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INDUSTRY HORIZON

October 2023



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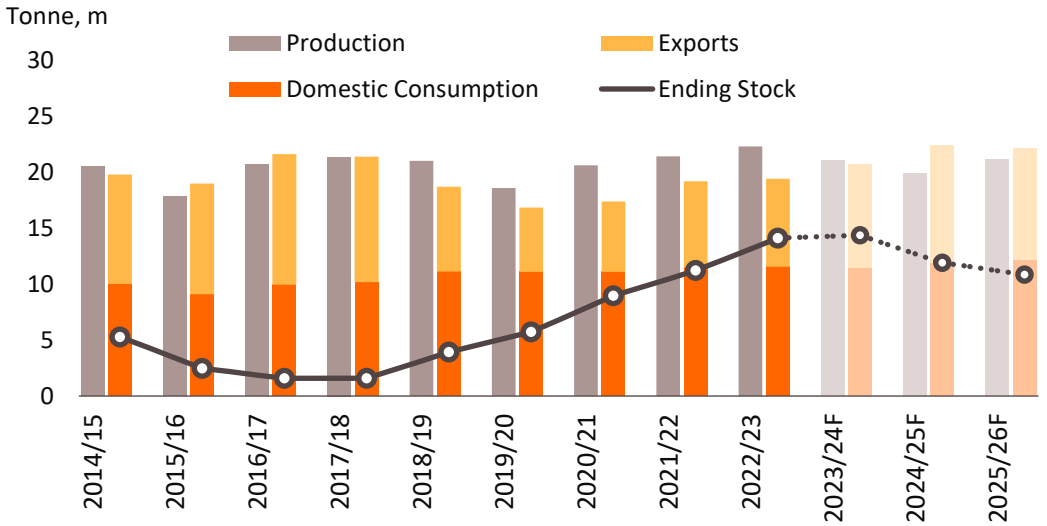


MAJOR INDUSTRY OUTLOOK

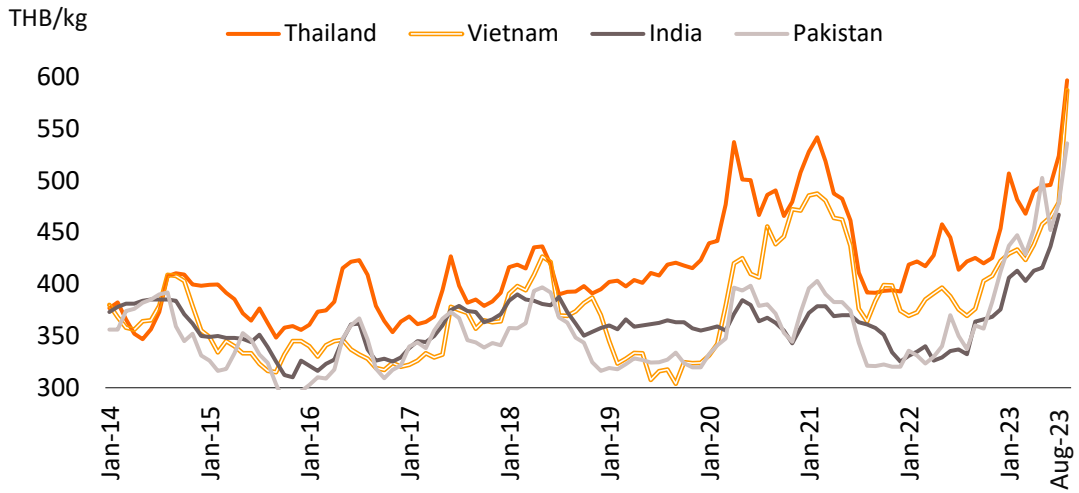
CBAM UPDATES

Rice: Lower outputs and fears over food security will push export prices for Thai rice to a 15-year high

Thailand Rice Balance (Milled Rice)



World White Rice 25% Prices (F.O.B.)



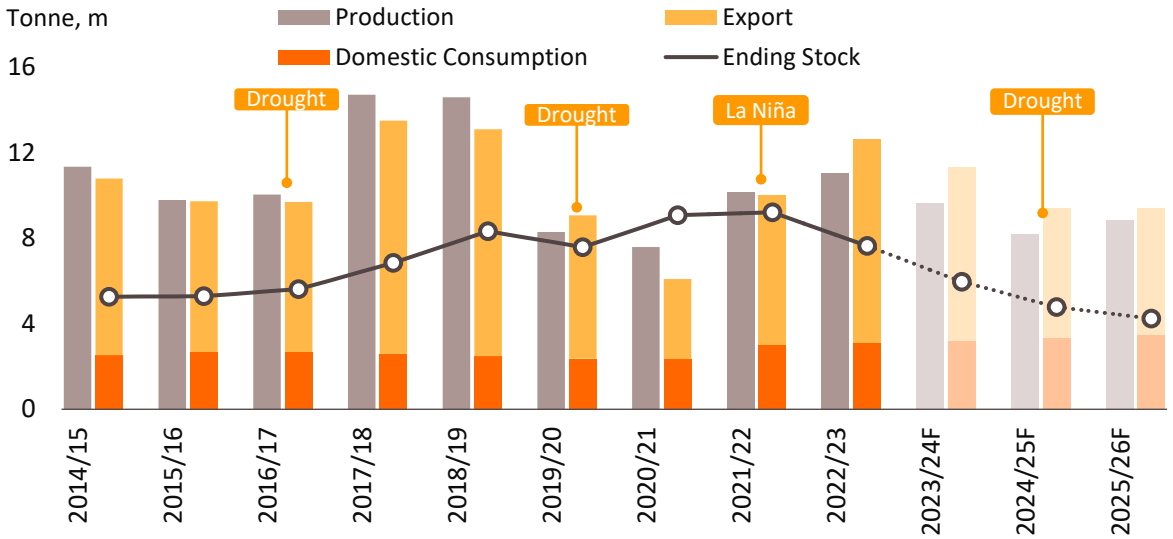
- **Paddy outputs jumped 14.2% YoY over 8M23** on: (i) better weather, heavier rainfall, and increased access to irrigation water in 1H23; and (ii) the incentive effects of government measures to stabilize and support the rice market and generally strong prices. **Prices for paddy thus rose 16.1% YoY**, helped by: (i) the negative impacts of the emerging El Niño on global outputs; (ii) rising worries over the impacts on food security of economic uncertainty, war, and natural disasters that are then driving additional demand for rice for stockpiling; (iii) the block on exports of rice from India, which has diverted demand to Thailand; (iv) growth in the Thai economy and the return to normal conditions for restaurants, hotels, and downstream industries; and (v) competition between traders and middlemen trying to source rice to export. **Overall beneficial conditions have then lifted incomes for rice farmers by 33.7% YoY**, but the onset of El Niño conditions in mid-2023 will cut access to water and reduce yields, while costs remain high for energy, fertilizer, and labor, and this may erode profitability. **For all of 2023, domestic milled rice outputs are expected to run to 22.3-22.4mn tonnes (4.0-4.5%), with domestic consumption and export sales coming to respectively 11.5-11.6mn tonnes (0.5-1.0%) and 7.8-8.0mn tonnes (1.5-4.0%).**
- **Outputs are forecast to shrink by between -1.5% and -2.0% annually over 2024-2026, which would then bring the total harvest down to 19.9-21.1mn tonnes of milled rice.** This will be a consequence of: (i) the likely 1-2 years of El Niño conditions, which will delay seasonal rains and amplify water shortages; and (ii) continuing high costs, especially for power, chemicals, and fertilizer, which will encourage some farmers to cut back on applications of the latter and because of this, yields will slip. Over the same period, **domestic consumption should expand by 1.5-2.5% per year to 11.5-12.2mn tonnes of milled rice** due to the ending of the pandemic and the rebound in foreign arrivals. This will then boost demand in restaurants and hotels, as well as in downstream industries, though most importantly among food processors. **Export volume of rice will total some 9.3-10.5mn tonnes of milled rice annually, or expand by 8.0-9.0% per year,** driven by: (i) greater demand for food stocks in response to worries over food security, in particular due to worsening global drought; and (ii) the impact of the El Niño on global outputs, which will likely trigger an increase in imports from Thailand.

Source: Ministry of Commerce (MOC), Office of Agricultural Economics (OAE), Food and Agriculture Organization of the United Nations (FAO), Krungsri Research

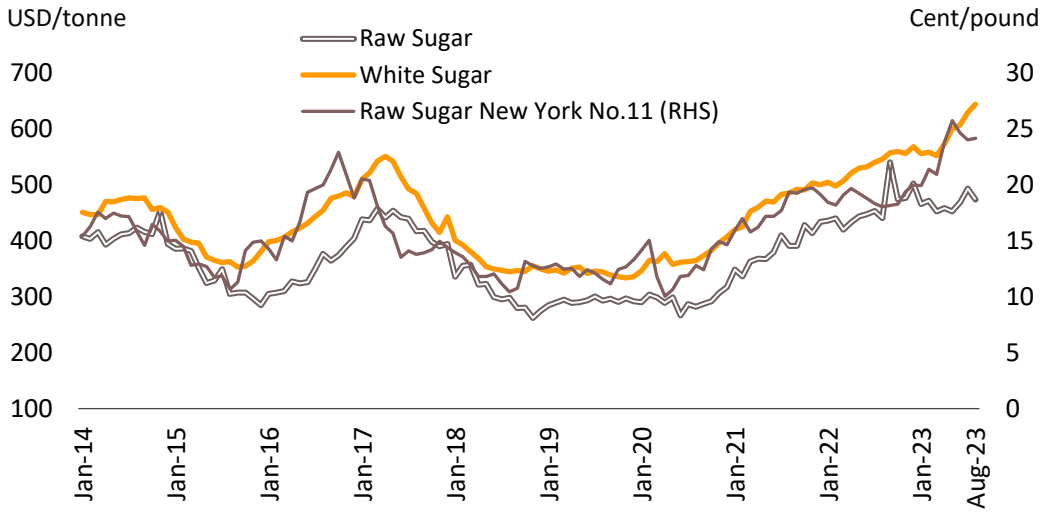
Notes : * As of Jul 20, 2023, India banned the export of non-basmati rice, set a minimum export price of USD 1,200 for basmati rice, and began collecting 20% export duties on parboiled rice on 25 August 2023.
** Export prices for Indian rice, correct as of June 2023 (the latest data available)

Sugar and molasses: Outputs will be undercut by drought resulting in a drop in exports, while domestic consumption will continue to expand.

Thailand's Sugar Balance



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

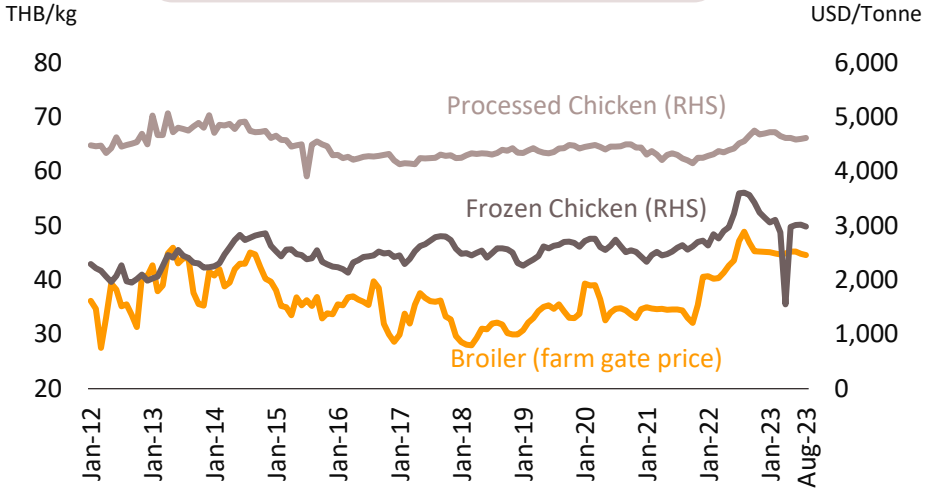


- **The volume of sugarcane being pressed has edged up 2.0% to 93.9mn tonnes in 2023,** and this then produced 11.1mn tonnes of sugar (+8.9%). Output has been supported by: (i) better weather and heavier rainfall during the growing season; and (ii) an increase in the total area under cultivation, which rose from stronger prices. **Domestic consumption of sugar is expected to rise 6.1% to 2.6mn tonnes, while exports of sugar and molasses are predicted to have surged 29.5% to 9.1mn tonnes.** The market has benefited from the reopening of countries and the return to more normal conditions in the food industry, as well as in the economy overall.
- **Annual sugarcane outputs should run to 75-85mn tonnes over 2024-2026, equivalent to a decline in sugar output between -6.5% and -7.5% to 8.2-9.6mn tonnes.** Declines will be driven by: (i) the emergence of El Niño conditions and the resulting decline in rainfall; and (ii) continuing high production prices for sugarcane, which will encourage farmers to switch to more drought-tolerant crops, such as cassava and maize. At the same time, recovery in the economy and the rebound in the tourism sector will add to domestic demand for sugar in downstream industries, and so **domestic consumption of sugar will expand by 3.5-4.5% per year, or 2.7-2.9mn tonnes**, although growth will be restrained by increases in the sugar tax (on sweetened non-alcoholic drinks). By contrast, **exports of sugar and molasses are expected to slump by between -14.5% and -15.5% per year to just 6.0-8.0mn tonnes** as: (i) difficulties sourcing sugarcane translate into supply shortages; and (ii) Thailand's government policy to establish reserves to meet the domestic demand, which is expected to expand with economic recovery. However, Thai producers may benefit from the switch in government policy by the major producers of Brazil and India, which are promoting greater domestic consumption of ethanol. This requires that sugarcane be diverted from the production of sugar, thus leading to a reduced global sugar supply.

