

DOUBLE OR

NOTHING

*The Broken Economic Promises
of PNG LNG*



This is a publication of the Jubilee Australia Research Centre.

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About Jubilee Australia

Jubilee Australia (formal name: the Jubilee Australia Research Centre) engages in research and advocacy to promote economic justice for communities in the Asia-Pacific region and accountability for Australian corporations and government agencies operating there.

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PNG LNG construction



Table of contents

FIGURES	3
TABLES	3
EXECUTIVE SUMMARY	4
SECTION 1: INTRODUCTION	10
1.1. TOO GOOD TO BE TRUE?	11
SECTION 2: MACROECONOMIC IMPACTS	14
2.1. THE ACIL-TASMAN PREDICTIONS	14
2.2. ACTUAL MACROECONOMIC OUTCOMES	14
SECTION 3: IMPACTS ON PNG GOVERNMENT BUDGET	19
3.1. PREDICTION VS THE REALITY	19
3.2. DIGGING A LITTLE DEEPER: THE EITI DATA	21
3.3. COSTS OF THE PROJECT TO THE BUDGET	22
3.4. ESTIMATION OF FUTURE REVENUE	24
SECTION 4: BROADER IMPACTS	26
4.1. SECTORAL IMPACTS	26
4.2. EXCHANGE RATE EFFECTS	28
4.3. EMPLOYMENT IMPACTS	29
SECTION 5: WHY DID THIS HAPPEN?	31
5.1. FLAWS IN THE ACIL-TASMAN/PNGGEM MODEL	31
5.2. GENEROUS TAX CONCESSIONS	31
5.3. THE USE OF TAX HAVENS	32
5.4 THE RESOURCE CURSE	33
5.5. GOVERNMENT OVERSPENDING	33
5.6. MANAGING THE IMPACT ON OTHER SECTORS	36
5.7. INSTITUTIONAL WEAKNESSES	36
SECTION 6: CONCLUSION AND RECOMMENDATIONS	38
6.1. RECOMMENDATIONS TO THE GOVERNMENT OF PNG	39
6.2. RECOMMENDATIONS TO THE GOVERNMENT OF AUSTRALIA	39
APPENDIX 1: THE ACIL-TASMAN ANALYSIS AND PNGGEM	41
APPENDIX 2: METHOD USED FOR THIS ANALYSIS	43
ABBREVIATIONS	46

Figures

PNG LNG - MAINLY NEGATIVES, NOT POSITIVES	6
SECTORAL PREDICTIONS VS ACTUALS	7
FIGURE 1: PNG'S ACTUAL GDP GROWTH RELATIVE TO ACIL-TASMAN PREDICTION	16
FIGURE 2: LNG PRIVES - ACIL-TASMAN ASSUMPTIONS VS ACTUALS	19
FIGURE 3: ACIL-TASMAN ESTIMATE OF PNG LNG REVENUES TO GOVERNMENT AND LANDOWNERS	20
FIGURE 4: PNG LNG NET BUDGET REVENUES	24
FIGURE 5: PROJECTED FUTURE PNG LNG BUDGET NET REVENUES	25
FIGURE 6: DETAILS ON AGRICULTURE, FORESTRY AND FISHING	27
FIGURE 7: COMPARISON OF EXCHANGE RATE MOVEMENTS	28
FIGURE 8: THE PROJECT'S IMPACTS ON EMPLOYMENT	19
FIGURE 9: PNG LNG REVENUES VS TOTAL RESOURCE REVENUES	34

Tables

TABLE 1: PREDICTED VS ACTUAL SHORT-RUN IMPACTS OF PNG PROJECT	15
TABLE 2: EITI REPORTS ON DIRECT REVENUE FLOWS FROM THE PNG LNG PROJECT	23
TABLE 3: EXAMPLE OF PNG LNG UBSA BUDGET COSTS	24
TABLE 4: PNG'S SECTORAL PERFORMANCE RELATIVE TO PNG LNG PROJECT PREDICTIONS	26
TABLE 5: ESTIMATES USED FOR DETERMINING UNDERLYING GROWTH PATH	45

Executive summary

The promises of PNG LNG

The Exxon-led PNG LNG project has, since 2014, shipped about 7.9 million tonnes of natural gas per year from the gasfields of PNG's Hela region. The gas is liquefied at a plant near Port Moresby and then shipped to buyers in Asia.

The proponents positioned it as a major transformational project for the PNG economy, based around the central claim of a doubling of GDP.

The upbeat figures found their way into the political discourse of PNG. Caveats around assumptions were lost and the forecasts moved into convenient promises for the project partners both in the lead-up to the approval of the project in 2009 and onwards into the 2011/12 election campaign.

Now that some time has passed, there is an opportunity to measure the economic predictions for the project against the realities. This is what this report seeks to do.

There are two key messages from this report.

