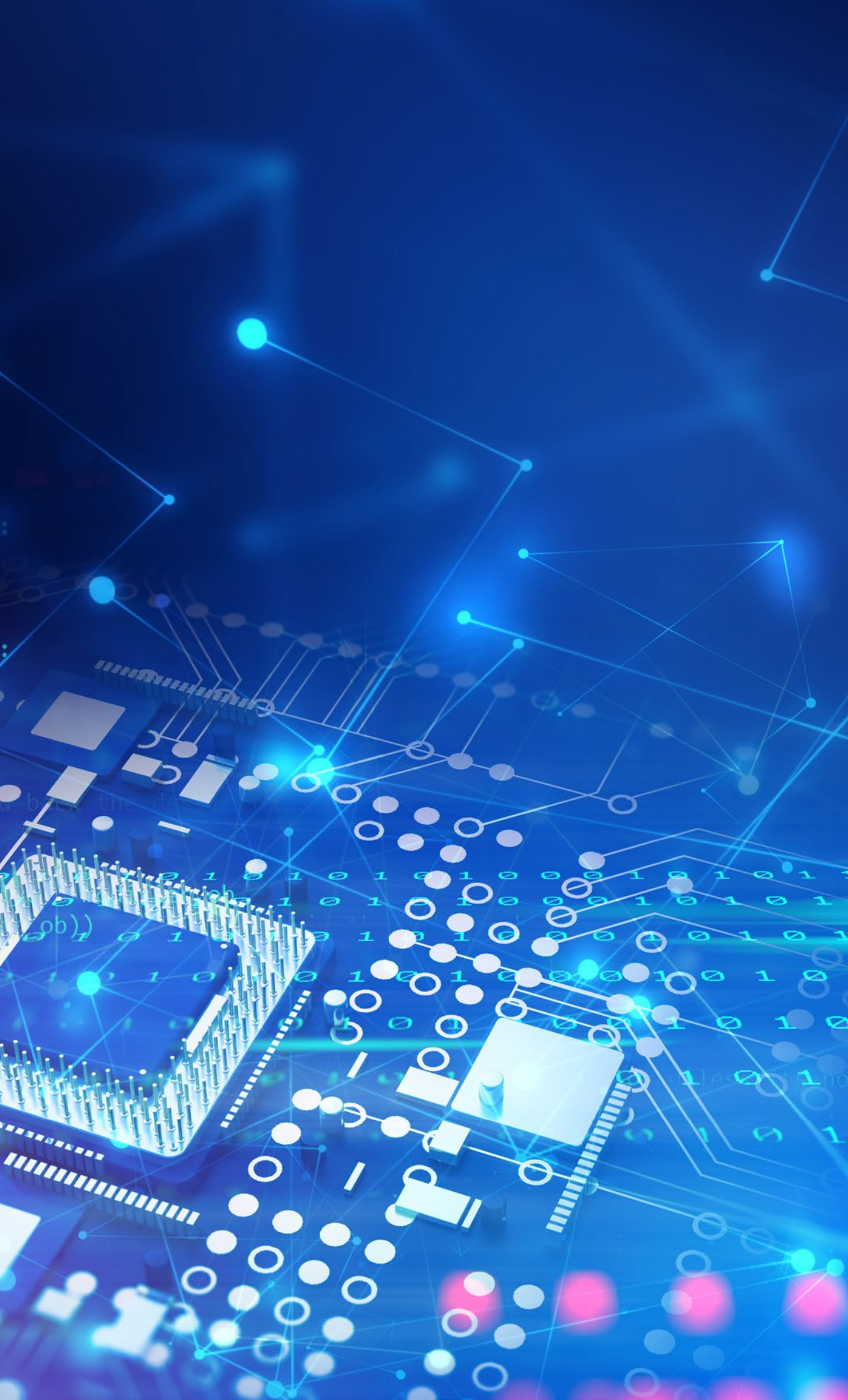


SMART ELECTRICAL & ELECTRONICS INDUSTRY





Why Thailand for Smart Electronics Industry?