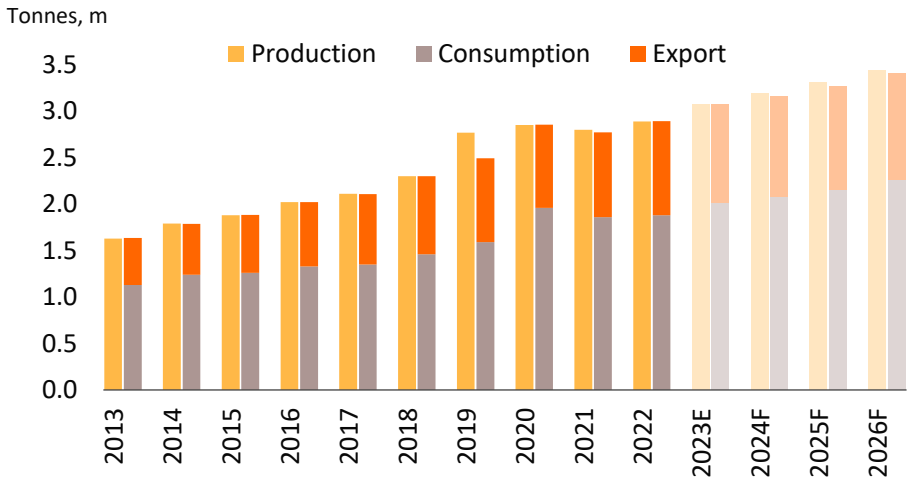
Source: United States Department of Agriculture (USDA), OAE, MOC, World Bank, Sugarzone, compiled and forecast by Krungsri Research

Chilled, Frozen and Processed Chicken Industry: Outputs and domestic sales will continue to grow with recovery of business activities and tourism rebound, although exports will be somewhat impacted by the easing of bird flu outbreaks in some overseas markets will weaken growth in exports.

Farmgate Chicken and Maize Price



Thai Chicken Industry Forecast

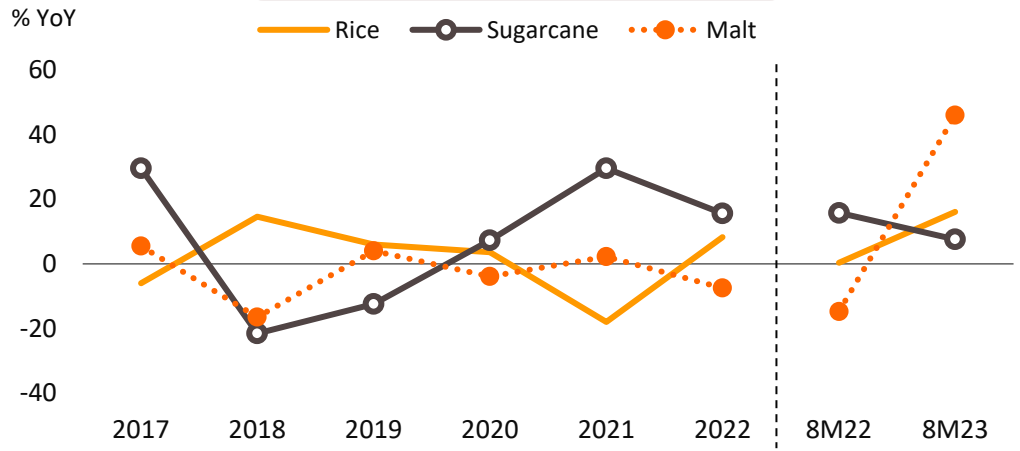


- **Output of chilled, frozen and processed chicken rose 9.8% YoY to 2.1mn tonnes over 8M23** thanks to: (i) recovering demand on domestic and international markets; and (ii) a 4.2% YoY increase in average chicken prices to THB 44.9/kilogram, which has incentivized farmers to expand their size of chicken farming. An uptick in economic activity, the rebound in foreign arrivals, and recovering purchasing power that has then increased spending in restaurants and added to income for food processors has combined **to lift domestic consumption by 10.2% YoY**. **At the same time, exports have risen 7.0% YoY** on: (i) stronger demand following the reopening of countries worldwide, especially from Chinese and Japanese markets; (ii) favorable changes to duties and import rules by China, which eased controls on imports, and South Korea, which has waived duties on Thai chicken for all of 2023; and (iii) ongoing outbreaks of bird flu in the important export markets of Japan and the EU, reducing domestic production and forcing buyers to increase imports from Thailand instead. Over the remainder of the year, these factors should continue to support growth in domestic and overseas markets, although the rising cost of animal feed and the slowing spread of bird flu in export markets will drag on the rate of expansion. **For all of 2023, production, and consumption on domestic and overseas markets is thus expected to grow by respectively 5.0-7.0%, 6.0-8.0% and 4.0-5.0%.**
- **Output of chicken products should expand by 3.0-4.0% annually** to 3.2-3.4mn tonnes over 2024-2026. The market will be stimulated by the continuing strengthening of demand on both Thai and international markets. **The volume of domestic consumption is therefore expected to grow by 3.5-4.5% per year** on continuing economic growth, but the rebound in the tourism industry and the effects of this on the outlook for restaurants and hotels will be especially important. In addition, changing consumer behavior and rising interest in personal health is favoring the consumption of low-fat products such as chicken. **Annual growth in export volume will be somewhat slower, averaging around 2.0-3.0%,** though sales into overseas markets will continue to benefit from: (i) strengthening consumer spending power; (ii) the low price of chicken relative to other meat products; and (iii) improving trade relations with countries in the Middle East, most notably Saudi Arabia, that recognize Thailand's ability to produce chicken that meets halal standards. However, the abating of outbreaks of bird flu in major export markets will somewhat limit export growth.

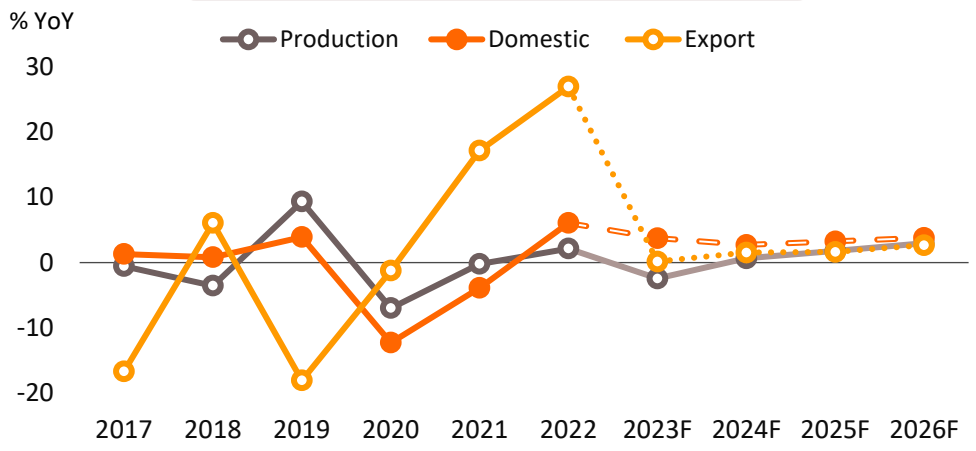
Source: Office of Agricultural Economics (OAE), Office of Industrial Economics (OIE), Ministry of Commerce (MOC), estimate and forecast by Krungsri Research

Beverage Industry: Production will be boosted by restocking to serve rising demand from tourism and restaurant businesses, which is then encouraging businesses to restock. In addition, cross-border trade will increase following the reopening of some border crossings.

Ingredient and Material Costs



Thailand's Beverages Industry Forecast

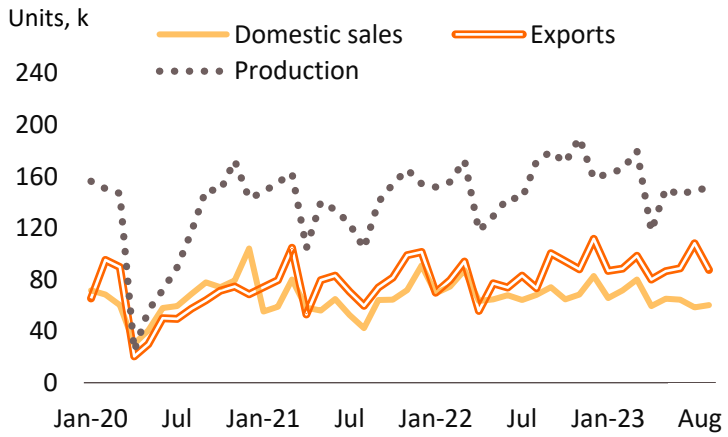


- **Over 8M23, total output by the Thai beverage industry contracted -3.9% YoY.** Declines were accelerated by the introduction of phase 3 of the sugar tax in April, which caused manufacturers of non-alcoholic drinks to cut production and run down stocks instead, and by the rising cost of inputs used by brewers and distillers, for example of malt (+46.0% YoY) and unmilled rice (+16.1% YoY). However, **the volume of drinks distributed domestically climbed 6.7% YoY** on a 10.2% YoY jump in sales of non-alcoholic. The latter was caused by: (i) the impact from the heatwave, which added to demand for thirst-quenching drinks; and (ii) recovery in the tourism, restaurant, and hotel businesses. However, demand for alcoholic drinks is being affected by rising consumer concerns about personal health, while the cost of living also ticked up, encouraging some consumers to cut back on discretionary spending. Increases in sales of non-alcoholic drinks were therefore offset by a -4.0% YoY decline in demand for alcoholic beverages. **Exports of drinks also suffered in the period, dropping -1.2% YoY** on weak regional purchasing power that has yet to recover (especially in Myanmar and Cambodia) and sharply weakening exchange rates, which pushed up the cost of imports. **For the whole year of 2023, output is expected to grow by 0.0-2.0%** as manufacturers step up production for stocking to mitigate impacts from next year's drought. **Domestic sales should grow by between 3.5-4.0%.** Meanwhile, barriers to trade remain in place in the major export markets, **causing exports to remain uncertain, and may decline by -0.5% to -1.5%.**
- **Over 2024-2026, production will increase by an average of 1.5-2.5% annually** as companies transition from a period of destocking to one of restocking, driven in part by the ongoing economic growth. **Domestic sales are expected to expand by 3.0-4.0% per year** on: (i) expected higher temperatures from El Niño impacts that will result in rising demand for consumption; (ii) stronger demand from the tourism industry, and from restaurants, pubs, bars, and related businesses; and (iii) ongoing urbanization and the spread of modern trade outlets, which is broadening the market for beverages to be more accessible. **Exports will also strengthen, and these are forecast to grow by 1.5-2.5% annually.** Overseas sales will be helped by the reopening of border crossings, a major route for distributing goods to neighboring countries, and the development of new product lines that will be popular in export markets (e.g., bottled water, mineral water, and fruit juices). However, brewers and distillers will have to contend with the impact of the El Niño on the supply of agricultural inputs and the resulting rise in prices for these.

Source: Euromonitor, Office of Industrial Economics (OIE), Ministry of Commerce (MOC), forecast by Krungsri Research

Automobile: Output will strengthen as problems with chip shortages ease. Domestic sales and exports are expected to grow on gradual recovery of purchasing power.

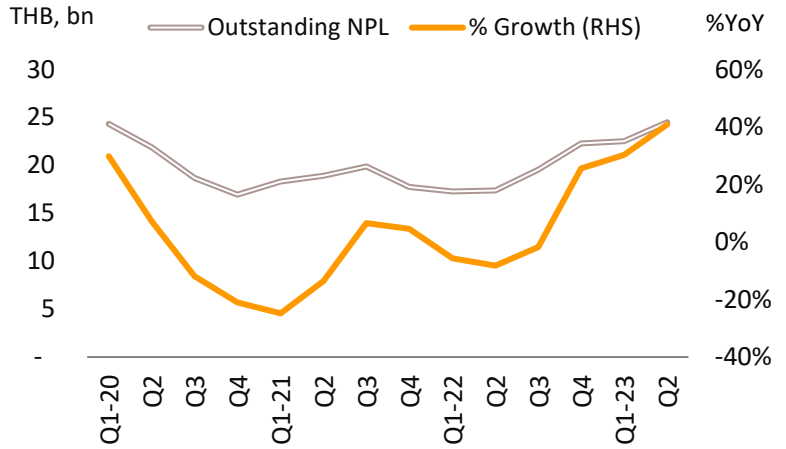
Automobile Production and Sales (Monthly)



Thailand's Car Production and Sales Forecast

		8M2023	2023F	2024F-2026F
Production	units, m	1.22	1.93-1.95	1.99-2.19
	% YoY	3.1%	2.5-3.5%	3.0-4.0%
Domestic Sales	units, m	0.52	0.85-0.86	0.87-0.97
	% YoY	-6.2%	0.0-1.0%	3.0-4.0%
Exports	units, m	0.72	1.06-1.07	1.09-1.20
	% YoY	19.5%	6.0-7.0%	3.0-4.0%

Auto Leasing (Quarterly)

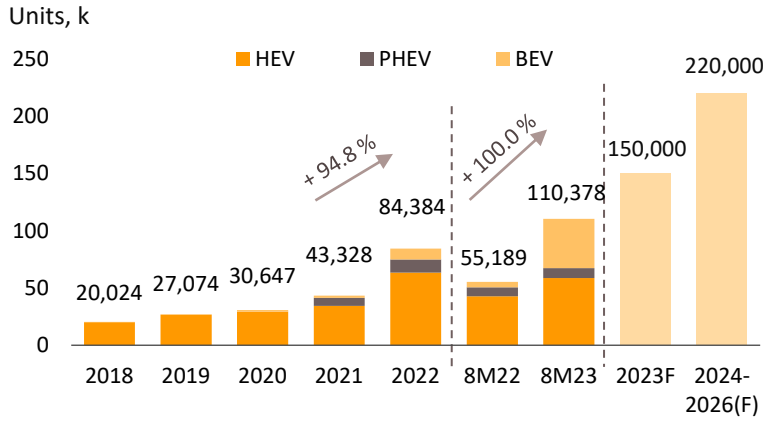


- **Over 8M23 automobile output increased 3.1% YoY to 1,221,878 vehicles,** as supply chain disruptions gradually improved, despite periodic problems of complex chips for production of some auto models resulting from the intensified US-China tech war. Output of PHEV and HEV autos surged by respectively 72.8% and 59.6%, while output of ICE-powered vehicles slipped -10.4%. **Domestic sales contracted -6.2% YoY** to 524,784 vehicles, mainly due to a -22.1% YoY crash in pickup sales. This was driven by worsening problems with household debt and NPLs, especially in the agricultural sector, that then encouraged lenders to tighten credit conditions, while at the same time, the high interest rates further ate into consumer spending power. **Overseas markets performed better, and exports jumped 19.5% YoY** to 724,423 vehicles, though this was partly due to extensive problems sourcing semiconductors last year, which then reduced the baseline comparison and boosted 2023 output to compensate for 2022's shortfall. Exports rose, in particular to Saudi Arabia (+62.6% YoY), the ASEAN region (+31.5% YoY), Australia (11.4% YoY) and Japan (+10.7% YoY). These trends should extend through the rest of the year, and so 2023 production, domestic sales, and exports are forecast to improve by respectively 2.5-3.5%, 0.0-1.0%, and 6.0-7.0%.
- **Output will continue to strengthen over 2024-2026,** as investment acceleration by major manufacturers will increase the supply of chips to world markets and improve the problem of shortages. Thanks to the need to produce vehicles to compensate for earlier imports[1/] and government measures to subsidize BEV purchases through 2024 and 2025, the number of BEVs coming off Thai production lines will surge. **The outlook for the domestic market will improve somewhat**, with tailwinds including the uptick in economic activity and the rebound in the tourism sector, which will boost demand for passenger transport, and greater spending on infrastructure, which will add to demand for freight transport. However, headwinds will also dampen demand, and in particular this will come from the effects of the El Niño on crop yields and through this, on sales of commercial vehicles upcountry. **Exports will rise** on pent-up demand and the backlog of unfilled orders, as well as the likely softening of inflation and interest rates in overseas markets. **Given this, domestic sales and exports are expected to rise by 3.0-4.0% annually.**