First, the flawed 2008 ACIL-Tasman/PNGGEM modelling was extraordinarily over-optimistic - the "broken promises gap". Such upbeat predictions were never likely.

Second, there is a "resource curse gap". The temptations of such large and easy economic gains have returned PNG to poor policies typical of a resource curse. These poor policies have pushed PNG below its underlying growth path. In this sense, the PNG LNG project to date has been bad for the economy and the people of PNG. Currently, on almost every measure of economic welfare in 2016, PNG would have been better off without the PNG LNG project.

Macroeconomic impacts

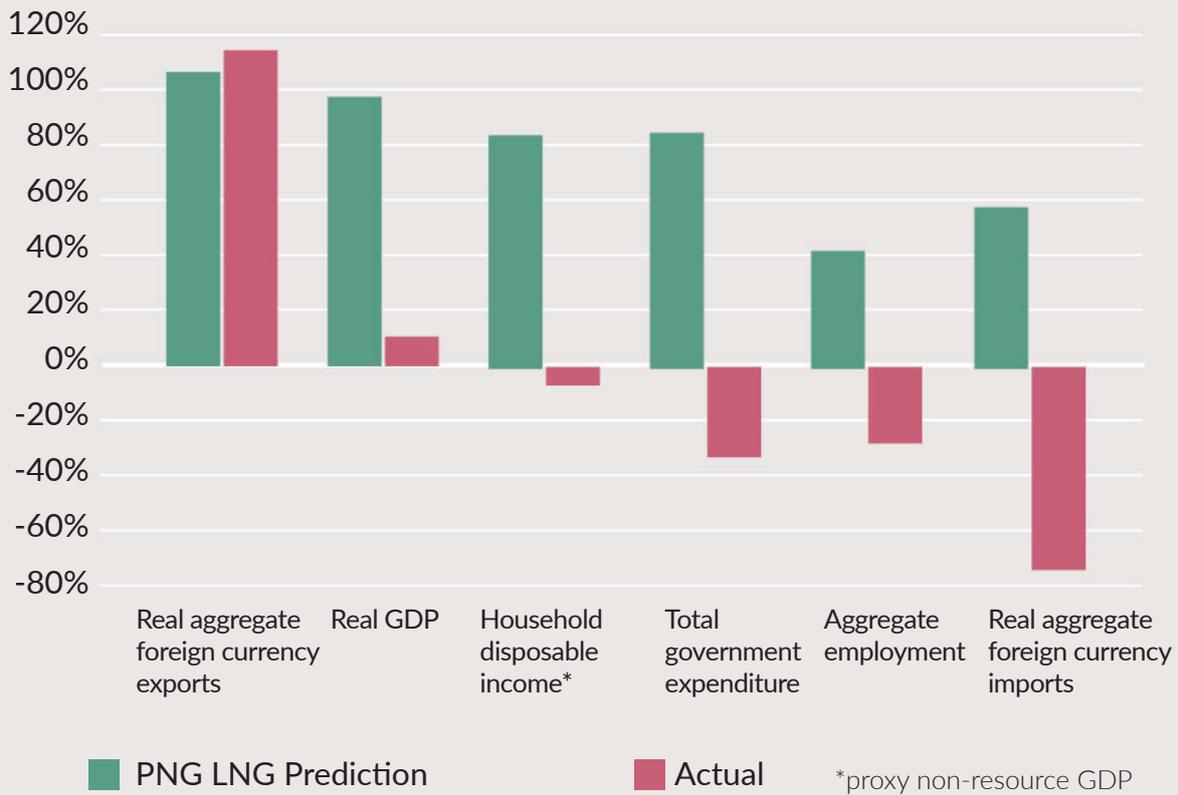
The aim of this study was to compare the projected benefits for the early years of the PNG LNG project with the actual outcomes.

The study has found that over the 'short-term' the economy has delivered very few of the outcomes that were predicted in the ACIL-Tasman model – and none outside of the resource sector.

More specifically, after estimating an underlying growth path of how the economy would likely have performed without the PNG LNG project (as did the ACIL-Tasman analysis), based simply on how the economy was performing in the years prior to the project, this analysis has made the following findings:

- Despite predictions of a doubling in the size of the economy, the outcome was a gain of only 10% and all of this focused on the largely foreign-owned resource sector itself;
- Despite predictions of an 84% increase in household incomes, the outcome was a fall of 6%;
- Despite predictions of a 42% increase in employment, the outcome was a fall of 27%;
- Despite predictions of an 85% increase in government expenditure to support better education, health, law and order, and infrastructure, the outcome was a fall of 32%; and
- Despite predictions of a 58% increase in imports, the outcome was a fall of 73%.
- The only area in which the ACIL-Tasman

PNG LNG - Mainly negatives, not positives



The only area in which the ACIL-Tasman model underestimated gains was in the export sector, where the prediction was of a 106% increase in exports, and the outcome was an increase of 114%. This reflects the technical success of the project – starting earlier than expected and producing at above design specifications. This makes the shortfall in other economic predictions all the more remarkable.

