PAPUA NEW GUINEA

POTENTIAL ECONOMIC CONTRIBUTION OF THE PROPOSED PAPUA LNG PROJECT

Papua LNG project benefits: at a glance

On track for final investment decision by early 2024

PGK42bn capex

Upstream LNG development of the Elk and Antelope gas fields in Gulf province.

320km of pipeline to existing PNG LNG downstream facility.

A four e-train processing facility, with capacity to move 5.4m tonnes per year.

We estimate a cumulative PGK5.6bn addition to construction GVA during the building phase.

With another PGK7.7bn to gas output when production begins in 2028.

Total direct contribution equal to 20% of 2022 GDP.

+PGK13bn direct add to GDP

+PGK15bn indirect add to GDP

Flow-on benefits to transport, business services and a range of other services required by Papua LNG.

Total indirect contribution equal to 22.3% of 2022 GDP.

+PGK28bn in real GDP

Value of construction, related infrastructure, services and gas production will add PGK28bn to real GDP.

Equal to 42% of 2022 GDP.

3.9 jobs supported

For every PGK1m invested by the Papua LNG project, 0.6 jobs likely to be created.

Another 3.3 jobs supported across formal sector employment.

Kina appreciation

Inflows associated with the project to bring the foreign exchange market back in balance by mid-2024.

After that, strong demand for PGK to pay for local contractors and suppliers is likely to see PGK start appreciating from late 2024.

Executive summary

Buckle in for strong growth!

Papua New Guinea's last resource boom, from 2009 to 2014, was narrow, driven by gas. It was characterised by the surge in activity associated with the PNG LNG project, with some stimulus from public infrastructure and expansion of existing gold/copper mines. While the resource sector is far from homogenous, the next boom cycle will be different. It will be dominated by a wave of mining and energy projects, both green- and brownfield, across commodities. Importantly, strong private sector-led growth will make room for the government to deliver improved essential services to all Papua New Guineans, especially those in rural areas.

Kicking-off this "Boom Mark II" will be the Papua LNG project, which is expected to go to commencement by early 2024. In this report, we quantify its potential economic contribution.

We estimate:

- The Papua LNG project will deliver **PGK18bn** in **new spending** (in constant prices or in **real terms**) during its **construction** phase. This is equivalent to 27.3% of 2022 GDP.
- When **production** comes on stream in 2028, PNG's gas exports will lift by **5.4 million tonnes per year,** boosting the gross value add of its gas industry by 60%. This direct contribution to GDP combined with indirect benefits associated with gas exports will see PNG's real GDP rise by **PGK10bn** in real terms in 2028, which is equivalent to 15.2% of 2022 GDP.
- Inflows associated with the project should restore balance to the foreign exchange market by mid-2024.

With more major projects due for decisions over the next few years, we remain optimistic that PNG can grow its market share in meeting rising global demand for resources over the medium-to-long term. This will be enough to ensure construction continues to rise into the next decade shifting GDP and jobs to a higher plane.

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Papua LNG: the economic benefits

The GDP contribution of Papua LNG

PNG's economy is expected to enter an unprecedented investment boom in 2024 in which all construction sub-sectors are likely to participate. This boom will facilitate significant flow-on effects to other industries servicing the investment upturn. As new and expanded mines come onstream there will be further direct and in-direct flow-on effects related to production, maintenance, transport and a range of services required by the resource sector. The objective of this report is to quantify the potential economic benefits of the Papua LNG project, PNG's second big gas project and the first cab off the rank for PNG's next wave of business investment.

We believe, the Papua PNG will go to commencement by early 2024 and:

- will add a cumulative PGK18bn to real GDP during its construction phase (2024–27 inclusive), which is equivalent to 27.3% of 2022 GDP, and
- when production comes onstream in 2028, gas output will lift by 60% boosting total real GDP by PGK10bn, which equates to 15.1% of 2022 GDP.

The construction contribution to GDP will drop-off when the project is completed. However, the value-add to gas industry output will remain through the life of the project.

Figure 1. Economic contribution of Papua LNG (PGKm)

Papua LNG: contribution to real GDP	Direct contribution	Indirect contribution	Total contribution
Value added during construction (2024 to 2027)	5,600	12,400	18,000
Value added during production (From 2028 to 2058/68)*	7,700	2,300	10,000

Source: National Statistical Office, ANZ Research
* The value-add during production phase applies during the life of the project, which is estimated at between 30-40 years.

