



ASEAN Construction market – Singapore, Indonesia and Thailand

November 2022

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Singapore

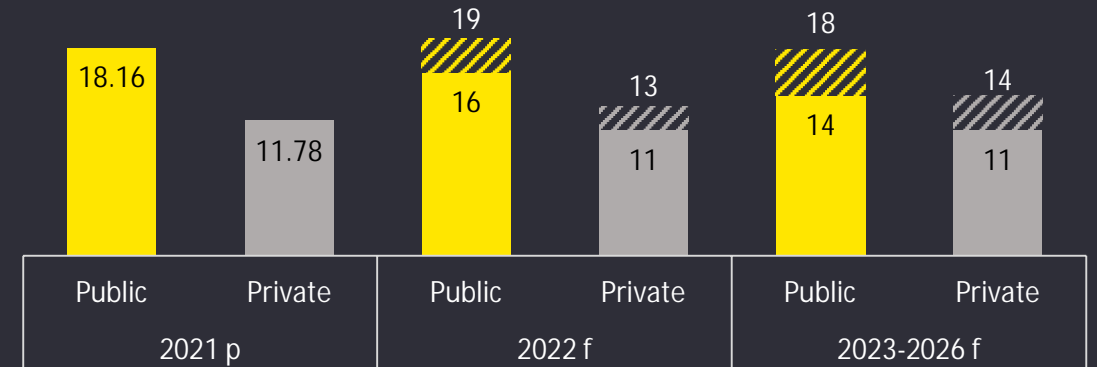
Construction demand is projected to remain strong, primarily driven by housing and long-term infrastructure development projects

In 2021, construction demand increased by 42%. The primary drivers were residential and infrastructure projects. Public sector contributes to around 60% of construction demand.

Segment	Performance
Residential Construction	Under the Home Improvement Program, the government has a strong pipeline of public housing projects. The Housing Development Board (HDB) delivered 14,500 flats in 2021.
Infrastructure Construction	The government plans several transport, renewable energy and manufacturing projects.

Infrastructure activity	Amount (US\$)
Transport infrastructure	75.8 billion (by 2030)
Rail network	42 billion (by 2030)
AAPowerlink solar energy project with Australia	20.7 billion
Tuas port	14.5 billion (till 2040)
Marina Bay Sands and Resorts World Sentosa expansion	9 billion
Changi Airport Terminal 5	-

Singapore Construction Demand (in S\$ billion)



Source: Building and Construction Authority
Slanted lines represent the upper range of estimates

p : preliminary
f : forecast

2022 Singapore Construction Demand breakup

Domain	Amount (S\$)
Civil engineering	8.6 – 10.5 billion
Public residential	3.5 – 4.0 billion
Institutional and others	3.3 – 4.1 billion
Industrial	4.1 – 5.1 billion
Private residential	4.8 – 5.1 billion
Commercial	2.7 – 3.2 billion

Source: Turner & Townsend

Singapore continues to invest heavily in maintaining and supporting its infrastructure, with a focus on environmental sustainability

Factors contributing to positive impact on the industry

US\$13 billion development expenditure announced by the government in the Budget 2022, announced in February 2022

US\$90 billion to be borrowed by the government to develop infrastructure that will last next 50 years

US\$20.3-24 billion is the estimated value to construction contracts to be awarded in 2022, according to the Building and Construction Authority (BCA)

60% of these contracts are expected to be from public sector

US\$26.3 billion worth of green bonds to be issued by 2030 to fund green building projects

17,000 new industry jobs are expected over the next five years due to the US\$8.8 billion in fixed asset investment that Singapore attracted in 2021, as reported by the Economic Development Board (EDB).

Source: Press Articles, Company Reports

Construction markets | Positive outlook

Commercial building demand to go up

- Singapore repairs and upgrades hotels and attractions while reviving inbound tourism after COVID-19 pandemic

Singapore Green Plan 2030

- Government is expanding the renewable energy infrastructure
- Targets solar power generation capacity of 2 GWp by 2030

Rising carbon tax

- Singapore will progressively increase carbon tax levels from 2024
- The building dwellers are likely to retrofit or upgrade buildings and achieve environmental certifications

Construction markets | Threats

GDP forecast cut down

- Oxford Economics cut the GDP growth forecast for 2023 from 1.5% to 1.3% due to suboptimal external outlook

High inflation

- The consumer price index increased in August at the fastest pace in 13 years
- Central bank tightened monetary policy three times this year and is likely to do it again next month

Singapore has an ambitious pipeline of long term projects to reach its carbon reduction and sustainable development goals

Significant Infrastructure Government Loan Act (SINGA)



- Passed in 2021, SINGA will allow the government to borrow up to S\$90 billion to develop infrastructure that will last for 50 years
- The borrowing would be used to fund projects valued at least S\$4 billion each
- Notably, Singapore has not borrowed for infrastructure development since the 1990s

Electric Vehicles (EV)



- The government is actively expanding the electric vehicle (EV) charging infrastructure
- It aims to reduce peak land transport emissions by 80% by 2050
- By 2025, the government aims to make every HDB town EV ready
- The Land Transport Authority targets 60,000 EV charging points in Singapore by 2030

Cross Island Line (CRL)



- Singapore is developing its eighth MRT line, Cross Island Line (CRL)
- It is Singapore's longest fully underground line, at over 50 kilometres
- It will be completed by 2032 and will connect the existing and future developments in the country

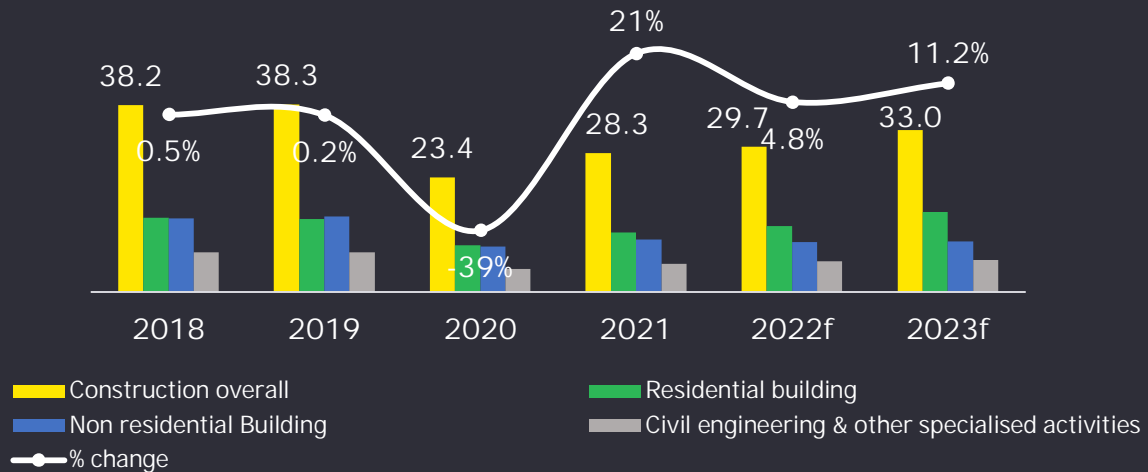
Tuas port



- Singapore is building a mega port with a targeted completion in 2040s
- The phase one was completed in November 2021. It took four years to plan and six years to construct
- The second phase is under construction and planning for the third phase is going on