Government revenues

The study's findings about revenues are:

- The extremely disappointing government revenues for the project cannot be put down to either to low global gas prices or to cost blowouts in construction.
- Rather, expected government revenues, which were predicted to still be around K1.4 billion per year in 2016 despite low gas

prices, are in fact only about one-third at less than K0.5 billion.

- By the time one includes the interest costs of buying the government's equity share and direct payments to landowners, the project has had a negative impact on the budget of at least K200m in 2016. This situation is not likely to change until around 2024. We estimate total net revenues of K23 billion over the 30 year life of the project – about one-quarter of the original low oil price case scenario and one-fifth the study mid-case scenario.

Broader economic impacts

- Although the ACIL-Tasman study did predict a 20% decrease in agricultural exports, the impact of the project and government policy has seen agricultural exports decline by 40% compared to the underlying growth path scenario. The government's exchange rate policy likely worsened the

decline.

- Direct employment impacts were greater than expected, but the overall 27% fall in employment as compared to the underlying growth path (i.e. no PNG LNG) scenario translates to an estimated loss of 140,000 jobs.

Why did this happen?

Why is it that the project has been a remarkable technical success, producing higher levels of export gains than expected, yet other expected benefits are either 90% lower than expected (GDP) or generally negative? The current failure of PNG LNG to deliver on its promises is based on two key elements.

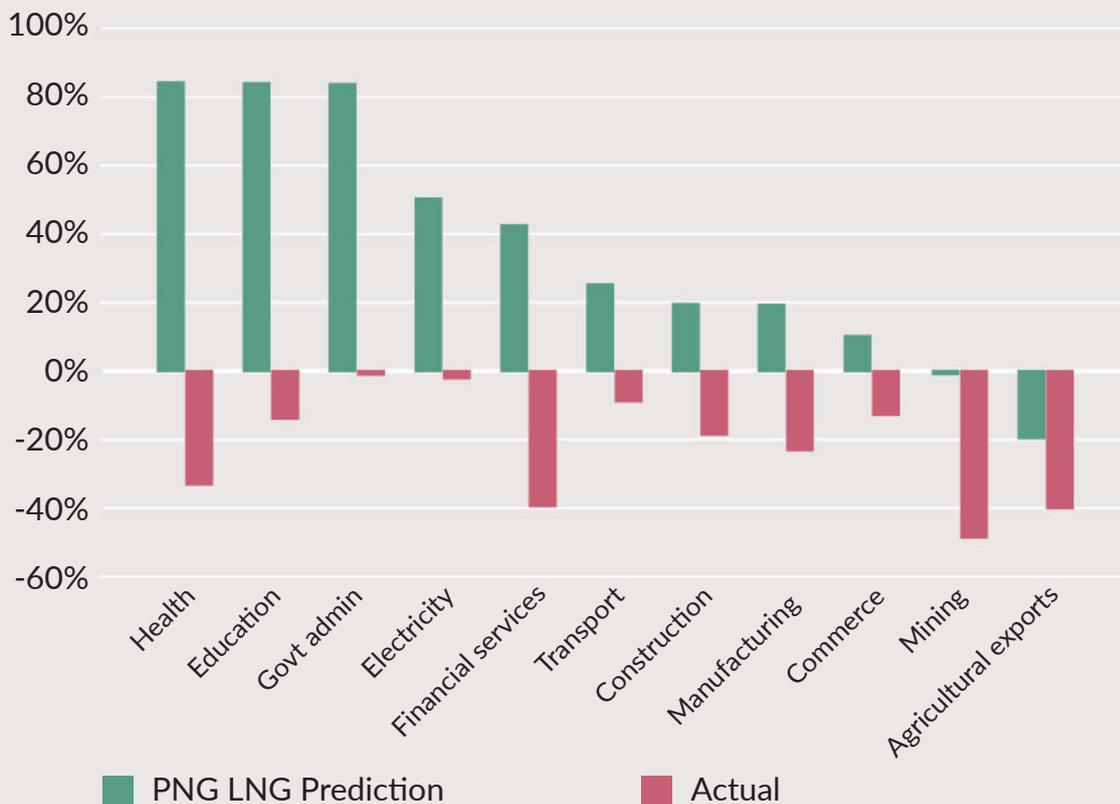
The first phenomenon is the failure of PNG LNG project to meet the positive economic projections of ACIL-Tasman and the project proponents. This failure resulted from a number of causes:

- The serious flaws in the original ACIL-Tasman economic impact analysis which was based on a model of the PNG economy called PNGGEM.
- A favourable tax regime and a generous fiscal agreement struck by the government, which left loopholes which the companies have been able to take advantage of.
- The aggressive tax avoidance methods of ExxonMobil and Oil Search, such as the use of subsidiaries, shell companies and tax havens in the Netherlands and the Bahamas to reduce their tax burden.

