,
Tokyo Office,
Royal Thai Ambassy, 8th FI,
Fukuda Building West, 2-11-3 Akasaka,
Minato-ku, Tokyo 107-0052 Japan
Tel: +81 3 3582 1806
Fax: +81 3 3589 5176
Email: tyo@boi.go.th

Seoul

Seoul
Thailand Board of Investment, Seoul Office,
#1804, 18th FI, Koryo Daeyeongak Center,
97 Toegye-ro, Jung-gu, Seoul, 100-706,
Republic of Korea
Tel: +82 2 319 9998
Fax: +82 2 319 9997
Faxil: cerul@Roj on th

Email: seoul@boi.go.th

Taipei
Thailand Board of Investment,
Taipei Office,
Taipei World Trade Center, 3rd FI,
Room 3E 39-40, No.5, Xin-yi Road,
Sec. 5, Taipei 110, Taiwan, R.O.C.
Tel: +88 6 2 2345 6863
Fax: +88 6 2 2345 9223 Email: taipei@boi.go.th

Thailand Board of Investment, Guangzhou Office, Royal Thai Consulate General, No. <u>36</u> Youhe road, Haizhu District, Guangahou, P.R. China 510310 Tel: +86 20 8385 8988 ext.220-225

+86 20 8387 7770 (Direct Line) +86 20 8387 2700 Email: guangzhou@boi.go.th

Thailand Board of Investment, Shanghai Office, Royal Thai Consulate General 2nd Fl, 18 Wanshan Road, Changning District, Shanghai 200336, P.R. China

+86 21 5260 9876, +86 21 5260 9877 +86 21 5260 9873 Email: shanghai@boi.go.th

Thailand Board of Investment. Beijing Office, Reyal Thai Ambassy, No.21 Guanghua Road, Chaoyang District Beijing 100600 P.R. China Tel: +86 10 8531 8755 to 87,

+86 10 8531-8753 +86 10 8531 8758 Email: beijing@boi.go.th

Sydney
Thailand Board of Investment,
Suite 101, Level 1, 234 George Street,
Sydney New South Wales 2000,
Australia
Tel: +61 2 9252 4884
Fax: +61 2 9252 2883
Email: sydney@bol.go.th

Jakarta Thailand Board of Investment, Inaliana Board or Investment,
Jakarta Office:
Royal Thai Embassy
Jl. DR Ide anak Agung Gde Agung,
Kav. E3.3 No.3 (Lot 8.8)
Kawasan Mega Kuningan,
Jakarta 12950, Indonesia
Tel: +62 817 9800 203
E-mail: jkt@boi.go.th

Thailand Board of Investment, Hanoi Office: Royal Thai Embassy 26 Phan Boi Chau Street, Hoan Kiem District, Hanoi City, Viet Nam Tel: +84 24 3823 5092-4 E-mail: hanoi@boi.go.th

Nyaul Thailand Board of Investment, Riyadh Office: Royal Thai Embassy, Riyadh, Kingdom of Saudi Arabia Diplomatic Quarter, P.O. BOX 94359, Riyadh 11693 (966-1) 488-1174

E-mail: riyadh@boi.go.th