Leading Sector of the Country

Thailand has long been a regional leader of E&E production. Renowned for export of hard-disk drive as well as other electronic products, the country's export reaches USD 34 billion in 2020 according to Ministry of Commerce. Beside HDD, key export products include integrated circuits (IC), semiconductor, transistor, diode, and other mobile equipment parts. These samples of product combined account for over 60 percent of E&E export.

A Complete Supply Chain

The E&E supply chain in Thailand has long history. Since the 1970s the Thai government has always been in support of the sector through various forms of incentives and facilitative measures. Hence, the industry has been able to grow to become one of the most vibrant E&E producers in Southeast Asia. Robust network of supporting industries such as metal, plastic, and rubber production enables easy and cost-effective sourcing, which compliments Thailand's position as the prime investment destination for the smart E&E industry.

Growing Demand for Smart E&E in other Products

The ASEAN economy produces around USD 3 trillion of output per year, making it one of the world's most sizable market. The growing consumer demand will spur new type of products not just within the E&E category itself, but also in other industries/products that are also becoming digitally transformed, such as the automotive industries, where digital components are replacing analog equipment. Since Thailand is also the 11th largest automotive producer in the world, E&E producers will see Thailand not only as a hub for production, but also for potential market.

Government and BOI Support

The Thailand Board of Investment offers many highly attractive investment incentives, which, among others, include exemption of import duties on machinery, exemption of import



duties on raw materials used in production for export, and other non-tax incentives such as BOI business facilitation services. Moreover, the incentives are highly competitive compared to the rest of ASEAN, especially the necessary items to include R&D and innovation to develop the products. In order to incentivize these kinds of things, some measures such as corporate income tax exemption can be applied for maximum 8 years.

Overview of Thailand's Smart Electronics Industry

Electrical and Electronics Industry (E&E)

Thailand's export of electrical and electronic products in 2020 reaches USD 34 billion amid the backdrop of the global pandemic. Hard disk drive continued to drive forward export in this category, accounting for around a quarter of all E&E export in 2020. Apart from HDD, integrated circuits accounted for 19 percent or around USD 6.7 billion, followed by semiconductor, transistor, and diode at around 7 percent or approximately USD 2.4 billion.

Peeking at domestic production, besides the set of products mentioned above, Thailand is also a major producer of several commonly used home appliances, such as printers, air-conditioners, compressors, or washers. They are produced by a network of over 2,623 companies of varying production scale. In total, 750,000 are employed in this industry, making the E&E sector one of Thailand's most consequential industry.

The success of the E&E sector is made possible due to a complete and robust supply chain of the upstream industry. In particular, the semiconductor sector in Thailand is well known for its offering of assembling, packaging, and testing, thus enabling it to supply the E&E industry at a competitive cost. Furthermore, prevalence of several key downstream sectors adds to attractiveness of the E&E sector in Thailand. For example, as automotive production in Thailand heads towards modern electric vehicle, more electronic parts and equipment will certainly be needed. With Thailand being the 11th largest auto producers in the world, demands from this sector will be sizable.

A long-standing history of industrial development in the E&E sector: due to a strong and continuous support from the Thai government all the way back to the 1970s, the E&E value chain is therefore vibrant, and accounts for over 10.4 percent of Thailand's GDP in 2020. Furthermore, a complete ecosystem of supporting industries, including iron and steel, chemicals, plastics, or glass production, compliments the ease of procurement when it comes to parts and materials. A survey of Japanese companies by JETRO (2019) indicated that 45 percent of raw parts/materials for E&E production are procurable locally in Thailand.

Semiconductor

As a major manufacturing base in the E&E sector's global supply chain of the E&E sector, the Thai semiconductor industry has become the main sub-sector influencing downstream production. In 2020, the semiconductor industry shared approximately 7% of output bound for Thai electronics export markets. However, most of the semiconductors are supplied within domestic E&E industries. They are recognized as a crucial part of Integrated Circuits (ICs) production, which the latter is commonly used in electronics, computers, and mobile phones. Thus, the semiconductor industry moves closely to the global demand in technology products. The need for electronics equipment rose from Work from Home policies which pushed the distribution for semiconductors to grow up to 6%. The demand for Thai semiconductors is also expected to surge in response to the ongoing coronavirus pandemic.