The second phenomenon needing to be explained is the fact that the economy performed worse than would have been expected without any new gas projects at all. The cause of this result, it is argued, is poor policy decisions made by the PNG Government in response to the gas boom:

- The excessively optimistic promises of a

Sectoral predictions vs actuals



major new resource project led PNG policy-makers into poor decisions reflecting the “resource curse” experienced twice before by PNG and by other countries including:

A profligate spending policy of a 57% increase in expenditures during the early years of the project while revenues fell, which has burdened PNG with the largest budget deficits in its history;

unwise investment decisions such as a major loss-making investment in Oil Search shares;

an exchange rate policy that has damaged other vulnerable sectors of the economy, worsening the effects of the Dutch Disease; and

the weakening of PNG’s financial governance institutions, including the Central Bank and PNG Treasury and a poorly designed sovereign wealth fund.

All of these poor policy decisions are directly related to the PNG LNG project and the economic opportunities and challenges it presented. The potential benefits of PNG’s resource wealth could in theory be able to be tapped without damaging the rest of the economy. But it would require very different choices by the PNG’s policymakers.

Recommendations to the Government of PNG

1. PNG should return to more inclusive development policies while better managing the resource curse. There is a need to address the overvalued exchange rate, ensure the new medium-term fiscal plans are implemented in a transparent fashion, and re-design the SWF to ensure all resource revenues flow to the budget.
2. PNG should establish a clear policy framework for all future resource projects (and extensions) that ensures PNG gets a better

and earlier share of the resource pie than current agreements.¹ No new resource projects should be approved until this framework is completed and publicly released.

3. Projects should not be approved without the production and release of transparent, verifiable, contestable and independent economic modelling by the government; this modelling should include a completely new independent model that includes net costs to the budget.
4. PNG should urgently clarify some of the confusing figures in the most recent EITI reports that royalties and development levies paid by ExxonMobil are not being received, and explanations provided as to why the level of what should be identical payments are so different.

Recommendations to the Government of Australia

1. The Australian government should develop a code of conduct for economic modellers as recommended by the Australia Institute. This would include requirements such as discussion of assumptions used, a declaration of authorship and a requirement that authors take responsibility for the plausibility of the results and the appropriateness of the presentation, including by those who commissioned the work – this includes work by modellers for the PNG economy.
2. The Australian Government should immediately release the 2009 National Interest Assessment by DFAT which it provided to the Trade Minister recommending Efic support for the PNG LNG project. It should also compel Efic to immediately release all risk analysis it has compiled in connection to the project.

1. For examples see Sir Nagora Bogan, *Papua New Guinea Tax Review* October 2015 and IMF, December 2017, p 8.

3. The Australian Government should require that any further investments by Efic on the National Interest Account are taken in the context of ensuring that local law has been followed (such as land ownership determination before construction begins as required under PNG's Oil and Gas Act).
4. The Australian Government should crack down on the use of tax havens.



Credit: Damian Baker

Section 1: Introduction

The PNG LNG project, which commenced production in 2014, extracts gas, condensate and naphtha from PNG's Highlands and ships these products to a liquefaction plant near Port Moresby by means of a purpose-built pipeline. It is currently producing around 7.9 million tonnes of LNG per year to buyers in Japan, South Korea and China and is projected to run for 30 years.² The lead operator is ExxonMobil, supported by the Australian/PNG company OilSearch: both have stakes in PNG LNG of just under one third. The Government of PNG also has a large stake in the project as does Australian gas giant Santos.

The project was supported by an AUD\$500 million loan via Efic, Australia's export credit agency, in 2009. 80% of this loan came from Efic's National Interest Account as directed by the Trade Minister, who himself was authorised by the Australian cabinet. Other export credit agencies such as Ex-Im (US), JBIC (Japan) and SACE (Italy) also lent money to the project, as did a consortium of private banks. A complete description of the main players in the project is provided in Chapter 2 of Jubilee Australia's Pipe Dreams report.³ A 2008 economic impact analysis report commissioned by ExxonMobil and authored by Australian consultants ACIL-Tasman (now ACIL-Allen) predicted massive benefits that would flow from such a project, not just to shareholders and financiers, but to the people of PNG. The ACIL-Tasman study predicted a doubling in the size of the economy and windfall revenue benefits to the PNG economy of K114 billion over 30 years.⁴ The ACIL-Tasman predictions also helped win over a key constituency: the

2. ExxonMobil, PNG LNG Environmental and Social Report—Annual 2016, <https://pnglng.com/Environment/Environmental-and-Social-Reports>.

3. Luke Fletcher and Adele Webb, *Pipe Dreams: The PNG LNG project and the Future Hopes of a Nation*, Jubilee Australia Research Centre, December 2012, chapter 2 (henceforth: JARC, Pipe Dreams).

