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INDUSTRY HORIZON

July 2023

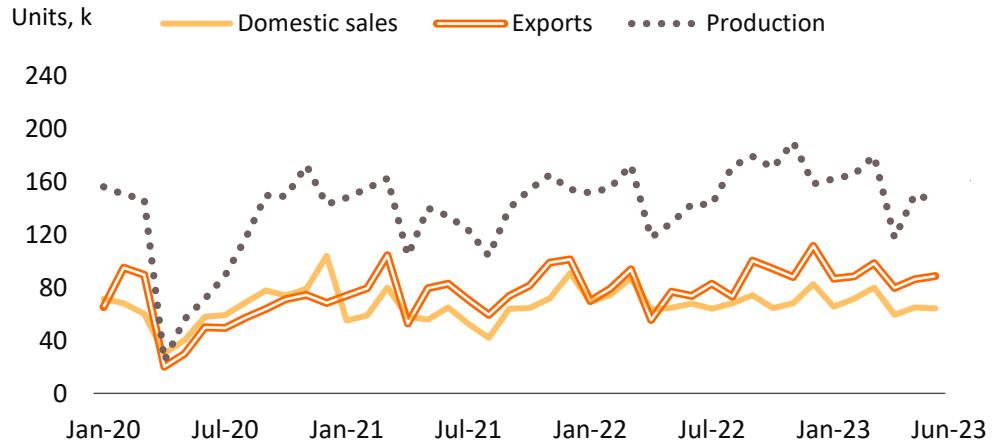
Krungsri Research



- **Half year updates**
- El Niño impacts on agriculture
- CBAM effects on industry
- Appendix

Automobile: Production and domestic sales are expected to grow at a slow pace with periodical supply disruption due to the tech war impacts through 2023, while exports expand on a pent-up demand from major markets.

Automobile Production and Sales (Monthly)



Thailand's Car Production and Sales Forecast

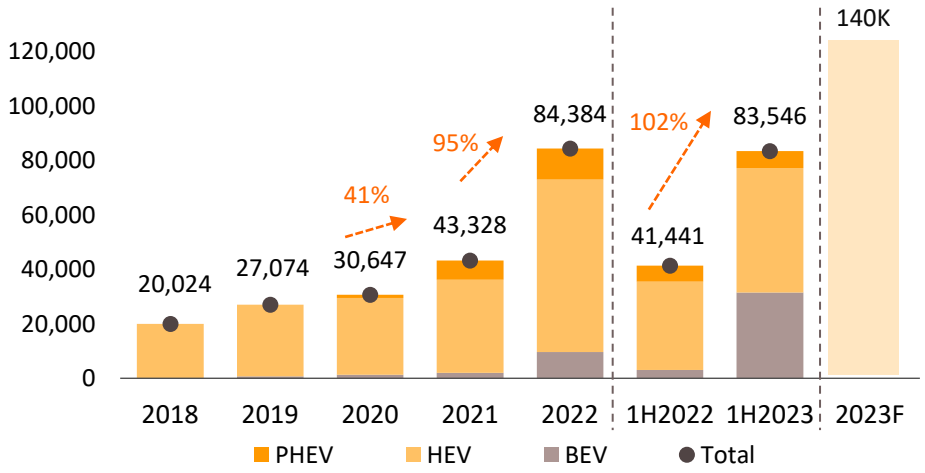
		2020	2021	2022	2023F
Production	**units, m**	1.43	1.69	1.88	1.92-1.94
	% YoY	-29.1%	18.1%	11.7%	**2.0-3.0%**
Domestic Sales	**units, m**	0.79	0.76	0.85	0.87-0.88
	% YoY	-21.4%	-4.2%	11.9%	**2.0-3.0%**
Exports	**units, m**	0.74	0.96	1.00	1.04-1.05
	% YoY	-30.2%	30.4%	4.3%	**4.0-5.0%**

- **In 1H23, output of autos rose 5.91% YoY** to 921,512 vehicles, due mostly to a 26.52% YoY increase in the production of passenger vehicles, while output of commercial vehicles slipped -6.31% YoY due to the remaining short supply of chips needed in pickups. Meanwhile, despite a 9.0% YoY increase in sales of passenger vehicles, **total domestic sales contracted -4.95% YoY** to 406,131 vehicles, from a -11.4% YoY fall in pickup sales, resulting from i) tighter credit approval to control rising NPLs for auto hire-purchase (+4.7% YoY in 1Q23) and ii) rising interest rates causing weak purchasing power amid still-high household debt. However, **exports jumped 17.61% YoY** to 528,816 vehicles as manufacturers tried to clear the backlog of unfilled orders. Export growth was especially strong in the main markets e.g., the EU (+104.7% YoY), Japan (+33.6% YoY), and ASEAN (+30.9% YoY), while exports to the US declined -86.4% YoY due to the impacts of economic slowdown and rising inflation.
- **During the second half of 2023, auto production would continue to grow** as the intensity of global chip shortages appears to be gradually easing. However, the presence of the tech war, particularly between the US and China, remains a concern and could possibly disrupt the supply chain and delay the production process of some segments. **Domestic sales will improve** supported by (i) ongoing growth in the economic activities and the recovery of tourism; (ii) continuing government support for the purchase and use of BEVs; and (iii) a better outlook for the construction, online retail, and logistics industries that will help improve demand for commercial vehicles. **Exports will continue to grow** thanks to pent-up demand from some major trading partners especially the EU and ASEAN. However, export growth would be limited by some headwinds including the global economic slowdown and high costs of living, barriers to trade with export markets, and the move by many countries to phase out sales of vehicles powered by internal combustion engines (ICE). ***For the whole year 2023, the automotive industry is expected to experience expansion of production by 2.0-3.0%, domestic sales by 2.0-3.0%, and exports by 4.0-5.0%.***

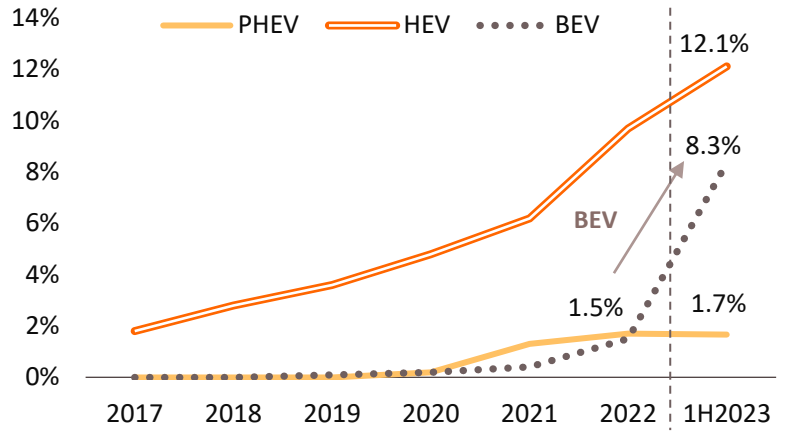
Source: The Federation of Thai Industries (FTI), Ministry of Commerce (MOC), forecast by Krungsri Research

EVs: The adoption of EVs in 1H23 grew remarkably faster than past years, especially for BEV, supported mainly by government's subsidy programs and tax incentives.

Newly Registered Electric Passenger Cars



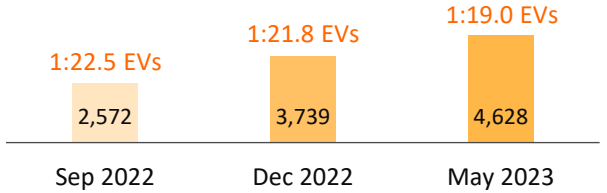
Share of EVs to Total Newly Registered Cars



ZEV Target (30@30)

ZEV Goal for Cars	2022	2025	2030	2035
Production (% of total cars production)	2%	10%	30%	50%
New registration (% of total new registered cars)	4%	30%	50%	100%

EV Charging Points

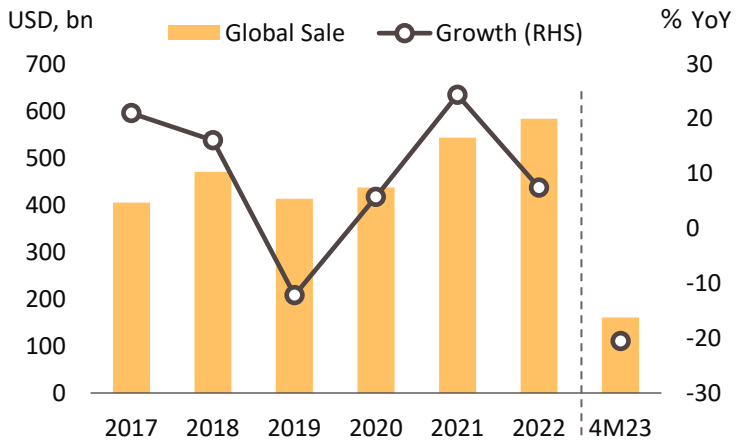


- **In 1H23, the total EV (including BEV, HEV, and PHEV) passenger car registrations increased to 83,546, from 41,441 cars in 1H22 (+102% YoY).** The number of new EV cars on Thai roads in 1H23 was comparable to that of the whole year of 2022, implying a significantly faster adoption by Thai consumers. **Among these, the new BEV registration in 1H23 jumped 948.5% YoY to 31,517 cars**, outnumbered the BEV registrations in the past 5 years combined. This has brought their market share up to 8.3% of the total passenger car sales, sharply increasing from 1.5% in 2022 (compared to the government's target of 4% in 2022). Stimulus measures from the government (EV subsidies and tax incentives) and improving ecosystem (expanding charging stations) play a vital role in BEV demand growth in 2022-2023.
- **The EV car registration is expected to continue rising in 2H23** and approaching 140k cars at the end of 2023 **mainly due to the government's support programs, favorable EV ecosystem and supply chain, and various choices of models from many brands coming out to the market.** With the faster rate of adoption, the BEV share will potentially be close to the target of 30% in 2025. Besides, the share of BEV registrations would surpass those of HEVs before 2030.
  - **However, domestic demand for EVs may be pressured by the rising cost of living, high household debt, and an upward trend of interest rate which affects purchasing power.**
  - **Another concern is the insufficient number of public EV charging stations.** EVAT reported that as of May 2023, there were just 4,628 charging points across Thailand, which needed to serve 88,154 registered PHEVs and BEVs (as of May 2023), or a ratio of charging points to EVs of 1:19. This is still insufficient and far behind the ratio of 1:6.5 in China. Moreover, the EV market is still significantly driven by EV subsidy programs which could be impacted by the government transition and delayed budgets for the Fiscal Year 2024 (Oct 2023 – Sep 2024).

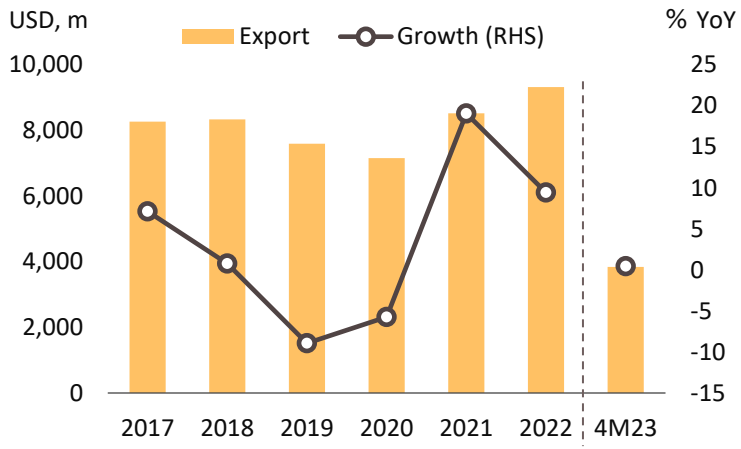
Source : Department of Land Transport (DLT), The Board of Investment of Thailand (BOI), Electric Vehicle Association of Thailand (EVAT), Krungsri Research
Notes: Electric Vehicles consists of HEV (Hybrid Electric Vehicle), PHEV (Plug in Hybrid Vehicle), BEV (Battery Electric Vehicle) and ZEV (Zero Emission Vehicle)

Integrated circuit (IC): Export value is expected to grow at a slow pace in 2023, while chip shortages will persist through 2023 before easing in 2024.

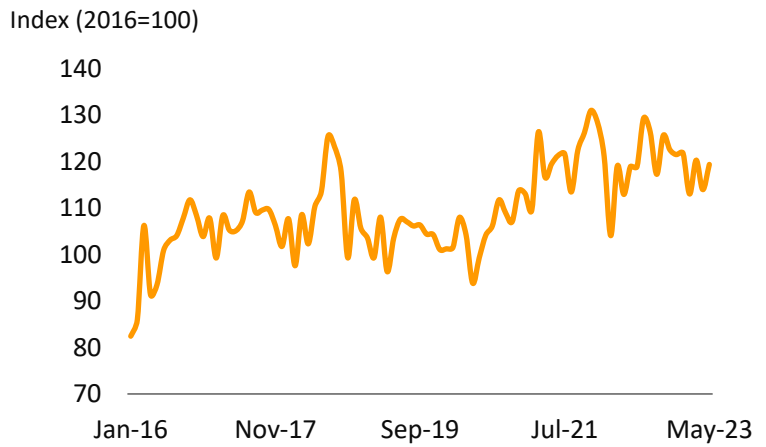
Worldwide Sales of Semiconductors



Thailand's IC Export Value



Thai IC Manufacturing Production Index (MPI)

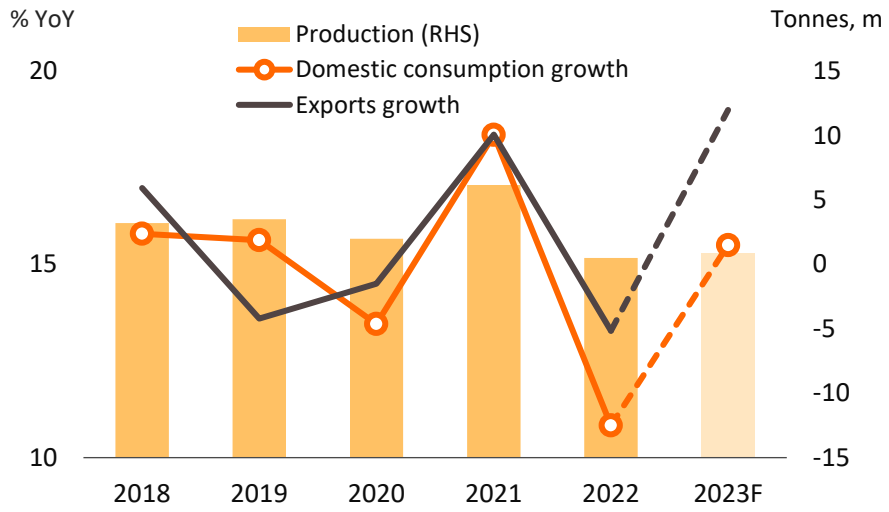


- In 5M23, the value of the global market for semiconductors contracted -20.6% YoY, due to high inflation and a global slowdown that has affected purchasing power in the main markets for ICs and through this, lowered demand for electronic goods, especially for PCs, for which global sales declined -16.6% YoY in 2Q23. As a result, **the value of ICs exported by Thai manufacturers inched up by just 0.5% YoY**, in line with the 5M23 -3.9% YoY fall in the IC Manufacturing Production Index (MPI). However, weakening global demand for electronics goods helps improve the problems with chip shortages. Consequently, lead times for chip deliveries have fallen from a peak of 27 weeks in May 2022 to around 20-23 weeks in 1Q23. Delivery times have continued to fall through 2Q23, but wait times remain lengthened relative to their pre-Covid average of around 12-15 weeks (source: Sourcengine Lead Time Report).
- **Through the rest of 2023, semiconductor manufacturers will continue to come under pressure from the global slowdown.** Gartner thus sees demand for semiconductors for use in PCs, tablets and smartphones being severely depressed across 2023, though this will particularly affect the market for memory chips. The latter has been hit by significant overcapacity that has dragged on prices and so revenue for players in this sector will be down 35.5%. By contrast, the market for semiconductors used in EVs is forecast to expand by 13.8%. **Chip shortages are forecast to affect the market periodically through 2023 due to worsening US-China tensions.** This has become clear in: (i) moves by the US government to block exports to China of chips used in advanced AI applications that are manufactured by US companies such as Nvidia and Intel (from July 2023); and (ii) the response to this by the Chinese government, which involves placing controls on the export of gallium and germanium (from Aug 1, 2023), two rare earth metals used in the production of semiconductors, IT equipment, and EVs (source: Nikkei Asia). Nevertheless, major chip manufacturers in Taiwan, the US, China and Japan have made significant investments in expanding their production facilities over the past 2 years. This should then add to supply, and as this increases, **problems with shortages will clear in 2024.** Overall, **the value of Thai IC exports is therefore forecast to expand by 2-3% in 2023, down from 2022's growth of 9.4%.**

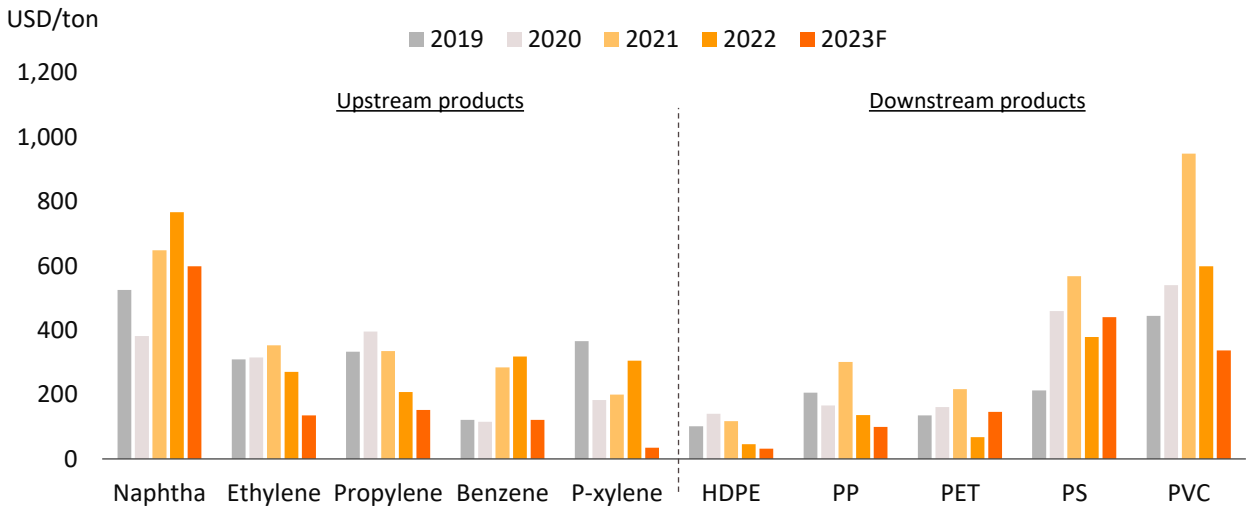
Source: Bloomberg, Susquehanna Financial Group, Semiconductor Industry Association, Accencture, IDC, Reuters, U.S. Department of Commerce, Ministry of Commerce (MOC), Office of Industrial Economics (OIE), Krungsri Research

Petrochemical: The business will improve steadily in step with overall economic recovery and increasing demand from downstream industries.

