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INDUSTRY HORIZON

April 2023

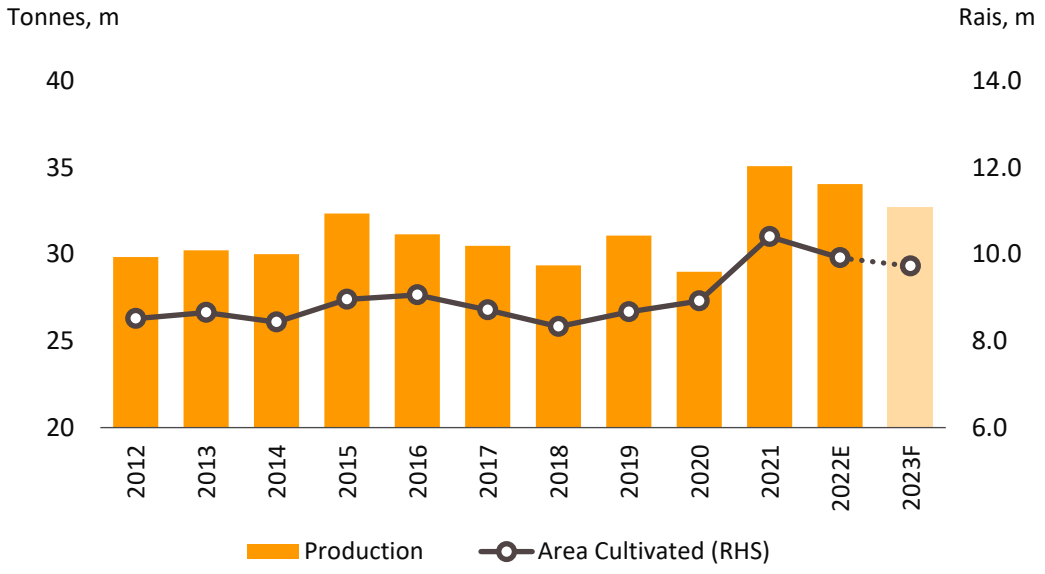
Krungsri Research



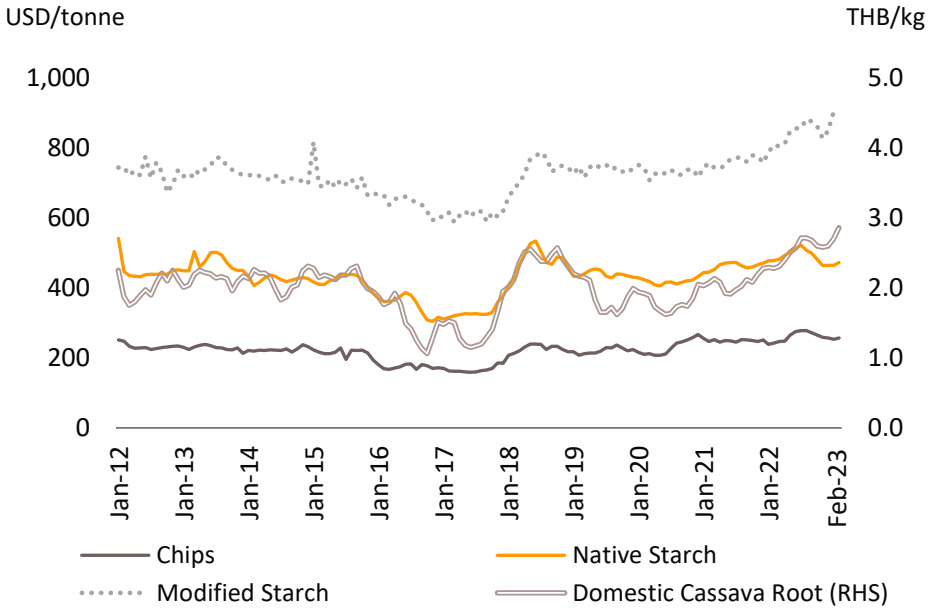
2023 Investment Inducing Growth

Cassava: High prices remain on strong demand and high cost of fertilizer with investment focusing on the transition to low-carbon production.

Thailand Cassava Root Production Forecast



Thailand Cassava Export Price

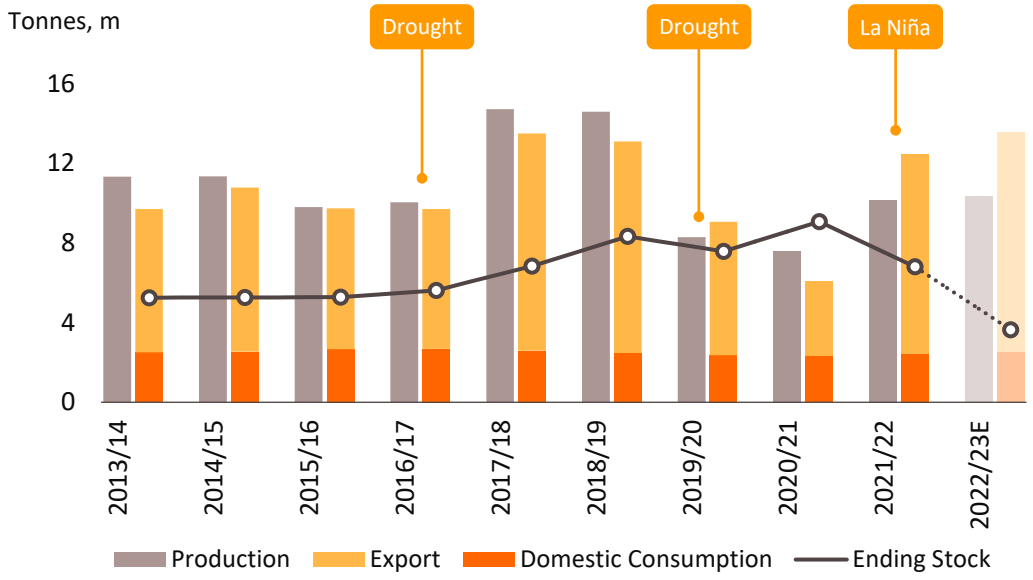


- **Outputs for the 2022-2023 season are expected to decline by between -3.5% and -4.5% to 32.6-32.9mn tonnes.** This is a result of the impact of storms a year earlier and of the rise in fertilizer costs, which has helped to reduce yields, and as such, only 0.74mn households (down -2.5% to -3.5%) are involved in cassava production.
- **Investment is tending to focus on increasing the sustainability of resource use and on shifting the industry towards a low-carbon social and business model,** to be achieved through collaboration with organizations including the ASEAN Cassava Centre and the Thai Tapioca Starch Association, as well as between cassava and tapioca processors. The development of environmentally focused investment projects includes i) setting long-term objectives for reaching net zero by 2050-2070, ii) reducing greenhouse gas emissions by boosting the use of renewable energy in cassava processing facilities, and iii) collecting data on the standardization of production processes, resource use, and carbon footprints. The Thailand Cassava Center has also set targets that will help to ensure that the industry is on a secure basis as regards the environment and its resource utilization as it moves to a low-carbon economic and social model. Investment and demand from downstream industries should remain on a strong upward trend on both the domestic and export markets, though with outputs continuing to weaken, prices will remain high through 2023.

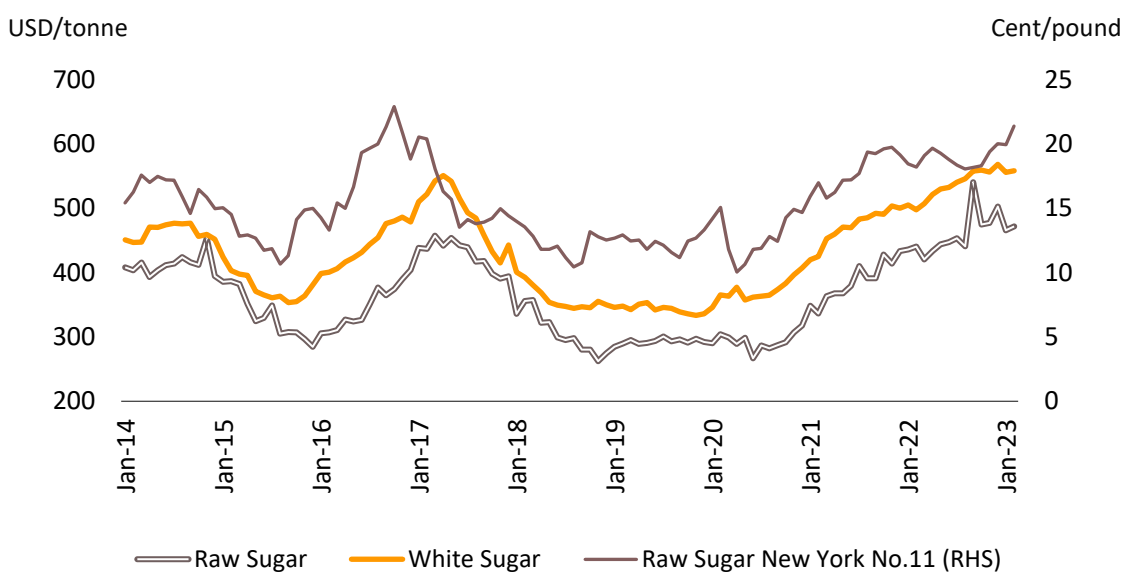
Source: World Bank, Ministry of Commerce (MOC), Office of Agricultural Economics (OAE), Tapiocathai, Krungsri Research

Sugar and molasses: Overall outputs should rise to meet stronger demand, while investment in environmentally friendly downstream industries will increase.

Thailand's Sugar Balance



Thailand's Sugar Export Prices & Raw Sugar New York No.11 Prices



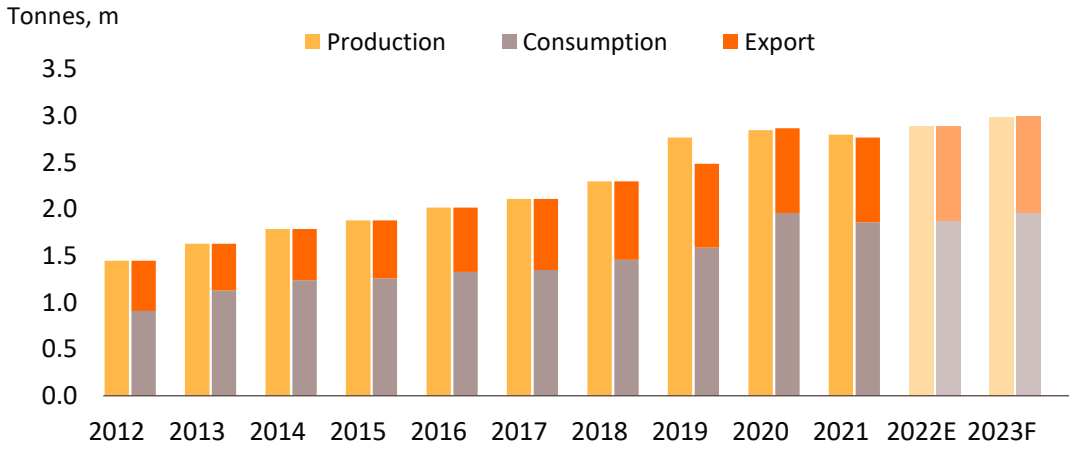
- **Through 2022 and 1Q23,** sugarcane outputs were boosted by generally beneficial weather, and with sufficient rain, efficient water management, rising prices for sugarcane and sugar, and the support of processors, in particular via the minimum price guarantee, **the volume of sugarcane being pressed in the 2022/2023 season rose 2.0% to 93.9mn tonnes.**
- **Many sugar processing facilities have planned or have started to increase their investments in downstream industries, especially those connected with the environment or with alternative energy.** These include manufacturing environmentally friendly packaging from bagasse, producing ethanol from sugarcane, biomass and steam power plants, manufacturing biomass briquettes, EV charging stations, and solar farms. Other related activities include reducing the emission of greenhouse gases, reducing water and energy consumption by reusing these as much as possible, recycling or reusing waste products, tracking the carbon footprint of sugar-based products, and developing forestry resources as a source of carbon credits and to move producers towards carbon neutrality, as per the Bonsucro* sustainable sugar and sugarcane initiative. These investments will help to support the growth of the sugar industry and will allow this to move with the overall expansion in demand for food and drink products. **In 2023, we therefore expect sugar outputs to rise by another 2.0% to 10.4mn tonnes.**

Note : * These measures cover the social, the economic, and the environmental aspects of the production of sugarcane, and encompass the entire length of production processes, from pre-planting soil analysis, through planting, cultivation, care, harvesting, and processing, and ending with trade and distribution that benefits both buyers and sellers. It is hoped that this will then ensure that the sugar and sugarcane industry is able to move to a more sustainable footing.