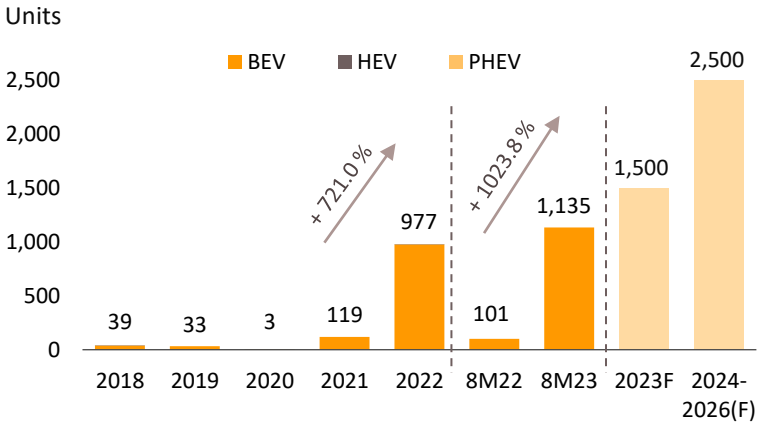
Source: The Federation of Thai Industries (FTI), Ministry of Commerce (MOC), Bank of Thailand (BOT), forecast by Krungsri Research
Note: 1/The number of BEVs newly registered rose 805.9% over 8M23, and manufacturers that have imported BEVs to distribute to the domestic market over 2022-2023 will be required to match these with Thai-produced BEVs over 2024-2025 at a ratio of 1-1.5 vehicles for every imported vehicle.

EVs: The number of EVs registered in Thailand will continue to surge on government supports and production increase in line with investment promotion conditions.

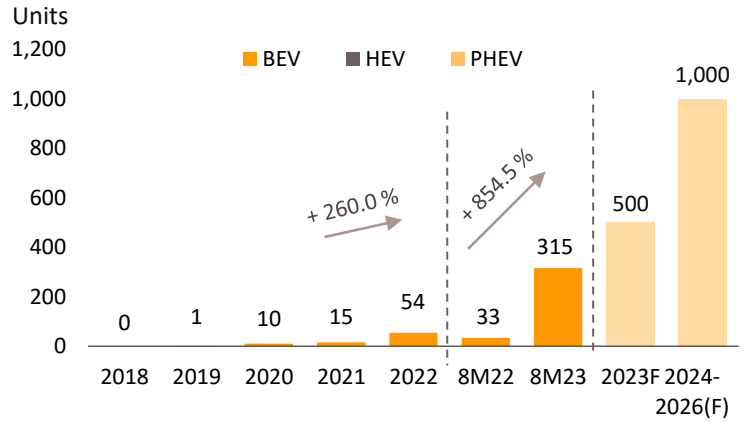
Newly Registered Electric Passenger Cars



Newly Registered Electric Buses



Newly Registered Electric Pickup Trucks



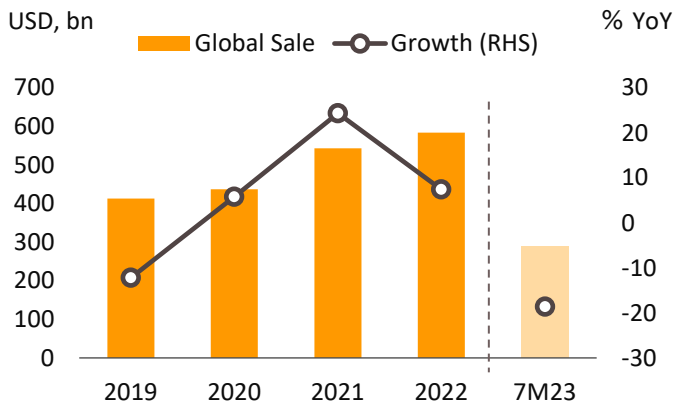
- **Through 8M23, the number of EVs newly registered in Thailand jumped drastically, with these rising 100.0% YoY for e-passenger cars (to 110,378 vehicles), 1,023.8% YoY for e-buses (to 1,135 vehicles) and 854.5% YoY for e-pickups (to 315 vehicles).** Sales have benefited from: (i) government support in the form of subsidies and cuts to vehicle excise; (ii) the release of a greater range of models (as of July 2023, 37 BEVs produced by 21 manufacturers were available); and (iii) rapid improvements in BEV efficiency (as of 2023, an average BEV in the THB 0.5-1mn price range can travel for 380-412 km per charge, as per the New European Driving Cycle: NEDC standards). New registrations of e-passenger cars and e-buses thus accounted for 22.8% and 20.4% of all new registrations of autos and buses, respectively. Meanwhile, e-pickup registrations represent just 0.18% of newly registered pickups due to limitations in terms of transportation distances, charging stations in the countryside, and prices that are higher than purchasing power. In addition, The electric passenger car has a competitive advantage through the phasing of product development to gain market acceptance. Starting with HEVs and transitioning to PHEVs and then BEVs sequentially makes it easier to access the market, compared to electric buses and commercial electric vehicles, which started with BEVs that will take more time to access the market.
- **Annual registrations of new e-passenger cars, e-buses and e-pickups will increase by some 220,000, 2,500 and 1,000 vehicles respectively over 2024-2026,** lifted by: (i) the expected extension of the EV3.5 measures through 2024-2026, which will provide subsidies of THB 50,000-100,000 to buyers of EVs; (ii) the likely fall in prices resulting from the increase in the number of brands and models available; (iii) the increasing number of BEVs that will be manufactured in Thailand over the next 4 years[1] (especially e-passenger cars); (iv) the stimulus effect on demand in advance of the introduction of new excise rates in 2026; and (v) greater use of both private and public e-buses (e.g., the EEC has set a target of using 6,000 e-buses by 2028). However, problems with an insufficient charging stations are likely to persist[2], and this may have some impact on sales.

Source: Department of Land Transport (DLT), Board of Investment of Thailand (BOI), Electric Vehicle Association of Thailand (EVAT), Krungsri Research

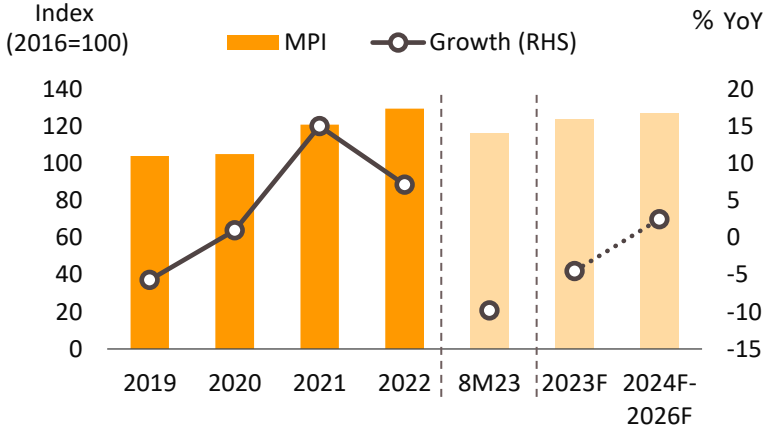
Notes: 1/ Manufacturers that have imported BEVs to distribute to the domestic market over 2022-2023 will be required to match these with Thai-produced BEVs over 2024-2025 at a ratio of 1-1.5 vehicles for every imported vehicle. For companies importing BEVS in 2024 and 2025, the ratio will be increased to 2-3 times the number of imports, and these will need to be manufactured in Thailand in 2026 and 2027.
2/ As of May 2023, there was 1 charger available for every 19 e-passenger vehicles. This is regarded as insufficient and is far behind China's ratio of 1:6.5.

Integrated circuits (ICs): Production and exports will improve in line with global sales recovery and inflows of FDI.

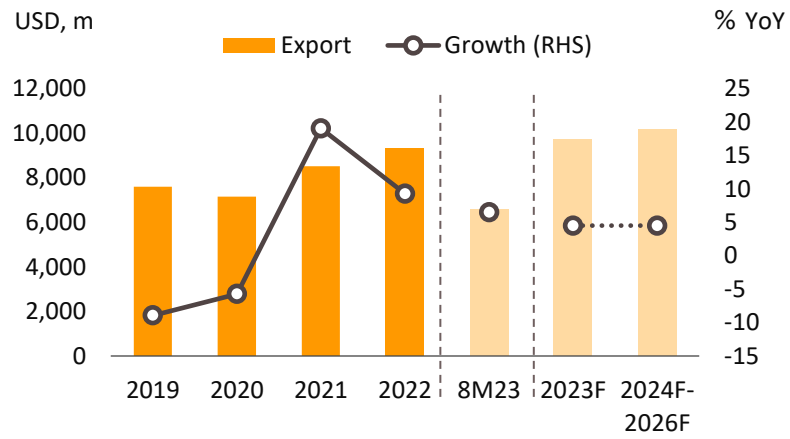
Worldwide Sales of Semiconductors



Thai IC Manufacturing Production Index (MPI)



Thailand's IC Export Value

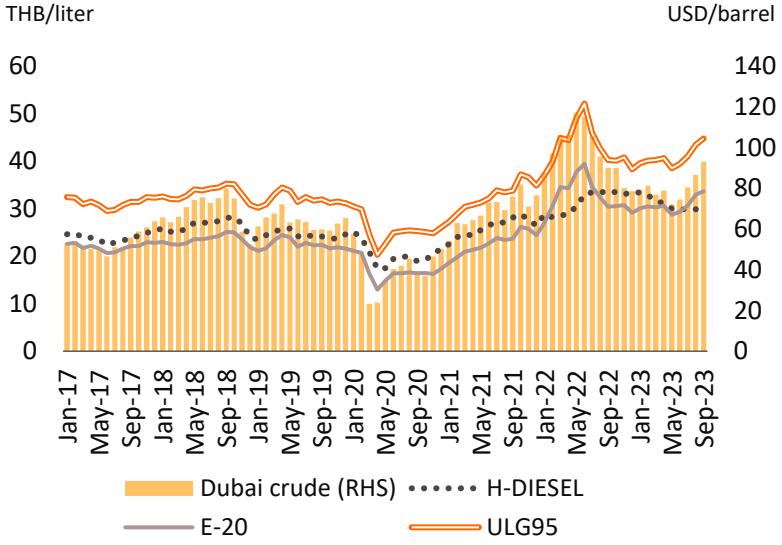


- **World semiconductor sales slumped -18.55% YoY in 7M23** alongside a downward trend in the global MPI for electronics goods, particularly global PCs MPI that declined -9.0% YoY in 3Q23. This was driven by: (i) strong inflation and sluggishness in the global economy that depressed spending power; (ii) the effect of the US-China tech war on exports of semiconductors and of important materials for chip production, which then led to periodic supply chain disruptions. Thus, over 8M23 the **MPI for Thai IC manufacturers slipped -9.81% YoY, and although exports were up 6.52% by value, this was a softened from the 14.2% average growth recorded over 2021 and 2022**. Nevertheless, domestic and global demand for semiconductors should pick up in the last quarter of the year as the need to buy new PCs that support Windows 11 upgrades drives a new cycle of sales. Gartner thus estimates that global demand for PCs will accelerate towards the year-end **For 2023, sales will be up 4.9%. Combined with strong worldwide demand for chips for use in EVs, this will help to lift the industry's MPI back to a softer decline of between -4.0% and -5.0%, while boosting IC exports by 4.0-5.0%.**
- **Global semiconductor sales will recover over 2024-2026.** On the demand side; (i) Demand for AI chips for use in AI-based applications will rise (e.g., in data centers, edge infrastructure, and endpoint devices), with Gartner predicting that sales of these will jump 25.6% in 2024. (ii) Sales of semiconductors for use in Evs will continue to climb, helped further by progress on the development of autonomous vehicles and fully automated driving systems. At present, auto manufacturers represent a full 42% of the world market for semiconductors, and the IEA expects that global growth in EV sales will average 18.9% through the period 2023-2030. (iii) The PC replacement cycle will extend into 2024. On the supply side, increasing inflows of FDI into the Thai electronics industry (in 8M23, applications for BOI investment support included those from 10 major Taiwanese companies with a combined value of over THB 30 billion) are helping to position Thailand as the ASEAN zone's leading center of PCB production. This, coupled with rising global demand for semiconductors, will then boost Thailand-based output and export of ICs, and so **for 2024-2026, the IC MPI and exports will rise by respectively 3-4% and 4-5%.**

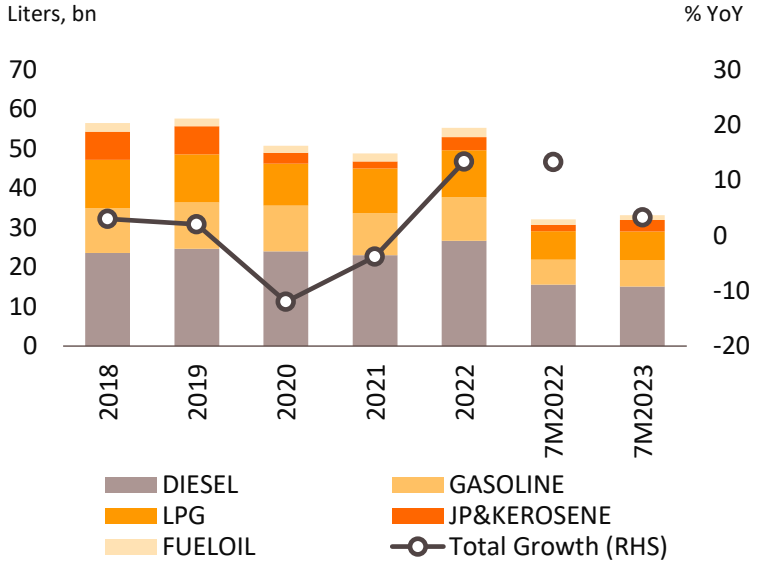
Source: Bloomberg, Susquehanna Financial Group, Semiconductor Industry Association, Accenture, IDC, Reuters, US Department of Commerce, Ministry of Commerce (MOC), Office of Industrial Economics (OIE), International Energy Agency (IEA), Krungsri Research

Refinery: Oil refiners will benefit from growth in the economy, especially from the sharp rebound in the tourism industry, while the cost of crude remains elevated.