Thailand Petrochemical Market



Petrochemical Spreads

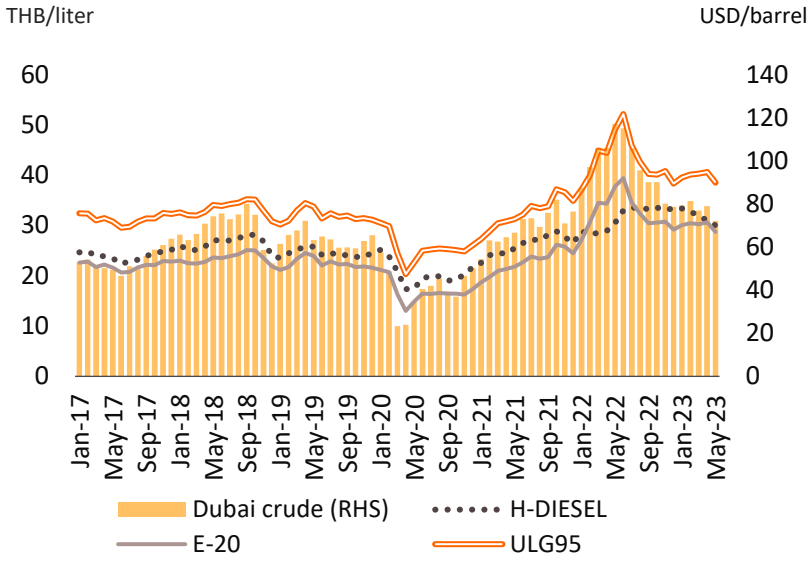


- **The Thai petrochemicals market contracted slightly over 5M23.** The slowing global economy weighed on exports (down 8 months consecutively), and as demand fell from downstream industries that use petrochemicals as an input, domestic consumption of these slumped -27.1% YoY. However, the reopening of China, which is the main market for Thai exports, lifted petrochemical exports by 25.2% YoY. The global cost of crude has softened, and as such, the price of some inputs has weakened but overall, these remain elevated (at USD 659.2/tonne, naphtha prices are above the 2019 pre-Covid level of USD 530.8/tonne). Spreads for some petrochemical products have therefore come under pressure.
- **Through the rest of 2023, domestic demand for petrochemicals is forecast to strengthen gradually,** lifted by the rapid rebound in the tourism sector that is then accelerating economic growth. Demand is thus building from downstream industries that use petrochemicals as an input (e.g., the packaging industry). At the same time, players are adjusting their operations as they look to take advantage of new opportunities in the market. This includes switching to the production of specialty plastics (e.g., ABS), meeting demand from the new 'S-curve' industries (e.g., EV auto parts and batteries, and medical devices) by increasing the output of higher value-added products and responding to growing concerns with ecological problems by producing environmentally friendly biodegradable and recycled plastics, concentrating in particular on food grade products. However, a slowing global economy will limit growth in exports. **For all of 2023, therefore, domestic demand for Thai petrochemical products is forecast to expand by 1-2%, though exports will be up by some 10-14% by volume.** Global crude prices also remain above their pre-pandemic level and so any fall in the price of feedstocks will be slower than the accompanying decline in the price of petrochemical products. **This discrepancy will then cause spreads to tighten for some products.**

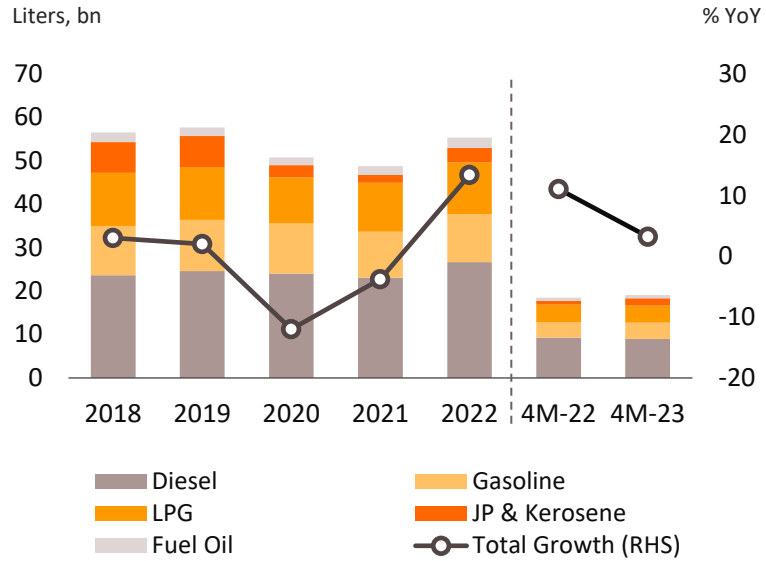
Source: Bloomberg, Office of Industrial Economics (OIE), forecast by Krungsri Research

Refinery: The business will benefit from improving economic activities, especially from a brighter outlook for the tourism sector and rising investment in clean energy.

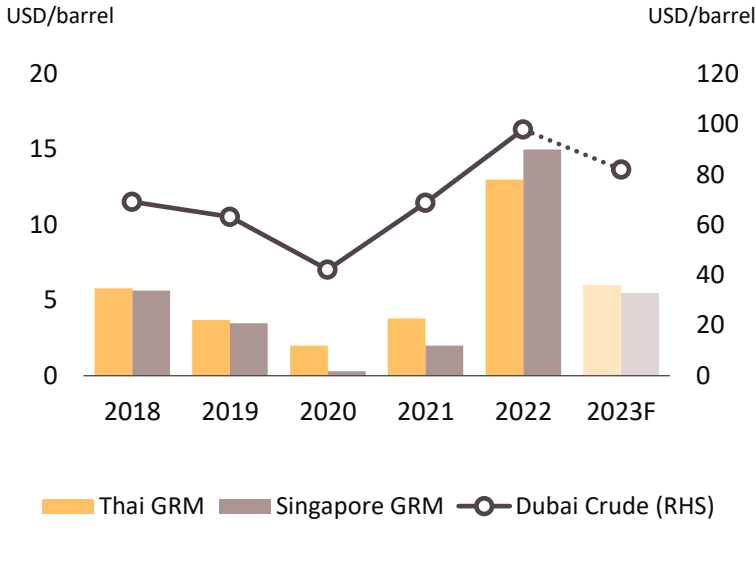
Thailand Petroleum Prices at Refinery



Domestic Petroleum Demand



Gross Refinery Margins

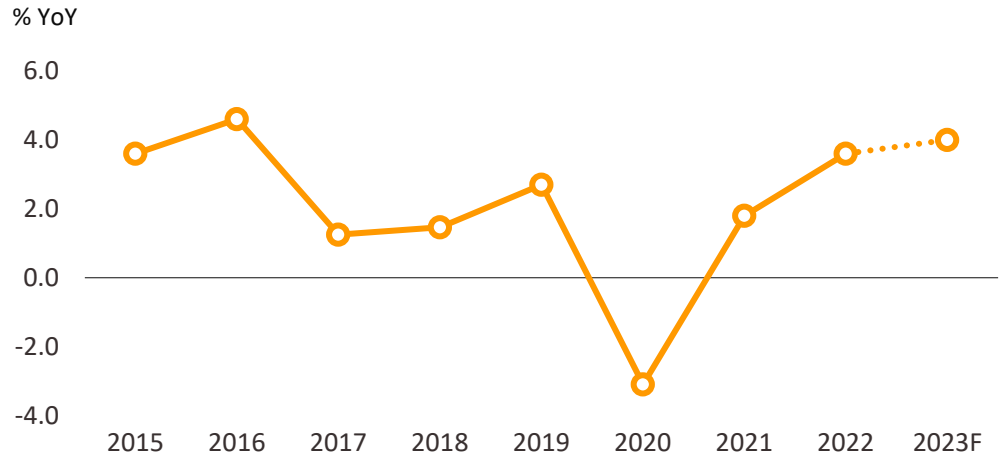


- **Gross refining margins slipped from their 2022 level over 5M23** due to the rising global inflation and its effect on demand for crude oil in global exchanges. However, China's reopening and the ongoing Russia-Ukraine war have kept prices at a high level, with Dubai Crude averaging USD 77.7/bbl through the period (down -24.4% YoY). Because of this, Thai ex-refinery prices (e.g., for regular gasoline and E-20) have stayed close to their level at the close of 2022. Domestic demand for refined products was up 3.2% YoY over 4M23 on the return of Chinese tourists to Thailand and the resulting recovery in the tourism sector, which has added to demand from the transport sector, especially for aviation fuel (up 89% YoY).
- **In 2H23, refineries will benefit from stronger demand, which will be lifted by:** (i) strengthening domestic economic activity as a result of the recovery in the tourism sector and growth in e-commerce sales, which will then add to the demand for transport fuels; and (ii) rising investment in the industry as operators look to meet anticipated stronger future demand and to open up new market opportunities. Investment is therefore increasing in clean energy, for example in processes to add value to low-value products (e.g., converting bunker oil into diesel or low-sulfur aviation fuel.) Nevertheless, although global crude prices will tend to remain high, not least because the OPEC+ group is cutting quotas to achieve just this end, these will fall from their level in 2022. Krungsri Research thus sees 2023 prices averaging USD 78/bbl, down from USD 96.5/bbl in 2022, and this will expose refineries to the risk of stock losses. Alongside this, **gross refining margins are expected to narrow from USD 13/bbl in 2022 to USD 6-6.5/bbl in 2023.**

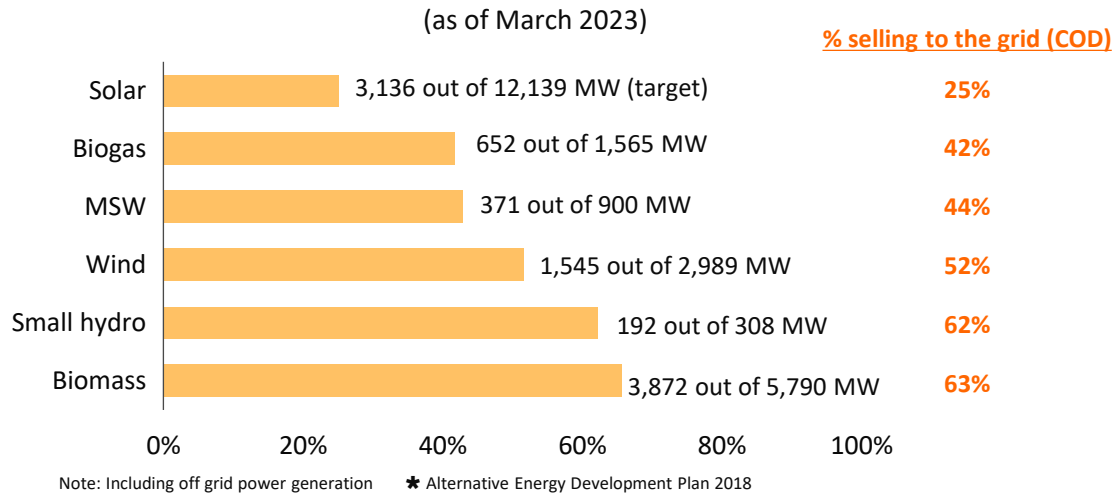
Source: Bloomberg, Energy Policy and Planning Office (EPPO), forecast by Krungsri Research

Power Generation: Income will rise on stronger demand for electricity that will occur alongside a fall in production costs

Growth of Electricity Demand



Renewable Energy Generation Capacity and AEDP* Target



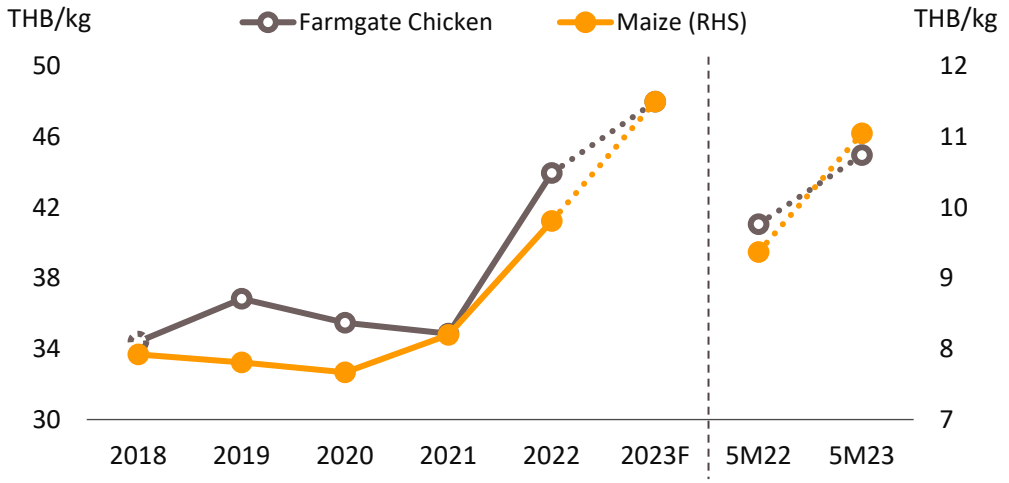
Note: Including off grid power generation ✱ Alternative Energy Development Plan 2018

- **Businesses benefited over 5M23 from higher tariffs that then boosted income** (for industrial and commercial users, tariffs rose to respectively THB 5.33/unit and THB 4.72/unit from an average of THB 4.16/unit in 2022). However, higher prices undercut demand, which then fell -3.6% YoY for industrial users (42.8% of total consumption) and +3.9% for households (28.1% of the total), though the reopening of the country and the resulting strong rebound in foreign arrivals meant that demand from businesses (24.3% of the total) jumped 9.7% YoY. 1H23 peak demand was seen in May, when a historic high of 34,130.50 megawatts was recorded. This represented an increase of 5.8% from 2022 peak demand.
- **For the remainder of 2023, demand for electricity will continue to strengthen on:** (i) the ongoing rebound in the tourism sector and the effects of this on overall economic growth; (ii) a combination of progress on mega projects and the rising number of EVs on Thai roads, which is now expected to reach 0.14m in 2023; and (iii) an expected fall in average unit costs for electricity resulting from lower generating costs (over 1H23, natural gas prices were down -60.1% YoY). Over May-August, tariffs averaged THB 4.70/units, down from an average of THB 5.02/unit over January-April. **Overall 2023 demand is thus predicted to expand by 3.8-4.3%,** up from growth of 3.6% in 2022. At the same time, competition will also intensify as new supply from renewables come on stream (COD) over 2024-2025. This will include power generated from grid-connected solar farms, solar farms linked to battery energy storage systems (BESS), especially from small power producers (SPPs), wind farms, and biogas generating plants. In addition, repayments to EGAT for outstanding subsidy-related debts may prevent electricity tariffs falling by as much as estimated. The outlook for individual segments over 2023 is as follows:
  - **IPPs:** Income will continue to rise thanks to rising demand and tariffs that remain higher than a year ago. Players will tend to expand investments in clean energy production.
  - **SPPs:** Income will rise gradually due to an expansion in installed capacity, with most new investment in renewable SPP hybrid firms as per government plans for the industry. Investment will also go into the construction of new power generating facilities in the Eastern Economic Corridor, and these will begin to supply electricity to users in the coming years.
  - **VSPPs:** Growth in income and investment will accelerate. Given government plans to expand purchases of electricity from clean energy sources by 12,000 megawatts, the latter will go in particular into solar, wind, biogas, and waste-to-energy plants.

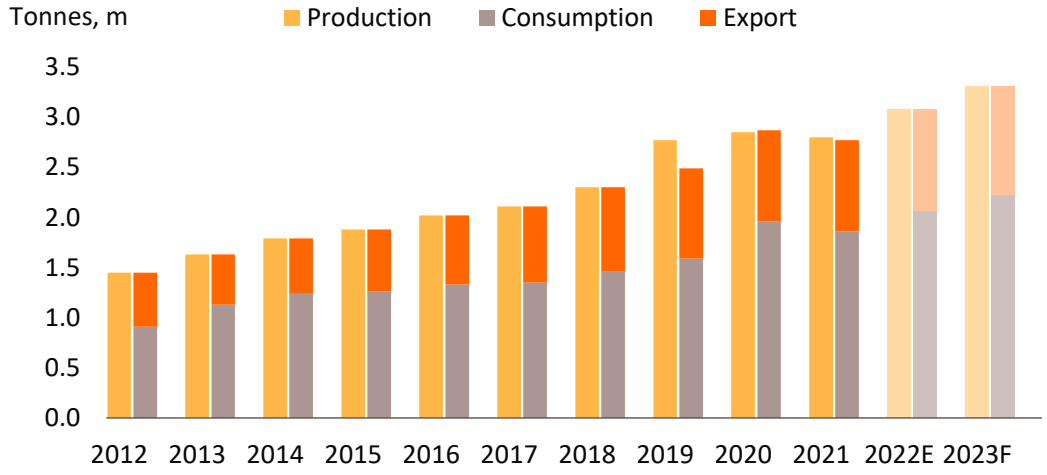
Source: Department of Alternative Energy Development and Efficiency (DEDE), Energy Policy and Planning office (EPPO), Forecast by Krungsri Research

Chilled, Frozen and Processed Chicken Industry: Firmer demand from the food, hotel, and tourism industries will support stronger domestic sales. Likewise, exports will expand in both core and new markets, especially in the Middle East, where Thai products are gaining ground.