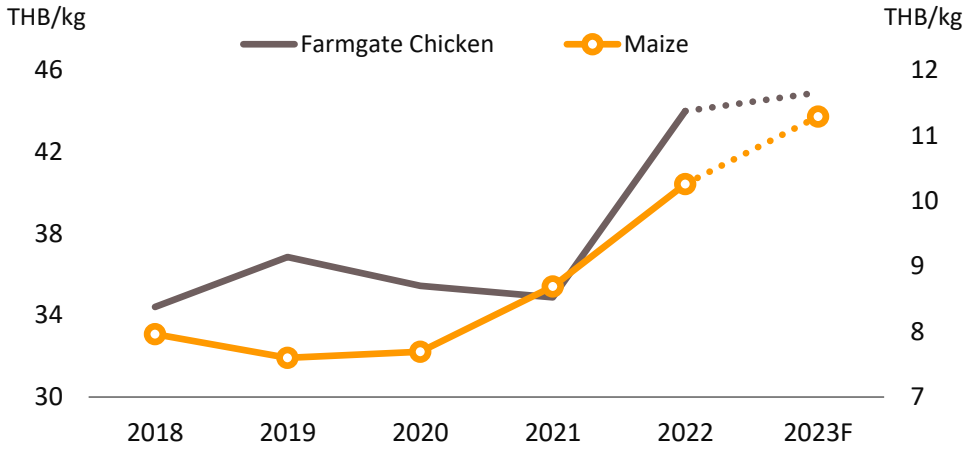
Source: USDA, OAE, MOC, World Bank, Compiled and Forecast by Krungsri Research

Chilled, Frozen and Processed Chicken Industry: Yields will increase on price incentives, and strengthening demand, with increased investment to improve environmental standards and strengthen supply chain integration.

Thai Chicken Industry



Farmgate Chicken and Maize Price



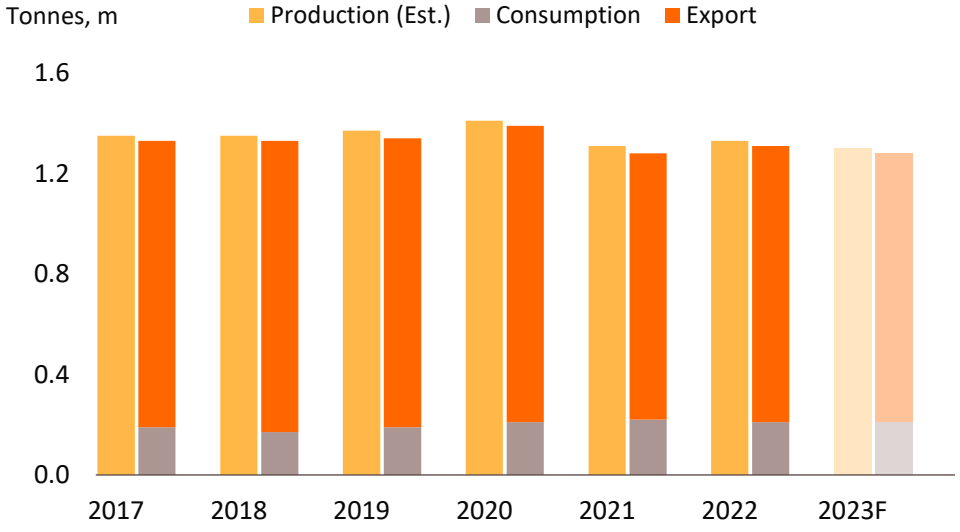
Note : Forecast by Krungsri Research

- **Yields of chicken should rise steadily,** helped by the incentive effect of high prices on supply and by high demand on both domestic and international markets. **Over 2M23, exports of chicken meat increased 4.3% by volume and 10.2% by value** thanks to: (i) stronger demand from China, especially for frozen goods, following the country's reopening; (ii) worries over food security that have been sustained by the continuation of the Ukraine-Russia war; and (iii) improving trade relations with the Middle East (in particular with Saudi Arabia) and the widespread acknowledgment of Thailand's adherence to halal production standards. On the supply side, the widespread outbreak of bird flu in European flocks will also help Thai producers. Domestic demand is growing with the economy and with recovery in the tourism sector, and demand from restaurants is especially strong.
- **Investment in the chicken industry will generally aim at accelerating industrial transformation in 3 dimensions: (i) increasing the business's security and improving its sustainability by expanding and integrating supply chains** by, for example, moving upstream into the production of animal feed and downstream into retail operations; **(ii) cutting costs by investing in energy production** (e.g., from biomass or solar rooftop installations) and the reuse of wastewater; and **(iii) investing in ESG-based production** by improving animal welfare (e.g., allowing access to natural light and reducing stocks), cutting environmental impacts by developing provenance-checking technology, and following through on the plan to start reducing greenhouse gas emissions by 2030. Given these supply-side changes to the industry and rising demand, **2023 yields are expected to increase by 3.0-3.5% to 2.9-3.0 mn tonnes. Exports should strengthen by 2.0-3.0% to 1.03-1.05 mn tonnes, while domestic consumption is forecast to increase to 1.9-2.0 mn tonnes, up 3.5-4.5%.** The high cost of animal feed, especially of corn, for which supplies are insufficient may add to farmgate prices for chicken, pushing these up to THB 44.0-45.0/kilogram.

Source : OAE, MOC, USDA

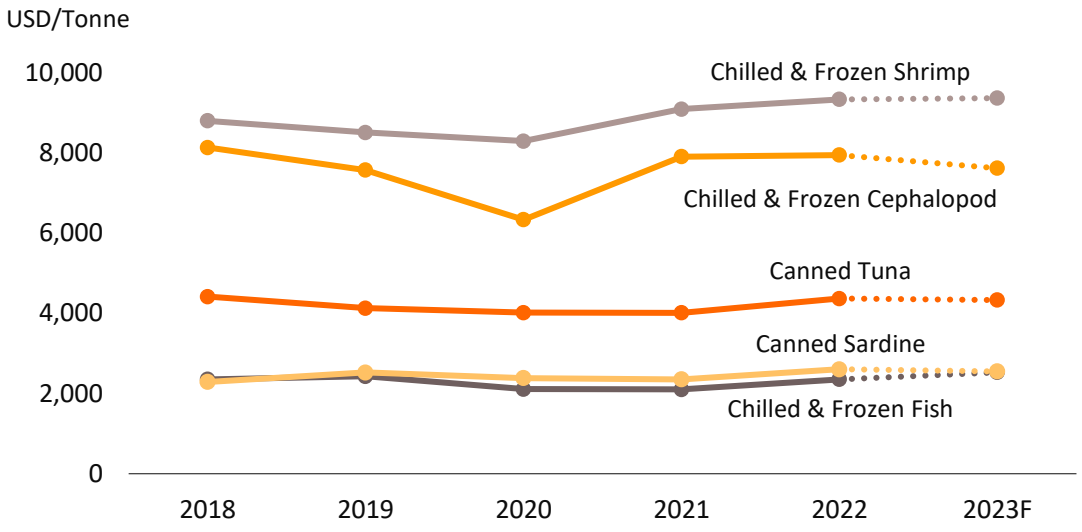
Chilled, Frozen and Processed Seafood Industry: Strong competition on price, worsening access to inputs, and the higher cost of raw materials are dragging business performance; Players will need to invest for sustainable sources of inputs.

Thailand's Seafood Balance



Note : Estimate (Est.) and Forecast by Krungsri Research

Export Seafood Price

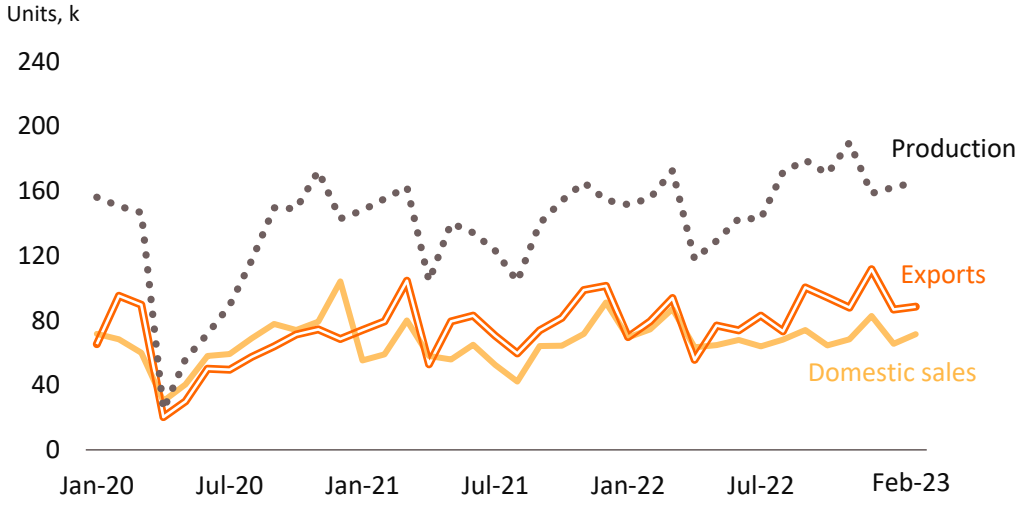


- **Output by the processed seafood industry will continue to weaken** on soft demand and a decline in supplies, and so **over 2M23 exports shrank -13.1% by volume and -10.2% by value.** As a result of Thailand's higher production costs and resulting competitive disadvantages with regard to price, declines were seen across all product groups. In addition, Thai consumers generally prefer fresh to processed seafood and so despite stronger demand from restaurants, overall growth in domestic demand remains flat.
- **Yields are expected to decline by between -1.5% and -2.0% over 2023, falling to 1.28-1.29mn tonnes. Domestic consumption should come to 0.20-0.21mn tonnes (a decline of up to -1.0%), but by value, exports will shrink by between -1.5% and -2.5%, or to 1.06-1.07mn tonnes** as overseas markets respond to Thai producers' higher prices and lack of competitiveness. Operators will tend to respond to this by investing in increasing their competitiveness, for example by recycling and upcycling waste from primary processing into new product lines (e.g., pet food, animal feed, and fish oil). Alternatively, companies may cut energy costs and move towards meeting net zero targets, and these trends are beginning to take shape with projects to generate electricity from rooftop solar installations on processing plants and cold stores, solar heating systems, and non-polluting refrigeration systems. In addition, some companies have adjusted their production lines to include the manufacture of high-value-added products, for example by extracting collagen from jellyfish for use in medical and cosmetic products and using seaweed to produce oil.

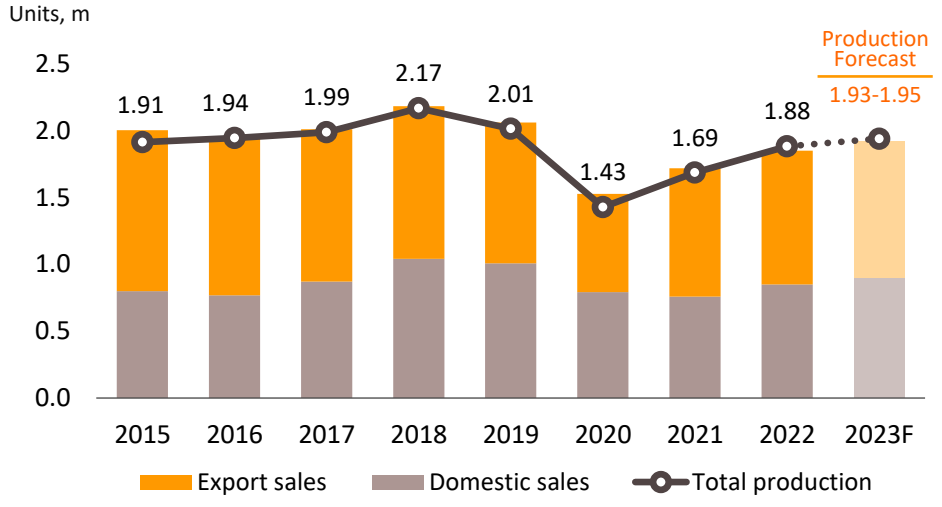
Source : OAE, MOC, Trademap

Automobile: Despite periodic chip shortages, output is expected to rise with an acceleration of investment in BEV, urged by government's supporting programs.