Construction output witnessed a sharp decline of around 39% in 2020 due to COVID-19, before recovering by 21% in 2021

Gross output (sales), real US\$ billion and growth rate



Source: Oxford Economics

Base year = 2015

f : forecast

Impact of COVID-19

Supply chain disruption

- Singapore imports nearly all of its building material
- Being a price taker due to its small market size, it had to procure at higher costs
- The housing projects using prefab parts brought in from Malaysia were slowed down in 2020 due to lockdowns in Malaysia, which caused supply chain disruptions

Construction cost inflation

- The land scarcity and supply chain disruptions, caused by the COVID-19 pandemic, led to rise in construction cost
- Average tender price increased by 10-15% in 2021 and is expected to increase by further 5-8% in 2022

Rise in cost of labour

- The strict border controls throughout 2021 led to a rise in labour costs and project delays

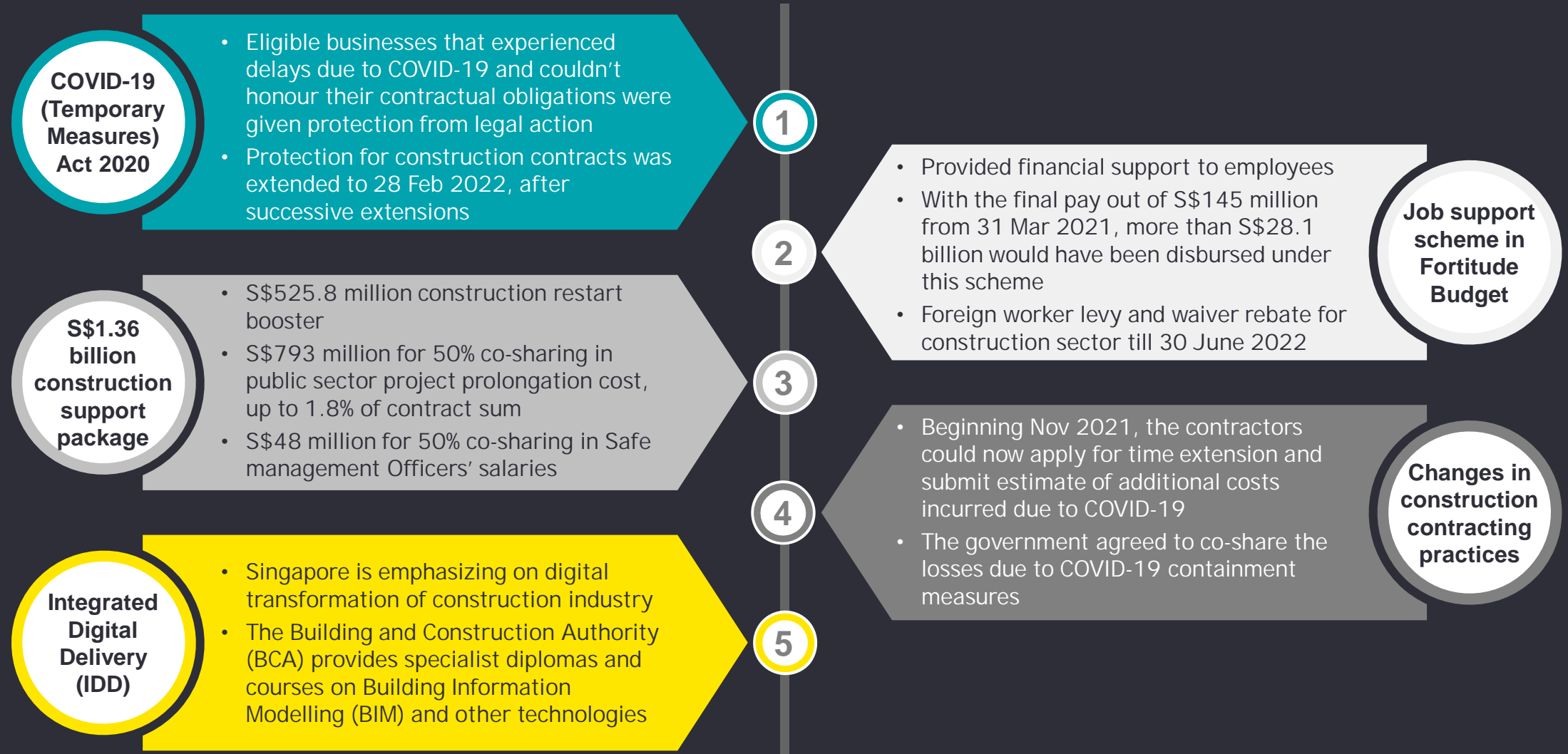
Project delays

- The circuit breaker measures introduced by the government further caused delays in construction projects
- Las Vegas Sands expects the US\$3.3 billion expansion of Marina Bay Sands to finish in 2026, instead of the earlier 2025 timeline
- The government is adding Terminal 5 to the Changi airport. The development was put on hold due to COVID-19 to reassess the situation

Cash flow difficulties

- Around 2,200 construction firms ceased operations as the construction and labour costs skyrocketed

The government provided monetary and legal relief to construction firms to cope up with COVID-19; it also emphasised on digitalization



Only selected companies are scored by external agencies on ESG; all companies reported Environmental Management Systems