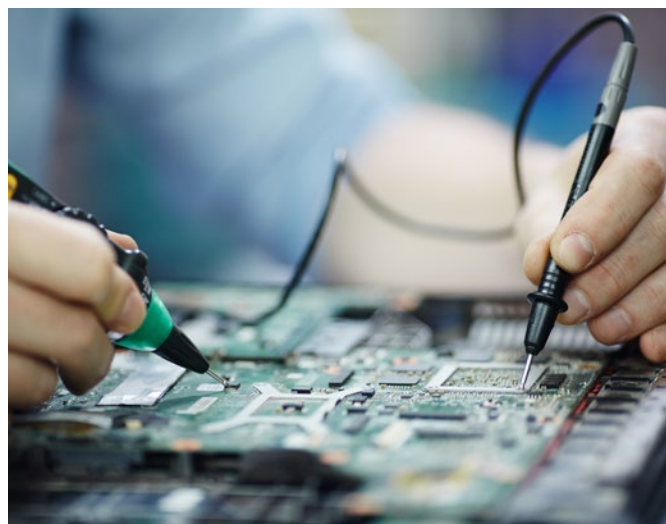
The examples of key semiconductor and semiconductor equipment producers in Thailand are Stars Microelectronics Public, Ecotech-Solar, INDEFF, and Siam IKK. Due to the experience of a hike in demand in the E&E industry, in June 2021, the Thailand Board of Investment approved an enhanced incentive for the semiconductor sector to attract more investors, expand production, and ensure a resilient supply chain.

Printed Circuit Board Industry (PCB)

Printed Circuit Board (PCB) is an important fundamental component of electronic circuits which will serve as a place to hold parts and to route the electrical signals of the various electronic devices on the circuit to keep devices connected and make them able to work. For the PCB market value, the global PCB market is expected to reach a value of 76.9 billion USD by 2024.

In 2020, the Thailand Board of Investment approves the investment application for 15 PCB projects with 244.01 USD investment value. The projects consist of these products as follows: flexible PC or multi-layer PCB or parts, printed circuit board assembly (PCBA), and other PCB which were highlighted as Thailand's key PCB products.

The examples of key player PCB industry in Thailand are Fischer, Kyoden group, Circuit industries, She Feng Enterprise (Thailand) Co., Ltd., Autech Thailand, Draco PCB Public Company Limited, MMC Global. However, more is always needed to prepare for future growth.





Business Opportunities

According to Thailand's trade report from ministry of commerce, electronics products are the large portion of all Thailand's product export such as automotive, computer, and electronic parts. This shows the potential of Thailand in E&E and PCB industry. The followings are a few reasons why Thailand should be a leading destination for E&E investment.

Key Global Levers

- Increasing demand for smart devices across consumer and industrial landscape: for example, IoT devices will soon become rampant as 5G rollout advances around the world; and Thailand will lead in this area as it is among the first country in the world to begin commercial operation of 5G.
- As for non-consumer uses, smart-city development and the rise of megacities, big data and digital transformation will require mass deployment of smart devices.

Location & Market Access

Thailand has connectivity to aerial, land, and marine which easily to import and export products and materials, moreover, also locate at proximity distance to China and India which are 2nd and 6th largest economy globally respectively. For international companies, Thailand's flagship Special Economic Zones like the Eastern Economic Corridor or EEC provides lucrative incentives, and world class infrastructures that set you up for east access to international market with close proximity to Thailand's largest industrial seaport.

In terms of market access, Thailand has an extensive network of trade agreements with 18 countries and jurisdiction via a network of 13 Free Trade Agreements (FTAs.) Thailand also just joined the Regional Comprehensive Economic Partnership (RCEP,) which, once ratified, will provide Thailand with unparalleled access with

Human Resource in Related Fields

Thailand has the total number of the worker in electrical and electronics industry accounting for 752,539 in 2020. This does not include new graduates in relating fields from various educational levels: diploma, high vocational education, and bachelor which make up 80,000 people approximately. This shows the potential of Thailand in the smart electronics industry.