Farmgate Chicken and Maize Price



Thai Chicken Industry

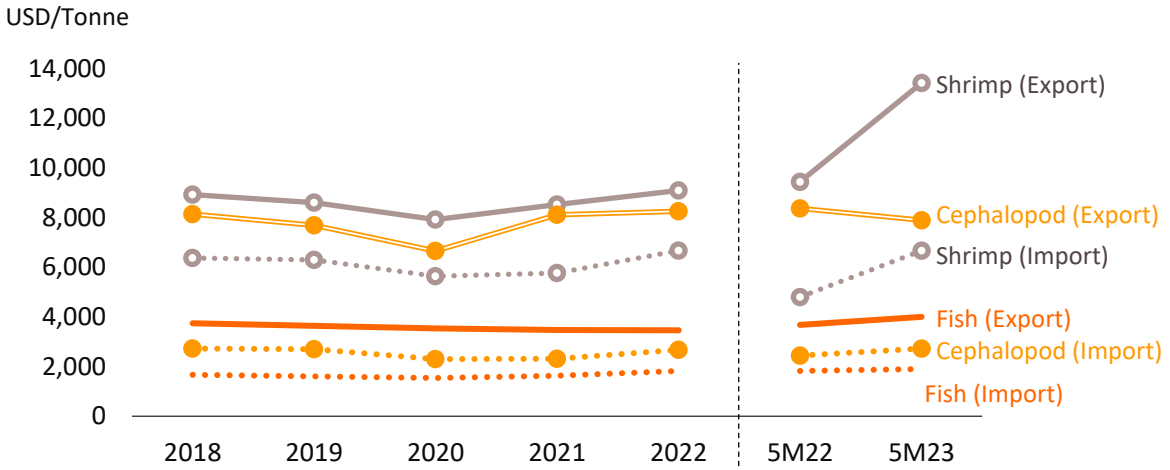


- **The business outlook improved over 5M23, and this was reflected in the +11.9% YoY expansion in domestic consumption of chicken.** Sales were lifted by the reopening of the country and the recovery in restaurants, hotels, and other parts of the tourism industry, though the return to widespread eating out was particularly important. Likewise, **exports jumped +13.3% YoY by volume** on (i) China's reopening, with demand particularly pronounced for frozen chicken; (ii) stronger demand from South Korea, where to combat increases in the cost of living and the surge in beef prices (caused by an outbreak of foot and mouth disease), the Korean authorities have waived import duties on chicken through to the end of 2023; and (iii) the certification of another 7 Thai processing plants by the Malaysian authorities. Due to a combination of stronger demand and higher feed costs (maize prices rose +17.9% YoY to THB 11.1/kg), average prices for Thai chicken were up +9.5% YoY to THB 45.0/kg.
- **The outlook will remain positive through the rest of 2023.** With the country now fully reopened, the economy growing, and the tourism industry rebounding rapidly, sales to restaurants, hotels, and other parts of the tourism industry will continue to grow. Exports will also strengthen, helped by rising concerns over personal health and the fact that compared to pork and beef, chicken is a low-fat product. Export markets that will be particularly strong will include: (i) Japan, where business activity is picking up; (ii) China, where strict controls on imports of chicken are being relaxed; (iii) the EU and the UK, which are expected to increase quotas for imports of Thai chicken; (iv) new markets, such as Saudi Arabia, that are benefiting from better trade relations; and (v) markets in the ASEAN zone, where economies are improving. **For all of 2023, output of chicken should be up by 7.0-8.0%, with sales to domestic and export markets rising by respectively 7.5-8.5% and 6.5-7.5%.**

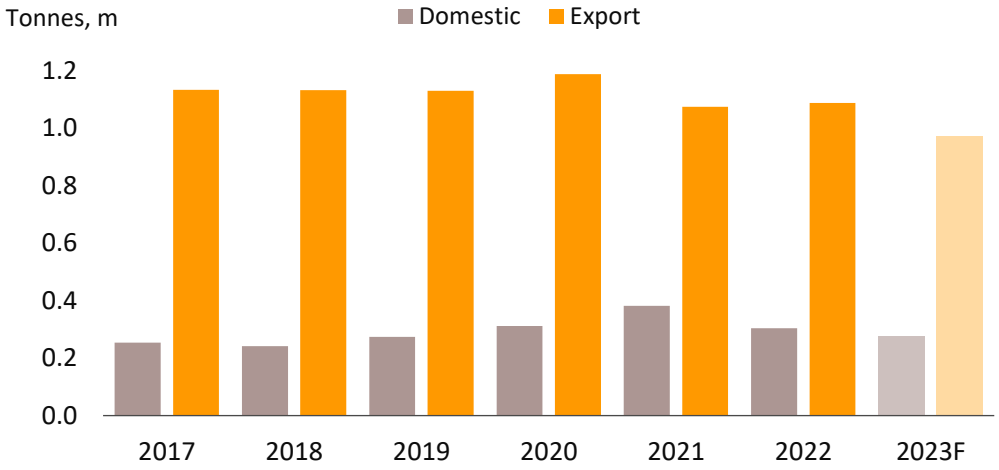
Source: Office of Agricultural Economics (OAE), Office of Industrial Economics (OIE), Ministry of Commerce (MOC), estimate and forecast by Krungsri Research

Chilled, Frozen, and Processed Seafood Industry: Domestic sales will be depressed by the switch by consumers to fresh products, while weak consumer spending power in overseas markets will encourage buyers to source products from lower-cost exporters.

Imported Raw Material Prices and Average Export Prices of Processed Seafood Products



Thailand's Seafood Distribution

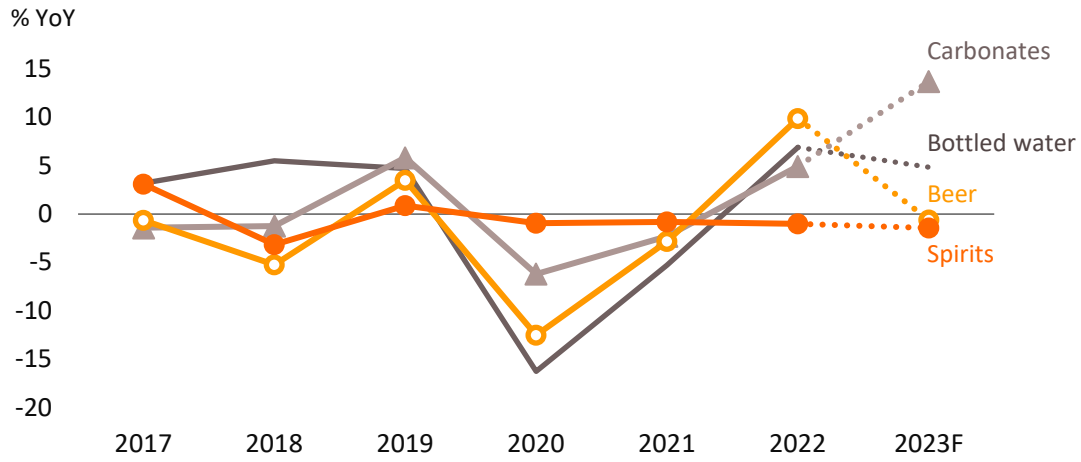


- **Over 5M23, sales of processed fish contracted on both smaller catches and a -12.8% YoY fall in domestic sales.** The former was caused by the imposition of official quotas, while the latter was driven by the lifting of lockdowns and the return of lifestyles and spending patterns to normal, which has then encouraged consumers to switch from processed to fresh seafood. **Exports were also down -13.3% YoY** on the effects on consumer spending power of the general economic slowdown and rising inflation. This was especially pronounced in Egypt (Thailand's second most important market for exports of tinned fish), which has suffered under the impacts of a crash in the value of the Egyptian pound. These problems have then been amplified by more expensive inputs and the continuing high cost of fuel, and given this, the average price for exports of Thai processed seafood rose 4.9% YoY to USD 4,930 per tonne.
- Output by the industry will continue to decline over 2023 on higher fuel and labor costs, which are feeding a contraction in the size of the fishing fleet and encouraging some fish farms to exit the market. With the pandemic over and the need to store food no longer evident, and consumers favoring fresh over processed fish, **domestic consumption of the latter is also expected to be down by between -8.0% and -9.0%. Likewise, exports are forecast to shrink by between -10.0% and -12.0%** due to: (i) Thailand's cost disadvantages relative to its competitors (especially China); (ii) pressure from slowing economies and strong inflation that is weakening consumer spending power in many overseas markets, including the US, Egypt, Australia, and Japan; and (iii) high energy costs that have added to higher cost of storing for chilling and freezing products faced by overseas operators. In addition, exports from Thailand remain under pressure from the enforcement of regulations relating to illegal, unreported, and unregulated (IUU) fishing and the findings of the Trafficking in Persons report, while Thailand's competitors (e.g., Vietnam and Ecuador) benefit from free-trade agreements with the EU.

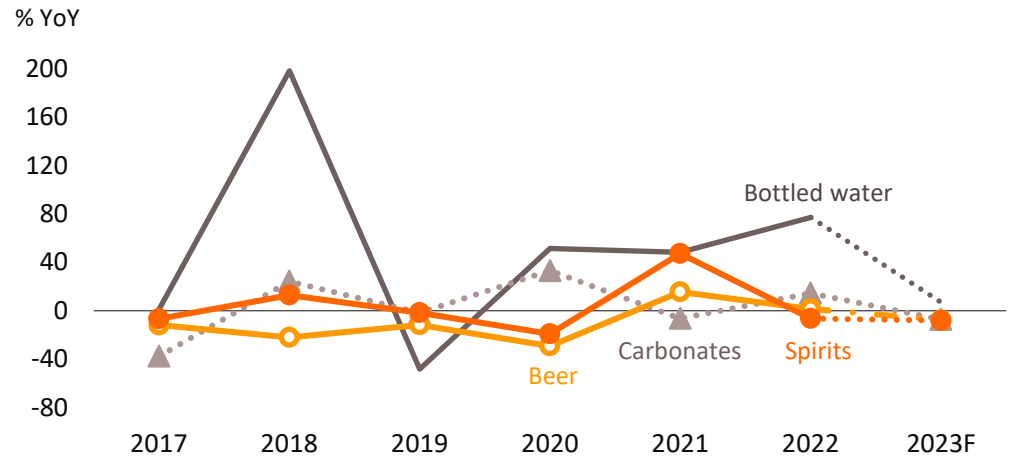
Source: Office of Industrial Economics (OIE), Ministry of Commerce (MOC), Trademap, forecast by Krungsri Research

Beverages Industry: The domestic market remains a key driver of growth, with benefit from recovery in the restaurant trade, the rebound in the tourism sector, and the impacts of higher temperatures.

Thailand's Beverages Domestic Consumption



Thailand's Beverages Export

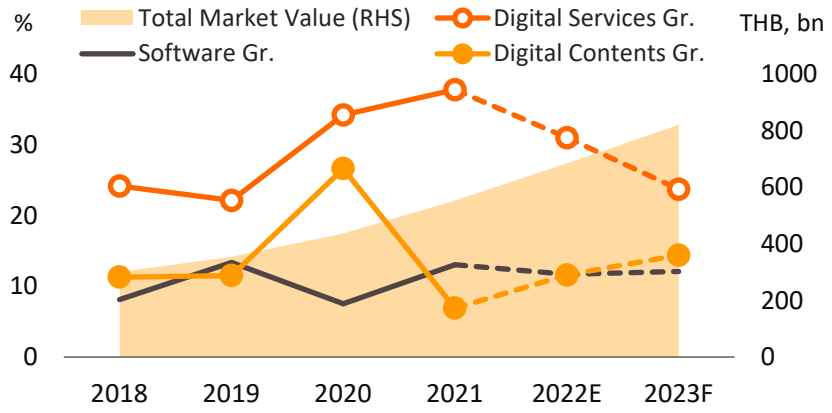


- **Over 5M23, beverage producers enjoyed an improving outlook thanks to strengthening domestic economic activity,** in particular the return to normal operations of restaurants, hotels, pubs, bars, and other entertainment centers, the full reopening of the country to foreign tourists, and the unusually hot weather. **Given this, the volume of goods distributed domestically (90% of all sales) expanded +8.2% YoY. However, exports contracted -2.4% YoY, with declines seen in almost all product categories,** including carbonated drinks (-10.4% YoY), beer (-8.4% YoY) and spirits (-10.5% YoY). These falls were driven by increasing domestic production of beverages in most export markets where more diversified types of products have been developed, which in some cases are cheaper than Thai imports. The only exception to this trend was drinking water, for which exports were up +7.9% YoY. These went primarily to neighboring countries where economies are improving.
- **The beverage industry will continue to grow through the remainder of 2023.** Domestic sales will be bolstered by greater demand from restaurants, pubs, bars and other entertainment centers, which will continue to benefit from the reopening of the country to foreign tourists. In addition, longer term trends in rising urbanization are making it easier for an ever-larger number of consumers to access these products. **Given this, the volume of goods distributed domestically is forecast to rise by 5.0-6.0%,** though this will be driven by an 8.0-9.0% increase in sales of non-alcoholic drinks, especially of bottled water since this market is undergoing rapid development in terms of the size and type of the products that are available (e.g., mineral water, carbonated products, water with added vitamins, and flavored water). By contrast, restrictions on sale hours, rising prices, and increased worries about health will mean that sales of alcoholic drinks will remain flat or possibly contract by up to -1.0%. **Exports are also expected to fall by between -4.0% and -5.0%.** Overseas sales will be held back by weak consumer spending in export markets, which are largely in neighboring countries with currently sluggish economies and so consumers there are more focused on cheaper domestically produced goods. In addition, foreign producers (including Thai players) have set up production facilities in these markets, further undercutting demand for imports.

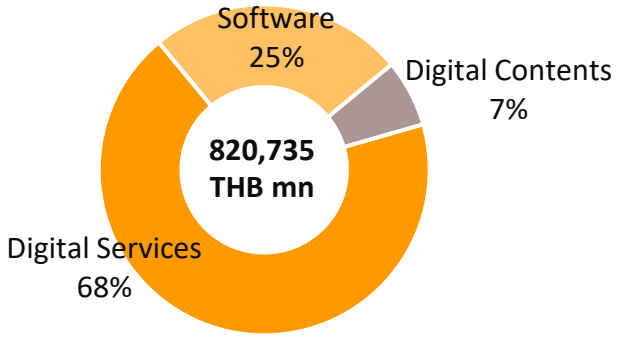
Source: Euromonitor, Office of Industrial Economics (OIE), Ministry of Commerce (MOC), forecast by Krungsri Research

Digital services and software: Income will grow strongly on greater use of learning algorithms on digital platforms to respond users' individual needs, while enterprises will increasingly use cloud-based software to minimize resource use and meet ESG goals.