	Sustainlytics ESG risk rating	% reduction in GHG emission	Intensity	Scope	Environmental Management reporting system	Recycling initiatives	Use of alternate energy sources
Lian Beng Group Ltd	NA	NA	Total emissions intensity ratio: 2.49 kg/m ²	Total CO2 emissions in FY21: 2,040,300 kg	Earth Control Measures ("ECM") are implemented across all construction sites	Waste recycled in FY21: 233 tonnes rebar waste	NA
Boustead Singapore Limited	32.3 (High risk)	NA	NA	NA	ISO 14001 Environmental Management Systems	Has rainwater harvesting and water recycling system installed	Boustead Projects' properties use electricity generated by solar power
PEC Ltd	NA	NA	Total GHG emissions intensity: 351 tonnes of CO2e/million man-hours worked	<ul style="list-style-type: none"> ▶ Scope 1: approx. 750 tCO2 ▶ Scope 2: approx. 2,600 tCO2 	<ul style="list-style-type: none"> ▶ Records total energy intensity and GHG intensity ▶ Tracks breaches to environmental regulations 	NA	NA
Lum Chang Holdings Limited	NA	NA		NA	<ul style="list-style-type: none"> ▶ Certified under the Environmental Management System (ISO 14001) ▶ Zero incidents of environmental non-compliance 	NA	NA
Boustead Projects Limited	NA	NA	NA	NA	Complies to ISO 14001 Environmental Management System	Implemented rainwater harvesting and water recycling system	Has installed solar panels on several properties

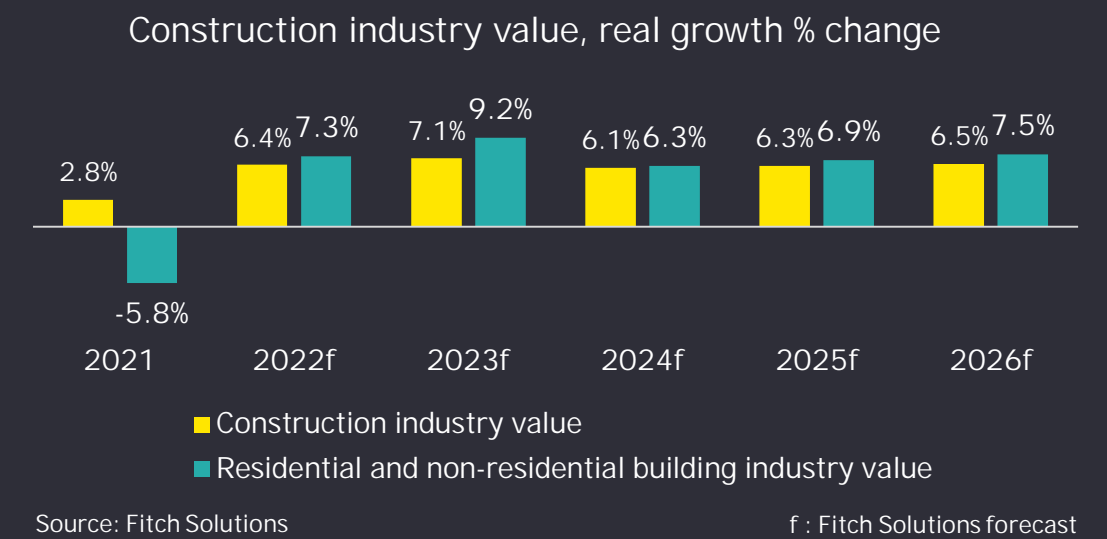
All companies reported safety and governance parameters comprehensively

	Safety initiatives	Safety metrics	Lost Time Incident rate (LTIR)	Diversity and Inclusion	Cybersecurity
Lian Beng Group Ltd	ISO 9001, ISO 14001 and ISO 45001 certifications for Quality, Environmental and Safety practices	FY21 Accident frequency rate: 6.9%	NA	In FY21 <ul style="list-style-type: none"> ▶ Males: 92% ▶ Females: 8% 	<ul style="list-style-type: none"> ▶ Has a Personal Data Protection Act ("PDPA") policy ▶ Trains employees on data confidentiality measures
Boustead Singapore Limited	Has workplace safety and health ("WSH") management system in place	<ul style="list-style-type: none"> ▶ Accident rate: 263/100,000 workers ▶ Workplace accidents per million man-hours: 1.7 	NA	In FY22 <ul style="list-style-type: none"> ▶ Males: 68% ▶ Females: 32% 	Complies with Singapore's Personal Data Protection Act 2012 ("PDPA")
PEC Ltd	<ul style="list-style-type: none"> ▶ ISO 45001 OHS Management Systems certified ▶ Has a Health, Safety, Security & Environment (HSSE) Policy 	<ul style="list-style-type: none"> ▶ Fatality: 1 ▶ Hours of safety training per employee: 23.08 ▶ Absentee rate in Singapore: 9.77% 	0.09	Employees by gender (excluding foreign workers) in 2021 <ul style="list-style-type: none"> ▶ Males: approx. 80% ▶ Females: approx. 20% 	<ul style="list-style-type: none"> ▶ Implements firewall, advanced threat analytics, malware and antivirus software programs ▶ Has an IT infrastructure Disaster Recovery Plan
Lum Chang Holdings Limited	Has OHSAS 18001 certification in Occupational Health and Safety Management	In FY21 <ul style="list-style-type: none"> ▶ Fatal workplace safety incidents: 2 ▶ Stop work days: 45 	NA	Workforce diversity in 2021 <ul style="list-style-type: none"> ▶ Males: 63.1% ▶ Females: 36.9% 	Has a Data Protection Policy, in accordance with the Personal Data Protection Act 2012
Boustead Projects Limited	ISO 45001 compliant Occupational Health & Safety Management System	<ul style="list-style-type: none"> ▶ Workplace accidents: 405 per 100,000 workers ▶ Workplace accidents: 1.9 per million man-hours ▶ Lost man-days to workplace accidents: 19 per million man-hours 	NA	Workforce diversity in FY22 <ul style="list-style-type: none"> ▶ Males: 67% ▶ Females: 33% 	Has a Data Protection Governance Framework ("DPG Framework") that covers governance principles, structure and system enablers

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Indonesia

Strong growth in construction is expected in the coming years, supported by healthy demand fundamentals and infrastructure development



Segment	Performance
Residential Construction	<ul style="list-style-type: none">Residential building demand is expected to rise due to low interest rate and high urbanization rate
Non-residential Construction	<ul style="list-style-type: none">The shifting of capital city from Jakarta to East Kalimantan will accelerate industrial developmentIndonesia's growing middle class and rapid urbanization supports retail, tourism and entertainment services
Infrastructure Construction	<ul style="list-style-type: none">The government has a healthy pipeline of national strategic infrastructure projectsTransport sector will remain the key driver of infrastructure growth