PNG LNG landowners.⁵ An umbrella benefits sharing agreement (the UBSA) was signed in May 2009.⁶

These huge expectations permeated political rhetoric and expectations for the project, both from the government and from the companies. In 2010, then-Treasurer Peter O'Neill said:

We cannot understate the opportunity the PNG LNG project offers to transform our economy and substantially improve our socio-economic development.⁷

An example of the companies use of the ACIL Tasman material is provided by the head of Oil Search, Peter Botton. Botton made a presentation on 14 May 2008 to investors which quoted directly from the ACIL-Tasman report (see box below).⁸ Botton was still quoting from the 2008 ACIL-Tasman figures in

4. ACIL-Tasman, PNG LNG Economic Impact Study: An Assessment of the Direct and Indirect Impacts of the Proposed PNG LNG Project on the Economy of Papua New Guinea. Prepared for Exxon Mobil. Final Report. February 2008, vi. (henceforth: ACIL-Tasman, PNG LNG Economic Impact Study)

5. The initial 6 February 2008 report was updated in April 2009. The only difference between the reports, possibly reflecting a desire to avoid sensitivities on the design of any sovereign wealth fund, was that the following sentences were deleted: "This essentially guarantees that the country can spend the real interest on its natural resources long after the oil resources have been exhausted. This is a good example of how a non-renewable resource can be transformed into a financial asset that will last forever. Importantly, by creating this fund Norway has minimised the negative effects of natural resource wealth by sending the rents offshore. Instead of driving up the exchange rate and making the country less competitive, the revenue simply drives up the value of the fund."

6. Government of Papua New Guinea (GoPNG), PNG LNG Project Umbrella Benefits Sharing Agreement, May 2009.

7. Treasurer Peter O'Neill 2011 Budget Speech, 16 November 2010, p 22.

Box 1: Presentation by OilSearch titled "Economic Importance of PNG LNG"

- "Affects economy of PNG and its balance of trade situation profoundly"
- GDP will more than double (K8.65bn (2006) to K18.2bn average during production phase).
- Oil and gas export increase 4 fold (Average LNG and liquids value estimated K11.4bn/yr).
- Up to 7500 jobs in initial phase, 20% by nationals; 850 full time positions, developing national workforce over time.
- Huge cash flows to Government - national and provincial - and landowners through tax, royalties, levies and equity participation (direct cash payments of US\$31.7bn/K114bn to PNG Governments/Landowners over 30 years).
- Multiplier effects additional.

February 2012:

In the long-term the impact is quite substantial on the economy of PNG. ACIL-Tasman did an independent study some years ago that suggested GDP would double as a result of the project and, I think, over the life of the project the state take, or state revenue from the project, is something like \$US30 billion - so very very substantial over the 30 year life of the project.⁹

1.1. Too good to be true?

Questions about whether the claims of the project proponents and ACIL Tasman were reliable were initially made by Jubilee in Pipe Dreams back in 2012.¹⁰

8. OilSearch Ltd, Oil Search Asian Roadshow, May 2008, slide 32. http://www.oilsearch.com/__data/assets/pdf_file/0008/2204/0805-Oil-Search-Asian-roadshow-4c9e5cef-d8bo-4f80-85fe-5f711e1f0fd8.pdf

9. See Jemima Garrett, 'PNG LNG Boss Speaks Out on Landowner Threats', ABC Radio Pacific Beat, February 15, 2012.

10. JARC, *Pipe Dreams*, Chapter 3.

PNG residents and observers might be surprised to be reminded of the bold predictions made about PNG LNG, with the country going through a budget crisis which has seen public spending slashed and services cut.¹¹ This is even more shocking given that an increase in public spending was supposed to be one of the major benefits.¹²

Could the predictions about PNG LNG have been too good to be true?

There are indeed some signs in PNG's public discourse that the PNG LNG project and the new resources export boom it has come to

11. Paul Flanagan, 'From economic boom to crisis management in PNG', East Asia Forum, 2 January 2016. <http://www.eastasiaforum.org/2016/01/02/from-economic-boom-to-crisis-management-in-png/>.

12. The NSO released in March 2018 a preliminary updated estimate of GDP in 2015 of K57.1 billion, some 10% lower than the K62.3 billion in the PNG Treasury estimates. This implies there was a serious recession in non-resource GDP in 2015 – which would increase further the gap between promises and reality. However, the final version of the NSO report has not been released, and this study is based on the PNG Treasury numbers.

signify may not be living up to expectations. For example, PNG's new Treasurer Charles Abel, when presenting the 2017 Final Budget Outcome to Parliament on 13 February 2018, seemed to warn the country that the resources boom may not be all that was promised. He stated:

Having an abundance of natural resources can be a blessing or a curse. A child that is given everything from birth never quite grows up. A child that struggles learns to become strong and independent. Papua New Guinea must learn from the African experience.