Ease of Doing Business and Export Potential

Thailand is being reported as the 21st easiest place for doing business in the world and 3rd in ASEAN. It is an area where Thailand has been continuously improving over the past 10 years. More importantly, the BOI will work hard to ensure that your business operation and investment process run smoothly.

BOI and Government Support

BOI Incentives

The Thailand Board of Investment (BOI) offers investment incentives for the electronics industry which consist of exemption of import duties on machinery, raw materials used in production for export, and non-tax incentives. Moreover, BOI also offers CIT exemption as follows.

Investment Incentives for Electronics Industry

(SMT: Surface Mount Technology)

Manufacture of Smart Electronics	
1. Must have sensor 2. Must connect to other devices or in wireless communication system 3. Must have operating system or embedded software	
If Projects have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower.	8-year CIT exemption
If projects have only assembly line	5-year CIT exemption
Manufacture of Emission, Transmission and Reception Devices Used in Fiber-Optic and Wireless Communication Systems	
If Projects have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower	8-year CIT exemption
If projects have only assembly line	8-year CIT exemption
Manufacture of other Telecommunication Products	
If Projects meet following condition 1. Must invest in SMT line for PCBA assembly process 2. Must have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower.	8-year CIT exemption
If projects invest in SMT line for PCBA assembly process	5-year CIT exemption
If projects have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower.	5-year CIT exemption
If projects have only assembly line	3-year CIT exemption

Manufacture of <ul style="list-style-type: none">• Electronic control and measurement instruments for industrial/ agricultural use with high precision sensor• Security control equipment with high precision sensor such as fingerprint scanner and retina scanner etc.	
If Projects have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower	8-year CIT exemption
If projects have only assembly line	5-year CIT exemption
Manufacture of <ul style="list-style-type: none">• Audio visual products• Office electronics	
If Projects meet following condition <ol style="list-style-type: none">1. Must invest in SMT line for PCBA assembly process2. Must have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower.	8-year CIT exemption
If projects invest in SMT line for PCBA assembly process	5-year CIT exemption
If projects expense for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower.	5-year CIT exemption
If projects have only assembly line	3-year CIT exemption



Manufacture of other Electronics Products	
<p>If Projects meet following condition</p> <ol style="list-style-type: none"> 1. Must invest in SMT line for PCBA assembly process 2. Must have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower. 	5-year CIT exemption
If projects invest in SMT line for PCBA assembly process	3-year CIT exemption
If projects have expenses for R&D not less than 0.5% of total sales during the first 3 years or not less than 100 million Baht, whichever lower.	3-year CIT exemption
If projects have only assembly line	-

Source: Thailand Board of Investment

Investment Incentives for Semiconductor and PCB Industry

Manufacturer of Semiconductor	
Front-end semiconductor (electronics design, silicon wafers, wafer FAB etc.)	10-year CIT exemption *Require advanced technology and innovation
Back-end semiconductor (wafer SORT, die bank, assembly, IC testing etc.) <ul style="list-style-type: none"> • Machinery investment of at least 1.5 billion baht • Machinery investment of less than 1.5 billion baht 	8-year CIT exemption 5-year CIT exemption
Manufacturer of Advanced Printed Circuit Board (PCB), including flexible PCB or multi-layer PCB (PCB FAB, FAB Lab, SMT, PTH, PCBA Test etc.)	
<ul style="list-style-type: none"> • Machinery investment of at least 1.5 billion baht • Machinery investment of less than 1.5 billion baht 	8-year CIT exemption 5-year CIT exemption
Manufacturer of Printed Circuit Board Assembly (PCBA) (Box build, Product Test, Pack/Ship etc.)	
<ul style="list-style-type: none"> • Machinery investment of at least 500 million baht • Machinery investment of less than 500 million baht 	5-year CIT exemption 3-year CIT exemption

Note: Semiconductor projects with further investment in R&D will be eligible for up to 5-year CIT exemption
Source: Thailand Board of Investment

Government Support

Supports from Public Organizations

The following agencies are key government stakeholders in Thailand's smart electronics industry. They will work to ensure the success of Thailand's smart electronics industry by providing an array of supports.