Indonesia has around 480 projects at various stages of construction in pipeline. The combined value of these projects is more than US\$287 billion

High-value strategic priority projects under The National Medium-Term Development Plan 2020-2024

Project	Amount (IDR trillion)
Power plants, transmission lines and substations	1,121
Developing oil refineries	637
New capital city	466
Urban flats (1 million)	397.9
9 industrial estates outside Java and 31 smelters	317.4
Aceh-Lampung Trans-Sumatra toll road	308.5
Metropolitan area development	222.9
Developing new towns	134.6
Urban mass public transport systems in 6 metropolitan areas	118.8
Integrating (main) port network	113

Source: RPJMN

Indonesian government is actively pursuing infrastructure development; transport sector plays an important role in infrastructure growth

Factors contributing to positive impact on the industry

IDR1,772 trillion is the gross value added (GVA) by the construction sector in 2021, which is equal to 10% of nominal GDP

IDR6.2 quadrillion investment planned by the government by 2024 to develop long-term infrastructure

IDR384.8 trillion allocated for infrastructure in 2022 State Budget

IDR438 trillion is the estimated value of 62 projects for 2022-2024. All projects, except those with multi-year contracts, would be finished by 2024

8.5% is the projected CAGR of Indonesia's construction industry turnover over 2021-2026

18.2% was the industry's profitability in 2021. In construction profitability, Indonesia ranks seventh in Asia Pacific region

333,615 was the number of companies operating in construction industry in 2021

Construction markets | Positive outlook

2020-2024 National Medium-Term Development Plan (RPJMN)

- By 2024, the government plans to develop strategic national infrastructure
- Includes roads, bridges, railways, airports, houses and other projects

2021-2030 Electricity Procurement Plan (RUPTL)

- The government plans to add 40.6GW of additional capacity by 2030
- 21GW will be from renewable sources

Economy to grow at 5.1% in 2022 and 5.3% in 2023

- Release of pent up demand
- Increased consumer confidence

Construction markets | Threats

Omnibus law controversy

- Law enacted to remove red tapism and improve investment climate
- Lead to protests and court ordering government to reconsider

Unreasonable renewable energy targets under RUPTL

- According to IHS Markit, Indonesia plans a 40-fold increase in solar capacity in an unrealistic timeline

Infrastructure financing shortfall

- 2022-24 infrastructure budget requirement is around US\$445 billion
- Government was able to fund 37%, as stated in July 2022

Indonesia has an ambitious pipeline of projects to develop its economic infrastructure

Jakarta-Bandung High-Speed Railway (HSR)



- A key railway project valued at US\$6 billion
- Supported by a soft loan from China as a part of Belt and Road (BRI) Initiative
- Government is exploring an extension of the HSR line from Bandung to Surabaya

Waskita obtained railway contract worth IDR508 billion



- Waskita Karya to build railway infrastructure in Medan and its vicinity, reported Investor.id in Apr 2022
- Medan-Binjai and Medan-Araskabu railway tracks contract is valued at IDR126 billion
- Medan Station stage 2 has a contract value of IDR382 billion

Trans-Sumatra Toll Road Project



- According to Fitch Solutions, this project is valued at over US\$33.7 billion
- At a total length of 2,900 km, this project is divided into multiple sections

Trans-Pacific Petrochemical Indotama (TPPI) Olefin Complex



- It is valued at US\$4 billion and is Indonesia's largest petrochemical project
- Samsung and Hyundai signed contracts for front-end engineering design (FEED) stage of project

New capital in East Kalimantan



- The new capital city will be built from scratch and is estimated to cost IDR466 trillion
- It will require significant investment in buildings and infrastructure
- The government would leverage public-private partnerships to finance this project

Investment Ministry's sustainable projects

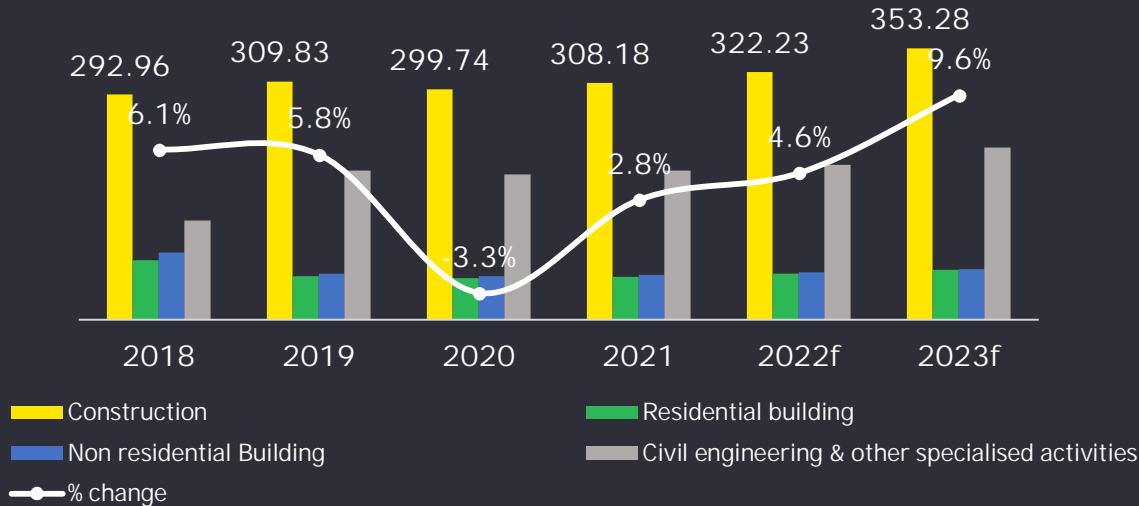


- In March 2022, the ministry proposed 47 'sustainable projects' worth over US\$10 billion
- Four sectors covered are:

• Manufacturing	US\$3.5 billion
• Infrastructure	US\$3.5 billion
• Economic zones	US\$3.5 billion
• Tourism	US\$0.4 billion

The overall construction industry declined in 2020 by 3.3% before rebounding in 2021

Gross output (sales), real US\$ billion and growth rate



Source: Oxford Economics

f : forecast

Base year = 2015

Impact of COVID-19

Building construction took a hit

- Building construction sector declined due to uncertainty caused by COVID-19 and government restrictions
- Nevertheless, it recovered in the second half of 2021 and is expected to continue to rise