Moreover, as detailed in the body of the report (section 5.5 below), there have been, since at least 2010, some PNG public officials who have questioned the rhetoric around the benefits to PNG and urged a cautious and pragmatic financial approach.

However, many in the PNG Government continue to cling to the line that PNG LNG has been good for the country. In a keynote address to the PNG Petroleum and Energy Summit in March 2018, Petroleum Minister Fabian Pok described the PNG LNG project as a 'huge success.' Minister Pok's speech was made in connection with a government white paper that which proposed that new gasfields in PNG be at least partly directed towards domestic energy usage.¹³

Whether for domestic or for foreign sales, plans are certainly afoot to expand the development of PNG's gas sector. There is an announced plan to double LNG exports. The country has a number of projects currently under exploration, including ExxonMobil's P'nyang gas in Western Province (which has recently had an 84% upgrade in potential resources), Total's Elk Antelope field also in Gulf Province and Twinza's Pasca offshore field in Gulf Province.

13. Barry Avery, 'PNG's new gas white paper plans to increase use,' Energy News Bulletin, 26 March 2018.

In fact, on all major economic indicators apart from GDP and exports, the PNG economy is in a worse state than it would have been if it stayed on the underlying growth path of the 2000s and had no PNG LNG project.

Given these plans for further expansion of the gas sector, now would seem to be the perfect time to analyse whether PNG LNG has lived up to all the grandiose promises. The report is even more necessary when it is considered that there has as been little public examination of this question.¹⁴

Section 2 of this report provides an overview of how the PNG LNG project has performed relative to expectations across certain key economic measures. It finds that despite a massive increase in exports, the PNG economy did not see the forecast improvements from PNG LNG. In fact, on all major economic indicators apart from GDP and exports, the PNG economy is in a worse state than it would have been *if it stayed on the underlying growth path of the 2000s and had no PNG LNG project.*

14. One study we are aware of is a draft December 2017 study by PNG's National Research Institute of the economic impacts of PNG LNG. This has not been released (it is not on the NRI website) and only an Executive Summary has been made available. The NRI draft study is based on the PNGGEM – the flaws of this model are discussed in Section 5.1 and Appendix 1. A second analysis was released just two days before the release of this report - <https://pngwoman.com/lng-a-catalyst-for-development-or-inequality-in-papua-new-guinea>. While done by a very credible author and emerging PNG leader, and the concerns about the resource curse are shared by this study, the methodology in the study was simply to compare 2009 to 2013 data. However, as discussed in Section 2.2 and the Appendices, the ACIL-Tasman model estimates are based on the time after the start of the production phase in 2014, not the construction phase. Making comparisons to 2013 picks up the once-off effects of construction activity - not the ongoing implications for PNG's economy from the project. This is clearest when considering imports in 2013 which were at a peak in bringing in parts for the PNG LNG liquification plant but have since dropped back to 2006 levels.

The following two sections of the report extends this analysis. **Section 3** examines in detail the important question of the lower than expected revenues. It lays out what revenues have actually been paid and discusses whether the lower than expected revenues are likely to continue. **Section 4** examines more specific economic impacts of the project. It compares the differences between the predicted impacts that the project would have on other sectors of the economy with the reality that has transpired in PNG. It also looks at differences between predicted and actual employment figures. **Section 5** provides a number of explanations as to why the PNG LNG project has so spectacularly failed to live up to predictions. **Section 6** contains the conclusion and recommendations.

This report should be read in the light of Jubilee's previous examination into the topic, its 2012 report *Pipe Dreams: PNG LNG and the Hopes of a Nation*.

This report is also the first in a series of reports to be released in 2018 about PNG LNG. The next paper in the series, to be released imminently, will look at the social impacts of PNG LNG in the Hela region and the other project areas. These two reports collectively demonstrate that many of the warnings about PNG LNG predicted by Pipe Dreams have now come to pass.

Section 2: Macroeconomic impacts

2.1. The ACIL-Tasman predictions

This report closely examines the predictions of the 2008 Final Report done by ACIL-Tasman. This was a comprehensive study of the claimed direct and indirect impacts of the PNG LNG project on the Papua New Guinea economy. The report was prepared for Exxon-Mobil but it became the key reference document for other project partners and the PNG government itself.

The ACIL-Tasman report used an economic model to estimate the overall impacts of the PNG LNG project. This included overall macroeconomic impacts as well as predictions for parts of the economy. The model used by ACIL-Tasman is known by economists as a CGE model. A version of that model is still being used in PNG.¹⁵ Appendix 1 discusses the model in more detail. The report also covered more direct expected effects such as increased tax revenue and direct employment gains.

The two most prominent predictions of the model were that PNG's economy was expected to be double the size of its underlying growth path situation and that there would be an expected K114 billion increase in revenues over the 30-year project life. In 2008, total budget expenditure was K7.6 billion. The expected new revenues were 15 times the government's budget at the time.