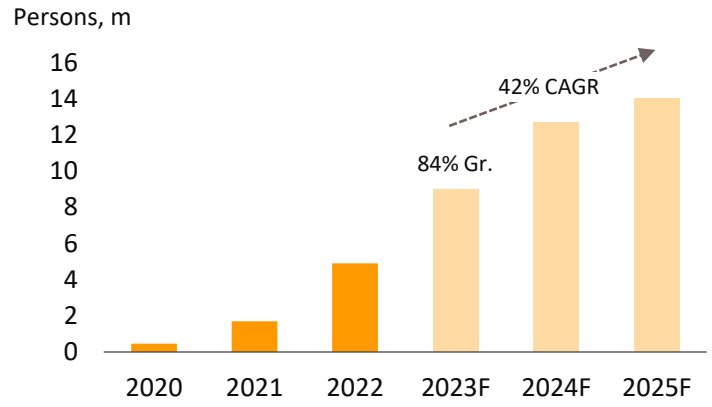
Revenue Growth by Segment



Share of Revenue by Segment



Number of 5G Subscriptions in Thailand

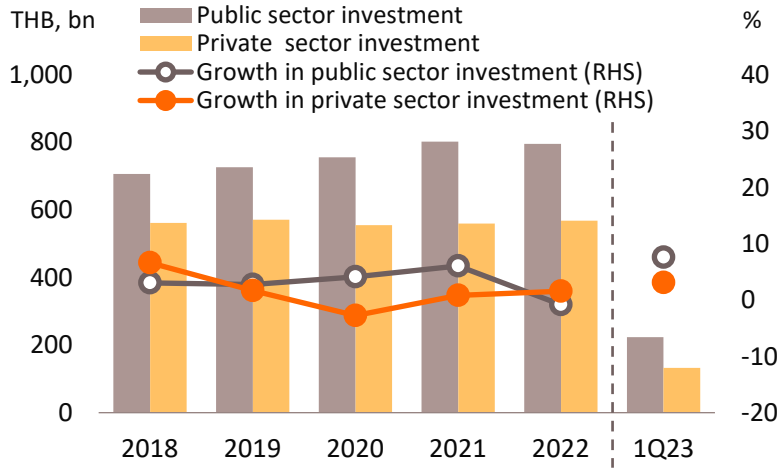


- **In 1H2023, income continued to strengthen** (having already grown 23.8% in 2022), mainly driven by growth in **the digital services segment**, which benefited from both demand and supply sides. The former was helped by an increase in economic activities and the rebound in the tourism sector, which boosted online sales, while the latter was lifted by the development of digital platforms on social media that provided better communication networks through chatbots and AR/VR, with the use of learning algorithms, to serve more individual consumer needs. The development of fintech payment systems also supported growth in e-commerce and omni-channel distribution, though, at the same time, competition is stiffening among e-marketplace providers and fintech companies. In **the software segment**, growth has been supported by the recovery in the business sector and the transition to the use of cloud data centers and data analytics services, and the exploitation of these in the development of new products. **Digital content services** are also seeing improving conditions following the switch by some providers to a new cloud-based business model that has enabled them to open up a range of new sources of income from online games.
- **The industry will enjoy a solid rise in income through 2023**, helped by gradual recovery in consumer spending power, and increasing number of 5G subscriptions with the spread of 5G internet services, which will help to meet a wider range of consumer needs and support the development of new services across mobile platforms. **The digital services segment will thus be the main driver of growth in the industry**. For **software service providers**, growth will come from the increasing move by enterprises to compete through the digitalization of services and business processes. This offers the advantages of cutting resource use and reducing costs, while also helping players meet their ESG goals. The majority of major Thai companies are thus expected to increase investment in cloud-based data services, and indeed, a report from Alibaba Cloud shows that over 2023-2024, 95% of Thai enterprises expect to do just this, the highest proportion in the ASEAN zone. **Digital content providers** will continue to benefit from increasing income from online games, with players exploiting cloud technology to develop new sources of income derived from gaming platforms. Krungsri Research thus **sees the industry enjoying an overall expansion in turnover of 20% over 2023, split between growth in the digital services, software, and online content segments of respectively 23-24%, 12-13%, and 11-12%.**

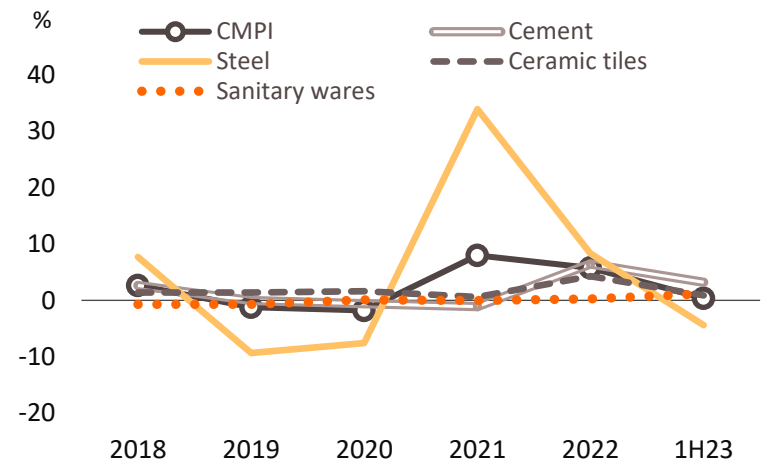
Source: Depa, Statista (5G subscriptions), Krungsri Research

Construction & Construction Materials: Slow growth is expected in 2023 due to a combination of only gradual recovery in private-sector construction and political uncertainty that may cause delays to some infrastructure projects

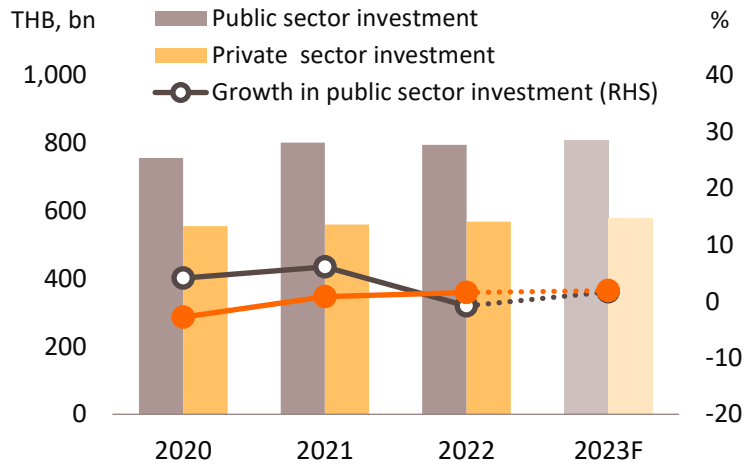
Construction Investment Value



Construction Materials Price Index (CMPI)



Construction Investment Trends

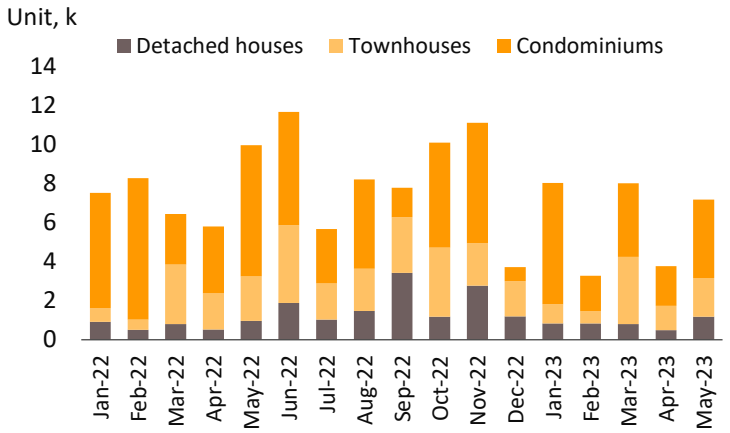


- **Overall spending on construction rose 5.9% YoY through 1Q23**, split between a 7.6% YoY increase in public sector construction and 3.1% YoY growth in private sector spending. In particular, the acceleration in work outlined in phase 2 of the EEC development plan (covering the years 2023-2027) fed through into a 9.2% YoY expansion in investment in government infrastructure projects. As such, the volume of construction steel distributed domestically rose 13.0% YoY in 5M23, though domestic sales of cement contracted -3.1% YoY on weakness in consumer spending power that then undermined the market for home repairs and renovations. The Construction Materials Price Index (CMPI) edged up by just 0.4% YoY over 1H23 due to a -4.4% YoY fall in the price indices of steel and steel products (a turnaround from 1H22's 13.2% YoY increase). This was a result of the decline in prices for billet and scrap that followed the easing of the Chinese lockdown and the resulting increase in supply to global markets. However, the price indices of other construction materials continued to rise.
- Growth in spending on construction is expected to slow in 2H23 relative to 1H23. This will be due to political uncertainty, which may well result in delays to disbursements for some public-sector construction projects. The industry will also be troubled by high energy prices and the resulting elevated costs for production and transport, as well as by ongoing labor shortages, which may result in contractors (especially SMEs) completing projects late or abandoning them completely. However, this will be at least partly offset by an acceleration in private-sector work, in particular for residential properties near mass transit lines and new communication routes, factories and industrial estates in nearby areas, and new hotels that will be built to meet rebounding demand from the tourism sector**. For all of 2023, total spending on construction is therefore forecast to expand at the somewhat low rate of 1.5-2.0%, split between growth of 1.7% and 1.9% for the public and private sectors respectively.** Given this, growth in demand for construction materials will be somewhat weak, and **the volume of cement and construction steel distributed to the domestic market is thus forecast to rise by 1.5% and 2.0% respectively.**

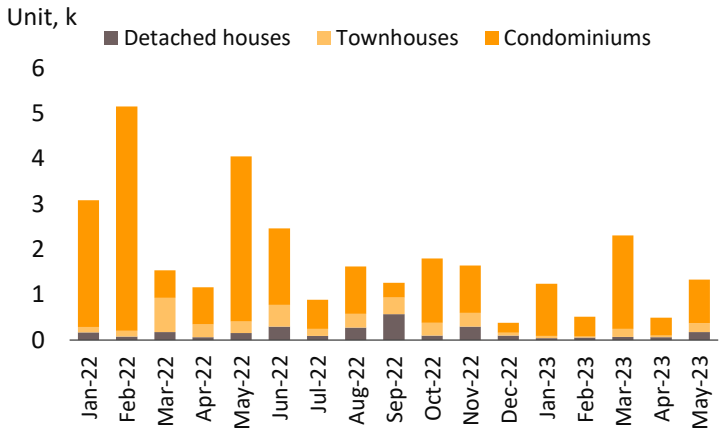
Sources: Office of the National Economic and Social Development Council (NESDC), Ministry of Commerce (MOC) and Krungsri Research

Housing (BMR): The housing market will strengthen on improving real demand and the return of foreign purchasing power.

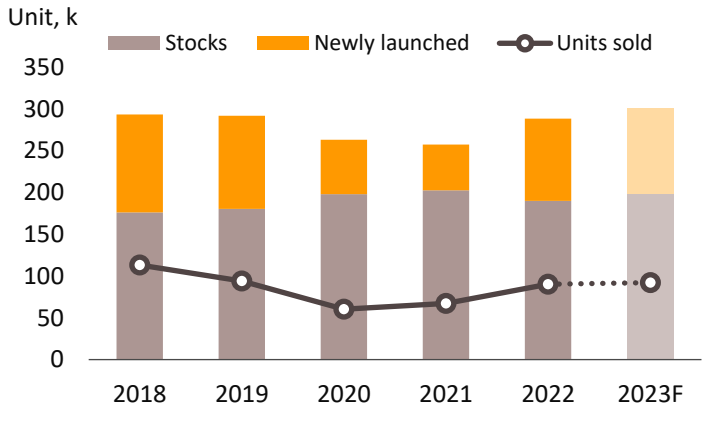
New Supply



Units sold*



Total Supply

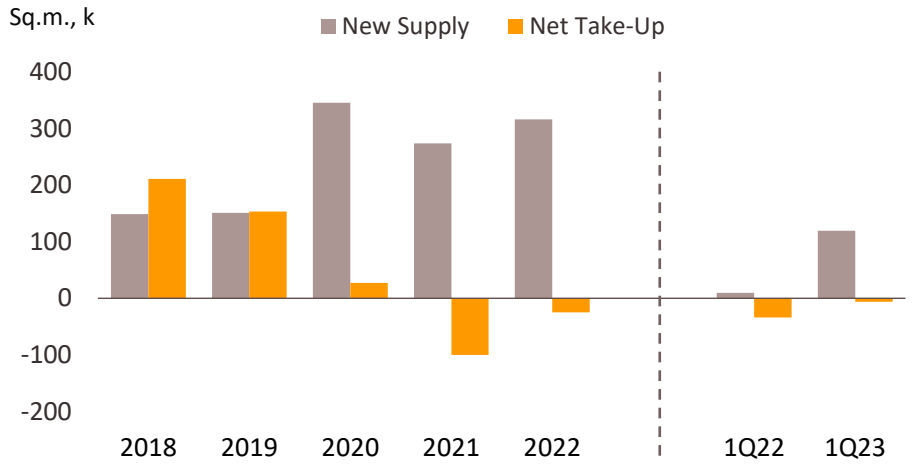


- **Over 5M23, the number of newly launched properties coming to market slumped -20.4% YoY to 30,223 units**. For condominiums and townhouses, declines came in at respectively -31.1% YoY and -1.6% YoY. The supply of new detached houses expanded by 12% YoY, as the segment is more focused on upper-end buyers who are less affected by troubles in the economy. **Sales of new units crashed -60.8% YoY to 5,882 units** on a combination of economic uncertainty, the tightening of the BOT's LTV rules (which is affecting buyers of 2nd and 3rd homes), and rising interest rates that are making it more difficult for potential buyers to take out loans. In addition, the higher cost of labor and of construction materials is pushing up housing prices, while recovery in income remains patchy and fragile.
- **Through the remainder of the year, demand will slowly strengthen** on ongoing economic growth and recovery in the tourism sector (15 million arrivals are expected in the second half of 2023), which will translate into stronger sales, especially from Chinese buyers. In some areas (e.g., around Ram Inthra), the market is being boosted by additional demand from Chinese students studying in Thailand and for properties for use as second homes. Overall, supply should continue to expand in line with developers' preexisting plans, but growth in demand will be limited by: (i) high levels of household debt (90.6% of GDP as of 1Q23), which is eroding purchasing power and encouraging tightened lending conditions; and (ii) the upward trend in interest rates and the effects of this on consumers' willingness to take on new long-term debt obligations. **The outlook for all of 2023 is as follows.**
  - **The supply of new units coming to market should rise by 4.5% from its 2022 level to around 10,000 units.** Most of the new supply will be in projects undertaken by major developers that are on a strong financial footing. This will bring supply growth back to close to the pre-Covid average during 2017-2019. The majority of these new units will be condominiums and luxury homes.
  - **Having jumped 34.2% YoY in 2022, annual sales growth is expected to drop to 2.0% in 2023.** This will be a result of: (i) a slowing export sector, which is dragging on the economy and impacting the purchasing power of lower- to mid-income buyers; and (ii) house prices that have risen by an average of 5-10% from last year on more expensive construction materials and labor shortages that are pushing up wages. In addition, the figures are being affected by last year's high base. Demand for low-rise properties should grow strongly in the year thanks to continuing real demand from owner-occupiers with still-high purchasing power, while sales of condominiums will be boosted by the return of overseas buyers to the market.

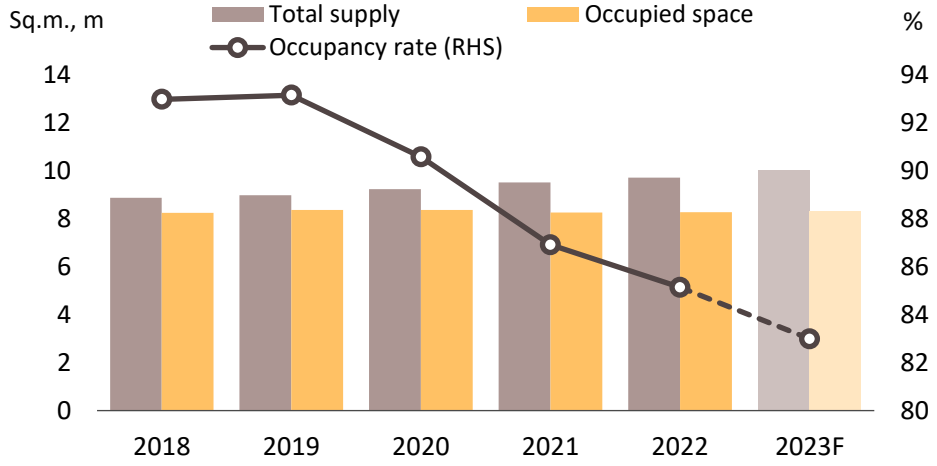
Note: ✱ Units sold (sales by month) = units sold of properties newly launched in that month only (i.e.., excludes units sold on housing projects launched prior to that month).
Source: AREA, forecast by Krungsri Research

Office Building (BMR): The occupancy rate will remain low due to pressure from growth in total supply that will continue to outpace demand.

New Supply and Net Take-Up



Office Buildings in BMR



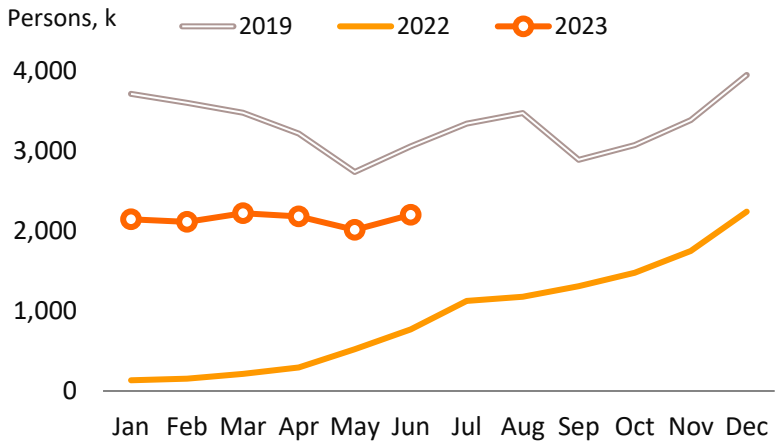
- **In 1Q23,** five newly completed buildings (Park Silom, The Unicorn, The Rice, T place and HQ Tower) added 119,750 sq.m. to supply, bringing the cumulative total supply of office space to 9.4 million sq.m.[1/] However, the net take-up[2/] was negative -5,961 sq.m. The majority of new take-up came from the grade-B non-CBD segment as tenants moved to new buildings that had more attractive facilities. In the period, the total occupied space stood at 7.9 million sq.m., and as a result, the occupancy rate as of the end of 1Q23 dropped to 84.1%, down from 86.5% in 1Q22. Overall rents also fell -4.7% YoY, due to tenants requiring rental discounts before agreeing to contract renewals.
- **Through the rest of 2023, the supply of office space will expand as planned projects are gradually brought to completion**, though the Covid-19 pandemic has resulted in delays to some projects. 90% of new supply will be in the CBD, which will contain a particularly high share of large mixed-use projects, such as Pier 111, Siam Patumwan House, JLK Tower and One Bangkok. However, growth in demand will lag behind supply, partly due to the growing popularity of hybrid working patterns that allow employees to 'work from anywhere' and reduce working days at office, for some business. **As such, for all of 2023, planned projects that will be completed should add 300,000 sq.m. to supply (up 3.1%) but demand will expand by just 0.5%, or by 40,000 sq.m.** (this compares to an average increase over 2016-2020 of 128,000 sq.m./year). Because supply will expand faster than demand, **the occupancy rate will come under pressure, and so this is expected to slip from 85% for 2022 to 83% for 2023.** As the oversupply of office space grows, this will add to competitive pressures, and as landlords vie to both keep existing tenants and attract new ones, they will need to reduce rents. Thus, average rental rates are likely to soften, undercutting income and profits for commercial landlords.