Travel restrictions delay projects

- Jakarta-Bandung High-Speed Railway project, undertaken by PT Kerata Cepat Indonesia China, was delayed due to travel restrictions and other complexities
- Within East Asia and the Pacific, Indonesia recorded the largest number of project delays, particularly in coal power sub sector, owing to lockdowns in China and travel restrictions in South Korea

Funds diverted to combat COVID-19

- In 2020, the government diverted funds from infrastructure budget to handle the COVID-19 situation
- This led to postponement of infrastructure projects

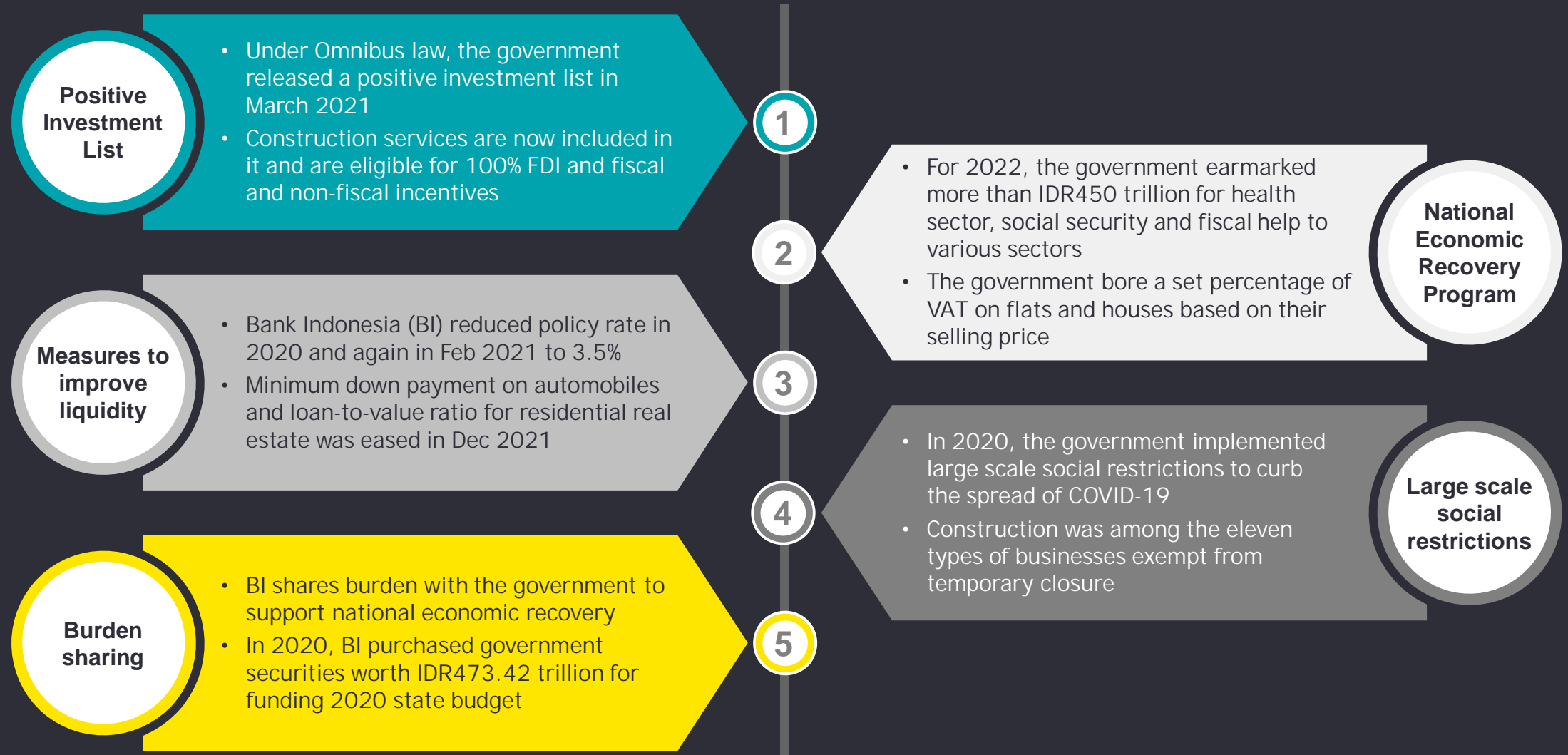
Supply shocks dampen economic activity

- With quarantine measures, many industries including construction experienced a supply shock
- This led to contraction in construction activity

Cost overruns

- The companies did not anticipate the disruptions caused by COVID-19
- The delays in projects, coupled with material shortage, led to increase in project costs
- Jakarta-Bandung High-Speed Railway project saw a significant rise in cost due to planning and execution complexities, exacerbated by COVID-19

The government eased policy to attract FDI and exempted construction sector from lockdown restrictions to prevent further project delays



Most companies are rated by Sustainlytics; Environmental management systems is the most reported parameter

	Sustainlytics ESG risk rating	% reduction in GHG emission	Intensity	Scope	Environmental Management reporting system	Recycling initiatives	Use of alternate energy sources
PT Wijaya Karya (Persero) Tbk	31.2 (High risk)	Yes	NA	Scope 1 and 2: 317.57 ton CO2* For head office (Wika Tower II)	ISO 14001: 2015 Environmental Management System	NA	In 2021, the total use of solar energy reached 26,471 kWp
PT PP (Persero) Tbk	37.1 (High risk)	<ul style="list-style-type: none"> ▶ Scope 1: Increased by 77.8% in 2021 ▶ Scope 2: 206% increase in 2021 	Scope 1 emissions intensity <ul style="list-style-type: none"> ▶ Diesel: 74,100 Kg/TeraJoule ▶ Gasoline: 69,300 Kg/TeraJoule 	<ul style="list-style-type: none"> ▶ Scope 1: 70,539,350 kg ▶ Scope 2: 2,898,473 kg 	ISO 14001-2015 on Environmental Management Systems	<ul style="list-style-type: none"> ▶ PTPP uses recycled water from the water treatment plant ▶ In 2021, it used 359,491 m3 of recycled water 	Utilizes solar panels and wind turbines as sources of electricity generation
PT Waskita Karya (Persero) Tbk	45.4 (Severe risk)	NA	NA	NA	<ul style="list-style-type: none"> ▶ ISO 14001: 2015 Environmental Management System ▶ Records total energy intensity 	The company has established a wastewater treatment system	NA
PT Adhi Karya (Persero) Tbk	41.1 (Severe risk)	Scope 2: Reduced by 22% in 2020	NA	Scope 2: 318,931.11 kgCO2 in 2020	ISO 14001: 2015 compliant Environmental Management Systems	NA	Installed solar power on the roof of the head office building
PT Bukaka Teknik Utama Tbk	NA	<ul style="list-style-type: none"> ▶ Direct: no change ▶ Indirect: increased by 17.2% 	NA	<ul style="list-style-type: none"> ▶ Direct: 255 tCO2 ▶ Indirect: 3,144.7 tCO2 	Has SHE (Safety, Health, and Environment) Department to look after environmental concerns	NA	NA