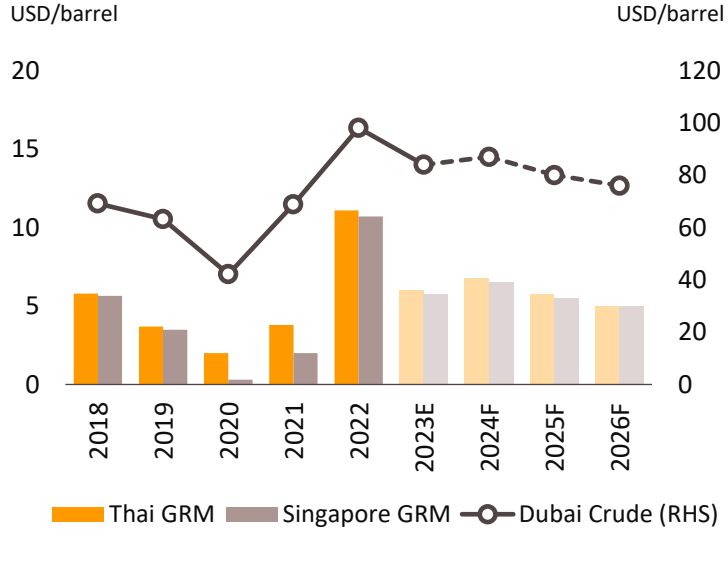
Thailand Petroleum Prices at Refinery



Domestic Petroleum Demand



Gross Refinery Margins

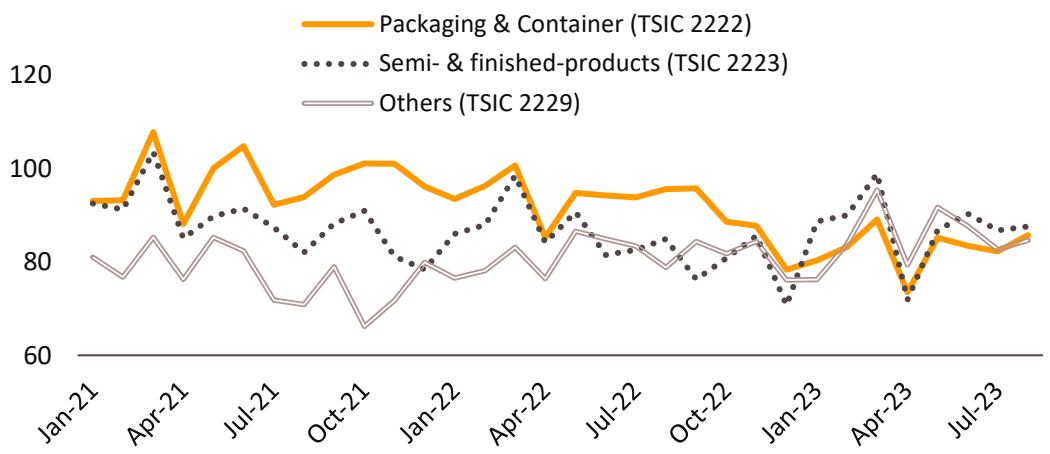


- **Thai gross refinery margins narrowed over 9M23** because of the slowdown in the global economy and the effects of this on demand. Nevertheless, the reopening of China, the continuation of the Russia-Ukraine war, and the production cuts by the OPEC+ group helped to underpin global crude prices. Dubai crude thus averaged USD 81.3/bbl over the period (down -19.7%YoY), and as a result, Thai ex-refinery prices (e.g., for gasoline and E-20) remained close to their level at the end of 2022. Domestic demand for refined products climbed 3.3% YoY over January-July 2023, due to the recovery in the tourism industry that then added demand for oil products for use in the transport industry most pronounced for aviation fuel (+74.7% YoY). Through the remainder of the year, supply cuts by OPEC+ and wars in several areas (e.g., Ukraine and Israel) will likely push up global crude prices, and Krungsri Research foresees these averaging USD 84/bbl in 2023, down from USD 96.5/bbl in 2022. Domestic sales will also strengthen with the overall uptick in economic activity, greater demand from the tourism sector, especially during year-end high season, and growth in e-commerce sales, leading to an increase in demand for transport and delivery services. As a result, **2023 gross refinery margins should average USD 6.0-6.5/bbl, compared to USD 13/bbl in 2022.**
- **Over 2024-2026, the oil refining industry will be lifted by growth in the economy, and especially by recovery in the tourism industry, which is expected to return to its pre-COVID-19 level by 2025.** Players in the industry will also pursue ambitious investment plans that will extend to include clean energy projects. For example, in line with government policy to reduce air pollution, cut emissions of greenhouse gases, and reach net zero by 2065, Thaioil Group is investing in major facilities in the EEC that should begin production in 2024. These aim to add value to low-value bunker fuel by converting this into higher-priced low-sulfur products, such as diesel and aviation fuel. **Prices for Dubai crude are expected to average USD 87/bbl, USD 80/bbl and USD 76/bbl in each of the next three years. Gross refinery margins are thus forecast to run in the average of USD 6.0-7.0/bbl, up slightly from the 2012-2019 average of USD 5/bbl.**

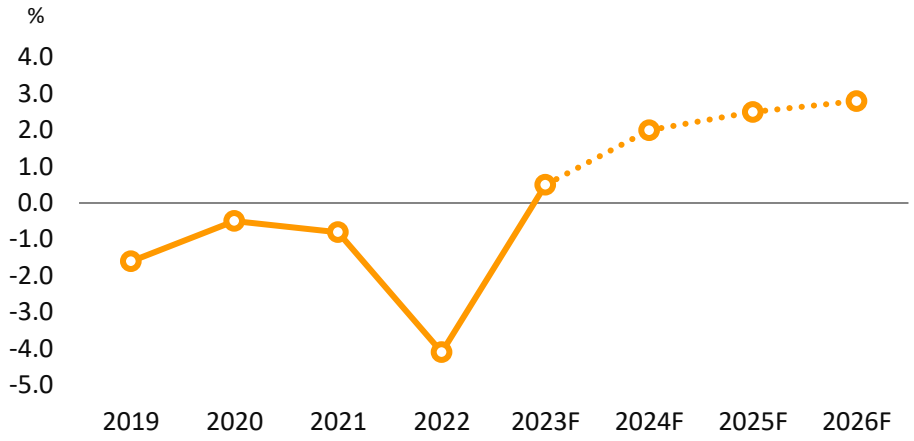
Source: Bloomberg, Energy Policy and Planning Office (EPPO), Forecast by Krungsri Research

Plastics: Sales will rise on a brighter outlook for downstream industries at home and abroad.

Plastics Manufacturing Production Index



Sales Growth of Thai Plastic Product

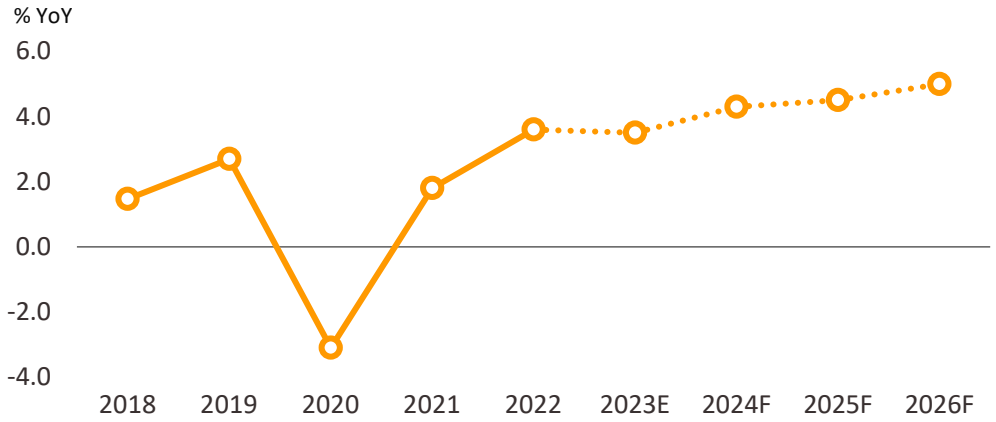


- **Sales of plastics for use in packaging declined in 8M23**, with output of these slipping -12.1% YoY on the ending of the COVID-19 pandemic. This had boosted demand for food packaging and plastic bags but worries over infection are now dissipating, and the high base in the past translates to a pronounced decline in production. Nevertheless, sales of finished and semi-finished plastics and of 'other' products strengthened slightly on an improving outlook in downstream industries (e.g., auto assembly and construction materials.) The manufacturing production indices (MPI) for these rose by respectively 0.7% YoY and 5.2% YoY. Likewise, sales of plastic piping and connectors also jumped 14.5% YoY. Exports performed weaker, slumping -21.1% YoY on the global slowdown which impacts plastic consumption and the recovery in downstream industries. **For the rest of 2023, domestic sales of plastics are expected to strengthen**, helped by: (i) recovery in the services sector, especially in the tourism industry; (ii) stronger demand for goods as part of year-end celebrations; and (iii) gradual growth in downstream industries (e.g., auto assembly and the production of electronic equipment). Exports will, however, continue to contract on the weak state of the global economy, **and so for all of 2023, domestic sales will rise by 1-2%, but exports will contract by between -1% and -3%.**
- **Over 2024-2026, domestic demand for plastic products will strengthen** with steady growth in the Thai economy, helped by the rebound in the tourism sector and the return of foreign arrivals to their pre-COVID level by 2025, and by recovery in the downstream industries of packaging, electrical appliances, auto parts, construction, and medical devices, which together account for 80% of the plastic market value. Given this, **sales into the Thai market are forecast to rise by an average of 2.0-3.0% per year. Over the same timeframe, exports will be helped by the improved prospects for the global economy (the IMF sees annual growth averaging 3.0-3.5%) and for downstream industries, but growth may fall anywhere between a contraction of -1% and a 2% expansion.** This will, though, be offset by a the likely consequences of a number of challenges, including: (i) the effect of volatile global crude markets on prices for plastics; (ii) phase 2 of the plan for the improved management of plastic waste (2023-2027), which will encourage consumers to use environmentally friendly plastics; (iii) the EU's policy to end production of single-use plastics; (iv) the plastic taxes that will be introduced in many countries and that will be placed on single use and non-biodegradable plastics; and (v) the introduction of the carbon border adjustment mechanism (CBAM). These will then conspire to erode demand for plastics.

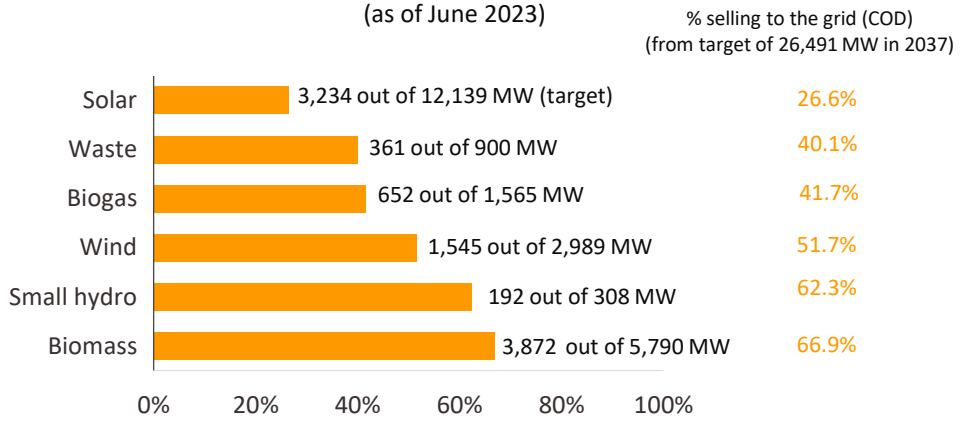
Source: Office of Industrial Economics (OIE), Forecast by Krungsri Research

Power Generation: Electricity consumption will move in step with growth in the domestic economy, while government policy will encourage the private sector to expand capacity and increase investment in new plants.

Growth of Electricity Demand



Renewable Energy Generation Capacity and AEDP* Target

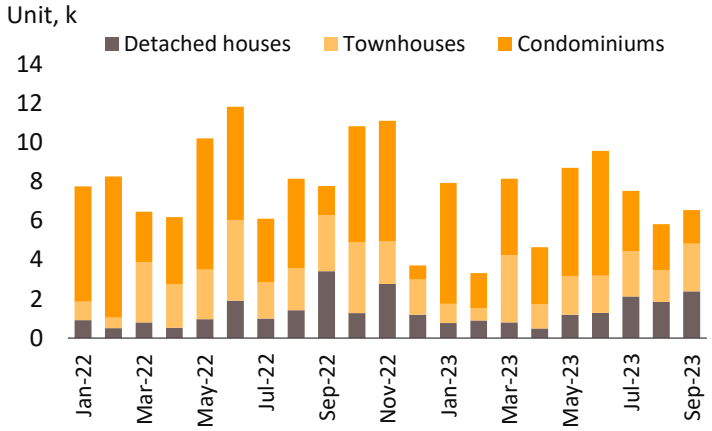


- **Income strengthened over 8M23 on two main factors**. (i) Overall demand for electricity rose 2.5% YoY, with peak demand hitting a record high of 34,130.50 MW in May (+5.8% from the 2022 peak). Household consumption of electricity rose 5.9% YoY on hotter weather, and in the business sector demand climbed 8.8% YoY thanks to recovery in the tourism industry (for 9M23, tourist arrivals +250% YoY), but industrial demand slipped -3.7% YoY following a -3.9% YoY decline in exports. (ii) higher fuel costs fed into higher tariffs (natural gas prices rallied by an average of 20.6% YoY), and so the Ft charge rose to THB 2.47/unit for businesses. **For the remainder of 2023**, demand should continue to increase due to: (i) recovery in business activity, especially tourism, that will then boost consumption of electricity in related sectors; and (ii) the increase of EVs on Thai roads, with new registrations expected to reach 150,000 units in 2023. **Total average demand is therefore expected to increase by 3.0-3.5% YoY**, from 3.6% growth in 2022.
- **Demand for electricity will continue to grow solidly over 2024-2026, due to** (i) Recovery in economic and business activities will support 4.0-5.0% average annual growth in electricity consumption. Demand will benefit further from the ongoing public-sector spending on infrastructure megaprojects (e.g., phase 2 of the EEC development for 2023-2027); (ii) Sales of EVs are expected to jump forward at an average of 220,000 units per year, adding to demand. At the same time, installed capacity will rise with the implementation of the PDP and ADEP, and this will then support an expansion in private-sector investment and generating capacity. The outlook for individual players is as follows.
  - **IPPs: Income will strengthen on rising demand and increased investment in natural gas-fired power stations in the northeast and south of the country to replace 6,969 MW of supply that is coming offline over 2030-2037**. IPPs are also investing in new renewables capacity, various types of hydrogen-powered projects, and increased generating capacity that will come from both natural gas and renewables in countries including Myanmar, Lao PDR, Indonesia, the Philippines, Australia, Japan and the US.
  - **SPPs: Income is expected to build steadily** on: (i) expanding investment in natural gas cogeneration power plants to replace supply from power plants for which contracts are expiring in 2025; (ii) production costs for renewable power supplied from SPP hybrid firms that will have average fuel costs of just THB 1.89/unit against forecast average tariffs of THB 4.0/unit; and (iii) greater investment in new power stations in the EEC.
  - **VSPPs: Investment and income will strengthen significantly** thanks to: (i) government plans to step up purchases of electricity generated from renewables (in particular from solar, wind, biomass and biogas) to a total of 11,095 MW by 2030; and (ii) the implementation of BOI-supported net zero plans that will waive corporate income tax for companies producing power from clean energy. However, new entrants to the market may have difficulty sourcing inputs, especially for biomass and biogas projects.