Methodology and data

We use 'net economic benefit' multipliers to derive the direct and indirect economic contribution of the Papua LNG project. Individual multipliers were generated for the construction and production phases.

To calculate the 'net economic benefit' multiplier for the **construction phase**, we were guided by the economic contribution of the PNG LNG project (2009–14). We estimate it contributed PGK40bn to total real GDP during its construction phase, about 54% of total capital expenditure.[1] Given PNG's small manufacturing base, most if not all of the LNG modules, pipelines and equipment were likely imported so a domestic value-add of 54% of total, reflecting work actually done on the ground, seems reasonable.

Importantly, while total GDP lifted by PGK40bn, construction sector gross value added (GVA) over the same period only increased by PGK12.2bn, meaning the indirect contribution of the PNG LNG project was PGK27.8bn (PGK40bn less PGK12.2bn). This gives us a net construction multiplier of 3.3 (PGK40bn divided by PGK12.2bn). Hence there are large flow-on benefits from gas projects in PNG with rental and hiring services, material suppliers, construction services and professional, scientific and technical services all benefitting.

1. Note that the capex for the PNG LNG project cost is estimated at PGK63bn (USD19bn). However, this project commenced in 2009. Given PNG's national accounts data are presented in constant 2013 prices, we escalated this current price estimate using the GDP implicit price deflator to ascertain constant (2013) price capex to calculate its contribution to real GDP and the construction multiplier for the project.

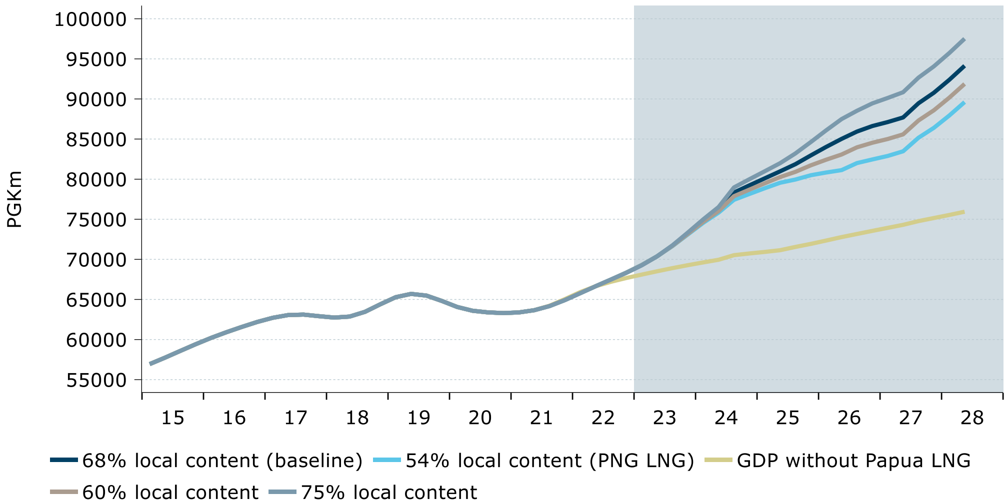
With a net construction multiplier of 3.3 in hand, we then calculated the domestic value-add component of the Papua LNG project. Here, we assumed that value of work done on the ground in PNG will be higher than for the first PNG LNG gas project. Our estimate is that it will be around 68% of total as opposed to 54% for the PNG LNG project.

The Fiscal Stability Agreement for Papua LNG asks for more local industry participation in the project. So, given plans to build a fabrication plant in Port Moresby to provide inputs to this and future work, a figure of around 68% we believe is reachable.

With capex (in constant 2013 prices) estimated at PGK26.5bn, 68% of total equals PGK18bn in new spending during construction which is expected to 2024–27 inclusive. Under a higher domestic value-add assumption of 75%, the new 'on the ground' spending rises to PGK20bn, while a lower local content proportion of 60% sees the contribution fall to PGK16bn (Figure 3). Our baseline assumption is 68% of total project spend to happen 'in country'.

Using a net benefit construction multiplier of 3.3, the total contribution to real GDP of PGK18bn can be disaggregated into: PGK5.6bn in direct contribution to construction GVA, and PGK12.4bn in indirect contribution.