Note: 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).

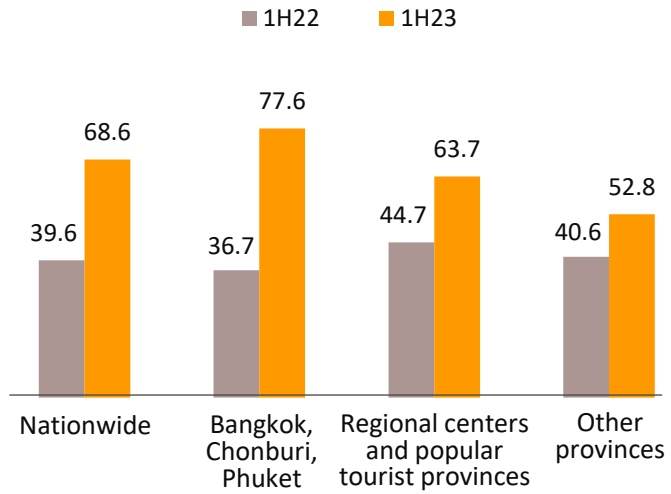
Source: CBRE Research, forecast by Krungsri Research

Hotel: 28-29 million foreign arrivals are forecast for 2023, and this will keep the occupancy rate at 67-68%

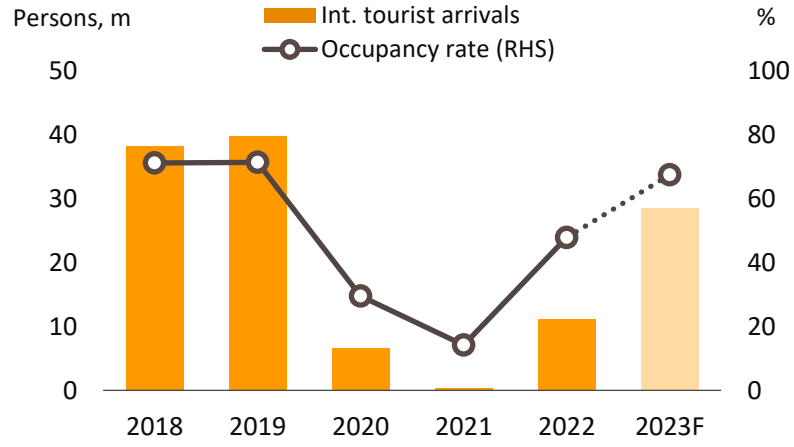
Foreign Tourist Arrivals in Thailand



Occupancy Rate by Area (%)



Forecast for Tourism Sector

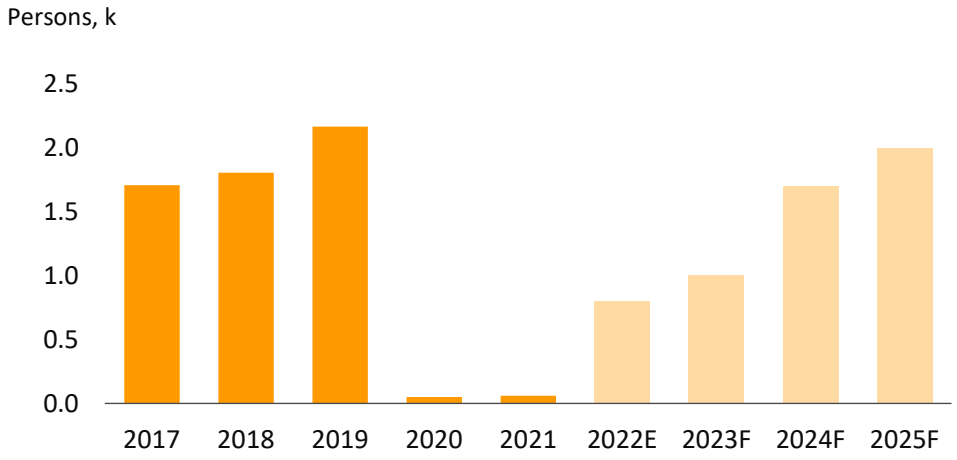


- **12.9 million foreign arrivals were recorded in 1H23** (up from 2.1 million in 1H22), with the three main markets being Malaysia (1.7 million arrivals), China (1.1 million), and Russia (0.7 million). However, the Chinese segment has not fully recovered, and the market is still only 25% of its size in 1H19. This is a result of: (i) tighter visa rules for Chinese visitors that aim to cut down on illegal entrants and that have resulted in the waiting time for visas for tour groups rising from 3-5 days pre-COVID to up to 15 days now; and (ii) insufficient flights linking China and Thailand to fully meet demand, despite a 98% YoY jump in the number of these over October 2022-April 2023 to 12,805 (source: Aeronautical Radio of Thailand, May 2023). Recovery in the tourism sector is also not evenly distributed; this has been concentrated in the major tourist destinations of Bangkok, Chonburi and Phuket. These areas have benefited from the return of overseas visitors, and so the occupancy rate there now averages 77.6%, far above the national average of 68.6%, 63.7% in regional centers and popular tourist areas, and 52.8% in other provinces, which are reliant principally on Thai tourists.
- **Growth in tourist arrivals should accelerate in 2H23** on: (i) the expected increase in the number of flights connecting to Thailand; (ii) the impact on arrivals of the new "Visit Thailand Year 2023: Amazing New Chapters" campaign; and (iii) the success of roadshows run by public-and private-sector organizations in high-potential markets such as Saudi Arabia and India. However, expansion in tourist numbers will be limited by a number of headwinds, including the weaker-than-expected rebound in the Chinese economy following the country's reopening, which may now dissuade some Chinese from traveling abroad, the continuing Russia-Ukraine war, and ongoing inflationary pressures. **In light of this, 2023 tourist arrivals are expected to total 28-29 million, while the national occupancy rate should average 67-68% in 2023.**

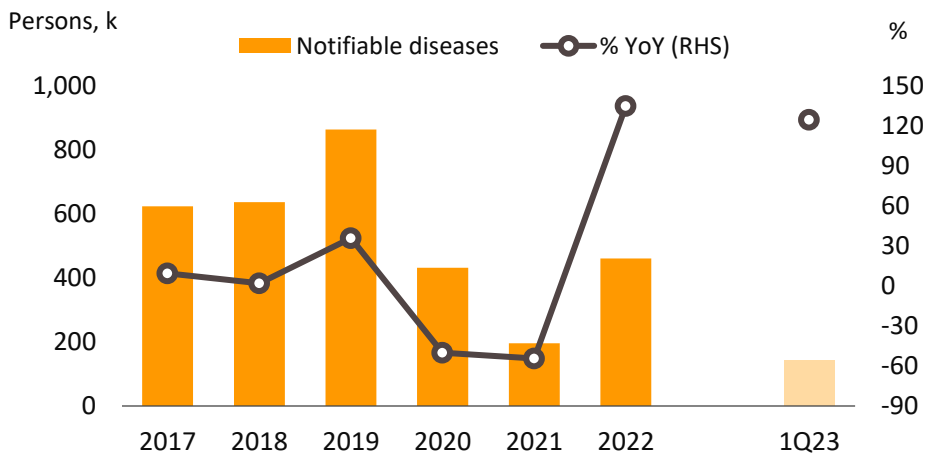
Note: Regional centers and popular tourist provinces include Chiang Mai, Chiang Rai, Phitsanulok, Kanchanaburi, Rayong, Chachoengsao, Nakhon Ratchasima, Khon Kaen, Udonthani, Ubon Ratchthani, Petchaburi, Prachuap Khiri Khan, Song Khla, Krabi, Phang Nga and Suratthani.
Source: Ministry of Tourism and Sports (MOTS), forecast by Krungsri Research

Private Hospital: Businesses will benefit from the return of overseas patients, while players will tend to look to new markets to expand income streams.

Number of Foreign Patients in Thailand



Number of Patients Infected with Notifiable Diseases

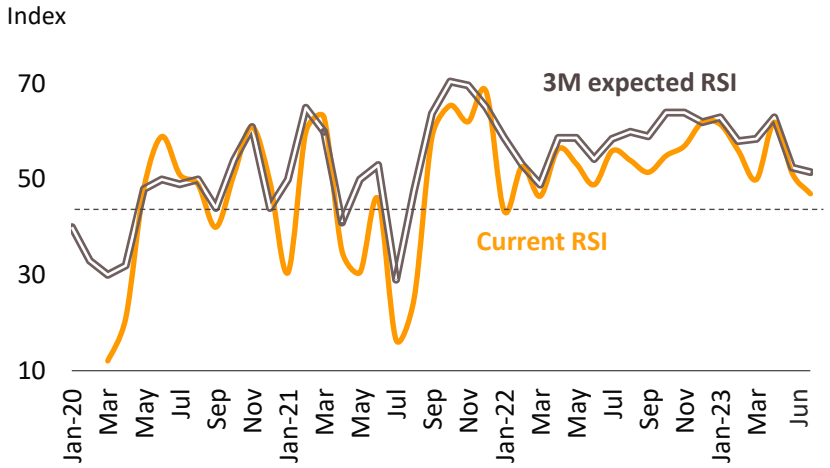


- **Income should have continued to grow through 1H23** thanks to the return of social and economic life to normal and the growing number of both non-Covid-19 domestic patients and foreign visitors seeking treatment in Thai hospitals, the latter arriving as both medical tourists (13.6m foreign arrivals are expected) and expatriates working or living in Thailand or neighboring countries. Income has also risen from capitation payments from the Social Security Office, which from May 1, 2023, have gone up by 10% to THB 1,808 per person per year, though this has naturally had the greatest impact on private-sector players focused on this market. However, income growth has been restrained by the drop in Covid-19 treatments, while patient arrivals from the Middle East have slowed due to the timing of this year's Ramadan (22 March-20 April).
- **Income growth will be maintained through 2H23**, and the market will be buoyed by several factors. (i) Seasonal outbreaks of disease (e.g., influenza and dengue fever) will likely continue as normal. (ii) 15m foreign arrivals are expected in the period and this will support growing demand for hospital services from foreign patients, especially from the Middle East, the CLMV countries, and China. In particular, as part of the city's health care system, from 1 July, the Beijing authorities have approved payments for 16 types of assisted reproduction technology (including in-vitro fertilisation, embryo transplantation, and the freezing and storing of semen), which should increase demand for IVF services. (iii) Players are looking to develop new customer bases and to secure new sources of income in overseas markets. (iv) Purchasing power remains strong in private hospitals' main domestic market of mid- to upper-income consumers. **Given the above, for all of 2023, private hospitals should enjoy income growth of 13-15%.**

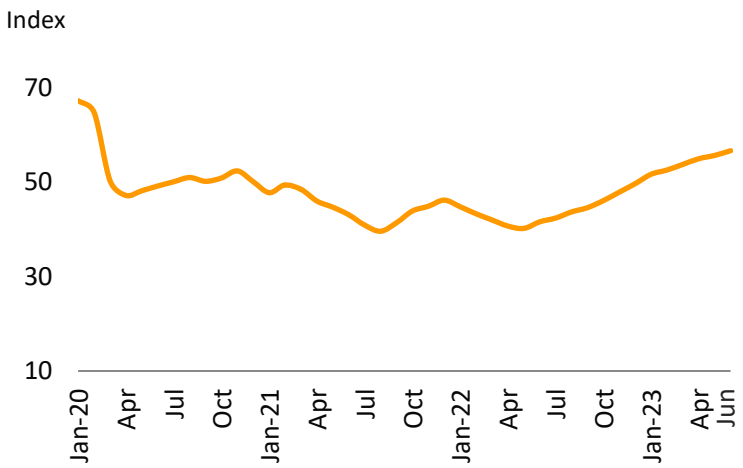
Source: NSO, MoPH, estimated and forecast by Krungsri Research

Modern Trade: The industry will benefit from strengthening domestic consumer spending power and the rising number of foreign tourists coming to the country.

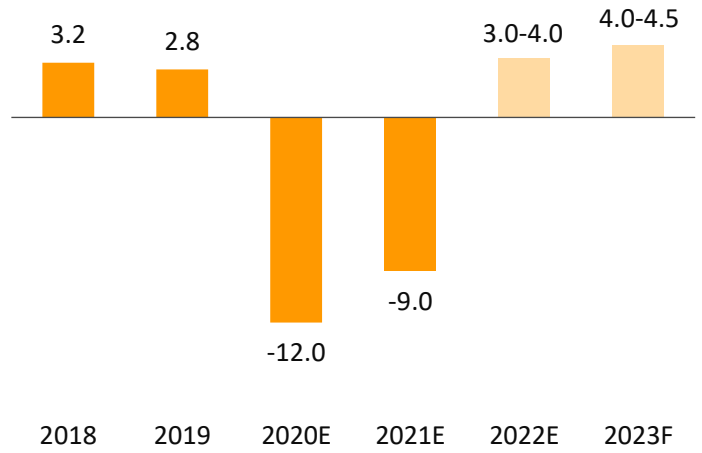
Retailer Sentiment Index (RSI)



Consumer Confidence Index (CCI)



Modern Trade Retail Business Growth (%)

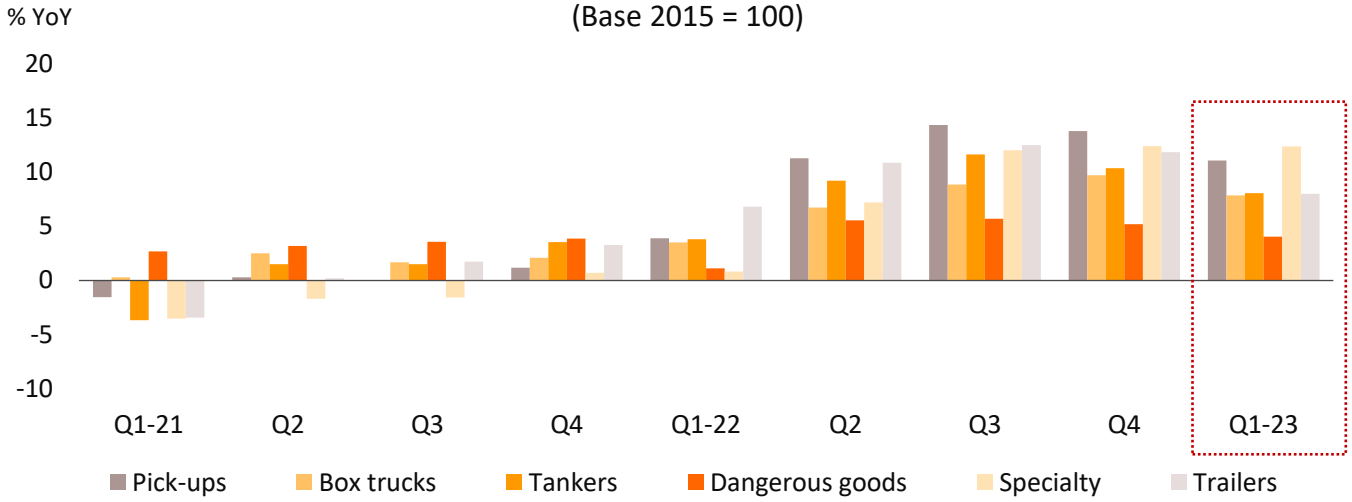


- **In 1H23, the modern trade industry enjoyed steadily improving conditions.** These were lifted by the rebound in the tourism sector and the impacts of this on overall economic growth, softening inflation, and the effects of government stimulus measures (i.e., the 'Shop and Refund' scheme, which ran over January and February, and phase 5 of the 'We Travel Together' program) as well as the impacts of general election-related spending. As a result of these, Consumer Confidence Index rose to a 3-year high of 56.7 in June 2023, although spending power remains fragile especially for lower- to mid-income consumers with the only patchy recovery and the high levels of household debt (as of Q1, this stood at 90.6% of GDP). Businesses are also nervous over costs (e.g., for labor, electricity, and the overall cost of living) and the delays to installing a new government, and so in June, retailer sentiment dropped to a 1-year low of 47.0.
- **The outlook will continue to improve through 2H23 on:** (i) sustained economic growth that will lift consumer spending power; (ii) a forecast 15 million foreign arrivals (up from 13.6 million in 1H23), which will boost retail sales, especially in popular tourist areas; (iii) ongoing expansion in e-commerce sales; (iv) progress on government megaprojects, which will strengthen labor markets and add to the volume of money in circulation; and (v) growing economies in neighboring countries (the IMF predicts that in 2023, the CLMV economies will expand by 2.6-5.8%) and this will then boost retail sales in border regions. Operators will likely continue to expand their branch networks alongside increased use of online channels, the development of new business models, and more widespread exploitation of smart technology. **As a result, 2023 retail sales are expected to grow by 4.0-4.5%,** up from average growth of 3.5% in 2022.
  - **Department stores and supermarkets:** Sales will continue to rise on stronger demand from mid- to upper-income earners.
  - **Discount stores/hypermarkets:** Sales will increase only gradually as consumers remain wary about spending on non-essentials, while operators will look to expand their target market and increase income by developing premium hypermarkets.
  - **Convenience stores:** Sales will continue to strengthen, especially for food and drink items. In addition, branch networks now cover almost the entire country.