Automobile Production and Sales (Monthly)



Automobile Production and Sales (Yearly)

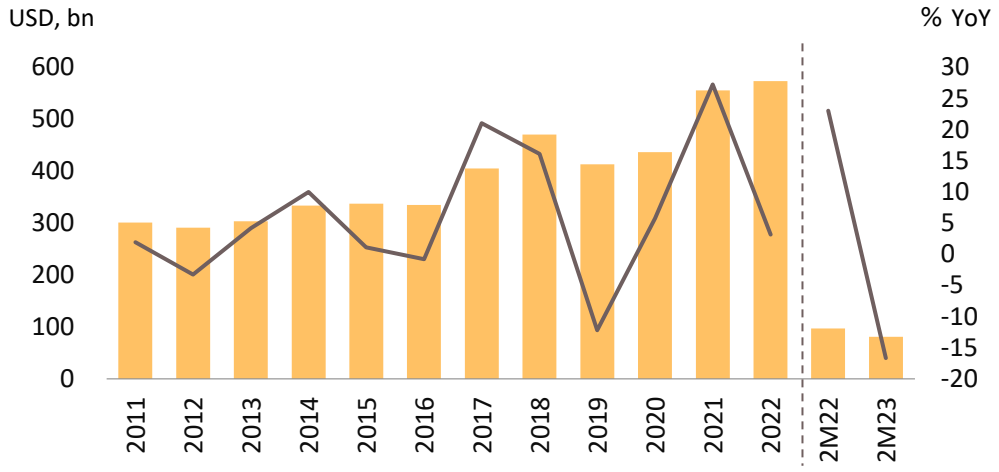


- **Output of autos rose 6.7% YoY in 2M23** to 327,939 vehicles due to a 26.8% YoY increase in the production of passenger vehicles. However, output of commercial vehicles slipped -5.2% YoY due to remaining short supply of chips needed in pickups. Meanwhile, despite the release of passenger vehicles for both EV and ICE models driving a 3.9% YoY increase in sales of passenger vehicles, **total domestic distribution contracted -4.7% YoY** to 137,130 vehicles on a -14.4% YoY fall in pickup sales. However, **exports jumped 17.4% YoY** to 175,311 vehicles as manufacturers tried to clear the backlog of unfilled orders. Growth was especially strong in the main markets of Japan (+47.0% YoY), the EU (+41.8% YoY) and the ASEAN region (+34.5% YoY).
- **The government aims to establish Thailand as a regional center for the assembly of EVs** and promote use of zero emission vehicles (ZEVs). As part of this, stimulus measures for BEVs that run from 2022 to 2025 include EV subsidies and tax incentives to stimulate BEVs investment and production. As of December 2022, 9 companies were involved in this scheme. These were MG, GWM, Neta, Mine Mobility, Volt, Toyota, BYD, Mercedes-Benz, and Honda. 5 of these companies are Chinese, 2 Japanese, and 1 each Thai and German, and the wide uptake of the scheme underscores Thailand's continuing potential as an auto production hub. **Total automobile output is thus expected to come to 1.93-1.95mn vehicles this year, an increase of 3-4%. Demand will be driven in particular by the domestic market, which is forecast to grow by 5-6% (or to 0.89-0.90mn vehicles) on an improving economic outlook. However, recovery in consumer spending power in overseas markets has been slower, and so exports are predicted to expand by just 2-3% to 1.02-1.03mn vehicles.**

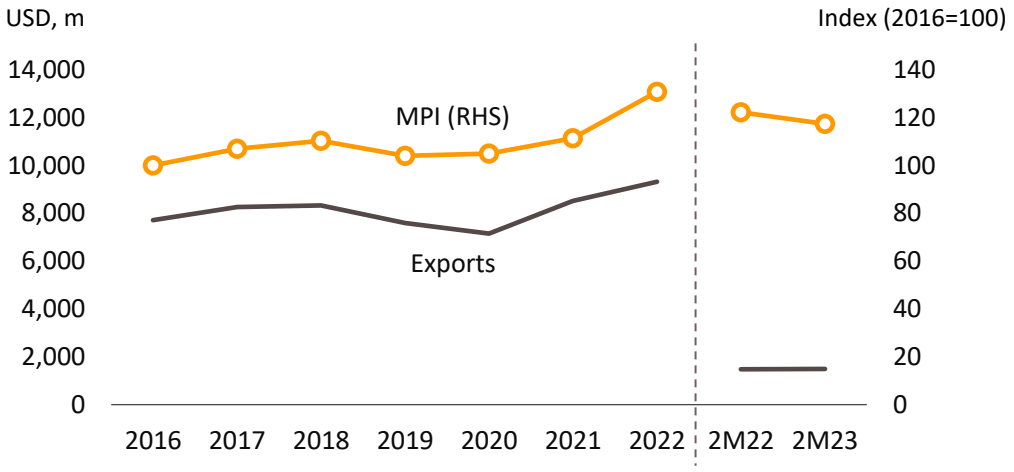
Source: The Federation of Thai Industries (FTI), forecast by Krungsri Research

Integrated circuit (IC): Chip shortages will persist through 2023, and despite increasing supply towards the end of the year, growth in export value will be only limited in 2023.

Worldwide Sales of Semiconductors



Thai IC Exports and Manufacturing Production Index (MPI)

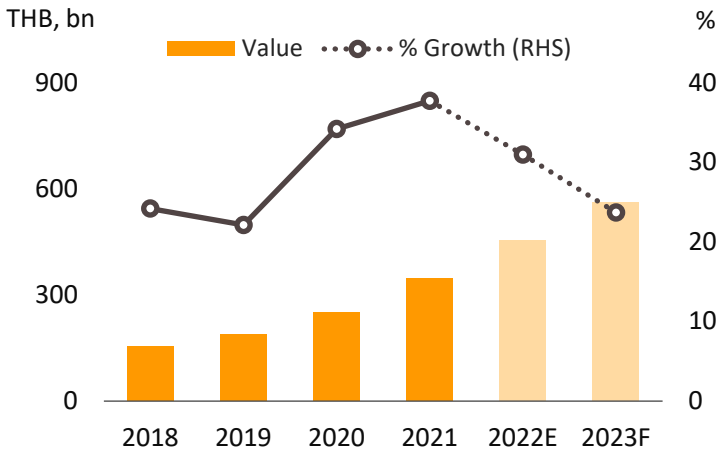


- **Shortages of IC/chips will tend to abate this year**, and so JABIL (an electronic services company) estimates that in 1Q23, wait times for chips stood at 26-52 weeks, down from an average of 70 weeks in mid-2022. For basic chips, the time to delivery is now around 26-35 weeks, though this is still a long wait relative to the pre-COVID average of 12-15 weeks. However, due to the backlog of orders and the shortage of inputs (i.e., of semiconductors), the wait time for the high-end chips used in auto assembly (e.g., for microcontrollers and chipsets) now averages 52 weeks.
- **Global distribution of semiconductors fell -16.7% through 2M23** on weak global demand. **The MPI for Thai chip manufacturers contracted -3.9% YoY, while the value of exports increased by just 0.3% YoY.** In January 2023, Nikkei reported that the market for chips for use in electronics goods had been oversupplied since 2H22 and it would take until 4Q23 for this glut to clear. However, the backlog of orders and the switch to production of EVs and self-driving vehicles is adding to demand for chips for use in auto assembly. **Thai government has thus been promoting investment in the electronics industry as part of its policy for developing the S-curve industries.** Examples of successes in this include the move by Sony Semiconductor Solutions to invest in the production of image sensors for use in self-driving vehicles to detect obstacles, scheduled to start production in 1Q25. Murata, a manufacturer of electronic components used in mobile phones (e.g., filters for picking up some radio signals and amplifiers for strengthening signals for transmission) has also expanded its Thailand-based production facilities, and operations should begin in October 2023, while Chinese manufacturers of electronics parts and printed circuit boards (e.g., WUS Printed Circuit (Kunshan) and ASKPCB) also plan to increase investment in Thailand as part of the 'China+1' policy.
- **Worsening US-China tensions are expected to impact chip production and so problems with shortages will continue to periodically affect the supply of ICs through 2023.** Nevertheless, heavy investment by major manufacturers in Taiwan, the US, and China should begin to bear fruit in 2023. Towards the end of the year, problems with supply should therefore start to ease, and **the situation is likely to be fully resolved by the end of 2023 or early 2024. This will then add 2-3% to the value of 2023 chip exports from Thailand.**

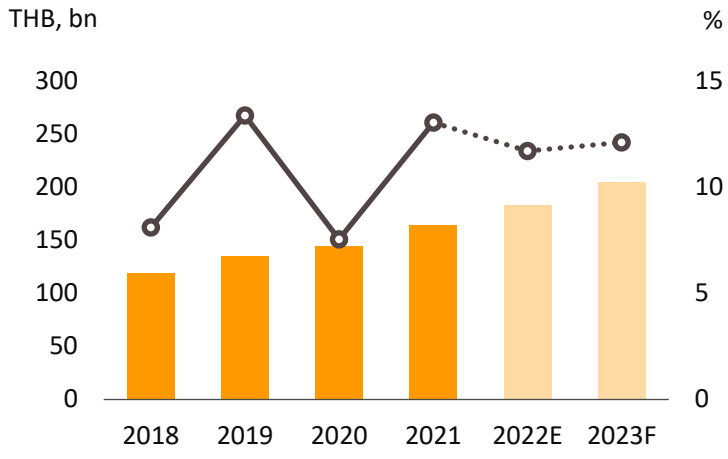
Source: Bloomberg, Susquehanna Financial Group, Semiconductor Industry Association, Accencture, IDC, Reuters, U.S. Department of Commerce, Ministry of Commerce (MOC), Office of Industrial Economics (OIE), Krungsri Research

Digital services and software: Investment will accelerate in cloud computing to serve growing demand for platform-based services, supporting a strong revenue growth.

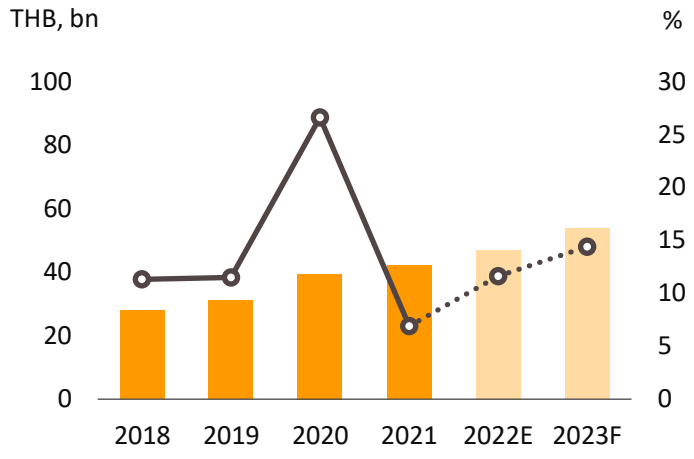
Revenue of Digital Services



Revenue of Software and Software Services



Revenue of Digital Content

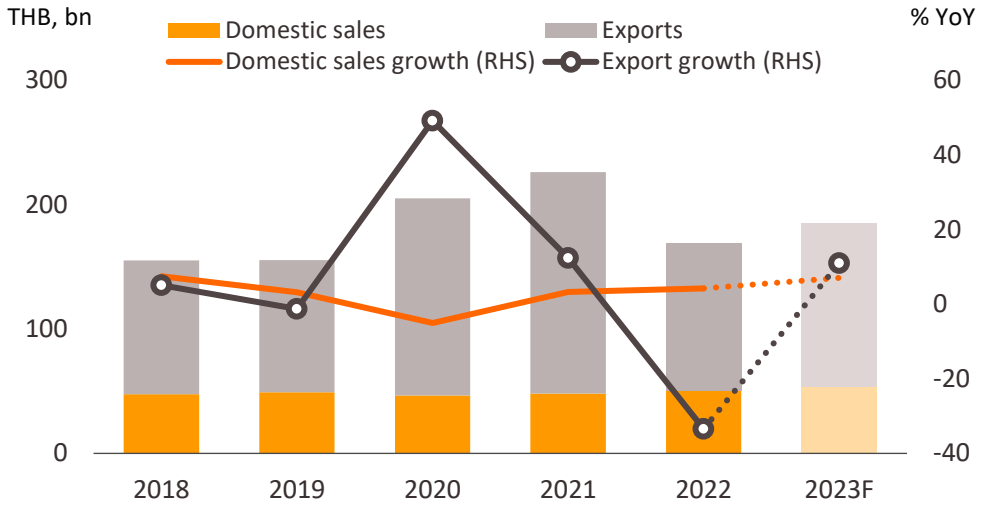


- **Revenue continued to strengthen through 1Q23** (jumped 23.8% in 2022). For the digital services segment, revenue growth accelerated by the uptick in economic activity, and recovery in the tourism and transport sectors. However, providers of e-marketplace services are facing stiffening competition in the e-commerce space as major online operators that provide short video services and that have a significant competitive advantage in promoting sales for market share. These include Facebook marketplace, Line shop, and Tiktok shop, which enjoyed a 24.8% increase in the size of the Thai userbase in 2022. Major e-marketplace players are thus looking to expand more comprehensive service offerings, by stepping up investment in online financial services. Software service providers are also seeing growth with a greater demand for enterprise software that provides digital touchpoints for customers and for analytics services that will generate insight into consumer demand and help develop products that will add value to the corporate brand. Thus, as the cost of accessing software-as-a-service (SaaS) falls, usage of this is broadening and deepening. Digital content providers are benefiting from growth in the online gaming industry. The latter is developing new business models based on the cloud and on AR/VR, and creating new experiences in a virtual world that are expanding the userbase and broadening revenue streams.
- **Growth will be supported through 2023 by strengthening domestic investment in cloud computing systems**, and a survey by Alibaba Cloud of 1,000 corporations in Asia revealed that a full 95% of Thai companies planned to increase investment in cloud computing in 2023 and 2024 (the highest proportion in Asia). For 2023, Gartner sees Thai cloud-centric software and data center providers enjoying growth of 5.5% and 14.9% respectively, while the BOI plans to support digital supply chains, especially those from China to invest in cloud and data centers in Thailand, especially now that Alibaba and Tencent plan to expand their investments in Thailand-based cloud solutions. Netflix also plans to invest in cloud-based systems to serve games development. Internet Thailand (INET) thus expects that demand for cloud solutions and digital platforms in Thailand will grow by at least 15% in 2023. Given rising trends in investment in cloud and data centers to serve growing demand for digital platform services, we believe that **the software and digital services industry should grow around 20% in 2023, mainly supported by the digital services segment, where growth should reach 23-24%. However, for software services and digital content, growth will run to 12-13% and 11-12% respectively.**

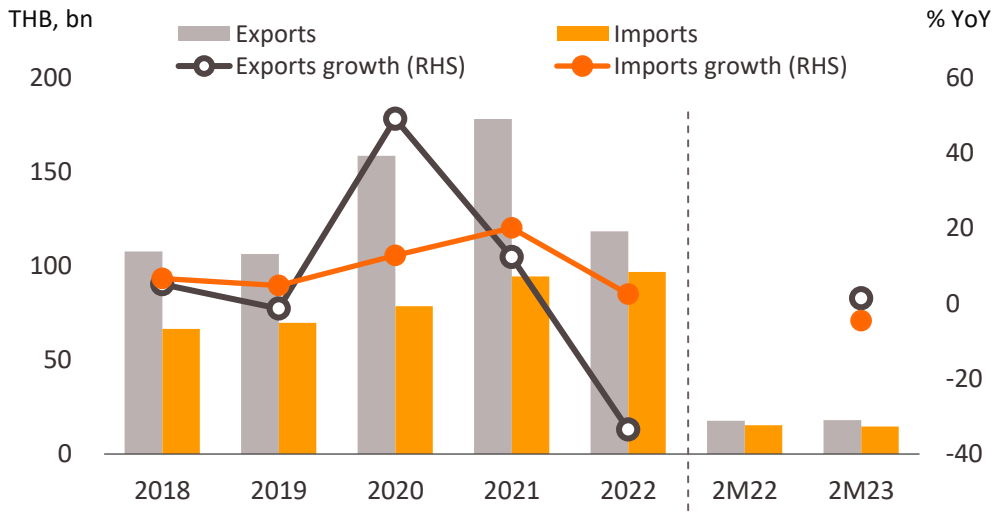
Source: Depa, Compiled and Forecast by Krungsri Research

Medical Devices: The government's plan to establish Thailand as a medical hub will help to support ongoing growth in income and investment.