E&E Intelligence Unit (EIU): promotes and supports the development and export of electrical and electronic products, as well as serving as a center of information for the industry.

National Electronics and Computer Technology Center (NECTEC): undertakes, supports, and promotes the development of electronics and computer technologies through research and development activities.

Thailand Science Park (TSP): research centers provide services ranging from technology transfer from universities and technology centers to financial assistance and business incubation.

Thai Organic & Printed Electronics Innovation Center (TOPIC): supports and promotes the Organic and Printed Electronics Industry in Thailand through R&D, One-Stop-Service and to make Thailand the location of O&PE infrastructure.

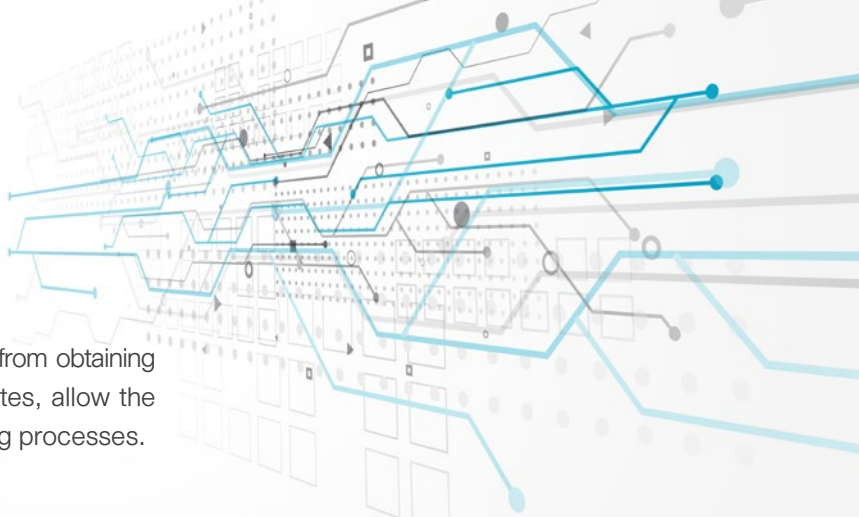
Thai Embedded Systems Association (TESA): Promotes and supports the development of the electronics design industry in Thailand by producing a skilled and innovative engineer supply pool for the electronics industry.