Figure 2. PNG's GDP scenarios: 'business as usual' vs with Papua LNG



Source: National Statistical Office, Macrobond, ANZ Research

The gas **production** multiplier was derived from the GVA shares matrix (Figure 3).[2] This shows the distribution of industry GVA generated for every kina spent on a particular industry's output. Figure 3, column 3 (Oil & Gas Extraction) shows that in 2020 for every PGK100m spent on buying gas output, on average:

- the gas sector contributed PGK72m of value-added (GDP)
- exploration and mining support services, rental & hiring services and wholesale trade each contributed PGK1m of value added, and
- construction services and professional, scientific and technical services contributed PGK4m of value add.

2. Note there are not any input-output tables available for PNG, so we use the Australian average multipliers as a proxy for PNG. Given similar structure of resource economies, the Australian multipliers are a reasonable representation of PNG's multipliers.

The estimates suggest that there are material spill-over benefits from demand for PNG's gas output to activities in domestic industries outside oil & gas. All in all, the GVA shares matrix gives us a net gas exports multiplier of 1.4 (1 divided by 0.72). This also matched with data from the latest (2020) national accounts. The gas sector contributed PGK12,961m directly to GDP in 2020. However, the final demand for PNG's gas exports in 2020 was PGK17,626m, yielding a multiplier of about 1.4 (PGK17,626/PGK12,961).

Figure 3. GVA shares matrix

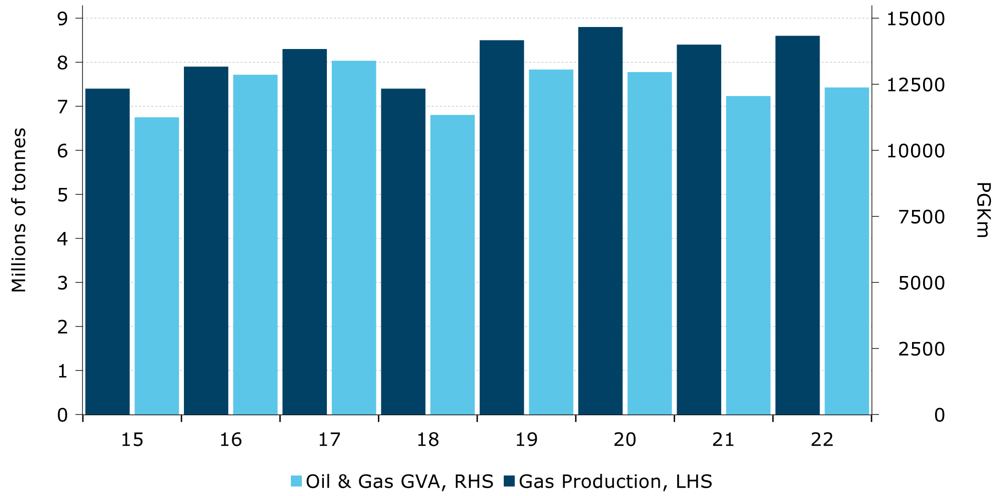
Value of GVA generated for every kina of final demand for industry output, 2020	Mining	Oil & gas extraction	Exploration & mining support services	Retail & hiring services	Whole-sale trade	Professional scientific & technical services	Construct'n services
Mining	0.35	0.00	0.00	0.00	0.00	0.00	0.00
Oil & gas extraction	0.04	0.72	0.03	0.01	0.02	0.01	0.02
Exploration & mining support services	0.04	0.01	0.56	0.00	0.00	0.00	0.00
Retail & hiring services	0.01	0.01	0.00	0.36	0.01	0.00	0.01
Wholesale trade	0.03	0.01	0.02	0.02	0.55	0.01	0.05
Professional, scientific & technical services	0.06	0.02	0.14	0.07	0.06	0.61	0.07
Construction services	0.04	0.02	0.01	0.02	0.02	0.01	0.44
Others	0.40	0.21	0.23	0.50	0.35	0.34	0.39
Total	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**

Source: ANZ Research
Note: Total does not sum to PGK1 due to taxes less subsidies on products.

The last piece of the puzzle is applying the net gas output multiplier to the step-up in gas production (volumes) expected when the Papua LNG project comes onstream, given that gas volumes have tracked gas GVA fairly well in recent years (Figure 4).