Thailand Sales and Exports of Medical Devices



Thai Medical Device Trade

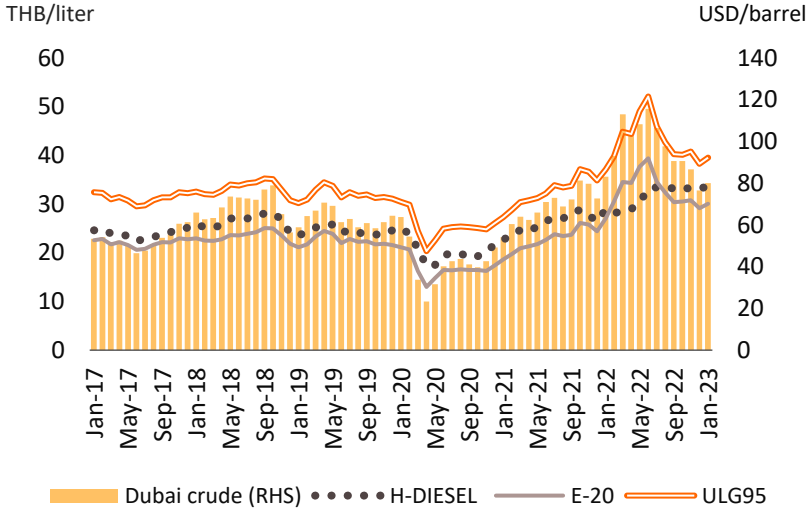


- **The market for medical devices continued to strengthen through 2M23** thanks to a return to normal service by hospitals and clinics, the full reopening of the country to foreign arrivals, which then brought in a greater number of medical tourists, and continuing demand for protective equipment (PPE). As such, combined demand for medical devices and PPE was up 6.7% YoY (demand for latex gloves rose 8.4% YoY, while sales of blood transfusion kits and saline drips climbed 12.7% YoY). Exports of single-use devices (87.1% of the value of all exports of medical devices) edged up 1.7% YoY, whereas overseas sales of reagents & test kits (2.5% of exports) jumped 11.7% YoY. The value of domestic and export sales of medical devices for 2023 overall is now expected to increase by 7.0% and 11.0% respectively, having slumped -33.5% in 2022.
- **Government plans to promote Thailand as Asia's medical hub** include: (i) designating the medical devices industry as one of the EEC's new S-curve industries (e.g., the EECmd and the EECg, which develop medical equipment for use in diagnosis and long-term monitoring); (ii) the BOI's investment support schemes; and (iii) supporting policies to promote SME medical device manufacturers. New Domestic investment with plan of production starting in 2023 include: (i) Innobic and Namwiwat that have partnered to expand sterile medical devices production worth THB 800mn to export into ASEAN zone (ii) PTT (IRPC-Innobic) working with PJW to manufacture disposable non-woven textile products and plastic medical devices and (iii) Innobic and Hatari Next developing a non-invasive blood glucose monitor, and portable blood pressure and heart monitors. Moreover, FDI inflows have also been coming from overseas, and in 2022, 22 applications for investment support were received from overseas companies wishing to invest in the production of medical devices. These had a total value of THB 8bn and included Japanese companies using Thailand as a base for the production of masks, stents, and blood testing equipment. German companies are also investing in Thailand, e.g., Haase Investment, which has joined with Siam Bioscience to produce biological reagents. This increase in investments will however add to competition, especially for SMEs, which comprise the majority of players in this industry.

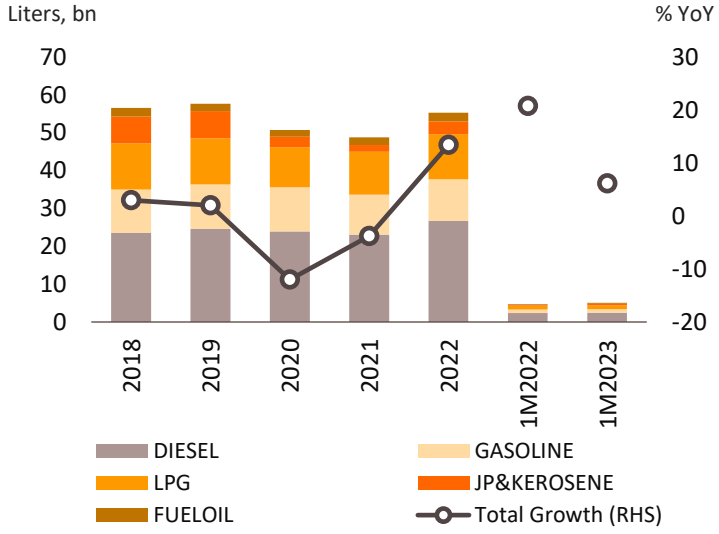
Source: Medical Device Intelligence Unit (MeDIU), Office of Industrial Economics (OIE), FitchSolutions and forecast by Krungsri Research

Refinery: The industry is benefiting from recovery in domestic economic activity, particularly the rebound in tourism sector, and increased investment in clean energy.

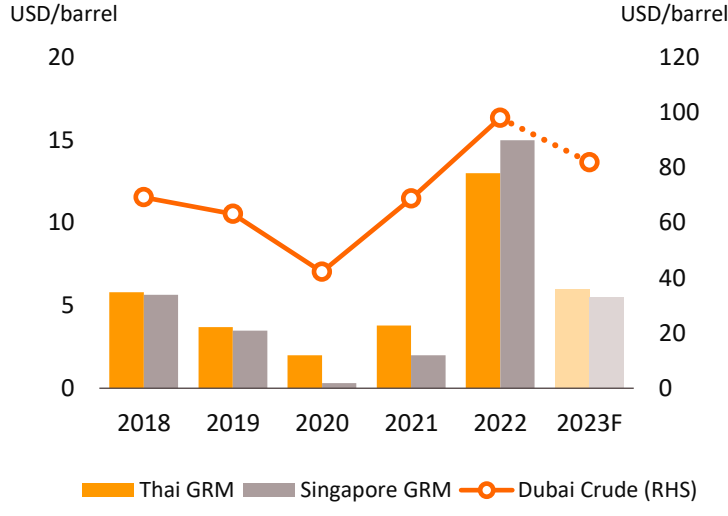
Thailand Petroleum Prices at Refinery



Domestic Petroleum Demand



Gross Refinery Margins

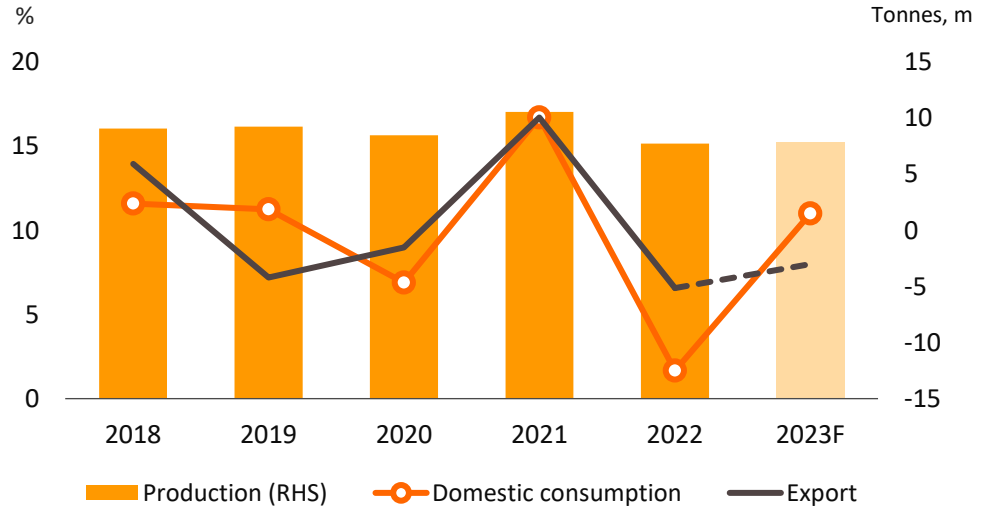


- **Refineries experienced a slowdown in business through 1Q23 relative to 2022 as the impacts of inflation weighed on global demand for oil.** However, the continuation of the Russia-Ukraine war and the reopening of China have helped to keep crude prices elevated, and despite softening -17.4% YoY, Dubai crude prices have averaged USD 79.6/bbl. Given this, Thai ex-refinery prices (e.g. for gasoline and for E20) have remained close to the level reached at the close of 2022. Domestic demand for refinery products is also up 6.2% YoY as of January 2023, helped by rebound in the tourism sector from China's reopening. This positive effect has boosted demand for jet fuels to surge by 102% YoY.
- **As the economy strengthens and tourism sector recovers, greater demand for travel will mean that refineries will enjoy an improvement in business conditions through 2023.** The industry will also benefit from an expansion in investment in related industries that is being made to meet strengthening demand for oil and to open new marketing channels. This includes investing in new clean energy projects. For example, in line with the government's goal of reducing air pollution and of reaching net zero by 2065, Thaioil Group has made large-scale investment in the EEC to increase output of high value-added diesel and low-sulfur aviation fuel made from heavy crude and low-value fuel oil (full commercial operations are expected to commence in 2024). This and crude prices that are now expected to average USD 82/bbl for 2023 will keep Thai gross refinery margins in the range of USD 6-6.5/bbl, close to the USD 6/bbl seen prior to the COVID-19 pandemic.

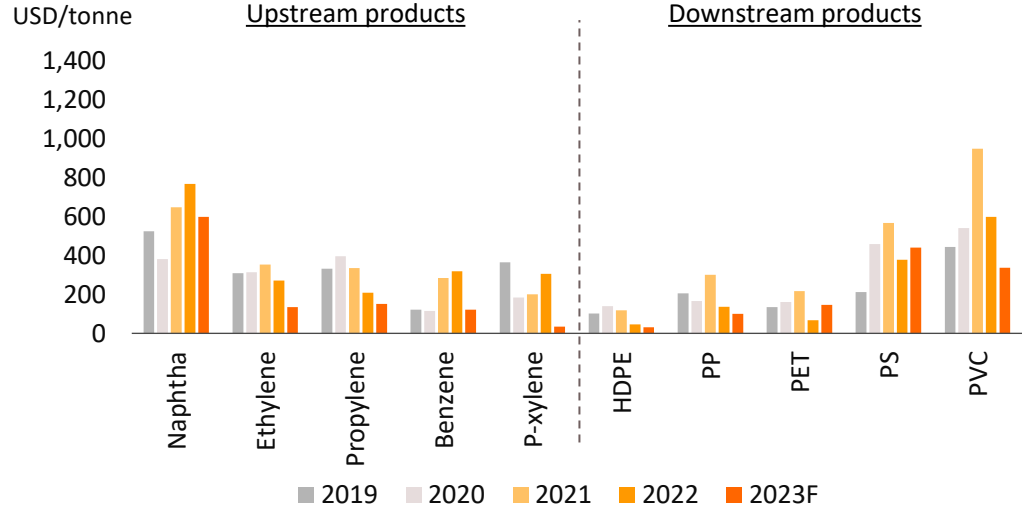
Source: Bloomberg, Energy Policy and Planning Office (EPPO), Forecast by Krungsri Research

Petrochemical: Growth will move in step with recovery of domestic economy and with investment to serve related industries.