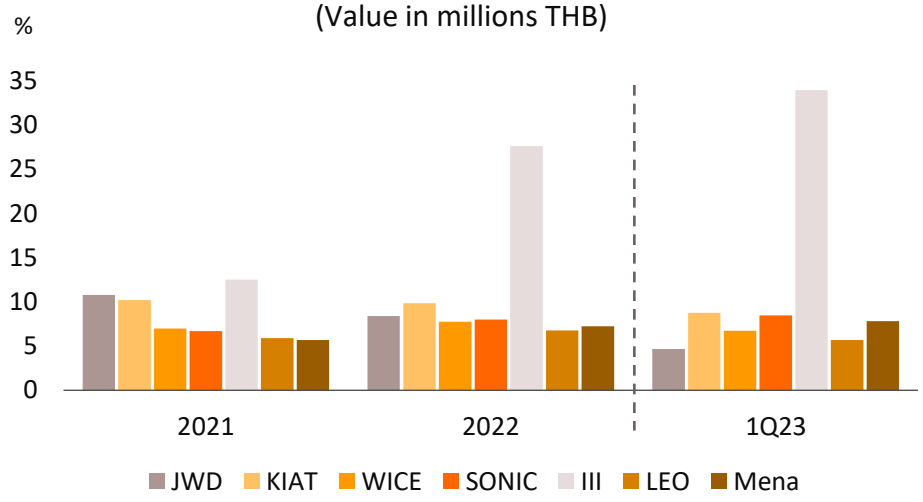
Source: Thai Retailers Association (TRA), Bank of Thailand of Thailand (BOT), Estimate and forecast by Krungsri Research

Road transport services: Players will benefit from the rebound in the tourism sector and growth in e-commerce sales.

Road Freight Transport Index, by Type of Truck



Business Margins



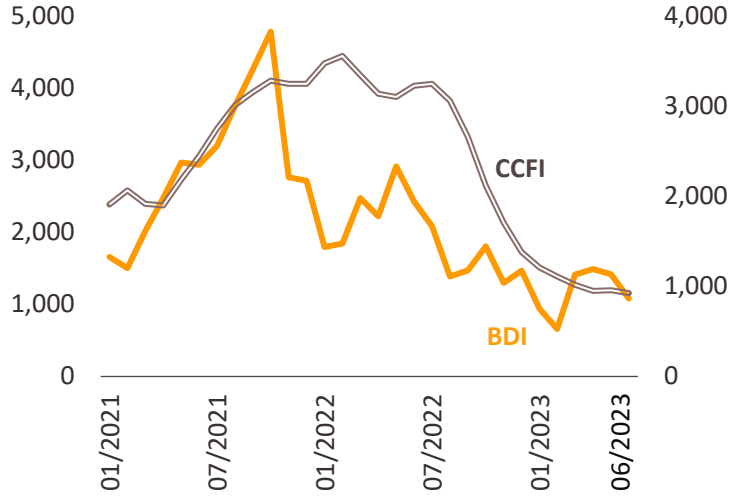
- **During 5M2023 the volume of goods moved by road came under pressure from weakness in the manufacturing and export sectors, which were themselves affected by the global slowdown.** However, the road transport business benefited from expansion in the tourism sector and growth in e-commerce sales, while softening inflation helped to boost consumer confidence (in Jun, the Consumer Confidence Index touched a 3-year high of 56.7). Uptake of truck transport services was also buoyed by much stronger demand for the shipping of some industrial and agricultural goods. Thus, through 5M23, the Agricultural Production Index rose 6.4% YoY, auto exports were up 17.1% YoY, and Q1 activity in the construction sector rose 5.9% YoY. This then translated into higher road freight charges, with the Road Freight Transport Index jumping 10.0% YoY in 1Q23. Rates were up 12.3% YoY for special-purpose vehicles, 11.1% YoY for pickups, 8.1% YoY for tankers, and 8.0% YoY for articulated trucks or trailers.
- **For the remainder of 2023, demand for road haulage services will continue to strengthen,** helped by: (i) continuing growth in the Thai economy overall, which will be boosted by the rebound in the tourism sector (28-29 million foreign arrivals are expected this year), rising exports to China, and stronger consumer spending power, while energy prices will fall from their level at the start of the year; and (ii) anticipated 13-15% expansion in the e-commerce market, which will then add to demand for parcel delivery services. Nevertheless, business growth will be limited by delays in installing the new government, which is weighing on investor sentiment and delaying budget disbursements, in particular for construction projects. In addition, recovery in consumer spending power remains somewhat patchy, and some groups continue to struggle with a high burden of household debt. On the supply side, high transport costs and rising wages (due to labor shortages) mean that some players are restricted in how far they can compete through pricing strategies, and **so for 2023, annual growth in the volume of goods shipped by road is expected to come to 3-3.5%, down from growth of 4-5% in 2022.** Because SMEs are less able to pass higher costs on to users, their profits will likely also narrow this year.

Source: Ministry of Commerce (MOC), SET, (OAE), Office of Industrial Economics (OIE), Energy Policy and Planning Office (EPPO) and Krungsri Research

Sea freight services: Businesses will benefit from recovery in the Thai economy and China's reopening.

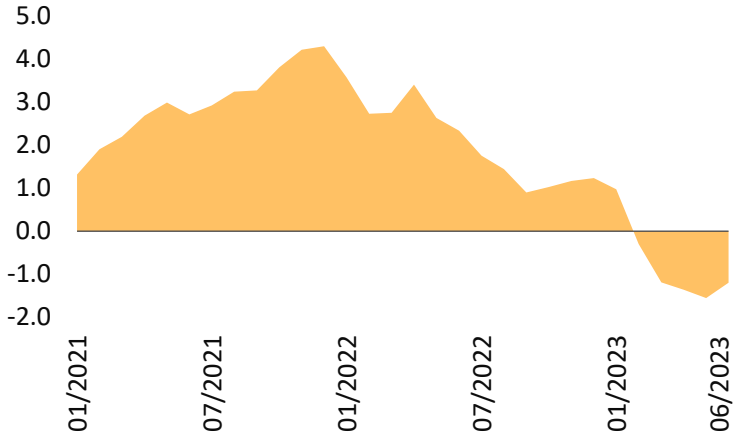
Sea Freight Index (BDI & CCFI)

(Unit: point)



Global Supply Chain Pressure Index

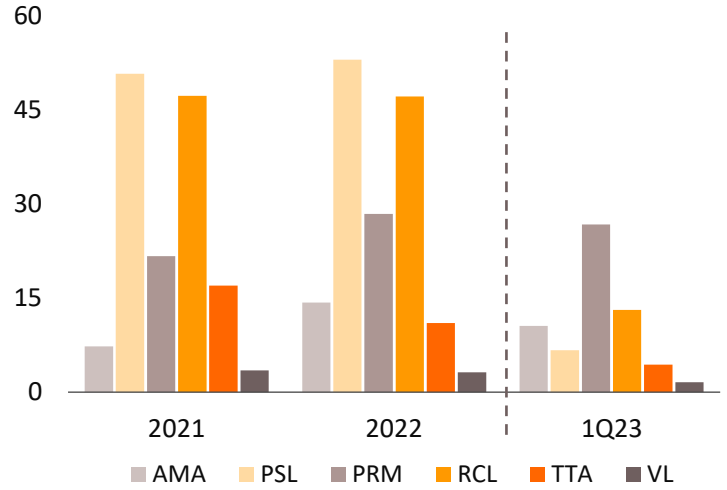
(Unit: Standard deviation from average value)



Note: The index is normalized such that a zero indicates that the index is at its average value with positive values representing how many standard deviations the index is above this average value (and negative values representing the opposite).

Business Margins (%)

(Value in millions THB)



- **The Thai sea freight industry has slowed through 1H23 on weakness in global trade and in the world economy** that then affected both imports and exports, cutting international trade of Thailand by -3.8% (5M23). In addition, freight charges have fallen sharply as global supply chain disruptions have cleared (the Global Supply Chain Pressure Index has fallen steadily since January 2023). The Baltic Exchange Dry Index (BDI) is thus down by an average of -48.8% YoY on lower global demand for commodities and ongoing sluggishness in the Chinese real estate sector, while the China Container Freight Index (CCFI) has slumped by an average of -69.0% YoY as the effects of weaker purchasing power impacted demand for consumer goods. Nevertheless, Thai sea freight operators have benefited from domestic economic growth and expansion in e-commerce sales, which has then sustained demand for sea freight services.
- **Business conditions should continue to improve in the second half of 2023. (**i) Growth momentum should persist for the Thai economy, with positive impacts expected from the reopening of China and the expansion in e-commerce sales that will then increase demand for international shipping. (ii) Drought is expected to hit countries around the world, and with outputs declining, demand for food stocks will rise as countries look to build food security and prevent shortages. In addition, lower water levels will allow operators to increase their income from special charges. (iii) Bulk cargo liners will benefit from stronger demand that will be driven by the annual harvest, which will begin at the end of Q2 and extend into Q3, while operators of container ships will enjoy higher profits from the rise in year-end demand for consumer goods. Shipping lines will also look to maintain their income by bringing the supply of shipping capacity into closer alignment with demand through a combination of blank sailing and skip call. Moreover, in accordance with IMO regulations requiring lower carbon emissions, players will tend to slow ships' operating speeds and accelerate the demolishing of older vessels. As a result of the above, **the volume of goods moved by Thai sea freight operators in 2023 is expected to grow by 1.0-1.5% from its 2022 level.**

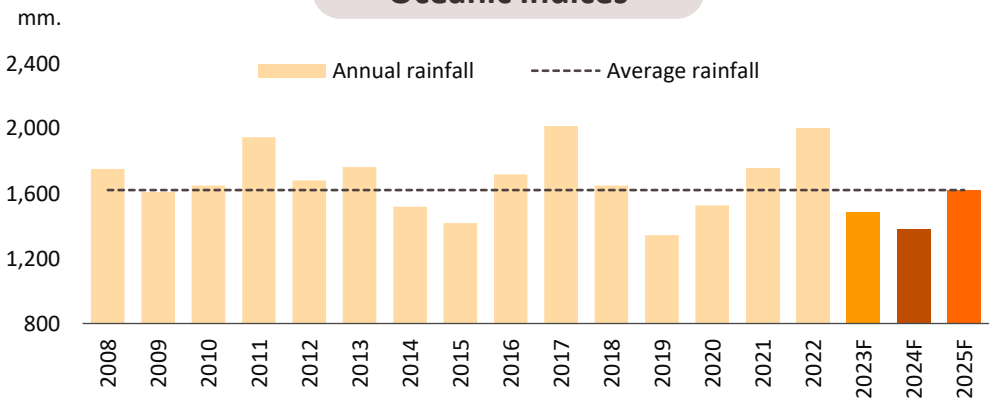
Source: Bloomberg, New York FED Economic Research, SET, compiled and forecast by Krungsri Research



- Half year updates
- **El Niño impacts on agriculture**
- CBAM effects on industry
- Appendix

The consequences from the El Niño in 2023-2024 will include *higher temperatures, disruptions to rainfall and intermittent dry spells, lower than average overall rainfall, and reduced access to water from reservoirs and aquifers.*

Oceanic Indices

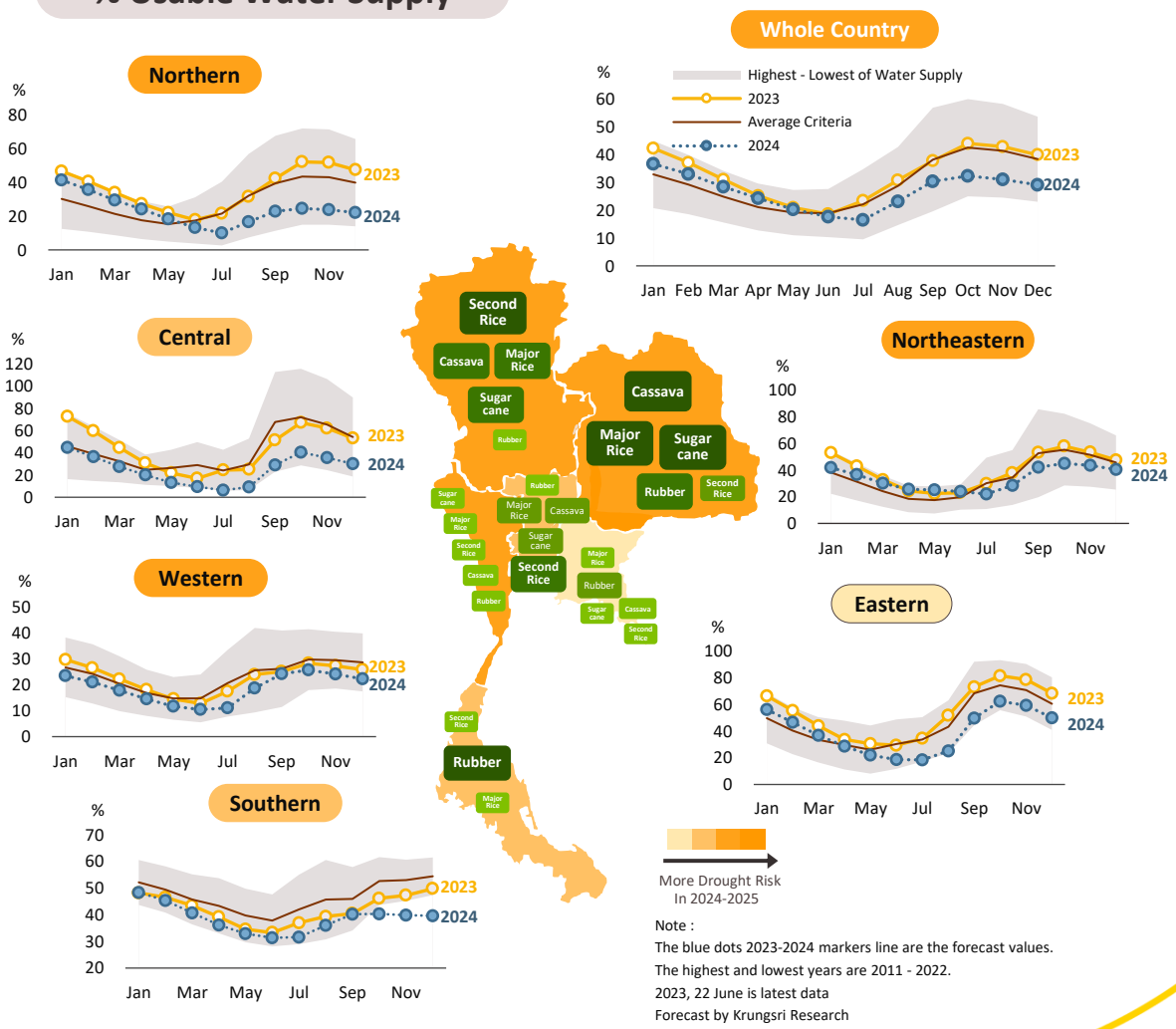


The consequences that will be seen if an El Niño emerges in 2023-2024:

1) **Higher temperatures and a greater possibility of heatwaves:** This may then lead to several unwanted consequences, including an increased risk of forest fires and greater smoke and air pollution, extensive coral bleaching, problems for marine species breeding and growing, crop losses, and food shortages, which can then push up prices for agricultural products and consumer goods.
2) **Disruptions to rainfall and intermittent dry spells:** This would then result in a shorter overall period during which water stores can be replenished, potentially leading to water shortages in agricultural areas that are outside the reach of the irrigation system.
3) **Lower than average overall rainfall:** Krungsri Research estimates that 2023 rainfall will dip below the average by between -5% and -10%, which would then result in annual rainfall of around 1,484mm. Precipitation will likely then drop by -10 to -15% in 2024 as El Niño conditions intensify, bringing forecast rainfall down to some 1,382mm close to the 1,343mm recorded in the 2019 drought.
4) **Reduced access to water from reservoirs and aquifers:** Given (2) and (3) above and the fact that some rain will fall outside catchment areas, the volume of water available from natural and man-made storage will be below average. This will then increase the risk of drought conditions emerging, as happened in 2018.

Source: Thailand Meteorological Department, Thaiwater, Krungsri Research

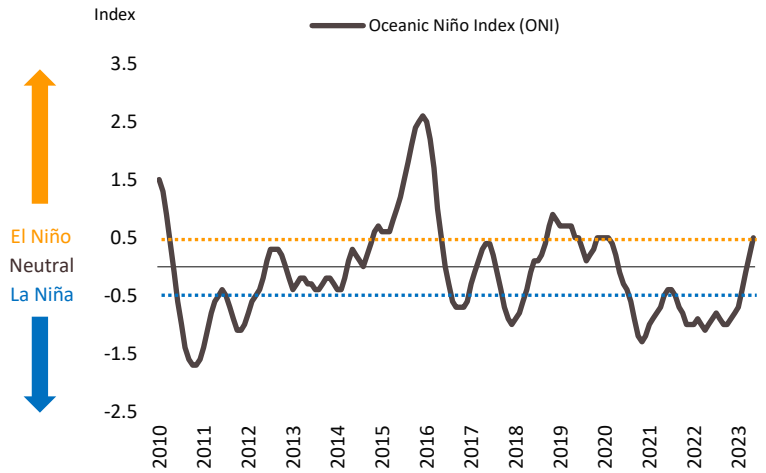
% Usable Water Supply



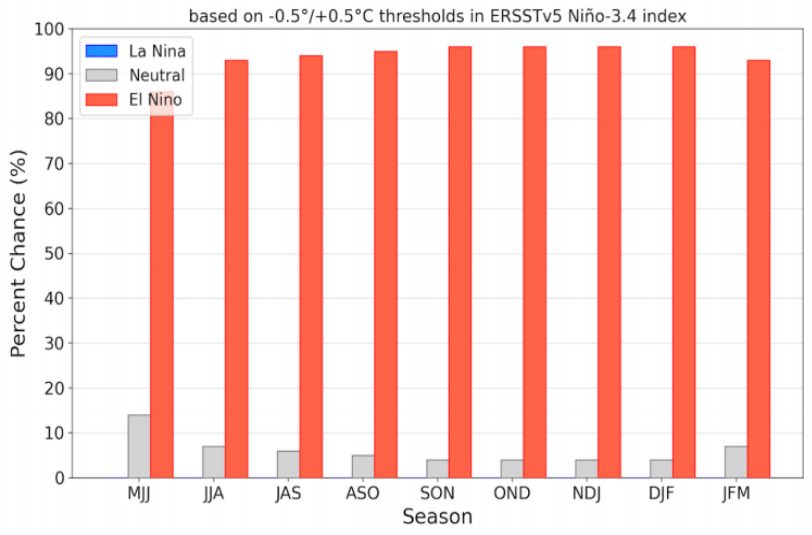
Note :
The blue dots 2023-2024 markers line are the forecast values.
The highest and lowest years are 2011 - 2022.
2023, 22 June is latest data
Forecast by Krungsri Research

Clear indications of an emerging El Niño indicate that *Thailand would face drought in 2023-2025*.