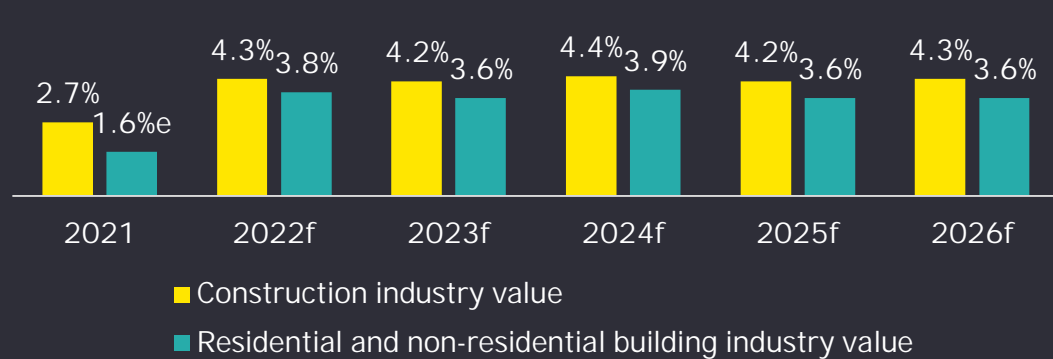
All companies have reported comprehensively on safety and diversity parameters

	Safety initiatives	Safety metrics	Lost Time Incident rate (LTIR)	Diversity and Inclusion	Cybersecurity
PT Wijaya Karya (Persero) Tbk	Implemented ISO 45001 and Government Regulation No. 50 of 2012	Number of work accidents, severity rate, NLTI rate and LTI rate reported	In 2021, ▶ 0.07 for Indonesia ▶ 0.34 for overseas	Total employees in 2021 ▶ Males: 1,929 ▶ Females: 204	WIKA has been ISO 20000 certified for Information Technology (IT) services and ISO 27001 for IT security
PT PP (Persero) Tbk	Has adopted the Occupational Health and Safety Management System (OHSMS), which applies to all employees (100%), both permanent and non-permanent	In 2021 ▶ Lost Days: 0 ▶ Lost Time Injuries: 0	NA	Permanent employees in 2021 ▶ Males: 1,594 ▶ Females: 239	NA
PT Waskita Karya (Persero) Tbk	Implemented OSH in operational activities in the office and at project sites, based on to the Occupational Safety and Health Management System (OSHMS)	In 2021 ▶ Lost working day: 0 ▶ Frequency rate: 0.18	In 2021 Lost working day: 0	Total employees in 2021 ▶ Males: 1,682 ▶ Females: 213	NA
PT Adhi Karya (Persero) Tbk	ADHI consistently implements an integrated management system in the form of Health, Safety and Environment (K3L)	In 2020 ▶ Work accident Incidents: 38 ▶ Incident rate: 0.52	NA	Employees by gender in 2020 ▶ Males: 2,292 ▶ Females: 466	NA
PT Bukaka Teknik Utama Tbk	To ensure its effective implementation, the Company has adopted the ISO 45001 about Occupational Health and Safety Management System	Human rights violation incidents: 0	NA	Employee composition by gender in 2021 ▶ Male: 592 ▶ Female: 67	NA

Thailand

Infrastructure is expected to drive growth for construction sector while the other segments tackle short-term challenges

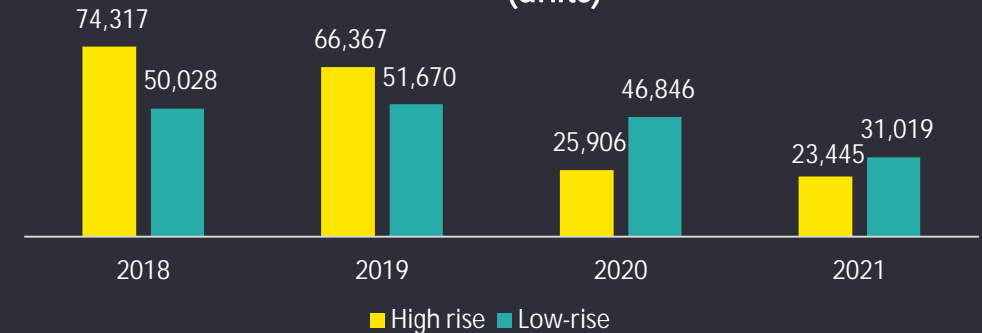
Construction industry value, real growth % change



Source: Fitch Solutions

f : Fitch Solutions forecast
e : Fitch Solutions estimate

New launches in residential housing segments (units)



Source: CBRE Research

Segment	Performance
Residential	<ul style="list-style-type: none"> Consumer preference has pivoted towards low-rise owing to the utility these segments provide for changing needs such as working from home. Stronger economic recovery, stabilisation of raw material prices, foreign demand for condo is expected to aid recovery for this segment from 2023
Non-residential	<ul style="list-style-type: none"> Although, occupancy rates remain high (~90%) in 2022, they are expected to decrease to around 85% in 2023, as pipeline supply will outpace demand Demand is directly related to economic health, and economy is forecasted to grow 2.9% in 2022 and 4.3% in 2023
Infrastructure	<ul style="list-style-type: none"> The aim of infrastructure projects is to boost economic activity and develop Thailand as a logistics and manufacturing hub. Investment in infrastructure leads to cascading effects in other segments, as it spurs commercial and residential activities around projects.