Thailand Petrochemical Market



Petrochemical Spreads

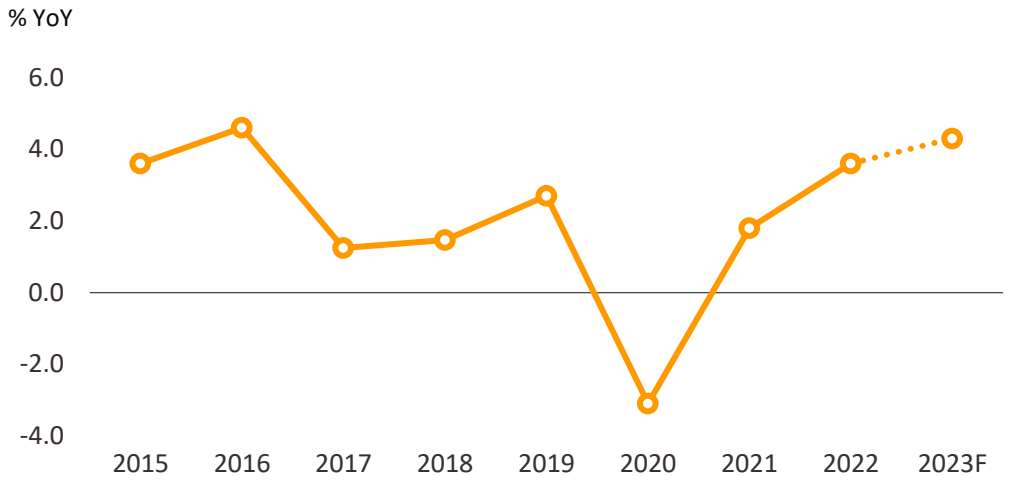


- **In the first 2 months of 2023, the domestic market for petrochemicals softened, with consumption of petrochemical products slumping -31.3% YoY.** This was a consequence of the slowdown in the global economy, and the resulting 5 months of negative growth in the export sector have then eaten into demand from downstream industries that consume petrochemicals. In addition, the data suffer from comparison with the high baseline set a year earlier, though at the same time, exports expanded 1.3% YoY on the reopening of China, Thailand's major export market. Prices for feedstock remain high due to the persistently elevated cost of crude (prices for naphtha averaged USD 717 tonne, above the pre-COVID price of USD 530.8/tonne set in 2019) and this then put pressure on spreads.
- **Domestic demand is forecast to strengthen steadily through 2023,** helped by this year's predicted 3.3% GDP growth (up from 2.6% in 2022) and increasing investment that will help to open up new markets and distribution channels. Thus, to meet demand for high-value products from S-curve industries (e.g., to produce parts for EVs, batteries, and medical devices), operators are shifting production lines to the manufacture of more specialty products, such as ABS. Manufacturers are also responding to rising global concerns over conservation and the environment by increasing output of biodegradable and international-standard food-grade plastics, as well as by establishing production facilities for the manufacture of recycled plastics. This will then help to add 1-2% to domestic demand for petrochemicals, but the slowdown in the global economy is weighing on overseas markets and so 2023 exports are now expected to contract by between -2% and -3%. In addition, the high cost of crude is keeping feedstock prices elevated and so for many products, spreads will tighten.

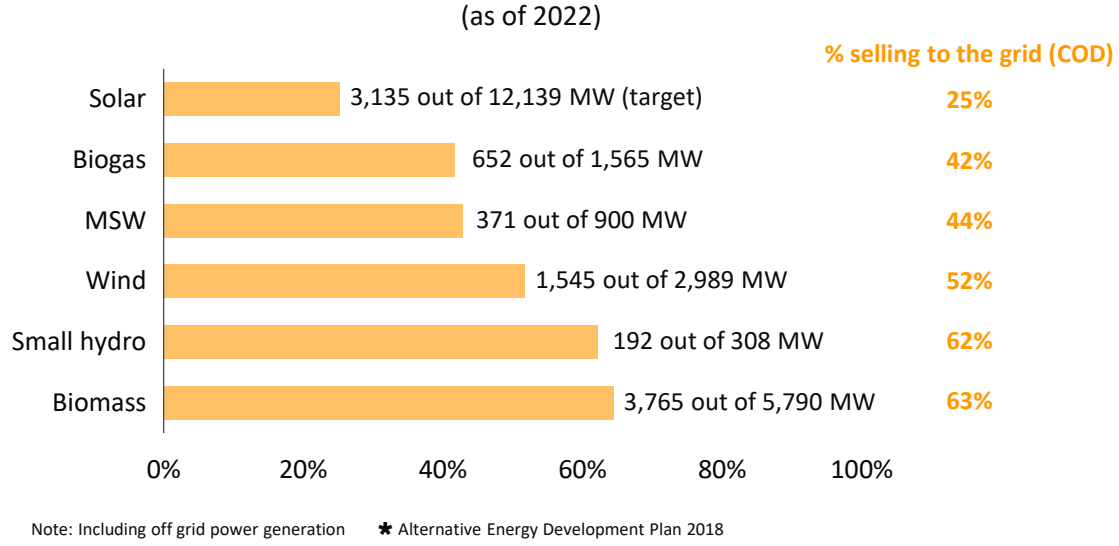
Source: Bloomberg, Office of Industrial Economics (OIE), Forecast by Krungsri Research

Power Generation: Government policy and incentives will encourage operators to increase investment in clean energy.

Growth of Electricity Demand



Renewable Energy Generation Capacity and AEDP* Target

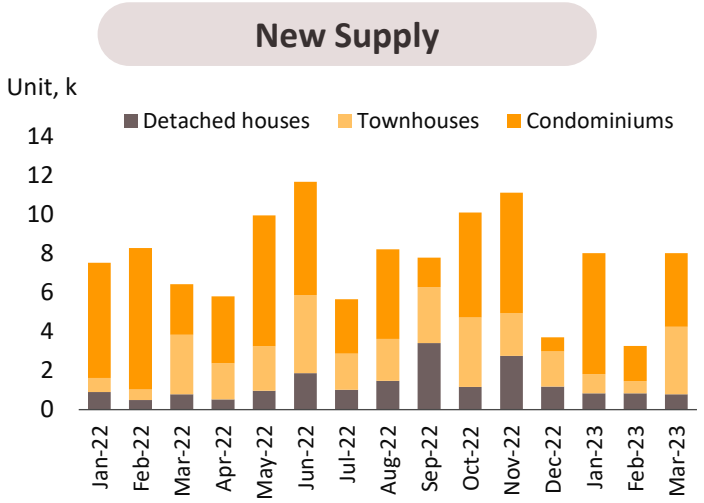


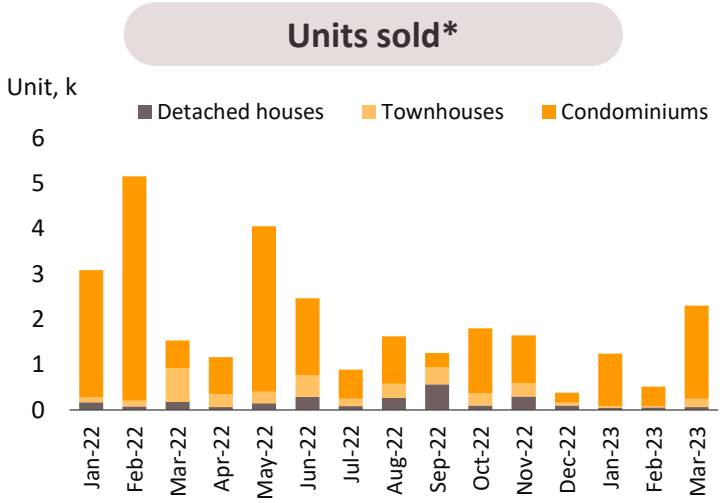
Note: Including off grid power generation ✱ Alternative Energy Development Plan 2018

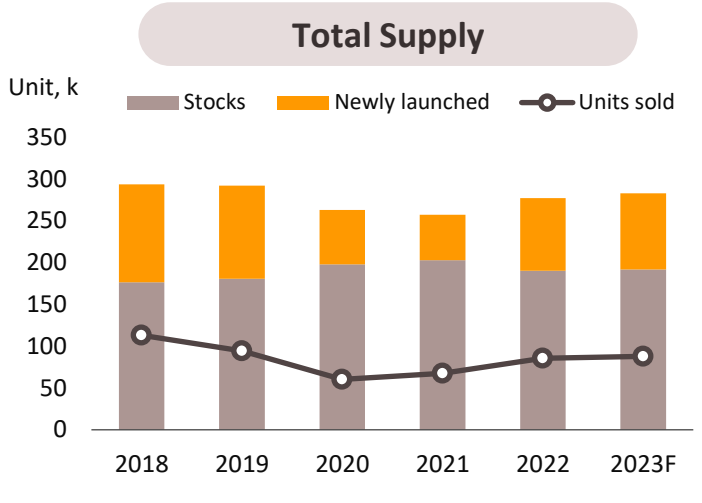
- **Over 2M23, operators of power plants benefitted from the hike in electricity rates**, which went from an average of THB 4.16/unit in 2022 to THB 4.72/unit for households and THB 5.33/unit for industrial users. However, higher charges led to a fall of -3.5% YoY in consumption by industry (46% of total electricity demand) and of -7.6% YoY from households (25% of total), although with the service sector rebounding, demand from businesses (24% of total) increased 5.3% YoY. Through the rest of 2023, demand should continue to rise on: (i) hotter than normal weather (peak demand is expected to touch a new high of 34,000 MW, up from 33,000 MW in 2022); (ii) the return of economic activity to more normal levels and the rebound in the tourism sector; and (iii) the falling cost of electricity (for May-August, rates have been set at an average of THB 4.70/unit). Given this, average demand for electricity in 2023 should increase by 4.0%, up from the 3.6% rise recorded in 2022.
- **Operators of power plants will tend to increase investment in renewables,** encouraged by the government support laid out in the PDP and the setting of net zero targets. Investment plans will also be influenced by the pursuit of ESG goals and the boost that this will give to investment in green energy. Projects that will come onstream over 2024 and 2025 will include solar farms, battery energy storage system (BESS)-enabled solar farms (especially when operated by SPPs), wind farms, and biogas plants. The outlook for players will be as follows:
  - **IPPs:** Income will tend to strengthen on rising tariffs and plans to expand investment in green energy (e.g., from hydrogen).
  - **SPPs:** Income will increase gradually as generating capacity comes online, while most new investment will likely be in renewables, in particular in SPP hybrid firms, as per government plans, and will take place in the EEC.
  - **VSPPs:** Growth in investment in and income from solar, wind, biomass, and waste-to-energy plants will accelerate in line with greater public-sector purchases of these (beginning in 2023).

Source: Department of Alternative Energy Development and Efficiency (DEDE), Energy Policy and Planning office (EPPO), Forecast by Krungsri Research

Housing (BMR): Demand will slowly strengthen, and developers will continue to invest in new projects as they look to meet future improvements in the market.





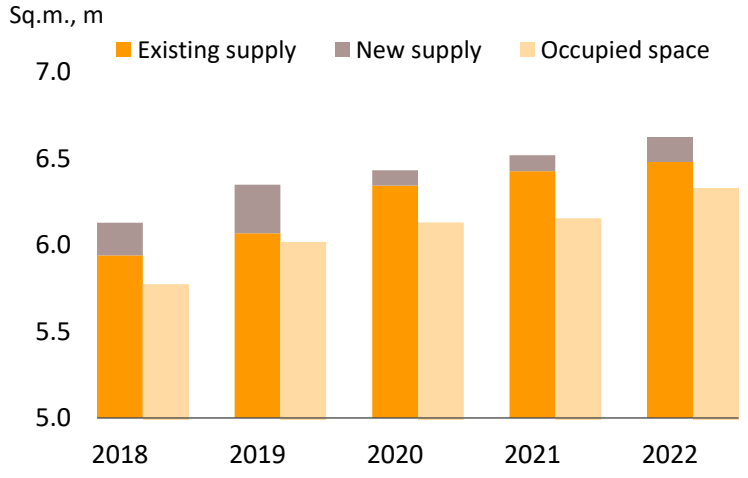


- **In 1Q23, a total of 19,287 new units came to market (down -13.2YoY).** The supply of townhouses and detached houses rose by respectively 17.8%YoY and 12.1%YoY, but the number of new condominiums coming up for sale crashed -25.2%YoY due to the large number of new projects begun a year earlier. Sales of new properties also slumped -58.5%YoY to just 4,058 units, around 90% of which were condominiums. This sharp decline was due to the impact of 2022's strong rise in inflation on consumer spending power, the increase in interest rates that commercial banks have pushed through, and the higher cost of most residential units, for which prices have gone up both directly or indirectly (i.e., via narrower discounts or a cut in the number of gifts or bonuses included with the sale). In addition, buyers tended to rush through purchases and title deed transfers ahead of the ending of government stimulus measures (e.g., the relaxation of the BOT's LTV measures, which ended on December 31, 2022, and the cut in fees for transfers of ownership from 1% to just 0.01% of the property's value, which also terminated at the end of 2022).
- **The housing market should improve slowly through 2023,** helped by an improving economic outlook and stronger consumer purchasing power. Developers will also continue working on and releasing new projects, and in the year, the 13 largest players in the market (in the BMR and upcountry) will undertake a total of 329 projects with a value of more than THB 460bn, up 2.8% from 2022. **It is therefore expected that new housing supply coming to market will increase 4.5% YoY to around 100,000 units,** close to the average maintained through 2017-2019. However, **sales are expected to rise at the somewhat slower rate of 2.5% YoY,** with demand suppressed by: (i) persistently high levels of household debt, which is encouraging a tightening of lending conditions; (ii) the higher cost of construction materials and of energy, as well as the impact of labor shortages on wages, which is then adding 5-10% annually to the average cost of new projects; and (iii) the current cycle of rate hikes and subsequently greater care that consumers are taking with long-term debt. The outlook for different segments is as follows.
  - **Condominiums:** Supply should expand by 8.5% from the 2022 level to 58,000 units (below the average of 68,000 new condominiums coming to market annually over 2017-2019). New supply will likely be especially concentrated in the sub-THB 3mn market.
  - **Low-rise housing:** Supply of detached houses will continue to expand, concentrated in the THB 5mn and above segment, though growth rates will be relatively low. Supply of townhouses is expected to mirror the 2022 situation.