The ACIL-Tasman report also predicted large increases in household incomes (84%), government expenditure (85%) and in foreign currency exports (106%). Smaller, but nonetheless significant increases in aggregate

15. CGE is the acronym for a Computable General Equilibrium model. The version in PNG is known as PNG-GEM – so PNG's General Equilibrium Model.

employment and foreign currency imports were also predicted. These macro-economic predictions are summarised in the middle column of Table 1 below.

2.2. Actual macroeconomic outcomes

How do these predictions stack up with what has actually happened in the PNG economy over the last 8 years? In order to answer that question, we need to ask: how does the current economic situation in PNG *with the PNG LNG project compare to what the economic situation would have been without the project?*

This was also the approach of the ACIL-Tasman report. It created an underlying growth path for the economy. It then used its model to find out how different parts of the economy would be affected by the PNG LNG project. It had short-run predictions (about 2 years) and long-run predictions (5 to 10 years). The report then expressed the “with PNG LNG” scenario as “percentage changes from the underlying growth path.” The short-run predictions from the model are shown in the middle column of Table 1.

In order to assess the ACIL-Tasman short-run predicted percentage changes because of the PNG LNG project, this study needed to generate an underlying growth path for each of the predictions of the ACIL-Tasman model.¹⁶

The comparison is made with 2016 as it was about two years after gas started being exported in May 2014. Fortunately, generating an underlying growth path is relatively simple to do – it is just a form of trend analysis. The study uses government data on how the PNG economy was performing in the 2000s before the PNG LNG project commenced its construc-

tion phase (so before 2010) and assumes this underlying growth performance continued. Details on how this was done are given in Appendix 2. Essentially, the latest available and consistent data from the PNG government was gathered – preferably covering the period 2005 to 2009.¹⁷ This data was converted into 2016 prices to remove the impacts of inflation and commodity price fluctuations. The average value was then calculated. The average growth rate was calculated. A simple formula then uses the average 2000s value and grows it by the average growth rate for another 8 or 9 years to get a 2016 estimate – an estimate based on the “underlying growth path”. An example of this calculation for GDP is provided below. The results of this comparison

16. ACIL-Tasman, *PNG LNG Economic Impact Study*, 21. It would have been easier if the ACIL-Tasman predictions were in terms of Kina values or numbers of jobs as these could have been easily compared with actual figures in 2016. However, as just percentages were provided, work was required to estimate the “underlying growth path” and what value this would have been to match the “short-run” prediction. The short-run is described as “about two years” after the project started exporting gas.

17. This was from the National Statistics Office, the PNG Treasury and the Bank of Papua New Guinea.

between the underlying growth path and actual outcomes in 2016 are shown in the third column of Table 1.

The table shows an extraordinary gap between the ACIL Tasman predictions and actual 2016 outcomes except for exports. For four of the six key macroeconomic indicators where information is available, the PNG economy has actually gone backwards relative to the underlying growth path of what was happening in the late-2000s. Possible reasons for these differences are considered in Section 5.

There are only two macroeconomic areas of the economy which have improved relative to the underlying growth path case. The first is that exports are higher, driven by increased resource exports (114% increase relative to a 106% prediction).¹⁹ However, these increased export revenues have not produced the impact expected by PNG businesses and even

18. As no reliable indicators for household income are available, non-resource GDP growth is used as a proxy.

19. This outcome has two distinct elements. There is a 440% increase in hydrocarbon exports starting in 2014. On the other hand, there was a drop-off in agricultural exports.

TABLE 1: PREDICTED VS ACTUAL SHORT RUN IMPACTS OF PNG PROJECT

Variable	Prediction (Source: 2008 ACIL-Tasman report)	Actual outcomes compared to baseline
Real GDP	Increase by 97%	Increase by 10%
Real aggregate foreign currency exports	Increase by 85%	Increase by 114%
Household disposable income	Increase by 84%	Decrease by 6%
Total government expenditure	Increase by 85%	Decrease by 32%
Aggregate employment	Increase by 42%	Decrease by 27%
Real aggregate foreign currency imports	Increase by 58%	Decrease by 73%

Note: Values expressed as percentage change from underlying growth path. The middle column of Table 1 is directly from the short-run predictions on page 31 of the ACIL-Tasman report. The right hand column is from Appendix 2.

the central bank. Despite large export earnings, these are largely being held in offshore accounts to repay debt obligations and foreign shareholders. There have been growing foreign exchange shortages in PNG, and this lack of foreign exchange is considered by 70% of CEOs of PNG companies to be the major barrier to doing business in PNG.²⁰