With an additional 5.4mt per year of gas available for export from about 9mt currently, gas production and GVA is expected to rise by 60%, boosting real GDP by PGK10bn (PGK7.7bn in direct contribution from the gas industry and PGK2.3bn in indirect contribution attributed to PNG's gas exports).

Figure 4. Gas GVA follows volumes of gas produced at PNG LNG plant



Source: Santos Annual Reports, National Statistical Office, Macrobond, ANZ Research

Papua LNG will also boost **government revenue** through **taxes**, both corporate and income tax by the project workforce. Total tax benefits to the state will be higher once extra household spending and GST revenue is taken into account. However, we have not modelled the likely additional revenue that will flow to the government from Papua LNG in this report.

Papua LNG project details

The Russia-Ukraine conflict has caused a structural shift in the energy complex, particularly for LNG. Europe imported 45% of its natural gas from Russia but currently imports only around 10-12%. So, rejecting Russian gas has left a huge gap in supply. New capacity will be needed not only to fill this supply shortfall but to meet an expected market deficit from about the middle of this decade. The fundamentals of bringing new LNG capacity onstream look good, so Papua LNG is looking to capitalise on this opportunity.

Papua LNG is a USD12bn project. It is being developed by a partnership between Total Energies (31.1%), Exxon (28.7%), Kumul Petroleum (22.5%) and Santos (17.7%) and will export LNG under long term off-taker contracts with sponsors ExxonMobil and Total Energies as well as buyers in Asia.

The joint venture partners have begun full engineering and design. It is currently on track for a final investment decision in early 2024 or earlier, and will begin exporting LNG to Asian markets from Q1 2028 or sooner if the project gets the green light later this year.

The integrated project involves:

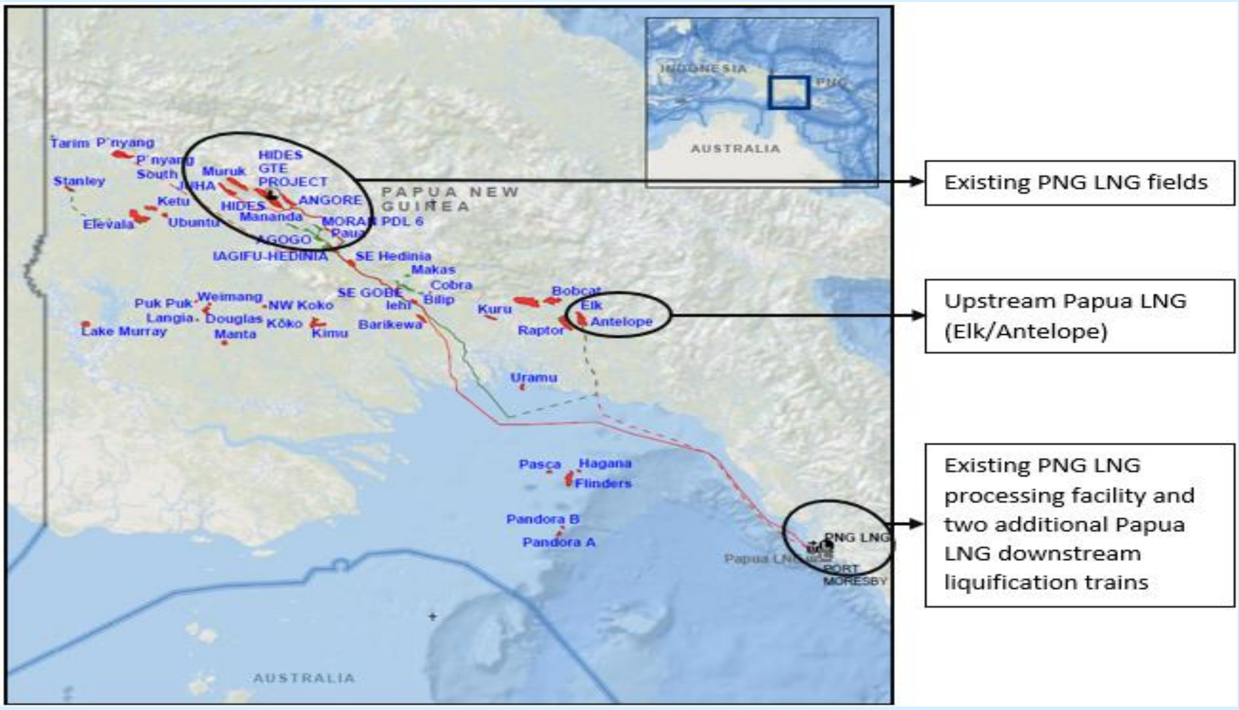
- upstream development of the Elk and Antelope gas fields in Gulf province of PNG
- 320km of pipeline to the existing PNG LNG downstream facility
- four LNG e-trains totalling 5.4mt per year carrying capacity located at the existing PNG LNG downstream site (Papua LNG will pay a tariff to PNG LNG for access to shared facilities including power, LNG storage and off-loading facilities)