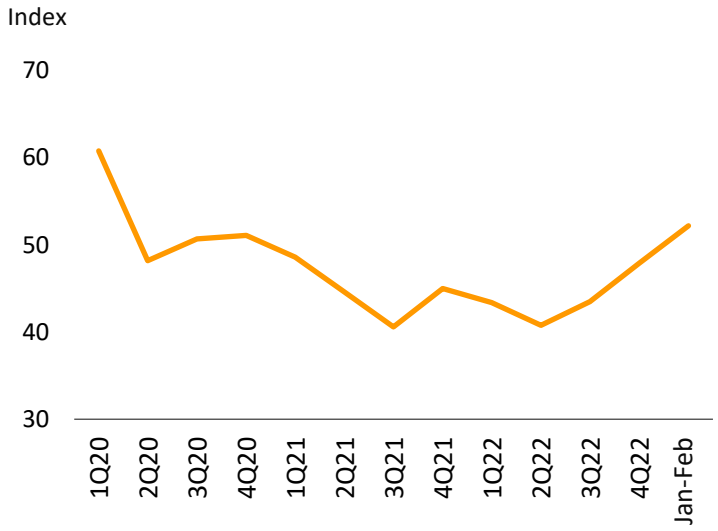
Note: *Units sold (sales by monthly) = units sold of new launched in this month only (excluding units sold of housing project launched before this month).
Source: AREA, bangkokbiznews, Realist, forecast by Krungsri Research

Retail Space (BMR): Operators will continue to invest in new projects to meet anticipated future demand especially from the rapid rebound in tourism sector.

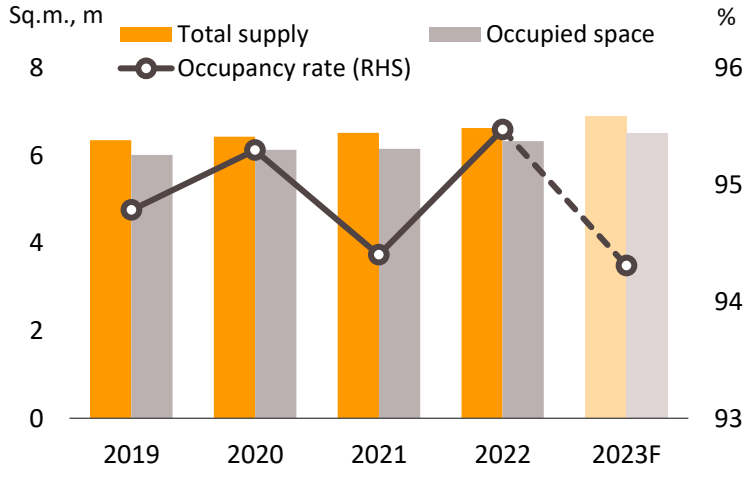
Existing & New Supply and Occupied Space



Consumer Confidence Index: CCI



Retail Space in BMR



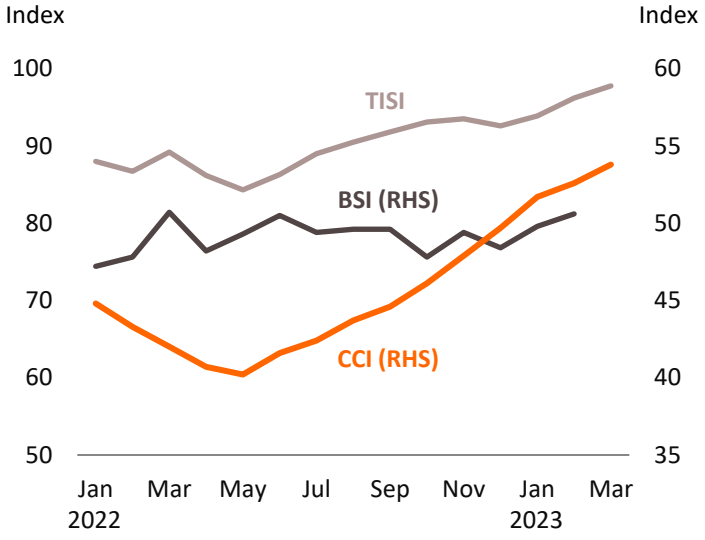
- **Demand for retail space was supported through 1Q23 by economic recovery and the positive effects of this on private sector consumption and spending.** Improving retail conditions were reflected in the rally in the Consumer Confidence Index, which has climbed to a 2-year high of 52.2. The rebound in tourism is also helping to boost the retail sector and demand for retail space, especially in the downtown and CBD areas where large shopping malls are located. **As such, the occupancy rate remained at 2022's 95%.**

- **Demand for retail space will strengthen gradually through 2023** as economic growth translates into a slow rise in purchasing power. Owners and operators of retail space will also benefit from the rapid rebound in the tourism sector, which this year is expected to see foreign arrivals nearly triple from the 2022 level. **Operators will also adjust strategies to entice consumers into shopping malls,** especially expanding entertainment areas, adding zones that are open to shoppers and their pets, **and expanding investment in refurbishing and upgrading existing sites and in the construction of new retail projects to meet strengthening demand.** This includes the move by Central Pattana to open four new shopping centers over 2023 and 2024, namely Central WestVille (budgeted to cost THB 6.2bn), Central Nakhon Sawan (THB 5.8bn), Central Nakhon Pathom (THB 8.2bn), and Central Krabi (THB 4.5bn), the Dusit Central Park mixed use project (THB 46bn), scheduled for opening in 2024 or 2025, and other projects with a further GFA of approximately 350,000 sq.m. each. Krungsri Research thus expects that for 2023, 280,000 sq.m. of new supply will come to market (+4.2% YoY), while demand will increase by 3.0% from its 2022 level (down from average growth of 3.7% over 2017-2019). The occupancy rate will thus dip slightly to an average of 94%.

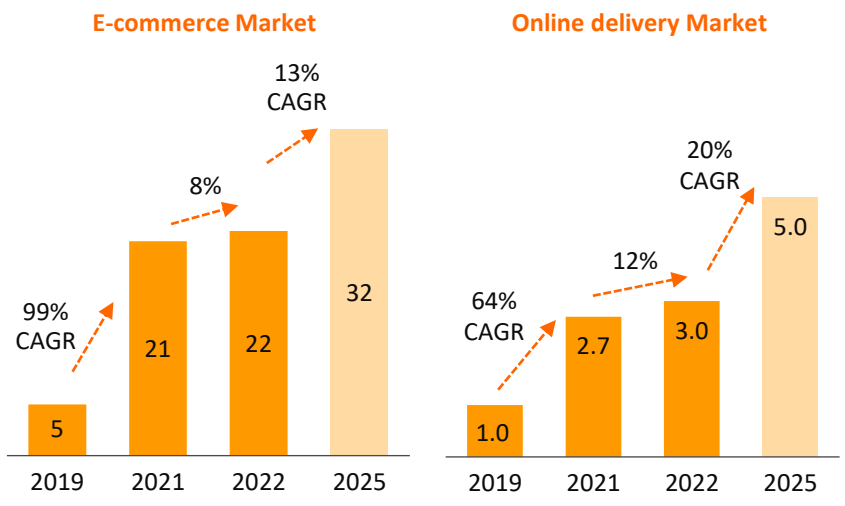
Source: CBRE Research, CPN, forecast by Krungsri Research

Warehousing: An acceleration in domestic economic activity will support stronger demand, while operators will expand investment, especially in smart solutions.

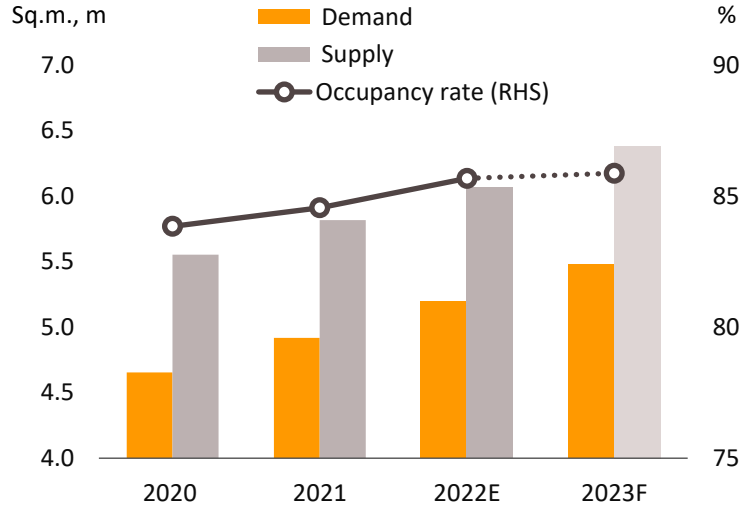
Thailand's Industry, Business and Consumer Sentiment Index



Growth of Online Market in Thailand
(in billion USD)



Demand, Supply and Occupancy rate of General-purpose Warehouse

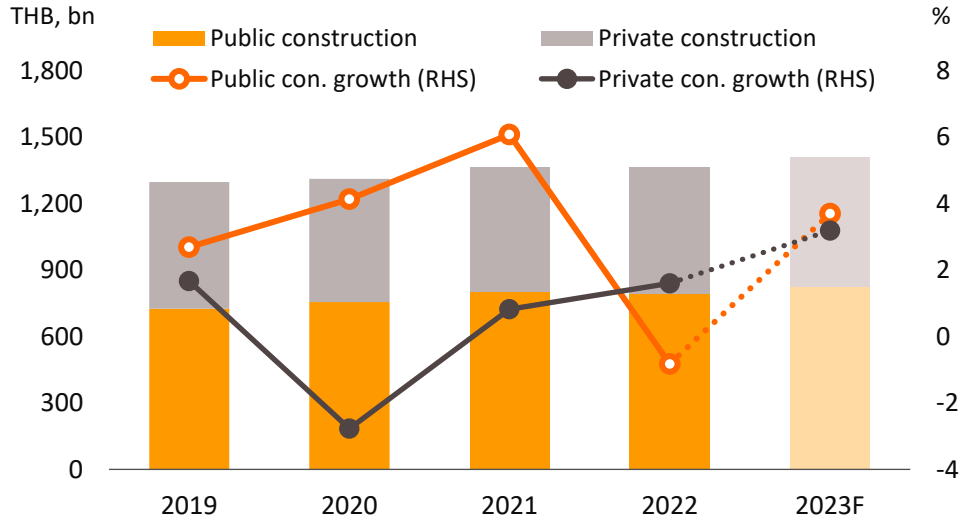


- **Demand for warehousing rose through 1Q23** as a result of: (i) growth in the economy and as economic activity returned to normal, consumer and investor sentiment strengthened; (ii) investment by the private and public sectors (in the latter case for infrastructure development); (iii) FDI inflows that continued to build in many industries, especially to businesses in the EEC and on industrial estates (over 2M23, the value of approved FDI jumped 305% YoY); and (iv) ongoing growth in the e-commerce and logistics boosted demand for storage space for goods prior to delivery.
- **With the industry moving towards a broader acknowledgement of 'green logistics', investment in modern units** that are equipped to deal with digital technology will tend to rise, for example, in the use of robots for stock management and transportation. The Thai Intralogistics Association therefore estimates that in 2023, investment in smart warehousing will rise by 10-15% to around THB 8bn. Individual corporate investment plans include the following. (i) Frasers Property Thailand plans to develop a 19,000 sq.m. built-to-suit (BTS) distribution center in Samut Prakan. (ii) WHA Corporation plans to expand its 130,000 sq.m. rented warehousing operation, WHA Mega Logistics Center in Samut Prakan. (iii) WICE Logistics and Somboon Advance Tech will jointly develop warehousing and distribution units in Bang Na and Rayong with a footprint of over 50,000 sq.m. as green logistics hubs. (iv) Alpha Industrial Solution, part of the Origin Property Group, plans to develop 220,000 sq.m. of mixed ready built and BTS warehousing and logistics units in the EEC, Samut Prakan, and Ayutthaya. Krungsri Research thus believes that **in 2023, demand for warehousing space will increase by 5.5% to 290,000 sq.m., while expansion in supply will lag very slightly at 5.3% (or 320,000 sq.m.)**

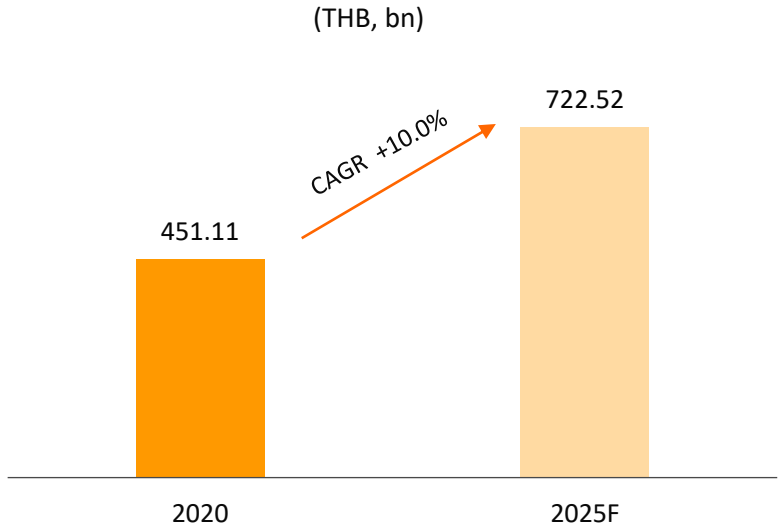
Source: Bank of Thailand (BOT), The Federation of Thai Industry (FTI), University of the Thai Chamber of Commerce (UTCC), Industrial Estate Authority of Thailand, Google, Temasek and Bain & company, EEC Office , WHART, company releases and Krungsri Research

Construction: Overall outlook is set to improve, with investment increasingly shifting to a greater focus on green building.