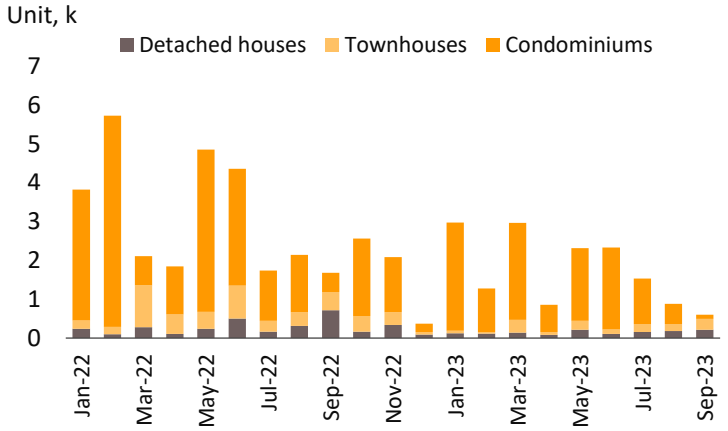
Source: Department of Alternative Energy Development and Efficiency (DEDE), Energy Policy and Planning office (EPPO), Forecast by Krungsri Research
Note: * Alternative Energy Development Plan 2018

Housing (BMR): The housing market will improve steadily on stronger demand from both domestic buyers with real demand and foreign investors.

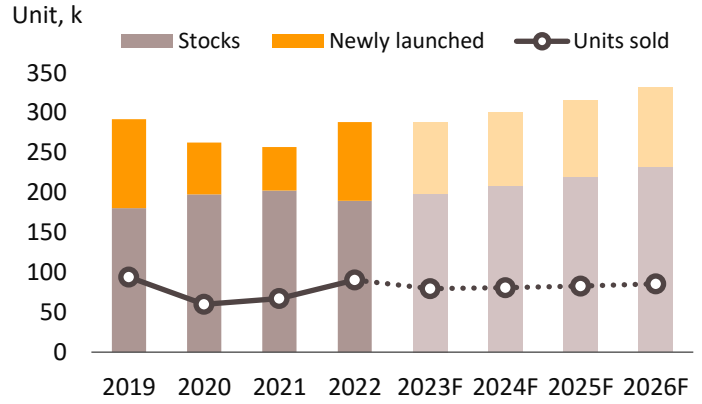
New Supply



Units sold*



Total Supply



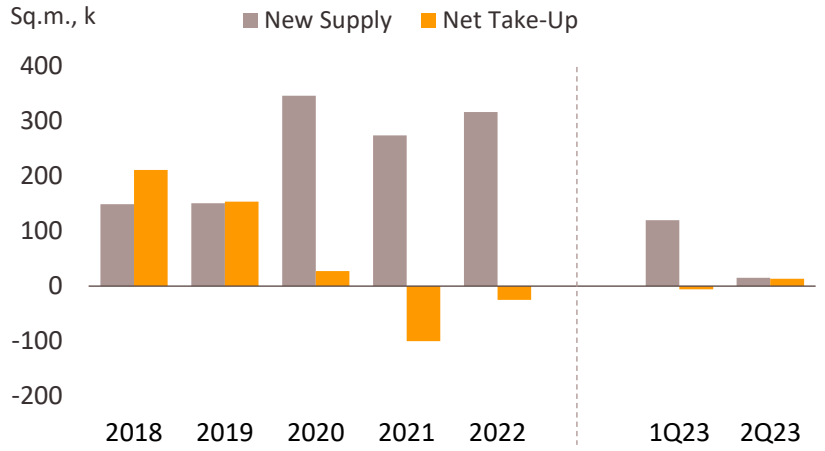
- **Over 9M23, the number of new housing units coming into the market contracted -14.4% YoY to 62,219 units.** The supply of new townhouses and condominiums decreased by respectively -18.6% YoY and -17.2% YoY, but for detached houses, this was up 3.1% YoY. At the same time, **sales of new units fell at the faster rate of -44.3% YoY to 15,758 units** as higher interest rates and slow economic growth eroded consumer purchasing power, affecting affordability for residential purchases. **For the rest of 2023, residential demand will pick up slightly from the group of real demand**, which still has purchasing power. In addition, the rebound in the tourism sector is lifting the economy, and with an additional 8.5 mn tourists expected for the high season and year-end celebrations, demand from overseas buyers will also rally. Nevertheless, recovery in overall demand remains limited by the heavy burden of household debt (over 90% of GDP as of 1Q23) and the tightening of credit conditions by lenders. **For 2023, the housing market will thus remain depressed and with developers wary of starting fresh projects, the supply of new units will contract -8.5% YoY, while sales will slip -12.0% YoY.**
- **Overall economic growth will lift the housing market over 2024-2026.** In particular, the economy will benefit from ongoing spending by the government on investment (most notably on transportation infrastructure) that will then boost employment, lift incomes, and support steady growth in demand for residential housing, especially along new mass transit lines and in areas served by these. In addition, foreign arrivals are on track to return to their pre-COVID 19 level by 2025 and the rapid rebound in the industry will help to boost demand from foreign buyers for properties in the BMR. Supply will then expand to meet improving conditions. Details are as follows.
  - **The supply of new units should expand by 3-4% annually.** Most of this will come from major developers that are on a strong financial footing, and will be in projects with a limited number of units, such as condominiums and luxury detached houses in areas close to international schools or that are long-term investments in the north and east of Bangkok (near New Krungthep-Kreetha Road).
  - **Sales will strengthen by some 2-3% per year,** helped by an expansion in the economy that will boost purchasing power and add to demand for houses from the real demand group with high purchasing power. Alongside this, the health of the tourism sector will buoy demand for condominiums from foreign buyers, especially in the city center and along metro lines. Beyond this, the extension of mass transit lines into more suburban areas (e.g., the Pink Line (Khae Rai-Minburi) and the Orange Line (Cultural Centre-Minburi) will boost demand for properties in these areas.

Source: AREA, bangkokbiznews, Realist, forecast by Krungsri Research

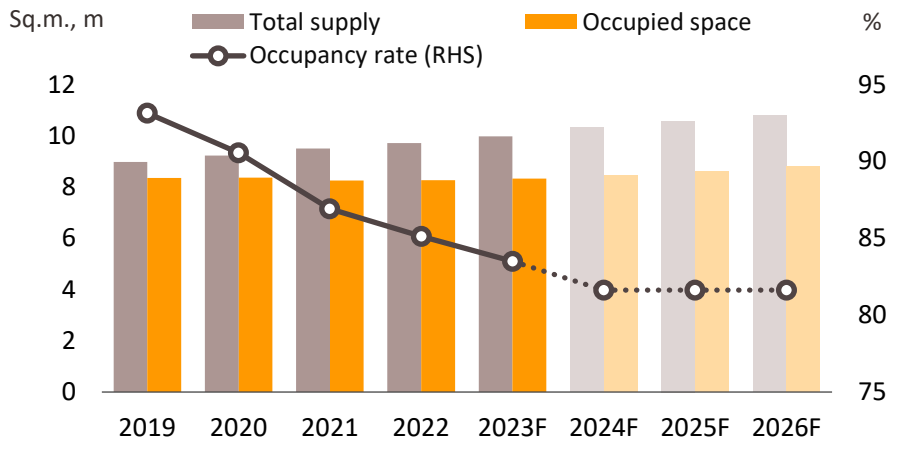
Note: *Units sold (sales by month) = units sold of properties newly launched in that month only (i.e.., excludes units sold on housing projects launched prior to that month).

Office Building (BMR): Expansion in the supply of office space for rent will outpace growth in demand, so the occupancy rate will come under pressure.

New Supply and Net Take-Up



Office Buildings in BMR

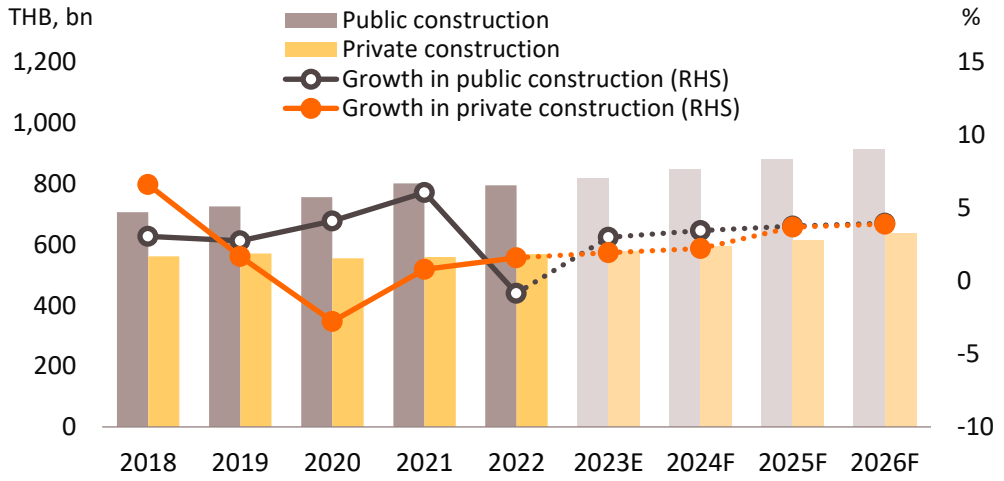


- **The supply of new office space expanded by 134,750 sq.m. over 1H23,** around 70% of which was in the CBD. This then brought total supply to 9.4mn sq.m.[1/], while total occupied space came to 7.9mn sq.m. Net take-up[2/] also improved, rising to +13,568 sq.m. in Q2 from -5,961 sq.m. in Q1. For the remainder of 2023, new space will continue to enter the market, especially for properties in the CBD (e.g., Pier 111, Siam Patumwan House, PUNN, JLK Tower and One Bangkok). However, demand will come under pressure from the continuation of hybrid working, **and so for all of 2023, while supply will expand by 270,000 sq.m. (+2.8% YoY), demand will strengthen by just 66,000 sq.m. (+0.8% YoY),** down from the average annual increase of 140,000 sq.m. seen over 2017-2019. Because supply will grow faster than demand, **the occupancy rate will slip from 2022's 85% to 83% this year,** and as the oversupply of space increases, average rents will tend to soften.
- **Income will strengthen steadily through the period 2024-2026 on an anticipated 1.8% YoY increase in demand.** The latter will be driven by growth in the economy and as companies take on more staff, their office needs will expand accordingly. In addition, renters (especially overseas companies) will tend to look for newly built offices that have been certified by international organizations for their energy conservation and reduced environmental impacts, their implementation of measures to ensure the health and wellness of their occupiers, and their digital connectivity. On the supply side, developers will continue with planned expansion, and this will include in particular mixed-use projects in the CBD on which work is currently underway (e.g., Central Park Offices, One Bangkok, The Forestias and AIA Ratchada 2). **Overall, the supply of new rented office space is expected to expand by some 2.6% per year (around 800,000 sq.m.), though this will pull the occupancy rate down to an average of 82%.** As such, bargaining power will shift to the demand side of the market, making it difficult to raise rents and increasing downward pressure on these in some locations.

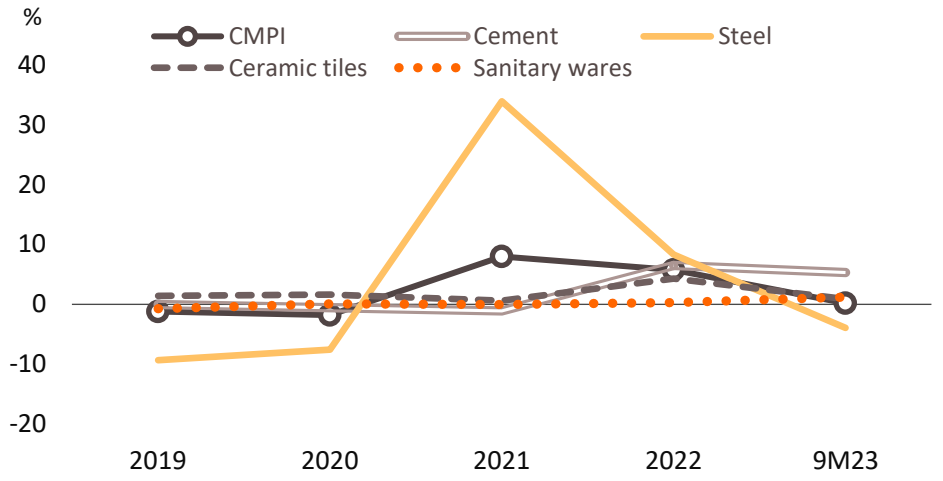
Source: CBRE Research, forecast by Krungsri Research
Notes: 1/ CBRE has reclassified database in Q1 2023, resulting in a smaller total office supply in Bangkok. This excludes home offices and government office buildings. CBRE have also excluded some non-active multiple ownership buildings. As a result, YoY analysis for Q1 2023 is not available as the data in the same period of last year basis is not provided for comparison.
2/ The net take-up represents the difference between new occupied space and rented space that the tenants terminated in that year (square meters).

Construction Contractors: Growth in spending on overall construction slowed in 2023, but the outlook will improve over 2024-2026 as public sector spending ramps up.