Under the Fiscal Stability Agreement between Total Energies and the PNG government, the latter will benefit from the project in the following ways:

- Corporate income tax of 30%
- Government royalties of 2%, a development levy of 2% and a production levy of 2%
- Additional profits tax of 7.5% if post-tax IRR exceeds 15%

At a recent announcement to enter front-end engineering design by the development partners, Prime Minister, Hon James Marape, applauded the milestone, declaring that, “the project secures significant revenue for at least 30 or 40 years and he looked forward to an FID within a year and first gas in 2027”.

Figure 5. Diagrammatic representation of the project



Source: TotalEnergies, ANZ Research

Multiplier definitions and interpretations

The economic benefits of a particular industry sector can be quantified by calculating a range of output and employment multipliers.

The common output multipliers are classified as either 'gross output' or 'net economic benefit'. The latter are often referred to as the gross value added (GVA) share multipliers.

The gross output multiplier is the total value of output (sales) generated for every kina of industry final demand. This comprises the initial effect, the first-round multiplier and second- and subsequent-round multipliers.

The initial effect is 1, as PGK1 of gross output is required to meet PGK1 of final demand. The first-round multiplier tells us the average value of inputs required to produce PGK1 of industry output, which, in turn, is required to meet PGK1 of final demand. The second- and subsequent-round multipliers describe the sum of all downstream outputs needed to produce first round inputs.

However, gross multipliers do not equate to additional GDP generated, as inputs are counted multiple times in the derivation of the gross multiplier. Hence, we need to adjust the overall impact to calculate the GDP impact of both mine and oil & gas output. To do this, we manipulate the gross output (Leontief inverse) matrix to generate the GVA shares matrix. We have used these 'net economic benefit' multipliers to estimate the economic contribution of the Papua LNG project. Data on gross multipliers can be accessed here.

Every PGK1m spent on construction supports 3.9 jobs

We estimate the resource sector to have an employment multiplier of 3.9 (Figure 6). The 'initial effect' employment captures the direct employment in the industry, and we estimate that every PGK1m of resource construction directly creates 0.6 jobs. Hence 60 workers are required to produce PGK100m of work done. This activity, in turn, supports another 330 jobs in the formal sector.

Figure 6. Construction employment multipliers

Jobs supported for every PGK1m of construction work done	Jobs supported
Initial effect (direct employment)	0.6
First round effect	1.5
Second- and subsequent-round effect	1.8
Total formal sector jobs supported	**3.9**

Source: National Statistics Office, BPNG, ANZ Research

However, if one takes into account the informal sector of the economy which accounts for 90% of PNG employment, the total construction sector employment multiplier would be a lot higher than 3.9. Wage and salary earners' purchases of goods from markets and micro, small and medium enterprises would support many thousands of jobs in the informal sector. Due to lack of data, we cannot quantify this multiplier, but anecdotal evidence suggests that the employment would be several multiples of 3.9.

Kina appreciation

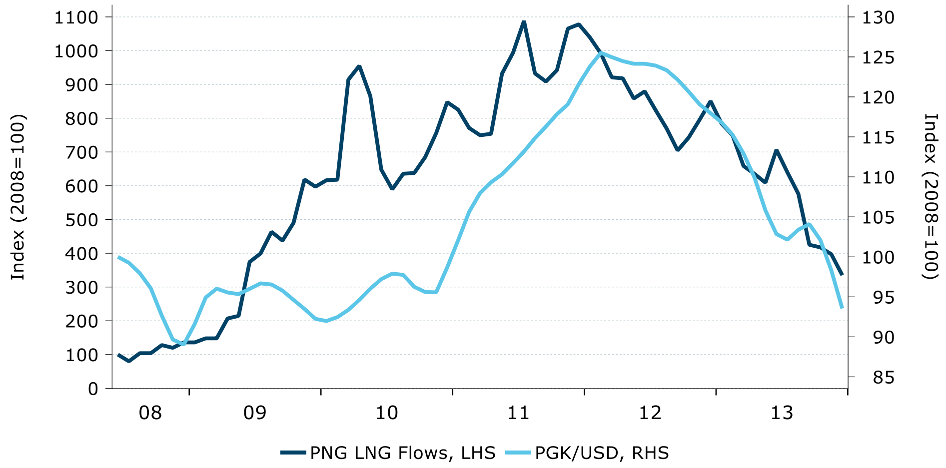
Flows to tip the foreign exchange market back to balance