Construction Investment Trends



Forecast Value of Thai Green Construction Market

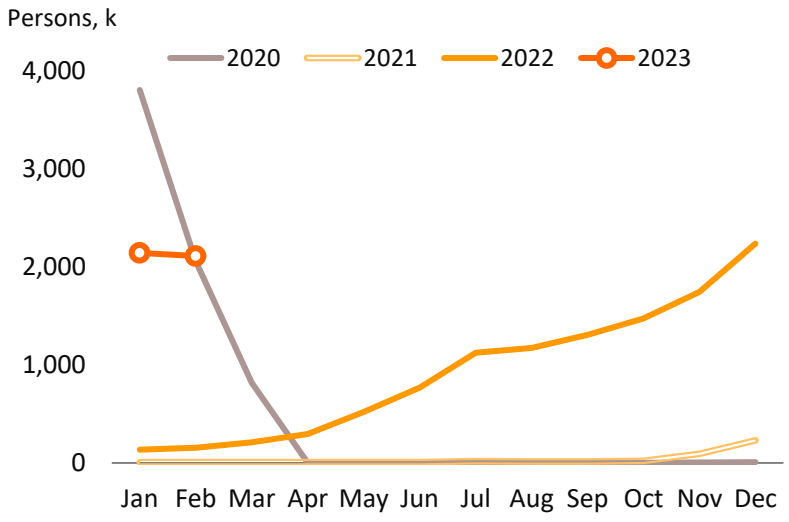


- Having increased by just 0.2% in 2022 (a result of a drop in government expenditure), **overall spending on construction should trend upwards in 2023.** This will be helped by an acceleration of government spending on megaprojects, in particular those connected to the Eastern Economic Corridor (EEC) that fall under phase 2 of the EEC development plan (2023-2027), and as part of the latter, work on phase 3 of the Laem Chabang Port should begin this year. Private sector spending will also benefit from: (i) a generally improving outlook for the residential housing market; and (ii) heavier spending in the EEC that will support an uptick in work on factories and industrial estates in the area. However, headwinds may blow against government spending as a result of: (i) uncertainty over the political outlook and the direction of policy, which may delay spending on infrastructure projects; and (ii) increased pressure on costs with high bidding competition. The private sector may also experience problems as a result of: (i) the supply glut affecting the market; (ii) rising interest rates; (iii) tighter lending conditions, and especially the reintroduction of the BOT's LTV rules; and (iv) the rising cost of construction materials. The net effect of these factors may then be to impact profits.
- **Contractors are increasingly shifting to green building construction methods,** and large companies will be the leaders of this business transformation. These players will leverage the comparative advantages that they enjoy in technology and economies of scale to shorten construction times, reduce their costs, and focus more heavily on eco-friendly materials. The latter will include mixing plastic waste in asphalt for road surfacing and in concrete blocks for constructing footpaths, and using hydraulic cement in place of Portland cement due to its lower CO2 emissions. Indeed, the Thai Cement Manufacturers Association (TCMA) has set a goal of keeping CO2 emissions below 1mn tonnes in 2023 by using hydraulic cement in all construction projects. Research and Market (2020) thus forecasts that the market value of green construction in Thailand will grow by an average of 10.0% annually over 2020-2025. For 2023, overall construction investment will recover and is expected to grow by 3.5% in 2023, split between growth of 3.7% in the public sector and 3.2% in the private sector.

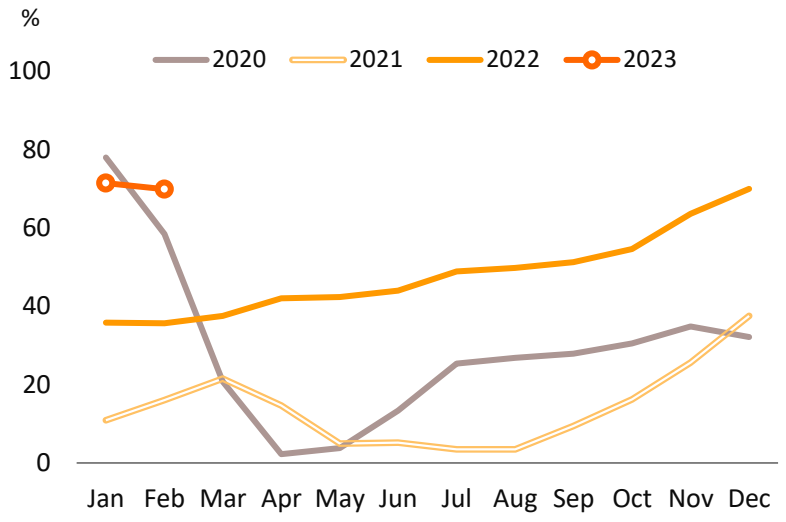
Source: Office of the National Economic and Social Development Council (NESDC), Krungsri Research

Hotel: Occupancy rates rebounding strongly on a surge in demand from overseas visitors, supporting an expansion in investment especially towards green hotels for sustainable growth

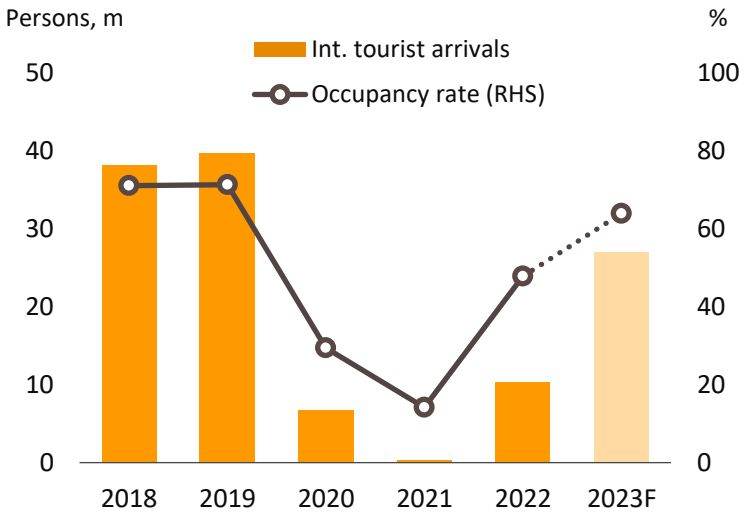
Foreign Tourist Arrivals in Thailand



Occupancy Rate



Tourism Forecast

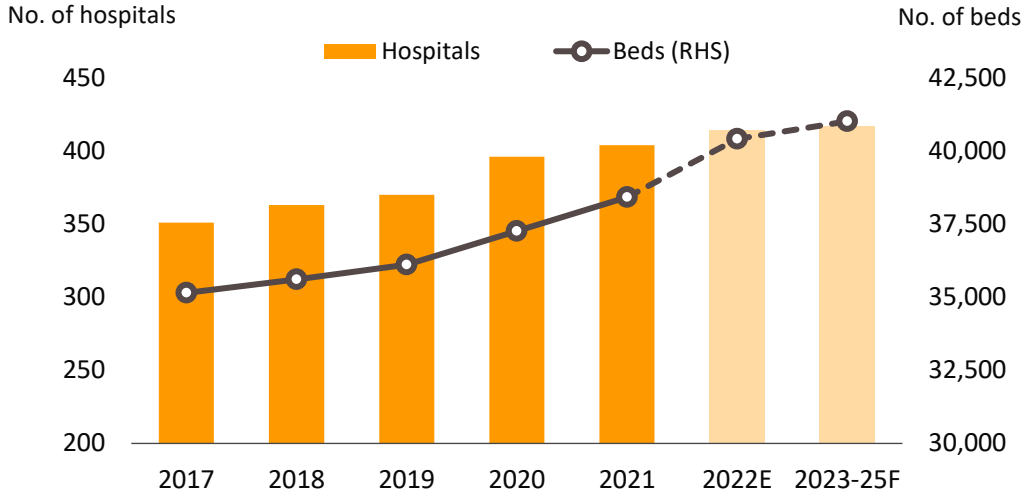


- **4.26mn foreign arrivals were recorded in the first 2 months of the year, up from just 0.29mn in the same period a year earlier.** Arrivals have rebounded with the reopening of the country on July 1, 2022, and the relaxation of controls in many originating countries, which has then brought about a sharp increase in tourist numbers. Tourist arrivals in fact ran in excess of 2mn/month for the 3 months from December 2022 through to February 2023, though this is partly due to this being the high season. Malaysians represented the largest single market, with 0.59mn coming to Thailand in the period (14% of all foreign tourists in 2M23), followed in importance by Russians, South Koreans, Chinese, and Indians. At the same time, the occupancy rate climbed to 70.9%, up from 35.7% in 2M22, and in January 2023 this stood at 71.4%, its highest since February 2020, though the return of foreign tourists meant that occupancy rates were highest in the major tourist areas. Thus, these stood at 75.5% in Bangkok (up from 27.6% in 2M22), 83.9% in Phuket (up from 25.0%) and 76.7% in Chonburi (up from 36.9%).
- Hoteliers, and especially the large chains, have been investing in expansion as they prepare for recovery in the tourism industry, as well as in cost-cutting and green technology. In line with the ESG model, this will help with the development of 'green hotels' by cutting hotels' environmental impact and allowing for the sustainable development of the industry. This includes greater use of solar energy and of energy-saving equipment in hotel rooms and cutting consumption of single-use plastics. In fact, many Thai hotels are already among the over 60 hotel companies that are in the Sustainable Hospitality Alliance, and whose members operate 4.5 million hotel rooms, or 25% of total hotel room inventory globally (HotelTechReport, February 2023). Thanks to the broad recovery in the industry, **27mn foreign arrivals are expected in Thailand in 2023 (compared to the earlier estimate of 25-28mn), and this will result in an average occupancy rate of 63-65%.**

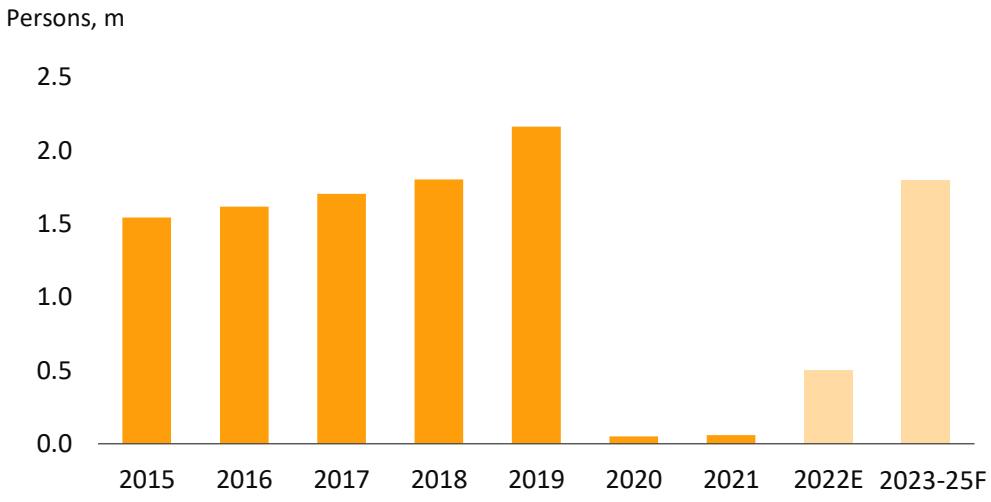
Source: MOTS, forecast by Krungsri Research

Private Hospital: Income will return to its pre-COVID-19 level and this will then support an expansion in investment to meet future demand.