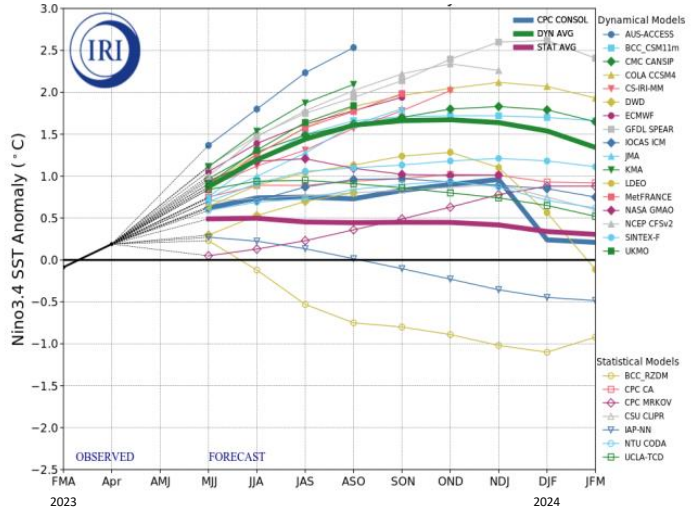
Oceanic Indices



Official NOAA CPC ENSO Probabilities



Model Predictions of ENSO



- Thanks to La Niña conditions that extended from mid-2020 through to the start of 2023, over the past few years, Thailand has enjoyed lower than average temperatures but higher than normal rainfall. However, **the signals of an emerging El Niño are becoming increasingly clear, and there is thus a growing risk that this will affect the climate through the rest of 2023**. Indications of the approaching El Niño are seen in the Oceanic Niño Index (ONI), which uses the temperature of the sea surface of the equatorial Pacific to reflect the current balance of La Niña/El Niño conditions. Having been below average (and thus in La Niña conditions) since 2020, this has returned to 'neutral' conditions, or between -0.5 °C and +0.5 °C of the mean value.
- For Thailand, this tends to be accompanied by average levels of rainfall, but the direction of change is from negative to positive and the ONI is continuing to trend upwards. The ONI thus moved from weak La Niña conditions to neutral negative conditions in February 2023, and then into neutral positive conditions in April (at +0.2). The likelihood of El Niño conditions emerging is thus now considered to be greater than 90%, with this expected to persist at least until the first quarter of 2024. It should be noted that it is normal for El Niño and La Niña conditions to alternate every 2-5 years.
- Given these trends, it is **highly likely that from the end of 2023 through 2024, Thailand will see El Niño conditions predominate**. It is expected that the ONI will rise above 0.5 °C in June, therefore confirming that a weak El Niño has begun, with the dynamic average (DYN AVG) of a suite of models now pointing to the increased likelihood of this intensifying into a strong El Niño in August. On average, El Niño conditions persist for 8-19 months.

Source: National Oceanic and Atmospheric Administration, Krungsri Research

The drought will hurt the output of several important crops, especially rice, cassava, sugarcane, rubber, and oil palm. This will put impacts on manufacturing supply chains.

Expected output losses from the El Nino phenomenon

% Output Losses by Major Products	In 2023	In 2024-2025 (per year)
Rice	**(-4)-(-5)%**	**(-2)-(-10)%**
Cassava	**(-0.5)-(-4)%**	**(-5)-(-13)%**
Sugarcane	**N.A.**	**(-5)-(-25)%**
Rubber	**0-(-0.5)%**	**0-(-2)%**
Oil Palm	**0-(-0.5)%**	**(-1)-(-6)%**

1. Impacts on agricultural outputs

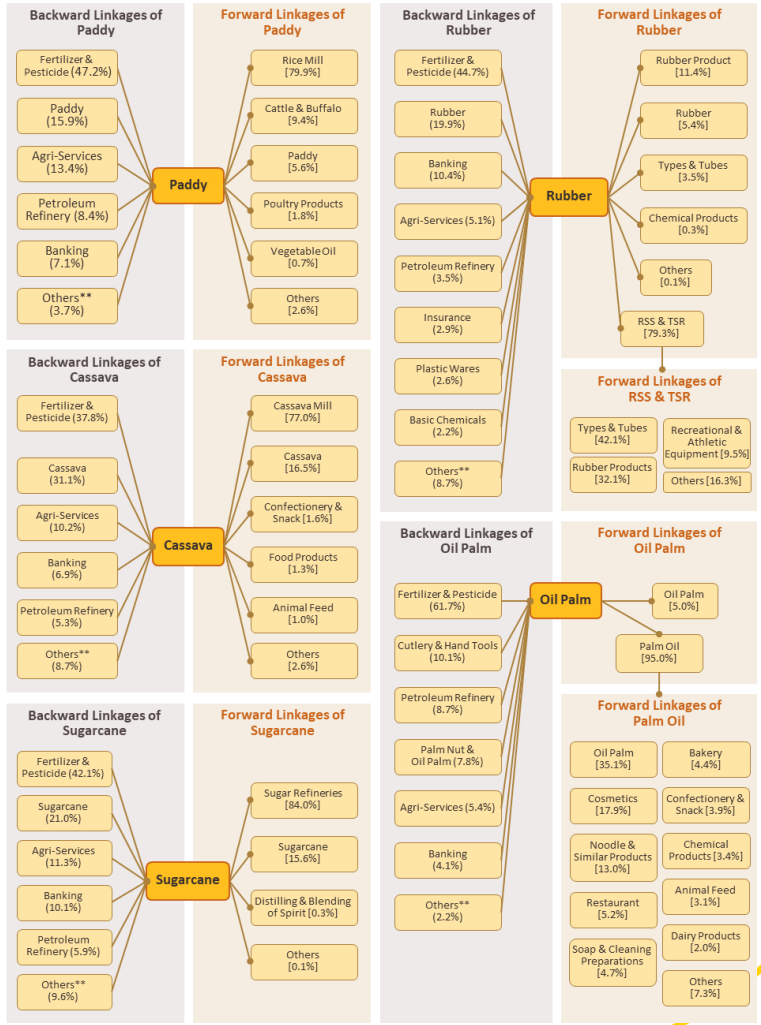
- **2023 outputs of rice and cassava are expected to suffer, and in 2024 and 2025, these losses will spread to other crops.** The most seriously affected regions are likely to be in the north, northeast, and west of the country, while in the central region, impacts will fall most heavily on rice growers.
- **Declining outputs will feed into a drop in household incomes for those in the agricultural sector and will also indirectly affect labor markets.** Those most affected by this will generally be those on low incomes, and these households will be exposed to an increased risk of having to shoulder an even higher debt burden.

2. Impacts on manufacturing supply chains

- The results of this analysis indicate that drought-induced losses will not be limited to the agricultural sector. Rather, **upstream industries will be affected by falling outputs** and the impact of this on demand. Meanwhile, **downstream industries that use agricultural goods as inputs will see capacity reduced and/or will need to source alternative products**, which will likely then entail higher production costs.
- It is therefore clear that the consequences of any future drought will not be restricted to the agricultural sector but will ripple out to agro-industrial businesses and on to a wider circle of manufacturing and service sector businesses connected directly or indirectly across the economy (RHS chart).



Agricultural Supply Chain Linkage



Source: Office of Agricultural Economics (OAE), NESDC, Krungsri Research

Expected impacts of the drought on Thai GDP, drought is estimated to shave -0.11 ppt off GDP growth in 2023 and an average of -0.29 ppt off in each of 2024 and 2025

Projection of Economic Losses from Drought

In 2023, Scenario of Drought Risk	Best Case Rainfall Drop 5-7%	Base Case Rainfall Drop 8-10%	Worst Case Rainfall Drop 10-15%
Economic loss (Million Baht)	**14,736**	**18,241**	**22,522**
As percent of GDP	**0.08**	**0.11**	**0.13**

Scenario of Drought Risk	Best Case Rainfall Drop 5-7%	Base Case Rainfall Drop 10-12%	Worst Case Rainfall Drop 15-20%
Likelihood in 2024	High	Medium	Low
Likelihood in 2025	Low	Medium	High
Economic loss (Million Baht)	**22,077**	**50,174**	**77,837**
As percent of GDP	**0.13**	**0.29**	**0.45**

- The data show that the impacts on the GDP of an El Niño are affected by its timing and duration, and the effects of this on access to water. Thus, future rainfall and the effectiveness of water management policies will have a very important role to play in determining the severity of the drought.
- Initially, Krungsri Research sees El Niño persisting through 2025 and so modeling of the situation and its impacts are divided into two time periods and three levels of intensity.

Source: NESDC, Krungsri Research

3. Impacts on Thai GDP

2023: Onset of the El Niño

Krungsri Research modeled 3 cases to evaluate the financial consequences of drought-induced impact on economic activity.

- **Best case:** Supply chain losses will total THB 14.74 billion, or 0.08% of GDP.
- **Base case:** Supply chain losses will total THB 18.24 billion, or 0.11% of GDP.
- **Worst case:** Supply chain losses will total THB 22.52 billion, or 0.13% of GDP.

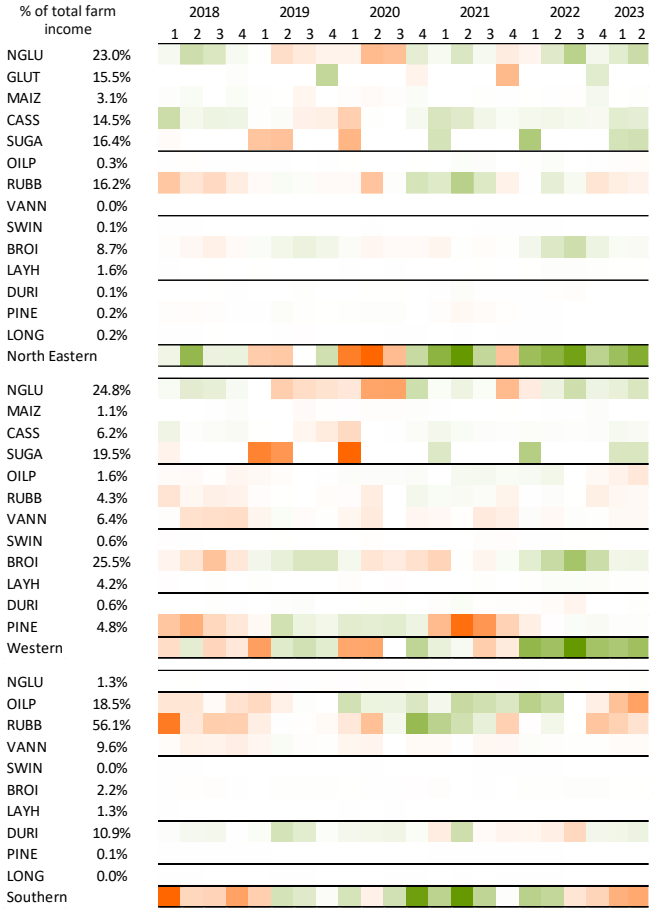
2024-2025: El Niño conditions reach their full intensity

The impacts over the following two years may differ from one year to the next, depending on the intensity of El Niño in each year and how much usable water is remaining from the previous year.

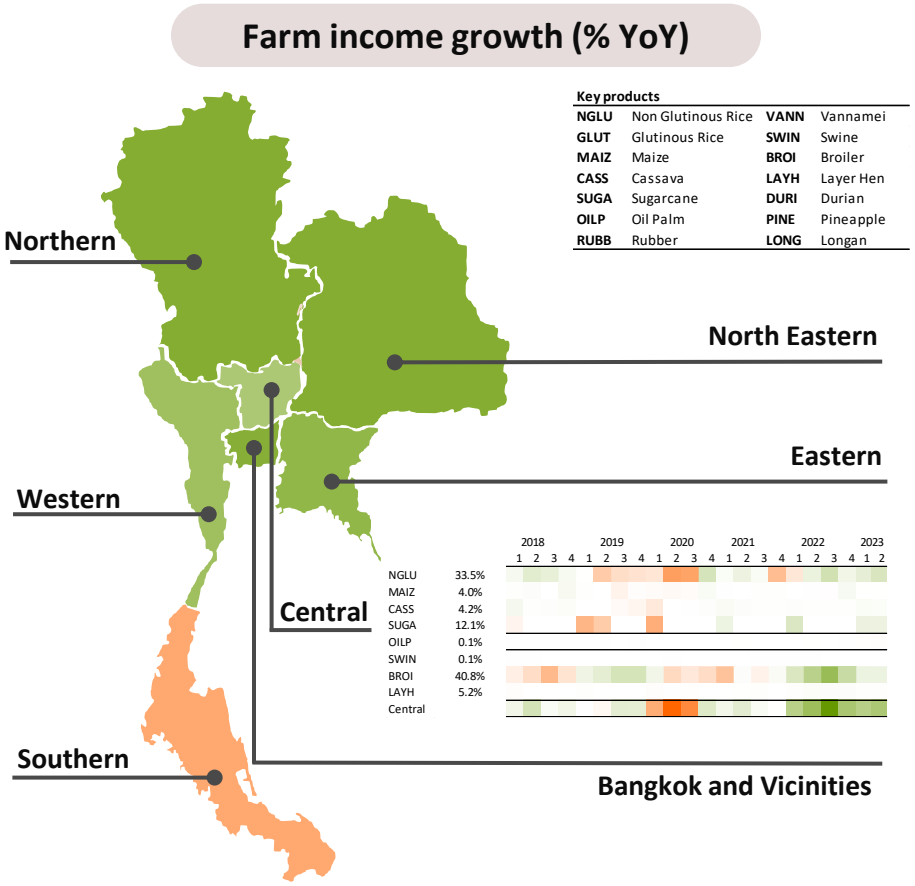
- **Best case:** Annual supply chain losses will total THB 22.08 billion, or 0.13% of GDP. This is the most likely outcome for 2024.
- **Base case:** Annual supply chain losses will total THB 50.17 billion, or 0.29% of GDP.
- **Worst case:** Annual supply chain losses will total THB 77.84 billion, or 0.45% of GDP. This is the most likely outcome for 2025.

Farm incomes are expected to rise by 2.0-4.0% in 2023, principally driven by rising outputs.

Farm incomes should rise through 2023 on expanding output, supported by: (i) sufficient reserve water in the dams with average rainfall still occurring, and (ii) improved mitigation of plant and animal diseases, resulting in reduced losses. Meanwhile, **the price decreases as a result of:** (i) continuous increase in production (ii) gradual reduction in the price level from the previous high baseline (especially the southern that suffered from falling prices of oil palm (-47.0%) and rubber (-24.9%)), and (iii) several countries easing measures regarding food security by finding alternative markets to replace previous trading partners. **Krungsri Research expects that in 2023 agricultural output will climb by 5.0-7.0%,while the prices decrease by (-1.0)-(-3.0)%, and as such, farm incomes will grow by 2.0-4.0%.**

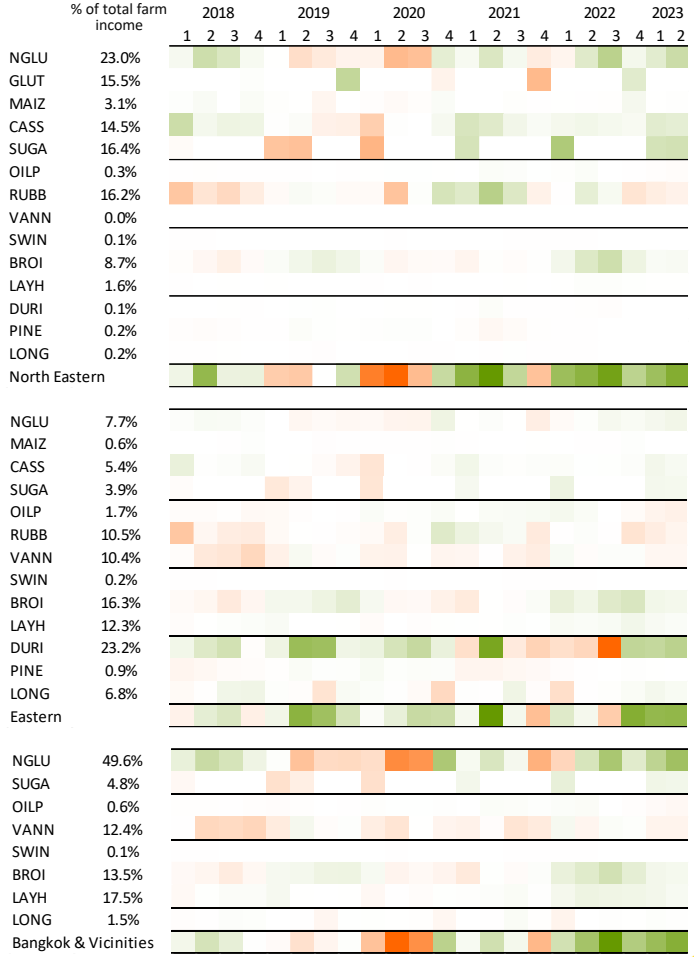


Source: Office of Agricultural Economics (OAE), Krungsri Research



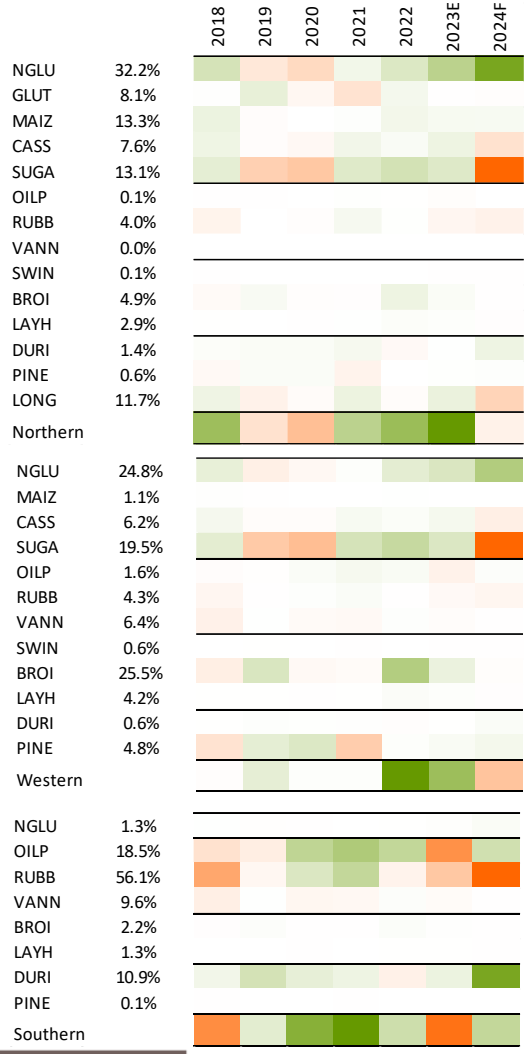
Regional Box: Color intensity indicates relevance of product, measured by share of total regional farm income.