Construction Investment Value



Construction Materials Price Index (CMPI)

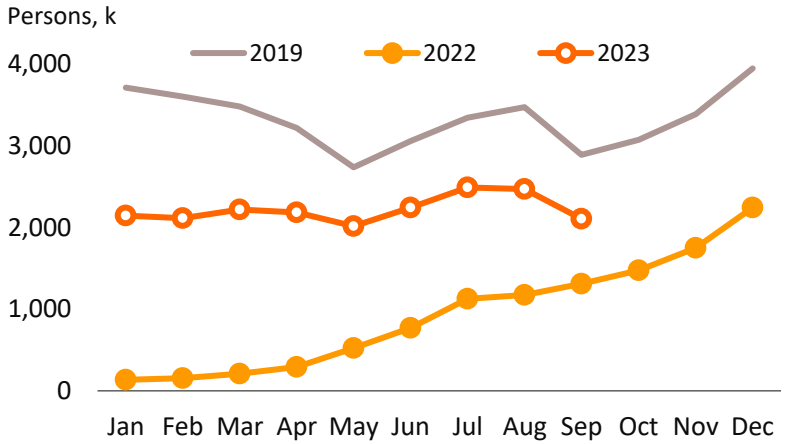


- **In 1H23, overall spending on construction rose 3.7% YoY to THB 720bn.** The majority of this (THB 430bn) came from the public construction, which increased spending by 4.0% YoY. Investment in infrastructure (82% of all public construction investment) rose just 3.0% YoY, with this spent only on ongoing work since in the period, work was not begun on any new infrastructure projects. Spending by private construction edged up 3.2% YoY to THB 290bn. 53% of this was on residential property, and spending here accelerated 3.6% YoY, while because Chinese investors have not yet significantly entered in Q1, investment in factories and commercial buildings fell, and this then pulled growth in non-residential private-sector construction down to just 2.7% YoY. Likewise, the construction materials price index (CMPI) inched up by only 0.2% YoY in 9M23, and although prices for cement rose 2.5% YoY, softening global markets meant that prices for steel and steel products slipped -3.9% YoY. **For all of 2023, total spending on construction will expand at the somewhat low rate of 2.0-3.0%, split between the growth of 3.0% and 2.0% for public and private construction, respectively.**
- **Over the next 3 years, total spending on construction will strengthen by some 3.0-4.0% annually. In public construction, spending will increase by an average of 3.5-4.0% per year** as work accelerates on both ongoing and new infrastructure megaprojects, especially the construction to improve the transportation and logistics networks that connect to the EEC, as per the 2023-2027 action plan. This will include the high-speed rail connecting 3 airports, for which ground should be broken in 2024, and transportation networks that connect to neighboring countries. **In private construction, investment should rise by 3.0-3.5% per year** on stronger spending on factories in industrial estates in the EEC, where investment will be increasing, and on hotels, for which demand will continue to rise with the overall rebound in the tourism industry. In addition, the residential property market will gradually recover, especially in the EEC and in major provincial centers. This will result in improving prices of construction materials, especially for the price of cement, which is expected to increase by 3.0-4.0% annually. **Meanwhile, steel prices will rise at a slow rate of 1.0-2.0% in line with the global market trend.**

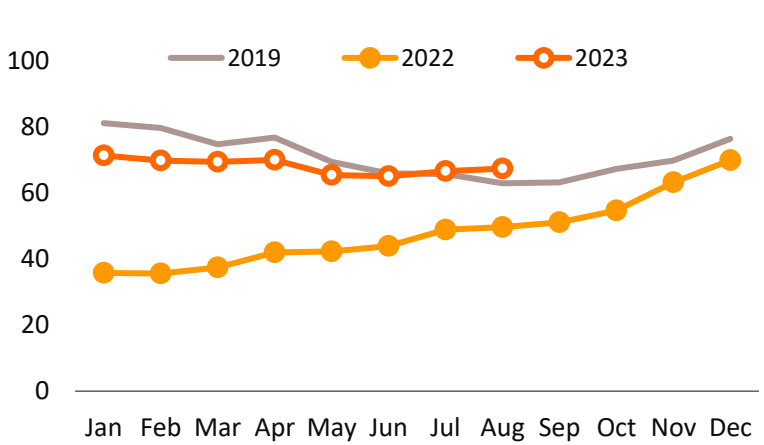
Source: Office of the National Economic and Social Development Council (NESDC), Ministry of Commerce (MOC), Forecast by Krungsri Research

Hotel: 28.5mn foreign arrivals are forecast for 2023, with arrivals potentially reaching 45mn by 2026. Hotel occupancy rates should also be above 70% in 2024.

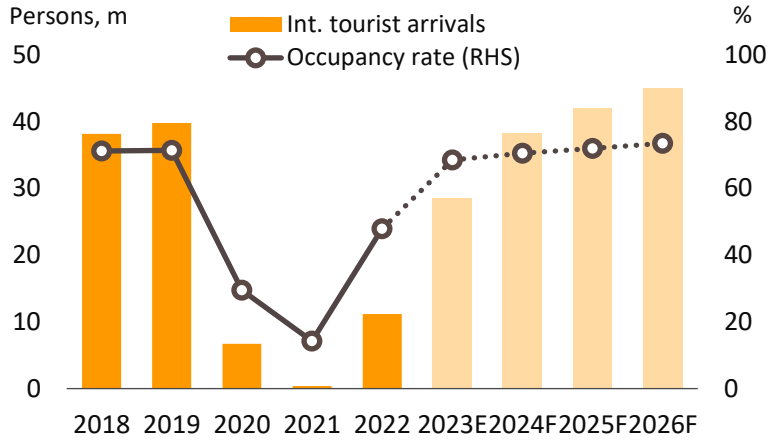
Foreign Tourist Arrivals in Thailand



Occupancy Rate (%)



Forecast for Tourism Sector



- **20.0 mn foreign arrivals were recorded in 9M23, up from 5.7mn in 9M22.** This improving outlook has been driven by: (i) the move by Chinese authorities to allow Chinese tourists to travel abroad freely from the start of the year; and (ii) thanks to Thailand's relatively low costs, the Malaysian market rapidly recovered. Despite these improvements, arrivals are still only at 67% of the 9M19 (pre-Covid) total of 29.5mn. The largest source of arrivals has been Malaysia, with 3.3mn visitors (+111% of 9M19 Malaysian arrivals), followed by China (2.5mn arrivals and 29% of the 9M19 total), and South Korea (1.2mn arrivals and 86% of the 9M19 total). Thai travelers made 86.2mn domestic trips over 1H23, up 31.5% YoY thanks to the large number of 3-day holidays and the effects of phase 5 of the We Travel Together program, which ran from March 7 to April 30**. Overall, this has then lifted the average 8M23 hotel occupancy rate to 68.2%,** up from 42.0% for the same period a year earlier and close to 8M19's 72.1%. However, the introduction of visa-free travel for visitors from China and Kazakhstan, effective from September 25, 2023, to February 29, 2024, may have only limited impacts in 2023 since: (i) the measure was launched late in the year[1/]; (ii) the Chinese economy is sluggish; and (iii) the number of Thai-China flights has not yet returned to its 2019 level. It is thus estimated that in 2023, around 4.7mn Chinese tourists will visit Thailand, contributing to approximately 28.5mn international arrivals in the year, compared to projected totals of respectively 4.3mn and 28.0mn in the absence of these measures. It is also expected that the mass shooting in a Bangkok shopping mall on 3 October will have only temporary impacts, **and for 2023 overall, the occupancy rate should average 68-69%, up substantially from 2022's 47.9%.**
- **Foreign arrivals are forecast to rise to 38.2mn in 2024 and then to 42mn and 45mn in each of 2025 and 2026.** The market will be lifted by: (i) gradual recovery in the main markets, although at present the Chinese market is under pressure from economic weakness, which is then encouraging Chinese tourists to travel domestically rather than abroad; (ii) the normalization of international flights; and (iii) government measures to promote tourism, such as extending the duration of the Free visa for Russian tourists from the previous 30 days to 90 days (effective from November 1, 2023, to April 30, 2024). Over the same period, **Thai tourists are expected to make 200-255mn domestic trips,** in part because additional stimulus measures are likely to be deployed over 2024-2026. Overall, this will then lift the average occupancy rate to above 70% in 2024 (similar to 2019's 71.4%). However, although the outlook is broadly positive, geopolitical tensions (most recently seen in the outbreak of violence in Israel and the Gaza Strip) may negatively impact global tourism.

Source: Ministry of Tourism and Sports (MOTS), Forecast by Krungsri Research
Note: 1/ The potential impacts are expected during the 2024 Chinese New Year period

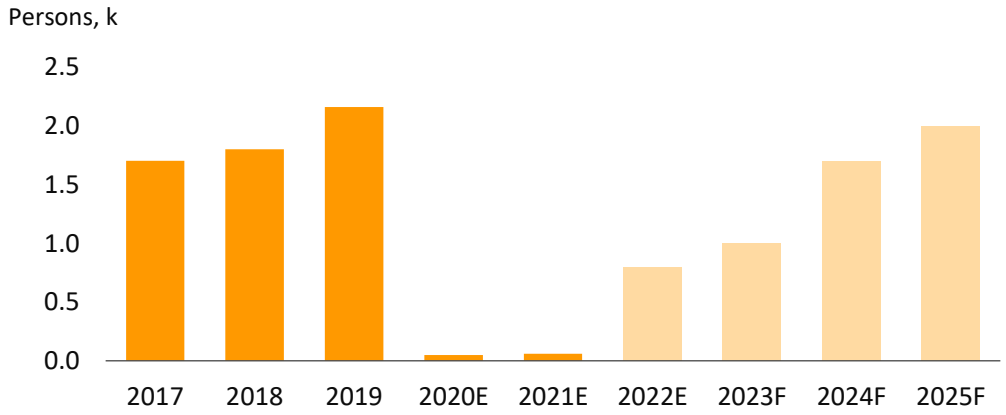
Private Hospital: Businesses will improve due to the aging population and the increasing number of overseas patients, while players will diversify their customer base to expand their incomes.

Proportion of Aging Population

% of population 65+ to total population

		2020	2040
Hyper-aged (20%)	Japan	29	34
Aged (14%)	South Korea	16	31
	Singapore	15	30
Aging (7%)	**Thailand**	**13**	**26**
	Vietnam	8	17

Number of Patients Infected with Notifiable Diseases

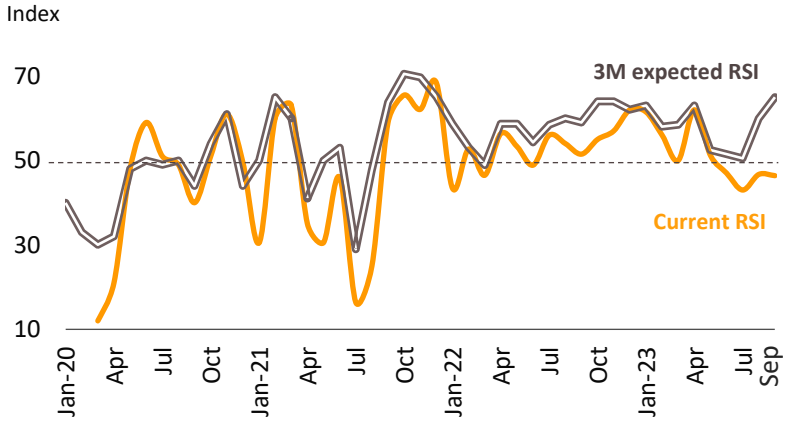


- **Income rose over 9M23, lifted by a range of tailwinds.** (i) Patient demand returned to normal, including patients with COVID-19 treated in the hospitals, (ii) The market for medical tourism revived and foreign patient numbers increased (total foreign arrivals reached almost 20mn). Recovery was seen in the established Middle Eastern segment and in new markets such as Saudi Arabia, Libya, and IVF treatment for Chinese patients, now that the authorities in Beijing city have agreed to include this in their basic healthcare provision. (iii) Seasonal diseases continue to affect the population (e.g., influenza, dengue fever, and hand, foot, and mouth disease). (iv) The Social Security Office has increased public health insurance payments from THB 1,640 to THB 1,808 per person. Patient numbers should continue to increase through the rest of 2023, especially for foreign patients since 8.5 mn visitors are expected to come to Thailand in the last quarter**. For all of 2023, private-sector hospitals should therefore benefit from an 8-10% YoY jump in income.**
- **The upward trend in income will continue through the next three years**, helped by: (i) Thailand's transition to an aged society and the resulting increase in demand for the treatment of ongoing and complex conditions as well as anti-aging medicine; (ii) continuing urbanization and with this, the rising incidence of non-communicable diseases (NCDs); (iii) the strengthening market for medical tourism, which will benefit from Thailand's status as a medical hub providing world-class care, though markets in the Middle East, China and the CLMV nations will be particularly important; (iv) operators' plans to grow their customer base and develop new income streams by expanding current sites and opening new hospitals to service the domestic and international markets; and (v) forecast economic growth of 3-4% per year that will then boost consumer spending power. As a result of these positive influences on the market, **income is forecast to increase by an average of 10-12% per year over 2024-2026.**

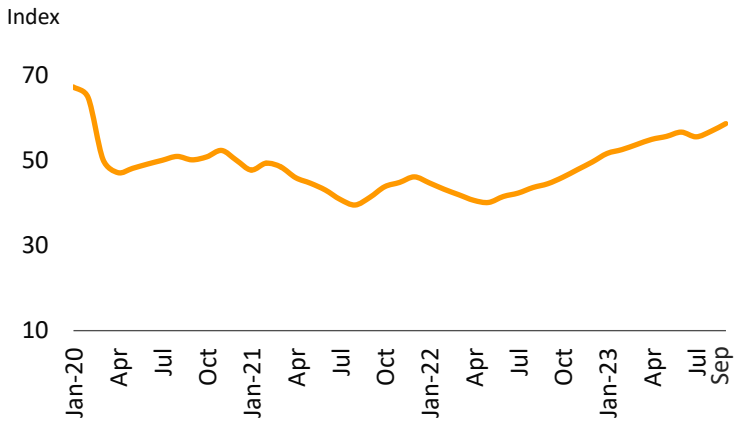
Source: National Statistical Office (NSO) , Ministry of Public Health (MoPH) , estimated and forecast by Krungsri Research

Modern Trade: The business outlook will benefit from improving consumer spending power, which will strengthen with economic growth, and expansion in branch coverage.