We believe inward capital flows associated with the Papua LNG project will probably restore balance in PNG's FX market in 2024 as foreign direct investment has an important influence on the kina, as we saw during the PNG LNG construction phase over 2009 to early 2014 (Figure 7).

A ramp-up in investment spending on the PNG LNG project over 2011 to 2012 brought USD into the country. As a result of this expenditure, the PGK/USD appreciated by 27.4% to a high of USD0.4893 in Q3 2012 from USD0.3842 Q1 2011. This occurred despite commodity prices falling during that period, having peaked in early 2011. We expect a similar path for the PGK from late 2024.

With demand for PGK rising to pay for local contractors, suppliers and labour associated with the mega projects including Papua LNG, PGK should start strengthening against the USD from late 2024 picking up pace in 2025.

Figure 7. Foreign direct investment a key driver of PGK



Source: BPNG, Macrobond, ANZ Research

In the near term, we believe the market will remain in deficit. So we think the PGK will remain under selling pressure. While the currency has been static, trading at USD0.2840 since late February last year, we expect it to depreciate against the USD through to Q3 2023, albeit only a touch (Figure 8). After that, flows associated with large project works should restore the market to balance.

That said, if the Bank of Papua New Guinea intervenes more frequently and brings the market back to balance earlier than we anticipate, the downward pressure applied from scarce foreign currency will recede and the PGK could appreciate earlier.

Figure 8. PGK exchange rate forecasts (quarterly averages)

	Current*	Jun 23	Sep 23	Dec 23	Mar 24	Jun 24	Sep 24	Dec 24
PGK/USD	0.2840	0.2838	0.2835	0.2843	0.2870	0.2922	0.2989	0.3036
PGK/AUD	0.4288	0.4236	0.4089	0.3986	0.3986	0.4058	0.4113	0.4121
PGK/NZD	0.4618	0.4573	0.4453	0.4396	0.4415	0.4495	0.4598	0.4623
PGK/EUR	0.2568	0.2573	0.2546	0.2509	0.2488	0.2490	0.2505	0.2530
PGK/JPY	37.95	0.2838	0.2835	0.2843	0.2870	0.2922	0.2989	0.3036

Source: Bloomberg, BPNG, ANZ Research
* Current as of 2 May 2023

PNG: gross value added by industry sector

Year-ended December	% of GDP 2020	PGKm 2020	Annual % change (1) 2019	2020	2021e	2022f	2023f	2024f
Agriculture, forestry and fishing	16.6	10,588	2.3	1.9	4.6	2.5	3.9	2.9
Oil and gas extraction	20.4	12,961	15.1	-0.7	-7.0	2.7	-2.5	0.2
Mining and quarrying	9.5	6,016	5.3	-23.2	-19.4	12.9	29.3	1.2
Manufacturing	1.5	939	-0.6	-6.4	2.1	5.0	4.5	4.2
Construction	5.3	3,381	-8.6	-0.2	2.0	4.1	7.1	56.3
Wholesale and retail trade	8.8	5,610	1.5	-0.1	9.0	7.0	6.8	7.8
Transport and storage (warehousing)	1.8	1,163	3.6	-20.2	2.1	6.0	9.5	16.3
Finance and insurance	2.1	1,345	-4.6	-10.9	2.4	2.8	3.7	6.9
Real estate activities	5.9	3,775	2.7	2.6	2.6	3.3	4.1	6.3
Administration and support services	7.3	4,633	4.1	-0.8	1.0	2.0	4.5	8.6
Public admin and defence	5.3	3,370	0.5	8.9	2.0	6.1	3.7	2.8
Education	2.8	1,762	0.7	1.4	4.0	3.8	4.5	4.8
Others (2)	8.7	5,538	5.6	1.8	6.8	6.0	6.4	8.0
Mining GVA(3)	29.8	18,977	11.3	-9.2	-10.9	5.6	7.3	0.6
Non-mining GVA	66.2	42,104	1.4	0.3	4.3	4.2	5.3	10.1
Total GVA	96.0	61,081	4.5	-2.9	-0.5	4.6	5.8	7.4
Taxes less subsidies on products	4.0	2,552	5.0	-9.9	12.6	6.7	2.3	4.5
GDP	**100**	**63,633**	**4.5**	**-3.2**	**0.1**	**4.7**	**5.6**	**6.8**