Smoothed growth (%)
Contract — Expand

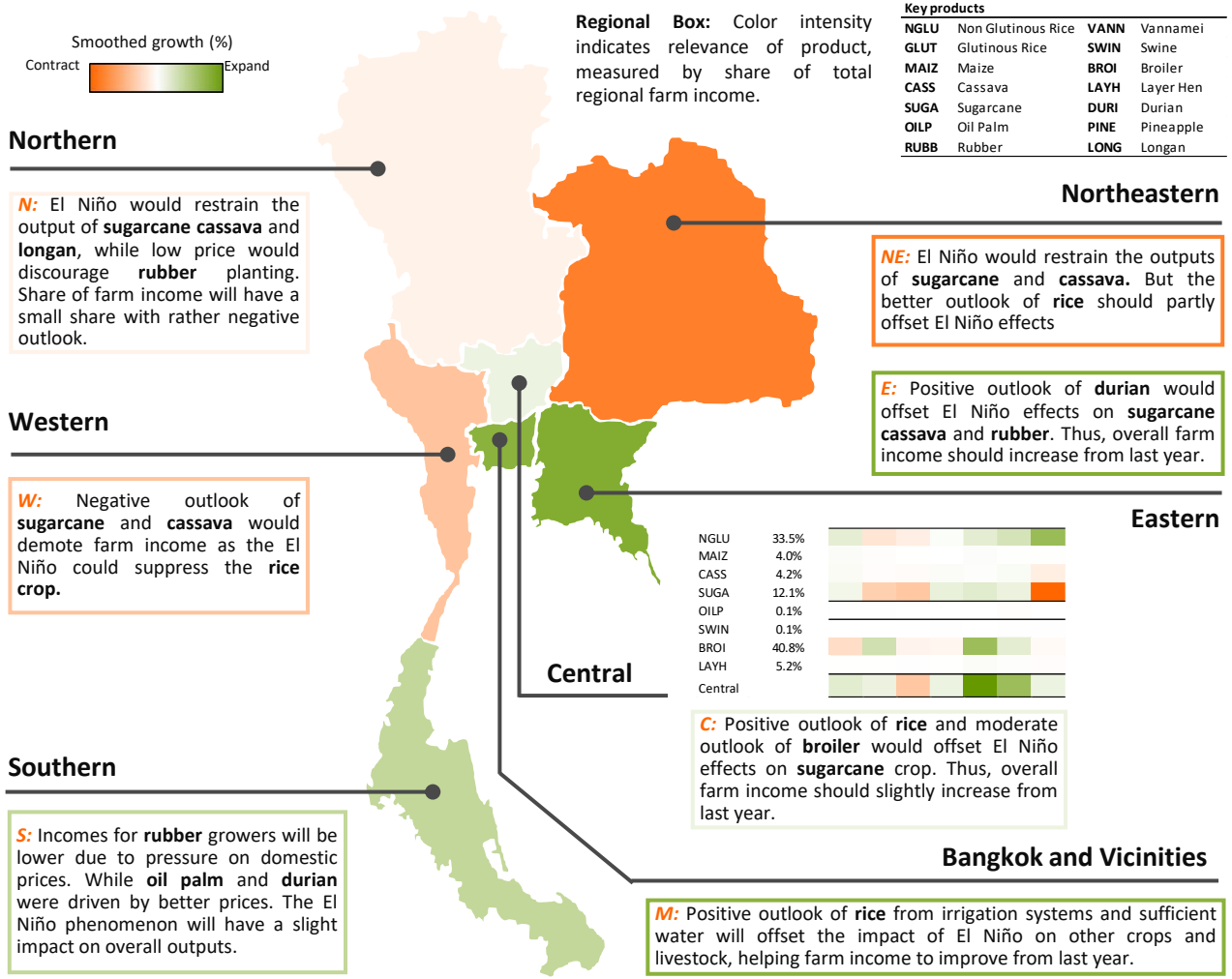


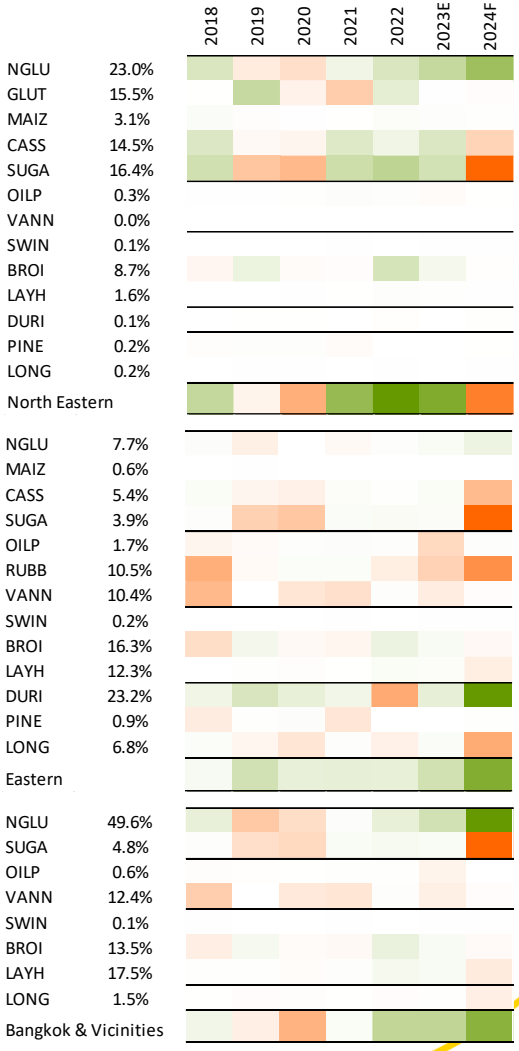
2024, El Niño would suppress some areas. But improving price outlook would secure growth in some crop.

Affected areas are NE, N, and W, relying on outputs which are vulnerable to drought and whose growing season will coincide with El Niño. However, better price outlook (esp. rice, durian, oil palm) help secure farm income YoY growth in E and S, while C and M region will benefit from irrigation and still-sufficient dam water.



2024 Farm income outlook





Note: NE=Northeastern, N=Northern, S=Southern, E=Eastern, W=Western, C=Central, M=Bangkok Metropolitan Area.

Source: Office of Agricultural Economics (OAE), Krungsri Research



Half year updates

El Niño impacts on agriculture

CBAM effects on industry

Appendix

EU-CBAM entering the transition period in October 2023, means exporters, especially in the iron and steel; and aluminum sectors, are facing emission measurement and reporting costs. However, the overall impact on Thai industry is limited as the EU is not a key market for Thailand's CBAM products.

Timeline of EU-CBAM

The European Union (EU) is implementing a **Carbon Border Adjustment Mechanism (CBAM)** aiming to charge an emissions tariff on imports of products with a high risk of carbon leakage from countries outside the EU.

Transition Period

EU importers of 6 targeted sectors are required to report;

- The number of imported goods
- '**Embedded Emission**' (the direct and indirect GHG emissions from the manufacturing of goods)

Targeted sectors

Iron and Steel | Aluminum | Cement | Fertilizers | Electricity | Hydrogen

Oct 1, 2023 – end of 2025

Full Implementation

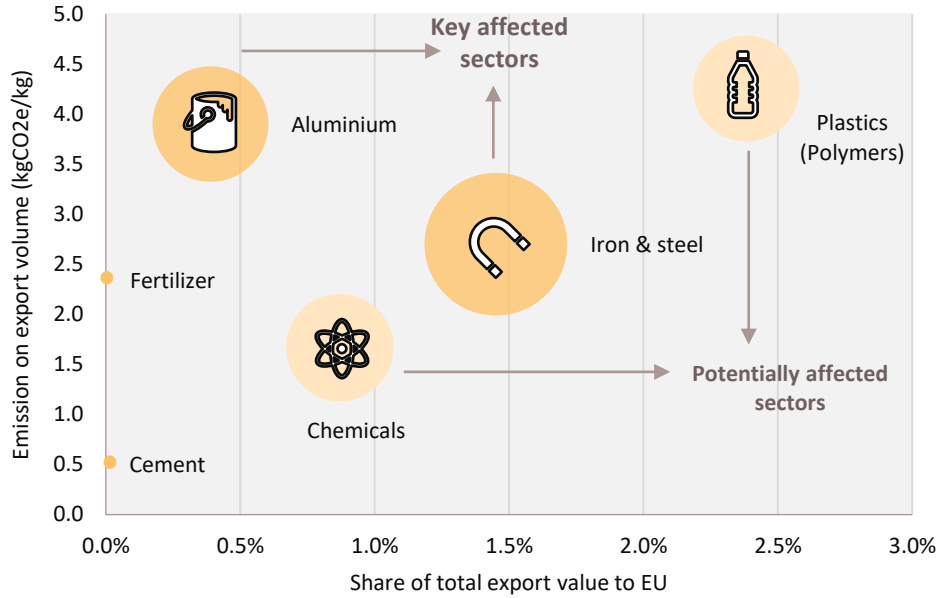
EU importers start buying **CBAM certificates**. The additional cost depends on;

- Import volume,
- Embedded Emission, and
- Weekly EU-ETS allowances (price of CBAM certificate)

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

Jan 1, 2026 onwards

Thailand's Export Shares to the EU and Emissions by CBAM Sector



Note: Bubble size represents Thailand's exports to EU as a percentage of exports to World

- **During 2023-2025, CBAM tends to have minimal impacts on the Thai industry** as these potentially affected products accounted for 2.12% of Thailand's export to the EU and 0.17% of the country's total export in 2022. Besides, Thai exports of CBAM products to EU accounted for 5.31% of CBAM products to the world, implying EU is not a key market for such products. However, **exporters, especially in iron and steel; and aluminum sectors, will be faced with additional costs of measurement, reporting, and verification (MRV) of carbon emissions** as well as costs of related documents (paperwork).
- **2026 onwards**, once the transition period ends, **Thai firms will be likely to pay higher costs when exporting to the EU**. The impact will become more severe if there is no proper emission mitigation and adaptation. Moreover, there is an impending risk for the EU to extend CBAM sector coverage (e.g., plastics and chemicals, which could worsen the impact due to larger shares of exports to the EU and high carbon footprints); as well as other markets to implement similar measures (e.g., the US in which CBAM is under consideration). Eventually, this will place greater pressure for Thai manufacturers.

Source: European Commission, International Trade Centre, MOC, ONEP, TGO, Krungsri Research



- Half year updates
- El Niño impacts on agriculture
- CBAM effects on industry
- **Appendix**

Appendix: The forthcoming drought on the wider economy, will have impacts on other manufacturing industries that touch on the agricultural sector.

Krungsri Research thus looked at the structure of agricultural supply chains and in particular those for goods that are most exposed to the impacts of drought, namely *rice, cassava, sugarcane, rubber, and oil palm.* As part of this, the 2015 Input-Output Tables (published by the Office of the National Economic and Social Development Council (NESDC)) were used to analyze production as the box below.

Box 1 **Supply chains for major agricultural goods**

Krungsri Research thus looked at the structure of agricultural supply chains and in particular those for goods that are most exposed to the impacts of drought, namely rice, cassava, sugarcane, rubber, and oil palm. As part of this, the 2015 Input-Output Tables (published by the Office of the National Economic and Social Development Council (NESDC)) were used to analyze production.

Rice supply chain

- **Backward linkages: Industries that provide inputs to agricultural production**
  - **Rice farming:** 47.2% of expenses are for purchases of fertilizer and pesticides, which is followed in importance by seeds (15.9%), agricultural services (13.4%), power and energy for agricultural machinery (8.4%), and loan repayments to financial institutions (7.1%).
- **Forward linkages: Industries consuming agricultural outputs for further processing**
  - **Rice harvest:** 79.9% of rice outputs are distributed to rice mills for processing into milled rice. Byproducts of production including rice bran and broken rice are generally used as animal feed (e.g., for cows) and this takes another 9.4% of output, while 5.6% is used as seed in the next season's planting.
  - **Rice mills:** 27.3% of rice mill output is processed into vegetable oil, and a further 19.8% is converted into rice flour. Byproducts from the milling process are also distributed to other industries, including alcohol production and the manufacture of animal feed (for pork and chicken).

Cassava supply chain

- **Backward linkages: Industries that provide inputs to agricultural production**
  - **Cassava farming:** Purchases of fertilizer and pesticides account for a combined 37.8% of expenses, followed by purchases of stem cuttings (31.1%), agricultural services (10.2%), loan repayments to financial institutions (6.9%), and power and energy for agricultural machinery (5.3%).
- **Forward linkages: Industries consuming agricultural outputs for further processing**
  - **Cassava harvest:** Around 77.0% of outputs are distributed to collection yards and processing facilities (for conversion into products including cassava chips and cassava pellets), 16.5% of outputs are used to propagate the next planting, and 1.6% is used as inputs to the production of sweeteners and snacks.
  - **Cassava processing facilities:** 54.1% of the output of cassava processing is used to manufacture monosodium glutamate, 22.0% is processed into cassava flour (i.e., native and modified starch), and the remainder is distributed to other downstream industries for use in the production of animal feed, textiles, printing supplies, noodles, and basic chemicals.

Box 2 Supply chains for major agricultural goods (continued)

Sugarcane supply chain

- **Backward linkages: Industries that provide inputs to agricultural production**
  - **Sugarcane farming:** Purchases of fertilizer and pesticides soak up 42.1% of overall expenses, which are followed in importance by expenses incurred in planting crops (21.0%), agricultural services (11.3%), loan repayments to financial institutions (10.1%), and power and energy for agricultural machinery (5.9%).
- **Forward linkages: Industries consuming agricultural outputs for further processing**
  - **Sugarcane harvest:** 84.0% of sugarcane outputs are consumed by sugar mills and are used in the production of sugar, while 15.6% of the harvest is reserved as stock to propagate for the next planting or for distribution to downstream industries for use in the production of alcohol and electricity.
  - **Sugar processors:** 21.8% of the output from sugar producers is used as an input into the production of sweeteners and snacks. A further 15.9% is consumed by manufacturers of carbonated and other soft drinks, 10.4% is used in the production of bakery goods, and 9.7% is processed into milk products. The remainder is used in the production of alcohol, canned fruit and vegetables, and ready-to-drink tea, coffee, and cocoa products.

Rubber supply chain

- **Backward linkages: Industries that provide inputs to agricultural production**
  - **Rubber cultivation:** Spending on fertilizer and pesticides absorbs 44.7% of total costs. This is followed in importance by purchases of seedlings (19.9%), loan repayments to financial institutions (10.4%), agricultural services (5.1%), power and energy for agricultural machinery (3.5%), insurance (2.9%), plastic containers used for tapping rubber trees (2.6%), and chemicals used in basic rubber processing (2.2%).
- **Forward linkages: Industries consuming agricultural outputs for further processing**
  - **Rubber harvest:** 79.3% of the rubber that is gathered through tapping is processed into block and sheet products, 11.4% is sold to companies for further processing into rubber products, and 5.4% is used for the cultivation of new trees or to help in the maintenance of existing stands.
  - **Block and sheet rubber processors:** 42.1% of the output of rubber processors are used as inputs into the manufacture of tires and rubber hosing. The remainder is used in a range of different industries, including the production of rubber goods (32.1%) and sports and recreational items (9.5%).

Oil palm supply chain

- **Backward linkages: Industries that provide inputs to agricultural production**
  - **Oil palm farming:** 61.7% of overheads go to purchases of fertilizer and pesticide, 10.1% is spent on tools for trimming and pruning, 8.7% goes to power and energy for agricultural machinery, 7.8% is accounted for by purchases of seedlings, and agricultural services and loan repayments to financial institutions take a further 5.4% and 4.1% each.
- **Forward linkages: Industries consuming agricultural outputs for further processing**
  - **Oil palm harvest:** Over 95% of the harvest is distributed to collection yards or directly to palm processing facilities, with the remaining approximately 5% used to produce seedlings for the next round of planting.
  - **Palm oil processors:** The entire harvest of oil palm is used to produce crude palm oil (CPO) but because this has a wide range of applications, this is then consumed by many different downstream industries, including in the production of refined palm oil for direct consumption (35.1%), cosmetics (17.9%), noodles (13.0%), soap and other cleaners (4.7%), bakery goods (4.4%) and chemical products (3.4%). Byproducts of the manufacturing process are also used as inputs into the production of animal feed.

KRUNGSRI RESEARCH

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