Regulatory Process

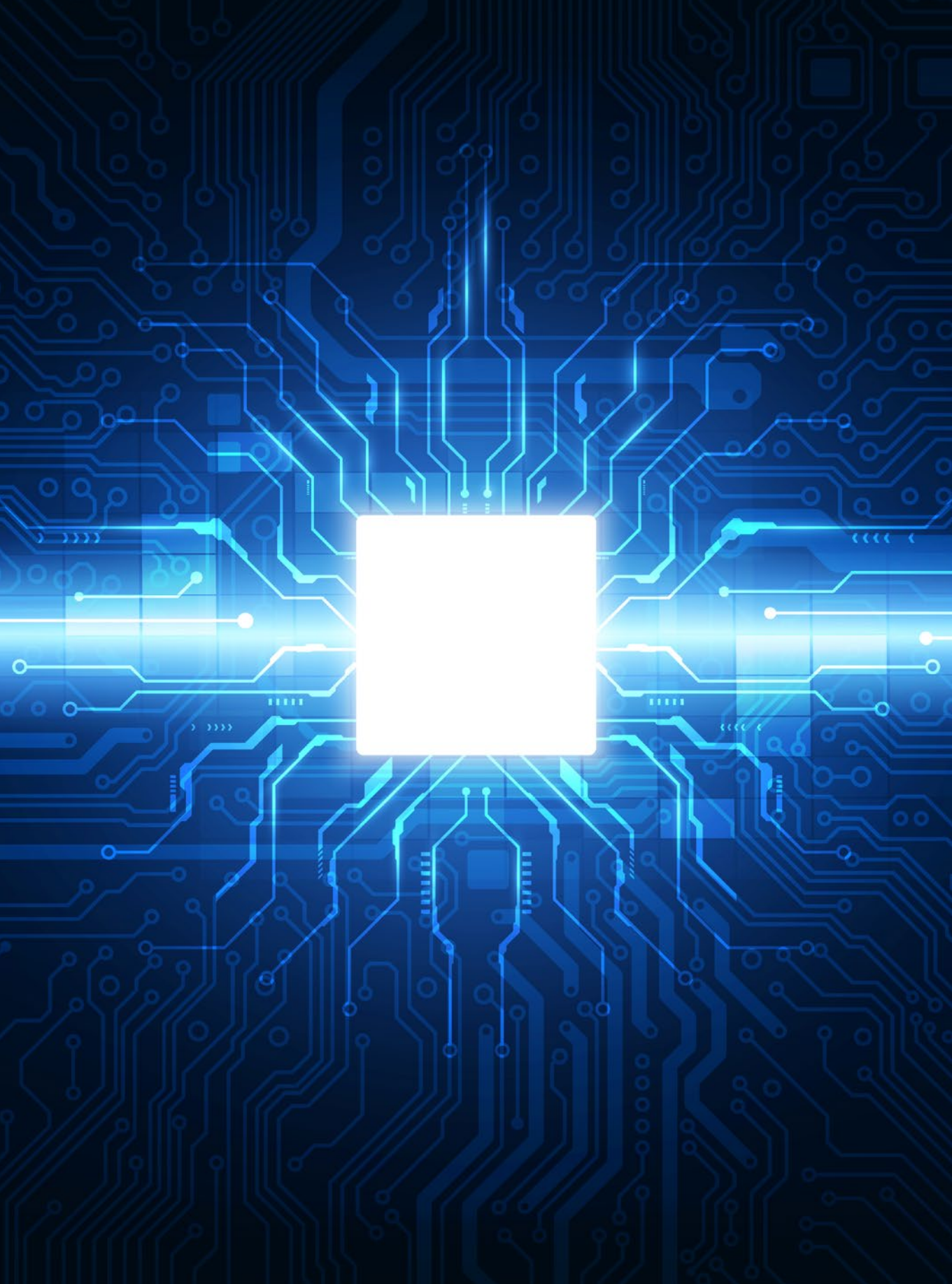
The following illustration describes your investment journey in Thailand. The BOI stands ready to provide investment facilitation services to ensure that you can fully comply with any regulatory requirement.





Per above illustration, apart from obtaining the BOI incentives and certificates, allow the BOI to assist you on the following processes.

Process	Details and Contact Point
Dealing With Construction Permits	<ul style="list-style-type: none">● Building Permit and Occupancy Permit: submit building permit application at the Civil Works department of the area you are building your establishment.● Telephone: TOT Public Company Limited● Water: connect with Provincial or Metropolitan Waterworks Authority depending on your location
Getting Electricity	<ul style="list-style-type: none">● Connect with the Metropolitan Electricity Authority or the Provincial Electricity Authority depending on your location
Registering Property	<ul style="list-style-type: none">● Submit your documents at the Land Office, Department of Lands.● All corporate documents used in this process must be certified copies.
Recruitment	<ul style="list-style-type: none">● Key takeaways in understanding labor laws in Thailand: protections, hours and holiday, compensation, social security, cessation of operation, termination, and minimum wage● Understand incentives for labor skill training
Manufacturing License	<ul style="list-style-type: none">● Apply for Authorization to Use Land, Authorization for New Factory Construction or Rental Factory Renovations, and Authorization to begin factory● Connect with either the Industrial Estate Authority of Thailand (IEAT) or the Ministry of Industry (MOI) Provincial Offices (Dept. of Industrial Works) depending on the location of your establishment
Import And Export License	<ul style="list-style-type: none">● Use of e-Custom system for importing and exporting
Foreign Business License/Certificate	<ul style="list-style-type: none">● Obtain foreign business license if required per business type



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