Number of Private Hospitals & Beds



Number of Foreign Patients in Thailand

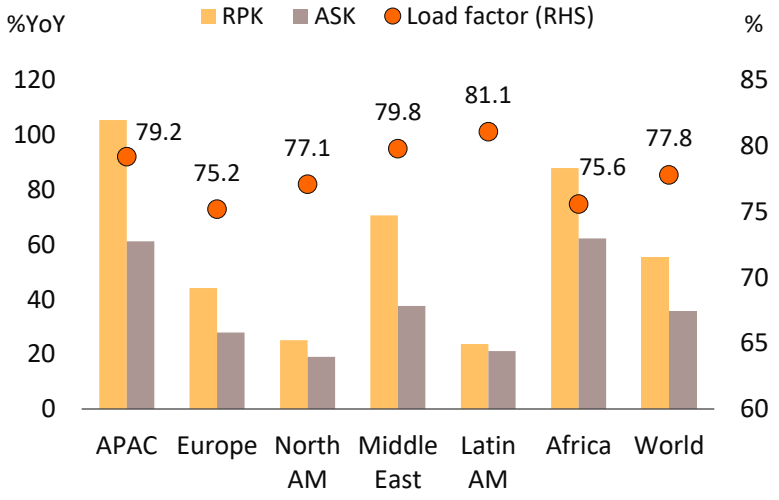


- **Income is expected to have grown solidly through 1Q23** thanks to the following. (i) The return to normal economic and social life means that the number of domestic patients has risen (for 2022, the number of patients with 'diseases under observation' was up 1.3-fold from 2021, and because the public have become laxer about wearing masks and avoiding social contact, in 4Q22, the number of patients with flu jumped 30-fold from a year earlier). Patients covered by social security, and those with COVID-19 or more complex conditions still also require treatment. (ii) Demand has been further boosted by the increasing number of medical tourists coming to Thailand and by improving relations with Saudi Arabia. At the same time, the supply of beds and specialist services on offer also continues to expand.
- **2023 income is predicted to rise 13-15% from its 2022 level.** Turnover will be lifted by growth in the Thai economy, increasing interest in preventative healthcare, and expansion in the market for medical and wellness tourism. **Hospital operators are also investing in the expansion of their services as they prepare to meet future demand**, and this includes: the construction of a new specialist treatment center by S Spine And Nerve Hospital; the construction of 2 new hospitals (in Sakhon Nakhon and Phitsanulok) by Princ Hospital Suvarnabhumi, together with a specialist medical center that will provide treatment for chronic illnesses in the elderly (costing THB 250mn); the investment of THB 500mn by Ladprao Central Hospital in a new international eye hospital and another THB 500mn in a surgical hospital that will provide comprehensive cardiac care; Kasemrad Hospital's plan to expand 5 hospitals; and the opening by Vimut Hospital of 3 health centers at a cost of THB 2.5bn. Most players in the healthcare industry are also investing in non-hospital businesses such as the provision of digital healthcare services and wellness businesses.

Source: NSO, MoPH, estimated and forecast by Krungsri Research

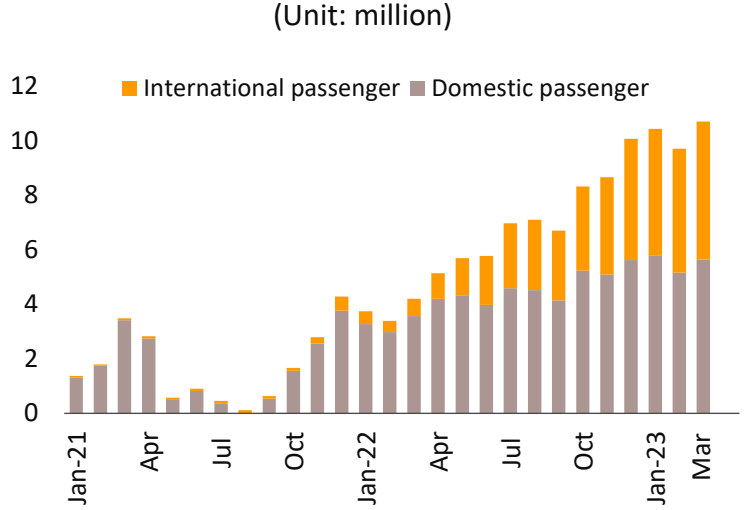
Air passenger services: With demand recovering strongly, operators will lay on more flights and open up new lines.

Air Passenger Traffic by Regional

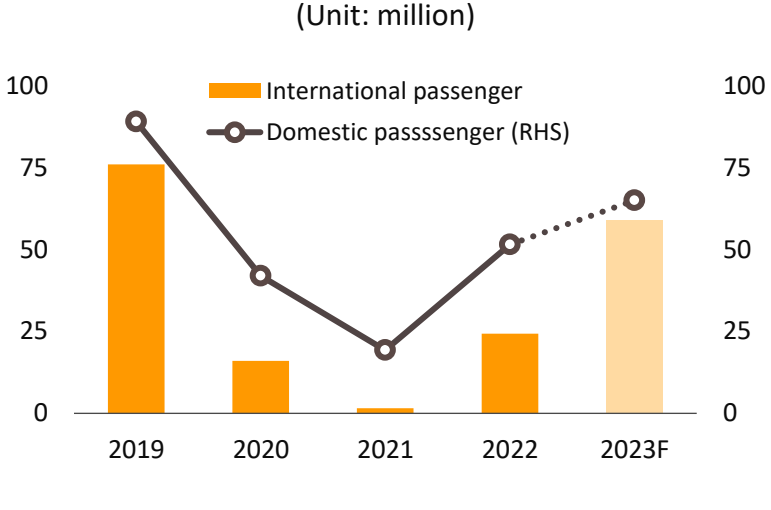


Note RPK: Revenue Passenger Kilometers measures actual passenger traffic
ASK: Available Seat Kilometers measures available passenger capacity
PLF: Passenger Load Factor is % of ASKs used.

Monthly Traffic Update of Air Passenger



Total Number of Air Passengers in Thailand



- **In 1Q23, a total of 30.9mn passengers made air journeys (inbound and outbound) in Thailand, a rise of 172.1% YoY.** At the same time, foreign arrivals numbered 6.5mn, up from 0.5mn in 2022. Thus, the number of international flights jumped 839.0% YoY, while domestic flights increased at the slower but still substantial rate of 69.1% YoY. These increases were a result of: (i) the ending of the COVID-19 pandemic, which allowed countries worldwide to lift travel restrictions and to reopen, most obviously in China (as of February, global traffic was back to 84.9% of its 2019 level (source: IATA); (ii) government promotion of domestic travel (e.g., phase 5 of the 'We Travel Together' scheme) and the promotion of Thai events and festivals within the MICE market; and (iii) carriers steadily reopening domestic and international routes to meet recovering demand.
- The industry will increasingly return to its pre-COVID state through 2023 as carriers reopen up lines, put on more frequent flights, and invest in increasing their capacity. For example, Thai Airways and Bangkok Airways both plan to increase their fleets by 2-3 planes annually over 2023 and 2024. In addition, new players are entering the market, including: (i) P 80 Air, which will fly on international routes to China, Hong Kong, and the Middle East and which has initial funding of THB 500mn; (ii) Really Cool Air, which will begin operations at the end of 2023 and which has funding of THB 200mn for its first year; and (iii) Landarch Airline, which has secured funding of THB 300mn and is focused solely on domestic flights between its home hub in Hat Yai and cities in the South, such as Betong and Surat Thani (beginning in 2023). Given this, **the forecast is for 121mn airline passengers to be made in 2023, a rise of 59.8% from 2022** that will be split between increases of 143% and 35% for international and domestic travel, respectively.

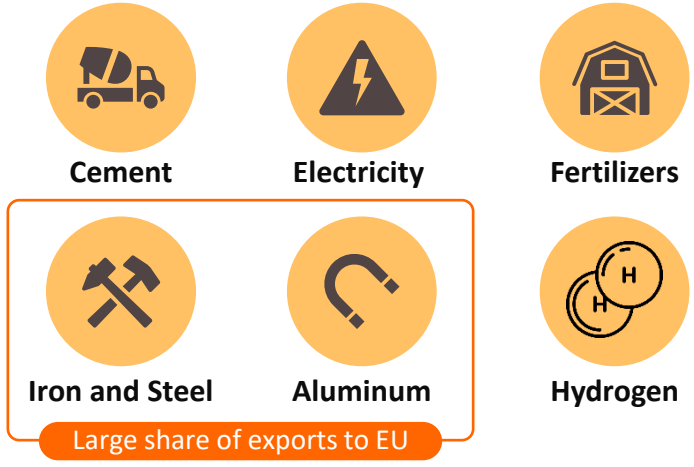
Source: International Air Transport Association (IATA), Civil Aviation Authority of Thailand (CAAT), compiled and Forecast by Krungsri Research



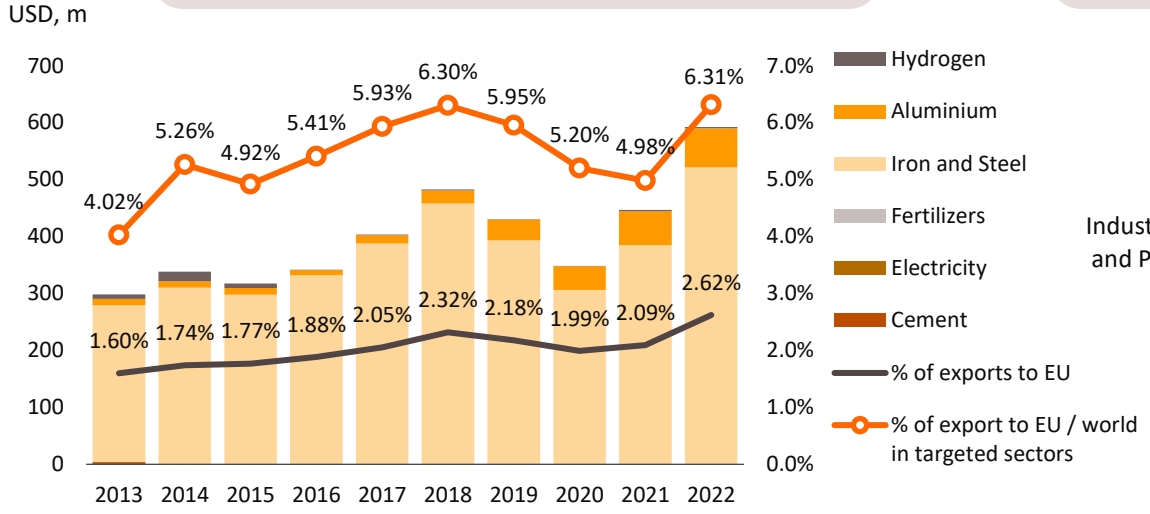
CBAM and impacts on Thai industry

CBAM is expected to have limited impacts on Thai industry during the transition period; Yet, businesses and policymakers need to be well prepared.

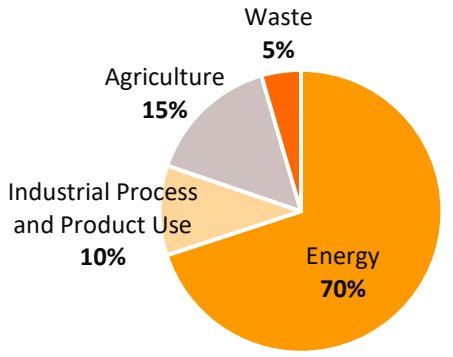
Targeted Products under CBAM



Exports of Products Affected by CBAM



2019 Emission Share by Sector



What is CBAM? Carbon Border Adjustment Mechanism (CBAM) is a measure aiming to charge an emissions tariff on imports of products with a high risk of carbon leakage from countries outside the EU. As a part of the European Green Deal to achieve a Net-Zero goal in 2050, CBAM will follow the timeline below:

- **Oct 1, 2023 – end of 2025 (Transition period)** – EU importers of targeted products: Cement, Electricity, Fertilizers, Iron and steel (including downstream goods), Aluminum, and Hydrogen are **required to report 'embedded emission'** (the direct GHG emissions from the manufacturing of goods), the number of goods, and the total amount of CBAM certificates.
- **Jan 1, 2026 onwards** – Importers start paying tariffs (buying certificates), and there may be an extension to other products such as chemicals and plastics as well as consideration of indirect emissions.

Impacts on Thai industry:

- In the short-run, CBAM tends to have minimal impacts as these potentially affected products account for 2.6% of Thailand's export to the EU and 0.21% of the country's total export. Despite small shares, the exports of iron and steel as well as aluminum have been expanding over the past decade.
- Thai exports of CBAM products to EU accounted for 6.3% of CBAM products to the world, implying EU is not a key market for such products. However, there is an impending risk for other markets to implement similar measures and eventually affect Thai manufacturers.
- Emissions by the Industrial Process and Product Use sector is growing over time and accounted for 10.3% of total emission in 2019, ranked third after the energy and agricultural sectors. Thailand's total emissions were on the rise during 2015-2019, suggesting increasing costs for producers to comply with CBAM if there is no proper adaptation.

Preparation and measures:

- Thailand Greenhouse Gas Management Organization (TGO) is developing an embedded emissions reporting system that focuses on measuring the amount of direct and indirect emissions in accordance with CBAM as well as embedded emissions verifiers following EU standards.
- Manufacturers in targeted and potentially extended sectors will need to prepare for emission measurement and reduction in order to maintain competitiveness. Those include producers in the value chains which are likely to be impacted by CBAM as well.

Source: European Commission, International Trade Centre, ONEP, TGO, Sustainable Capital Market Development, Krungsri Research

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