Major Infrastructure Investments, 2022	\$ Bn
40 projects including 27 new projects by Transport ministry	37.7
Value of approved developments in the Eastern Economic Corridor (EEC)	21.2
Approved investment in manufacturing & infrastructure projects by Thailand Board of Investment	6.6
Thai-China High speed rail project	5.5
Mass Rapid Transit Authority – MRT Orange line	2.8
Four new Special Economic Zones modelled after Eastern Economic Corridor	--

Source: EMIS, Krungsri Research, World Bank, Research and Markets

The long-term outlook of the industry is positive, driven by strong economic recovery, supportive government policies and foreign investment

Factors contributing to positive impact on the industry

4.2% forecasted growth for construction industry in 2022 before recording an annual average growth rate of 3.8% between 2023 and 2026

20% growth expected in the demand for industrial land (to buy or rent) per year, between 2021-2023

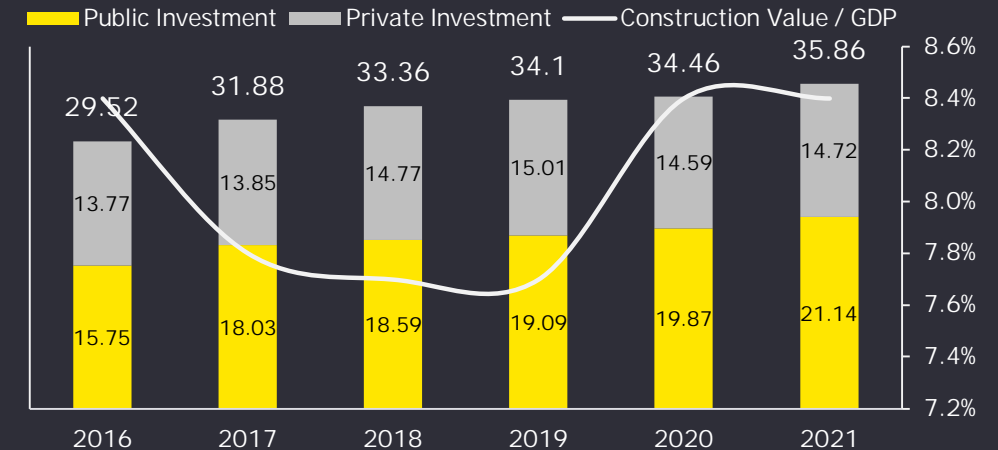
70,000 units of new properties in the residential segment coming to market, recording growth of 10.0% per year between 2022-2024

5-6% forecasted growth for public spending on construction annually, over 2022-2024

THB1.9 trillion earmarked in the Transport Infrastructure Development Strategy 2015-2022 by the Thai government, as investments to complete infrastructure projects which include high-speed rail lines, mass rapid transit lines, and motorways

THB500 billion (\$15.8 bn) expected private investment in the Eastern Economic Corridor (EEC is an ongoing megaproject that will establish a special economic zone once completed) between 2023 and 2027

Construction Investment (\$ bn) as % of GDP



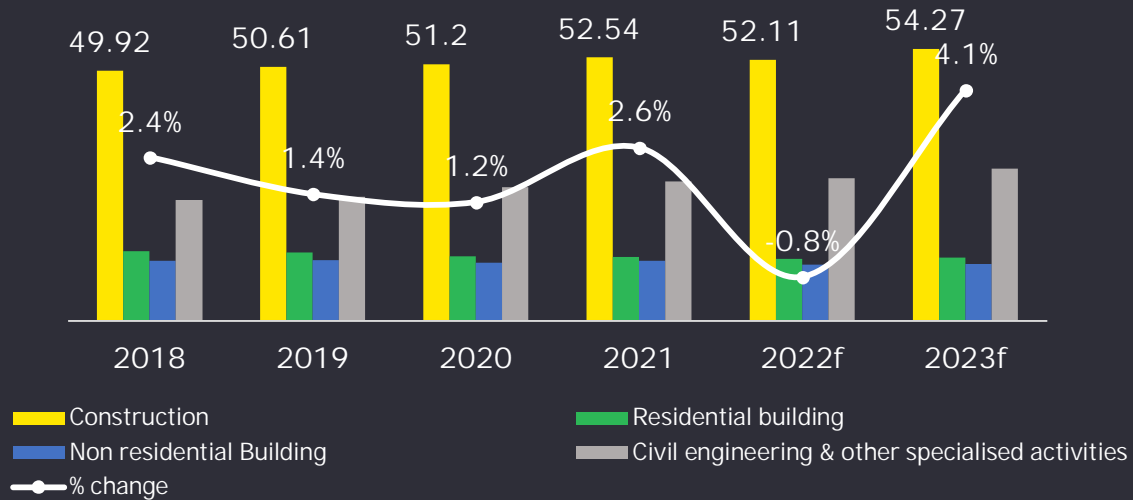
Source: Krungsri research, Industry Outlook 2022-2024: Construction Contractor

Long-term outlook of the Construction market

- ▶ Urbanisation rate in Thailand remains below global average and continued economic development will lead to increase in Urban centres
- ▶ Potential place for supply chain diversification, Thailand's geographic advantage and relatively affordable luxury market, maintain Thailand construction industry as a lucrative foreign investment destination
- ▶ Megaprojects such as Eastern Economic Corridor and the Southern Economic Corridor are underway and will create opportunities in the adjoining areas.

Industry slowed down from 2019, exacerbated by COVID, is likely to start recovery from 2023

Gross output (sales), real US\$ billion and growth rate



Source: Oxford Economics

Base year = 2015

f : forecast

Impact of COVID-19

Construction Sector context

- Construction sector in 2019 has started witnessing the impact of global economic slowdown and changes announced by Bank of Thailand to curb speculative demand in housing markets.
- Production GDP decreased 6.6% y/y in 2020 due to Covid, however, construction relatively unimpacted due to continued public investment.

Demand woes

- Domestic and foreign demand dried up, owing to reducing purchasing power, economic uncertainty and travel restrictions.
- In 2021, household debt to GDP has risen to 90% from 78% in 2017, making it further tougher to lend and borrow.

Labour shortages

- Migrant workers exited Thailand as workers camp and construction sites shutdown, which led to shortages and increased labour costs.