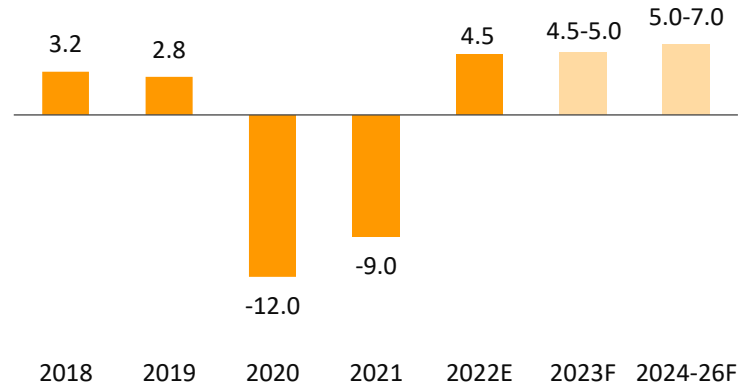
Retailer Sentiment Index (RSI)



Consumer Confidence Index (CCI)



Modern Trade Retail Business Growth (%)

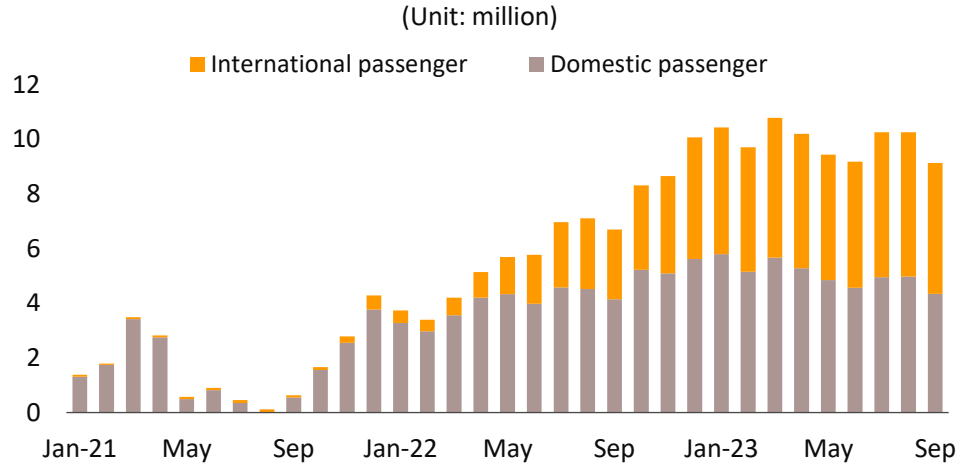


- **Income improved steadily through 9M23 for modern trade operators**, helped by: (i) an improving domestic economic outlook due to the rebound in tourism (tourist arrivals +250% YoY to 20mn in 9M23), which then boosted employment in related services and lifted consumer spending power; and (ii) government stimulus packages, i.e., the 'Shop and Refund' program (January-February) and phase 5 of the 'We Travel Together' scheme (March-April), and campaign spending during the general election. These positive influences then lifted the Consumer Confidence Index to a 42-month high of 58.7 in September, but operators remain worried about elevated business costs and the patchy recovery in spending power, so the Business Sentiment Index has remained below 50 points since June. **For the rest of 2023**, conditions should continue to improve with the onset of the holiday season and the continuing rebound in the tourism industry. In the latter case, the introduction of visa-free travel for tourists from China and Kazakhstan (October 25, 2023, to February 29, 2024) will help to lift total arrivals to 9mn during Q4. **For 2023 overall, sales are expected to increase by 4.5-5.0%, similar to 2022's 4.5% growth.**
- **Income is forecast to rise by 5.0-7.0% annually over the 3 years from 2024-2026,** helped by: (i) forecast economic growth of 3.0-4.0% per year that will then lift consumer spending power; (ii) the continuing rebound in tourist arrivals, which will reach an expected 45mn by 2026, and this will boost retail sales, especially in tourist areas; (iii) ongoing growth in e-commerce (Euromonitor sees retail e-commerce expanding by 15.4% (CAGR) over 2024-2027); (iv) progress on private- and public-sector construction projects, which will boost employment, inject additional funds into the economy, and stimulate additional investment in modern trade retail units sited to meet demand from expanding residential areas; and (v) growth in the broader region (the IMF sees the CLMV countries enjoying average growth of 2.6-6.8% per year), which will then support a better outlook for retailers in border regions. Operators will continue to expand their branch networks, increase their online presence, and develop new business models that allow them to connect better with their customer base. The outlook for individual segments is as follows.
  - **Department stores and supermarkets:** These shops cater to mid- to upper-income customers so sales will trend upwards. Players will also continue to develop omnichannel platforms and expand their branch networks in high-potential areas at home and abroad.
  - **Discount stores/hypermarkets:** Sales will build only gradually since the customer base is largely composed of mid-income and poorer buyers who are more careful about spending on non-essentials. However, players will develop premium outlets as they try to connect to higher-end consumers.
  - **Convenience stores:** Thanks to operators' almost complete national coverage, sales will continue to rise. Players will also adjust their strategies to align online and offline sales, and expand their offerings to include a greater range of food and drink.

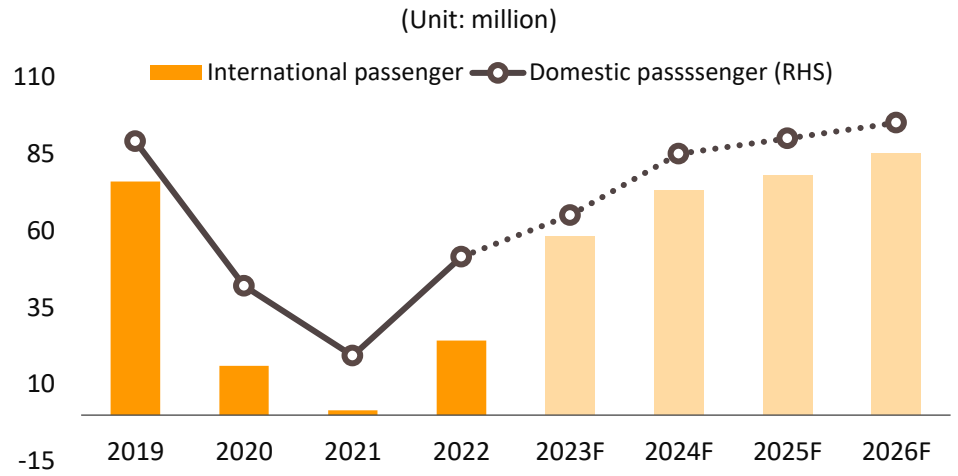
Source: Thai Retailers Association (TRA), Bank of Thailand (BOT), Estimate and forecast by Krungsri Research

Air passenger services: Strengthening demand for travel and tourism services is helping operators' income return to its 2019 pre-COVID level.

Monthly Traffic Update of Air Passenger



Total Number of Air Passengers in Thailand

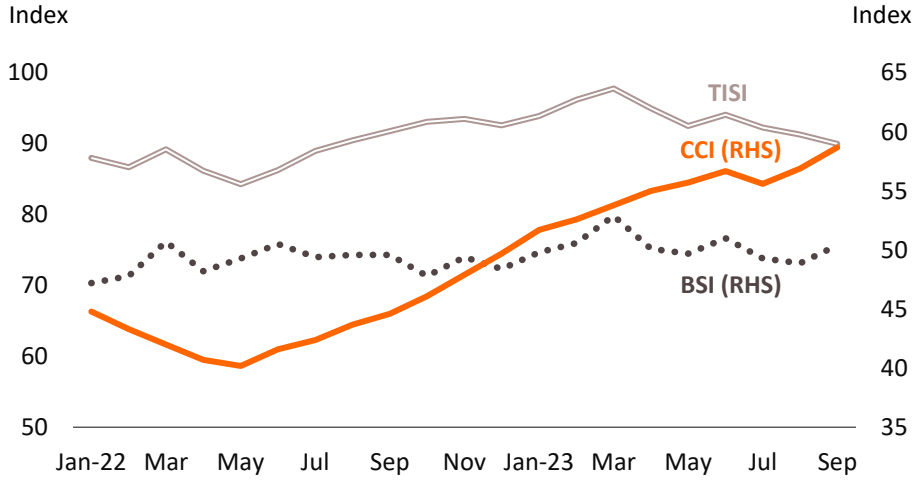


- **In 9M2023, Carriers enjoyed sustained recovery with a total of 89.5mn passengers,** split between 43.8mn international travelers (+233.3% YoY) and 45.6mn domestic flyers (+28.2% YoY). Demand was boosted by the post-pandemic releasing of pent-up demand, though this was helped further by government stimulus measures (i.e., phase 5 of the 'We Travel Together' program and the THB 0.20/liter cut in excise duties on jet fuel). These helped to grow the domestic tourism market to 86.2mn trips (+31.5% YoY) in 6M23. Foreign arrivals also surged 250.9% YoY to 20mn, boosted by the reopening of China, and as such, the Chinese market returned to life. With 2.5mn Chinese arrivals, this was second in size only to the Malaysian market (3.3mn arrivals). For the rest of 2023, demand will continue to strengthen as the year-end celebrations and high season approaches. On the supply side, operators are increasing flights and opening new routes, and 3 new carriers targeting higher-end Thai and international travelers will begin services at the end of the year. Overseas arrivals will benefit further from the temporary waiving of the requirement for visas for tourists from China, Kazakhstan, and Russia. Given this, **2023 passenger numbers are expected to reach 123mn (+62.3% YoY), split between 58mn international travelers (+138.7% YoY) and 65mn domestic flyers (+26.2% YoY).**
- **Through the years 2024 to 2026, carriers should see business conditions return to or improve on their pre-pandemic level. Demand is forecast to increase at an average annual rate of 13-15%,** meaning that 168mn travelers are expected to take to the air in 2025, above the 2019 level of 165mn. The market will benefit from: (i) slowly improving global trade and a gradually strengthening world economy that will improve spending power and add to expenditure on travel and tourism; (ii) government measures to stimulate the tourism industry, including visa-free travel for Chinese and Kazakhstani tourists (September 25, 2023, to February 29, 2024) and foreign visitors will receive a waiver on excise and duties of consumer goods purchases in the EEC Aerotropolis (EECa) in Rayong; and (iii) improvements to the efficiency and capacity of airport facilities, for example, by opening the Satellite 1 building in Suvarnabhumi Airport (soft opening started on September 28, 2023) and the plan to ease crowding at Phuket Airport by building a new airport in Phang-Nga. However, pressure on turnover will come from: (i) only slow growth in the world economy, which will undercut demand for air travel services; (ii) the introduction of stimulus measures by competitors, for example, the waiving of visa requirements for arrivals from China by both Japan and South Korea, which may then take market share from Thailand; and (iii) possible increases in global crude prices (the main determinant of business costs) that would then reduce consumer spending power and erode demand. At the same time, competition from overseas carriers is intense, and so there is only limited room within which players may increase fares.

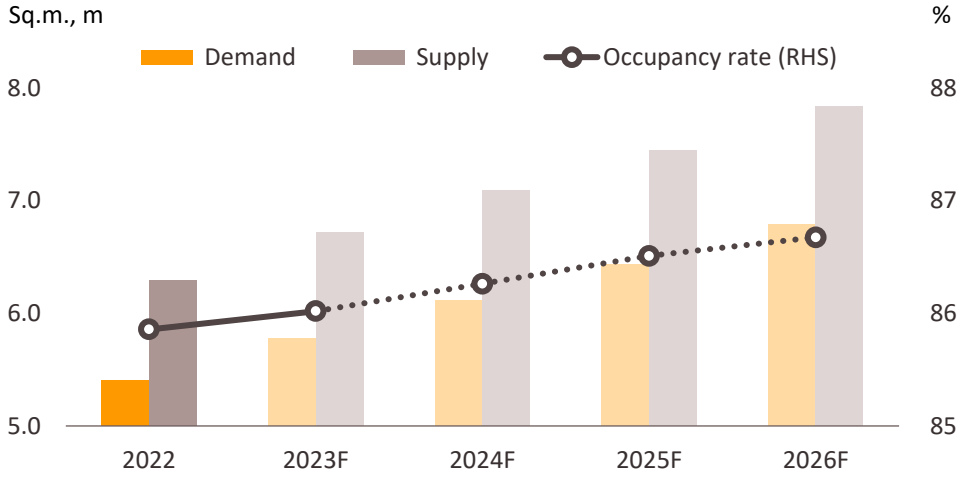
Source: Civil Aviation Authority of Thailand (CAAT), compiled and forecast by Krungsri Research

Warehousing: With demand expected to rise, the supply of warehousing space will expand.

Industry, Business and Consumer Sentiment Index



Demand, Supply and Occupancy rate of General-purpose Warehouse

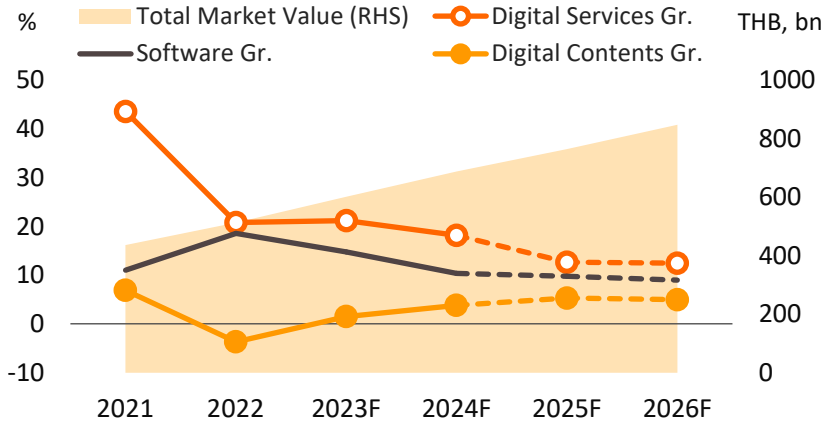


- **Demand for rented warehouse space trended up across 9M23** on the post-pandemic return to normal of social and economic life. This was led in particular by increasing private consumption and the bounce back in the tourism industry, the health of which was then reflected in the steady improvement in the CCI, and growth in e-commerce. Against this, exports have slid steadily since October 2022, and this has then eroded demand for warehouse space and weakened sentiment (the TISI is beneath the 100-midpoint mark and the BSI averages around 50 points). For the rest of 2023, demand for warehouse space to meet stronger demand for consumer goods and recovery in manufacturing will strengthen as the year-end approaches, and with this, consumption increases and the tourism industry peaks. In addition, the outlook for the export sector is improving, and in August, overall exports rose for the first time in 11 months, while the Thailand E-commerce Association expects e-commerce volumes to grow by 13-15%. **Given this**, **2023 demand for warehousing**, **space should increase by 7.0%, or by 378,079 sq.m., while supply will increase by 6.8%, or by 427,776 sq.m.**
- **Demand will continue to strengthen through 2024-2026** thanks to a number of factors. (i) The Thai economy is forecast to grow by 3.0-4.0% annually on recovery in tourism, exports, and public- and private-sector investment, helped further by the development of new industrial estates (e.g., the Smart Park Industrial Estate, due to open in 2024). (ii) Ongoing geopolitical tensions will encourage manufacturers to increasingly relocate production facilities to Thailand (over 8M23, applications for BOI investment support jumped 73% YoY, with this money targeted at manufacturers of electronics and electronic appliances, and autos and auto parts located around the BMR and the EEC). (iii) E-commerce is forecast to continue to expand at an average rate of 13% per year. Against this background and with demand expected to strengthen, operators will naturally invest in expanding the supply of warehousing space. **For the next 3 years, demand is thus forecast to increase by an average of 5.5% per year, while supply is expected to grow at a rate of 5.3%. This will then increase the average occupancy rate to 86.5-87.0%, up from 86% in 2023.**

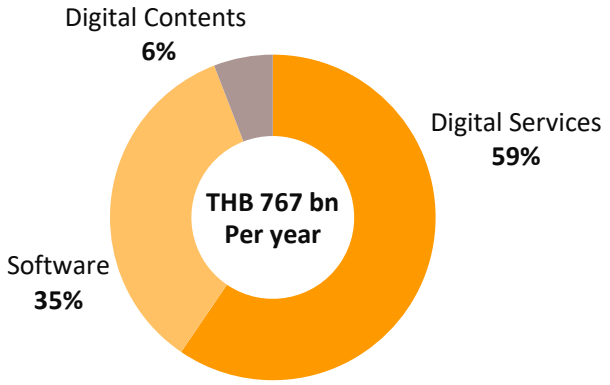
Source: Bank of Thailand (BOT), The Federation of Thai Industry (FTI), University of the Thai Chamber of Commerce (UTCC), Industrial Estate Authority of Thailand, WHART, Krungsri Research

Digital services and software: Revenues are rising with the development of media platforms offering new types of services driven by big data and AI.