1. Constant 2013 prices
2. Others include electricity, gas and air-conditioning; water supply and waste management; accommodation and food services; information and communication; professional and scientific; health and social work; and other services
3. Mining GVA is crude oil and gas extraction plus other mining

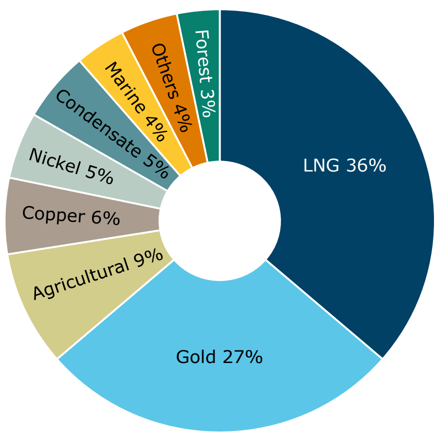
e: estimate, f: forecast

Country profile

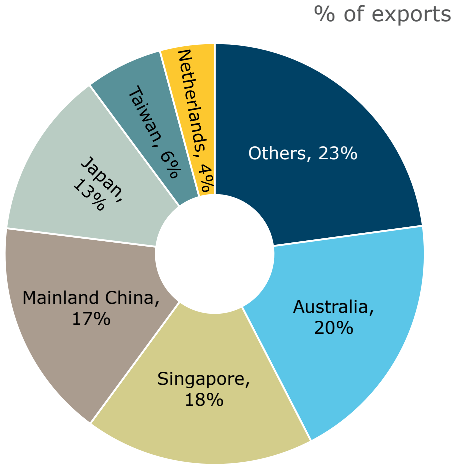
Demographics	1990	2000	2010	2019
Population (million)	4.615	5.847	7.301	8.776
Population female (million)	2.267	2.875	3.581	4.296
Population male (million)	2.348	2.972	3.720	4.480
Population ages 15-64 (% of total)	55	57	58	61

Global links	1990	2000	2010	2020
Merchandise trade (% GDP)	74	92	65	61
External debt stocks – total (current prices in USDm)	2,594	2,325	5,987	18,740
Total debt service (% exports of goods, services and primary income)	37.2	12.9	13.3	20.1
Personal remittances received (USDm)	5	7	4	3
Net official development assistance received (USDm)	370.2	275.0	512.3	667.3

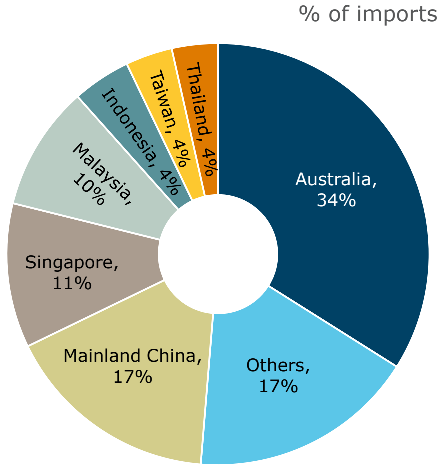
Composition of goods exports % total, 2021



Destination of goods exports % total, 2021



Import of goods origins % total, 2021



Long-term sovereign credit ratings	Rating	Outlook	Date
Moody's	B2	Stable	10 November 2022
Standard & Poor's	B-	Stable	24 May 2022

Corruption Perception Index, 2021	Score*
Western Europe & European Union	66
Asia and Pacific average	45
Papua New Guinea	31

*Scoring system: 100 highly clean, 0 highly corrupt
Source: World Bank, Moody's, S&P, International Monetary Fund, Transparency International

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