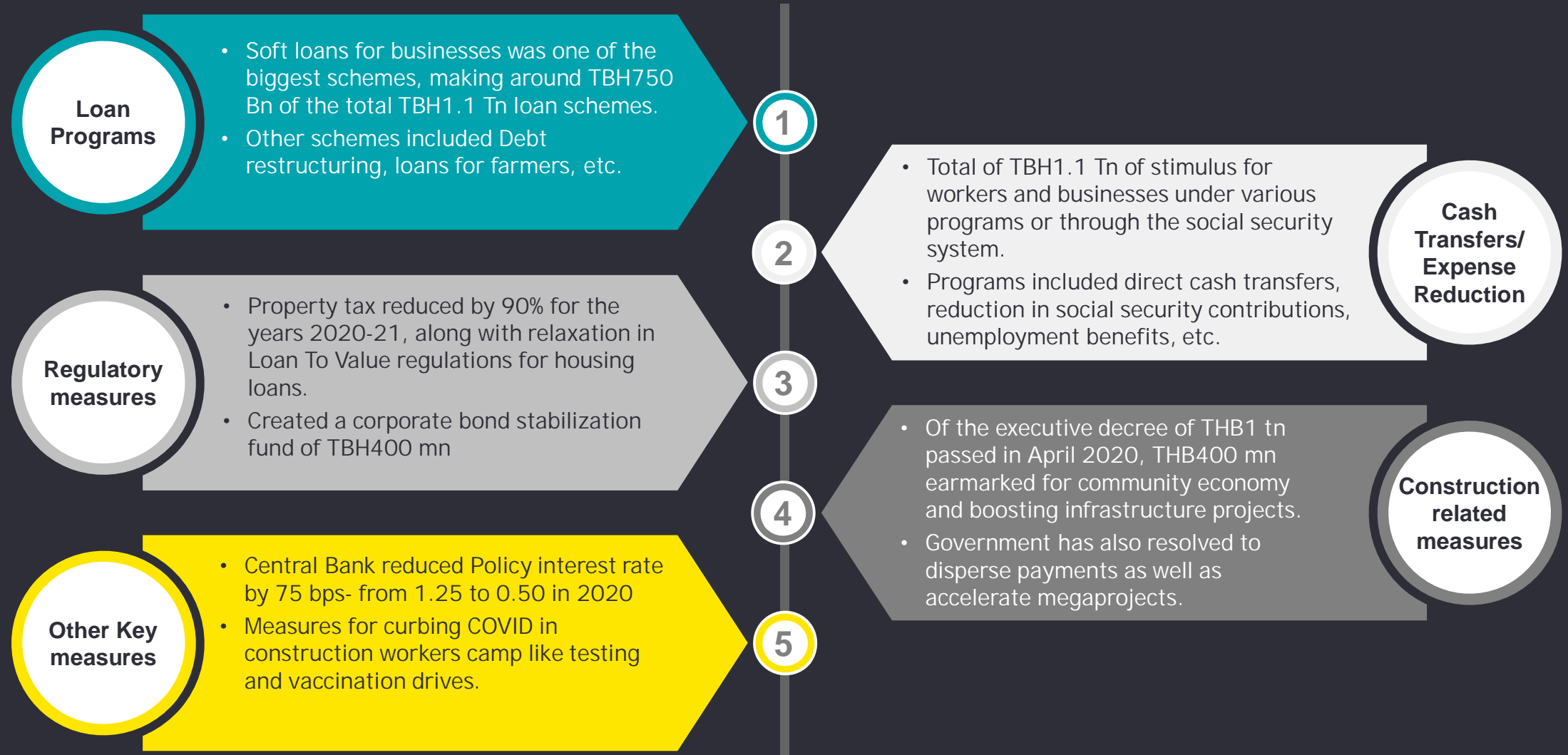
Excess inventory issues

- As the demand remains lacklustre, the pipeline supply expected by 2023 will far outpace the demand, extending the inventory problem.
- Promoters riddled with inventory issues resorted to aggressive marketing strategies (and halting construction activities), which has further impacted their profitability.

Cost Push inflation

- During large portion of the pandemic, raw material costs were mainly stable if not down.
- However, towards the end of 2021, the Construction Material Price Index recorded a 5 year high and is expected to rectify 2023 onwards.

The Government in three phases funded measures worth TBH3.1 trillion with the goal to restore purchasing power and restart the economy.




Although all companies implement ESG measures, everyone do not publish sustainability reports

	Sustainlytics ESG risk rating	% reduction in GHG emission	Intensity	Scope	Environmental Management reporting system	Recycling initiatives	Use of alternate energy sources
Italian-Thai Development	NA	NA	NA	NA	Established guidelines and procedures that implement the international standards for Environmental Management System (ISO 14001 : 2015)	NA	NA
Sino- Thai Construction and Engineering	41.2 (Severe risk)	NA	NA	No (Process started for data collection on emissions)	Implemented environmental management system to reduce the potential impact of the company's activities	NA	NA
CH Karnchang	37.8 (High Risk)	NA	NA	Category 2: 1629.1 tCO2e	Implemented environmental management that cover Air Quality Control, Noise Quality control, Energy consumption, among others.	Recycling efforts at the end of project with leftover materials	NA
Nawarat Patanakarn	NA	NA	NA	Greenhouse Gas Emissions- 250.76 tons	Implemented Environment Management System; ISO 14001 in order to reduce the environmental and society impact	Provides different colors to garbage for separating the different types of waste. Yellow represents recyclable waste.	Installed solar panels at the processed steel plant, Bang Nampreaw, Chachoengsao to reduce emissions.
Unique Engineering and Construction	NA	NA	NA	NA	Implemented system and procedures to minimize environmental impact	NA	NA

In addition to ESG, companies follow SDG and GRI goals too

	Safety initiatives	Safety metrics	Lost Time Incident rate (LTIR)	Diversity and Inclusion	Cybersecurity
Italian-Thai Development	Certified ISO 45001:2018- the standard for the Occupational Health and Safety Management Systems.	NA	NA	NA	NA
Sino- Thai Construction and Engineering	NA	NA	NA	NA	NA
CH Karnchang	Company has measures to integrate occupational health and safety management in day-to-day operations to address accidents	Injury Ratio- More than 300,000 consecutive hours without injuries forcing leave from work- 0.04 in 2021	NA	In FY21 ► Males: 72% ► Females: 28%	Company upgraded Computer Network Security System to secure confidential data
Nawarat Patanakarn	Installation of fall protection or safety nets to catch construction materials for safety reasons, trucks covered by canvas to prevent construction materials from falling onto the roads for road users safety	NA	NA	NA	NA
Unique Engineering and Construction	NA	NA	NA	NA	NA



EY | Assurance | Tax | Strategy and Transactions | Consulting

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