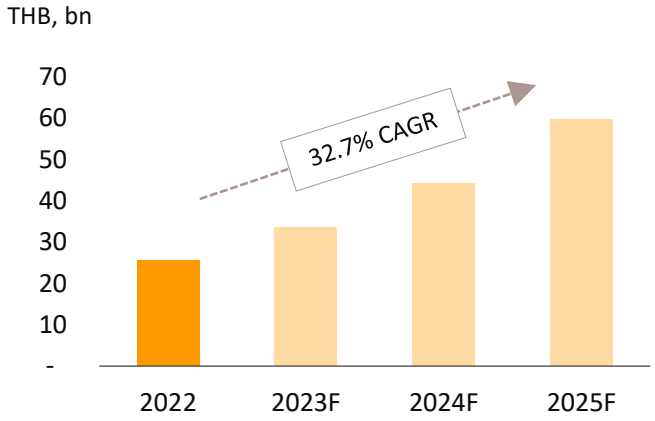
Revenue Growth by Segment



Share of Annual Revenue by Segment, 2024-2026



Market Value of Big Data and AI in Thailand



- **Overall industry revenue will increase through 2023 on strength in the digital services and software segments, while digital content will record a slow growth.** With annual growth expected to hit 21.0%-22.0% (close to 2022's 20.8%), digital services are the most important driver of industry growth, driven by: (i) the development of new models for delivering services through digital platforms linking data to online providers and through this, make targeted digital solutions available; and (ii) recovery in business activities, especially in logistics and tourism, which has then boosted online commerce. The software segment is also forecast to grow by 14.5-15.0% this year (down slightly from 18.6% in 2022) as businesses look to raise their forecasting abilities and improve their planning by using big data analytics and AI, that require investments in updating software. However, digital content revenue will grow only 1.0-1.5%, after a -3.7% contraction in 2022, resulting from a slow cycle of games online after the easing of the COVID-19 pandemic, which has returned workers to offices and outdoor activities. However, animation and character businesses will gradually improve as spending on advertising rebounds and audiences return to cinemas, important market channels for the segment. **Overall industry revenue is thus expected to expand by 17.0-17.5% in 2023,** close to the 17.6% growth recorded in 2022.
- **Over 2024-2026, total revenues will continue to enjoy a solid growth, driven especially by a 14.0-14.5% expansion in digital services revenue**, with the increasing dependence of business, finance and consumers on online platforms, and operators will likely expand their business offerings to consultancy and marketing planning delivered through new media platforms including live social commerce, creative content, performance ads, and media recommendation systems. This will help some segments of the ecosystem especially e-Retail, e-Logistics and Fintech, continue to grow. Other market segments that also demonstrate strong growth potential include HealthTech, supported by the development of medical and health applications. **Software businesses, revenue growth will average 9.5-10.0%** as companies need to restructure around data analytics and AI services and to the use of software to deliver end-to-end services. Meanwhile, **revenue of digital content will recover to 4.5-5.0%,** lifted by the release of new PC and mobile games, with a focus on expanding the market for gaming competitions and e-sports, while animation and character will be helped by recovery in the tourism sector, which will add to demand for the licensing of products. Given this, **revenue in the software and digital services industry is expected to strengthen by 12.0-12.5%.**

Source: Digital Economy Promotion Agency (DEPA), Statista (5G subscriptions), Krungsri Research



MAJOR INDUSTRY OUTLOOK

CBAM UPDATES

EU CBAM, entering its transitional phase on October 1, 2023, has pushed Thai exporters, particularly in the iron and steel and aluminum sectors to invest in carbon footprint measurement and reporting.

Timeline of EU CBAM implementation

Transitional Phase (Oct 1, 2023 – end of 2025) → **Full Implementation (Jan 1, 2026 onwards)**

1 Register

Oct 1, 2023 – Dec 31, 2024

Registration

- EU importers apply for a status of 'authorized CBAM declarant'
- Thai manufacturers (operator) register in the 'CBAM registry' which requires information e.g., name, location, and the main economic activity

2 Measure

Oct 1, 2023 – Jul 31, 2024

Measurement of embedded emission

- Non-EU methods for **emission measurement/ estimation** are allowed, including EU **default values**

Aug – Dec 2024

Measurement

- Non-EU methods are allowed if they provide similar accuracy

2025

Measurement

- EU method of embedded emission calculation required, but verification not required

3 Report

Report: EU importers quarterly report (Thai exporters provide information):

- Total quantity of goods imported during the preceding quarter
- 'Embedded Emission' (the direct and indirect GHG emissions from the manufacturing of goods)
- Carbon price due in the country of origin for the emissions

4 Verify / 5 Pay

Declaration: EU importers yearly declare (Thai exporters provide information):

- Total quantity of goods imported during the preceding calendar year
- **Embedded emission verified by verification bodies accredited by the EU**
- The carbon price effectively paid in the country of origin for the embedded emissions (e.g., carbon tax and ETS)
- Total number of **CBAM certificates to be surrendered**. Prices of CBAM certificates depends on weekly average auction price of EU ETS allowances

Sector

Share of total Thai exports to EU (GHG scope)

Iron and Steel	Aluminum	Cement	Fertilizers	Electricity	Hydrogen
1.5%	0.4%	≈0%	≈0%	0%	0%
(CO_2)	(CO_2, PFCs)	(CO_2)	(CO_2, N_2O)	(CO_2)	(CO_2)

2025

Regulation review

- Potential scope extension
- indirect emissions
- impacts on LDCs

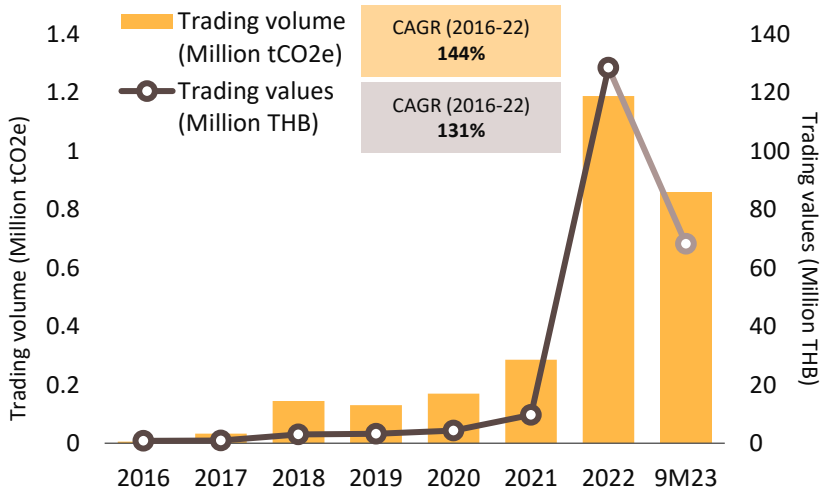
May include other EU ETS sectors (e.g., chemicals and plastics)

- **During 2023-2025,** EU importers having legal mandate to report emissions on imported goods means **Thai exporters need to provide information of carbon footprint of products sold in the EU**. Although there are **emission measurement and reporting flexibilities in the learning phase** of the CBAM, Thai manufacturers, especially in iron and steel; and aluminum sectors, will be encountered with **higher costs of carbon accounting investment and paperwork.**
- **2026 onwards**, once the transition period ends, **Thai firms will face additional costs of emission verification by EU accredited verifiers,** which is required in this phase. Moreover**, EU importers now are bound to surrender CBAM certificates (paying carbon prices on imports), placing pressure for Thai producers to invest in low-carbon technologies to ensure competitiveness in the EU market.**

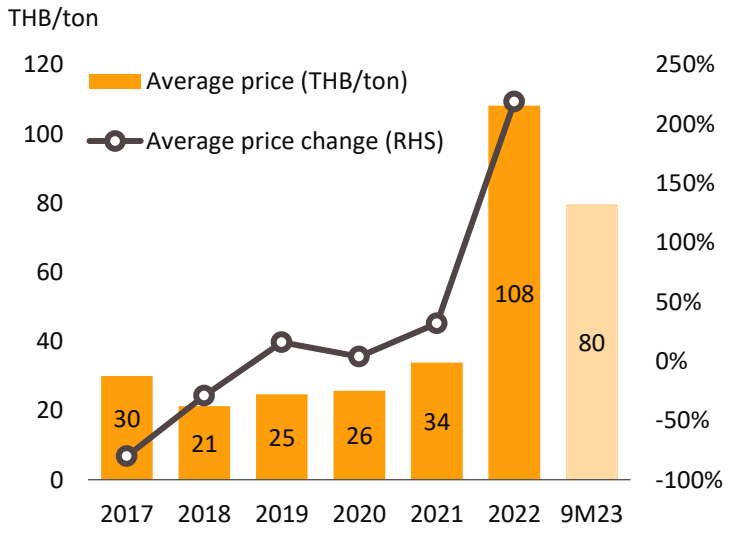
Source: European Commission, International Trade Centre (ITC), MOC, Office of Natural Resources and Environmental Policy and Planning (ONEP), Thailand Greenhouse Gas Management Organization (TGO), Krungsri Research

Carbon Credit: The market growth is expected to follow an upward trajectory on heightened awareness of environmental issues and transitions towards sustainability

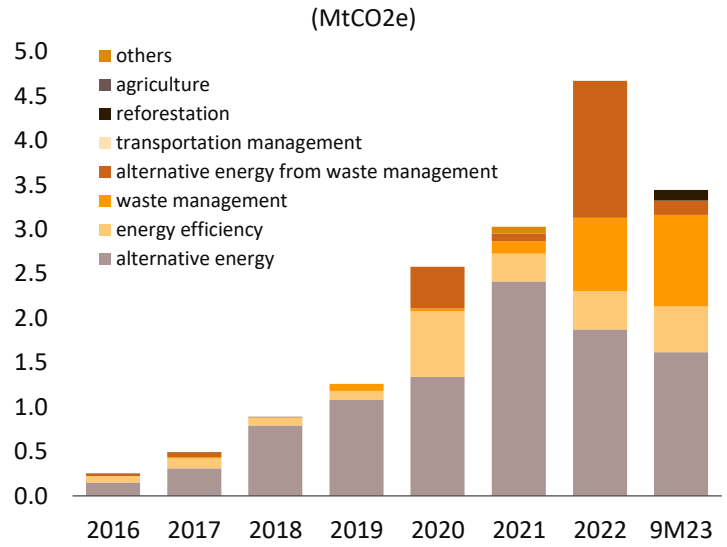
Carbon credit trading volume and value



Average carbon credit price



Registered carbon credits by project type



- **Thailand's market for carbon credits takes the form of the Thailand Voluntary Emission Reduction Program (T-VER)**, run by the Thailand Greenhouse Gas Management Organization (TGO). Although the market remains somewhat small with the average price of just THB 80/tonne of CO_2 equivalent (tCO_2e) in 2023**,** it has shown consistent growth in terms of both volume and value of carbon credits traded, with these up by an average of respectively 144% and 131% annually over the years 2016-2022.
  - **On the supply side,** the volume of registered carbon credits has been surging every year. **As of September 2023, the T-VER has cut emissions of greenhouse gases by 16.9 million tonnes of CO_2 equivalent ($MtCO_2e$) thanks to 308 projects, most of which involve the development of sources of alternative energy, energy efficiency, and waste management**. Notably, the volume of carbon credits generated by reforestation projects has seen significant growth in 2023, aligning with the global trend of increased credits from nature-based solutions.
  - **On the demand side**, at present, the purchase of carbon credits represents only a small proportion of the available supply. While 3.4 $MtCO_2e$ of carbon credits were awarded in 2023, just some 0.86 $MtCO_2e$ (or around a quarter) was traded. However, **the traded volume climbed remarkably during 2022-2023 due to greater awareness of environmental issues** following the global climate summit— the 26th Conference of the Parties (COP26), and **increased participation of the carbon offsetting programs to pursue sustainability targets, especially in the private sector.**
- **Going forward, the Thai carbon market is expected to continue its upward trajectory in 2024-2026** for several reasons: (i) more organizations are striving for carbon neutrality and net-zero goals, (ii) advancements in green technology make carbon credit projects more feasible and cost-effective, and (iii) the number of players, including suppliers, demanders, and brokers, will continue to expand. However, challenges persist, including high costs for carbon credit projects that may discourage smaller developers and the accreditation of Thai standards that are likely to be less strict than international standards. These could limit the opportunity for Thai carbon credit projects to access international markets, and the absence of mandatory regulations to scale up the market.

Source: TGO and Krungsri Research (Data as of October 6, 2023)

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