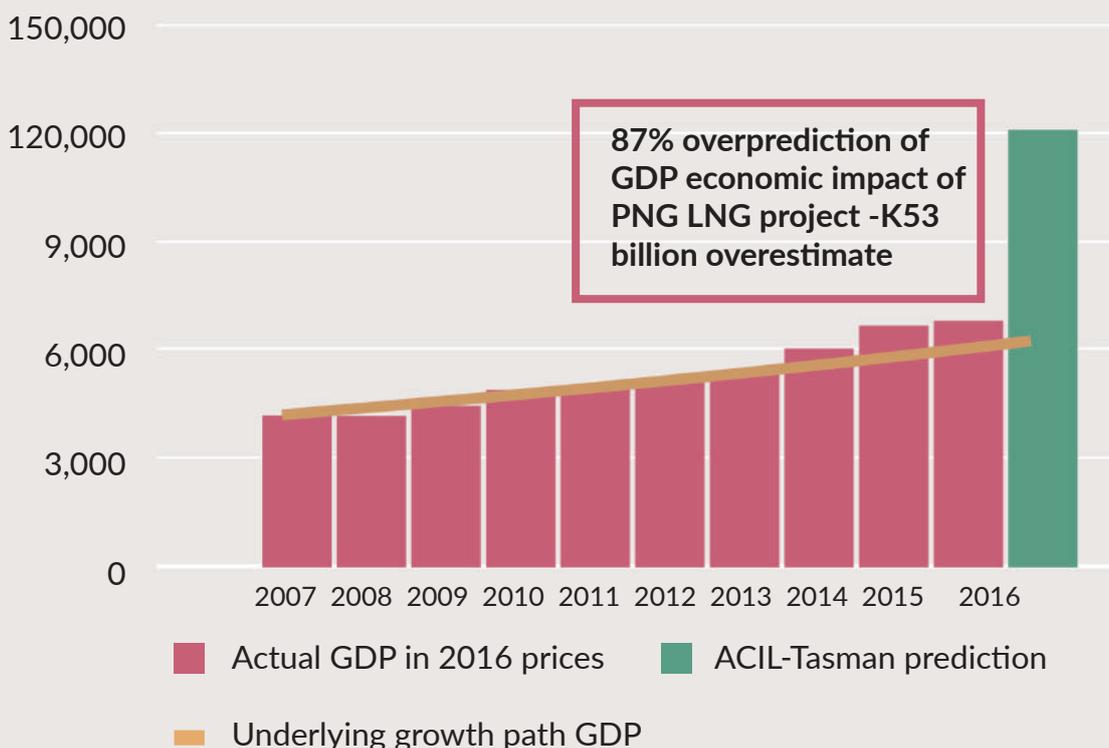
The second area where the 2016 outcome is higher than the underlying growth path is GDP (10% compared to predicted GDP growth without the project), although this was 87 percentage points less than the 97% predicted with the PNG LNG project. Figure 1 is a year-by-year comparison of the underlying GDP growth path determined for this report, the actual GDP figures (all in 2016 prices) and the ACIL-Tasman predictions for 2016. The orange

20. D. James, *The PNG 100 CEO Survey 2018*, Business Advantage PNG, 20 February 2018. <https://www.businessadvantagepng.com/the-png-100-ceo-survey-2018-papua-new-guineas-chief-executives-remain-optimistic/>.

line in the figure is the ‘underlying growth path’ for GDP in our simple trend analysis. For GDP, average values for the period 2007 to 2009 are used as there was not a consistent updated measure of GDP going back to 2005.²¹ This average 2007 to 2009 GDP figure of 42.3 billion (in 2016 dollars) is increased at the

21. The National Statistical Office made a major revision to GDP estimates in 2016. Currently, these figures are only available for the years 2007 to 2014 (an earlier 2006 figure was provided but the NSO methodology was updated again for 2007 onwards). PNG Treasury has estimated GDP figures for 2015 and forward years in the 2018 Budget (Volume 1, Appendix 3, Table 1). There is a distinct possibility that PNG Treasury has overestimated the 2016 GDP figure. This could drop the actual GDP figure even below the underlying growth estimate. This is because, as mentioned in footnote 12, the NSO released in March 2018 a preliminary updated estimate of GDP in 2015 of K57.1 billion some 10% lower than the K62.3 billion in the PNG Treasury estimates (2013 prices) which have been used in this report. The new 2015 figures have not been updated as the NSO has not released the detailed data required, including price deflators. There would then remain the issue of whether the 2016 GDP figures should be reduced by a similar amount.

Figure 1: PNG's actual GDP growth relative to ACIL -Tasman prediction



average real growth rate from 2007 to 2009 of 4.8% to reach K61.5 billion by 2016. The ACIL Tasman model predicted that GDP would be 97% higher than the underlying growth path – so K121 billion (K61.5 billion underlying growth path estimate times 1.97). The actual value for GDP in 2016 was K67.8 billion – so 10% higher than the underlying growth path but 87 percentage points lower than the ACIL-Tasman prediction.

It is difficult to reconcile the gap between the ACIL-Tasman GDP predictions and what actually happened. This study did a sensitivity analysis to determine if, for example, the gap of 87% between predicted and actual outcomes for GDP could be explained by an error in calculating the underlying growth path. This was considered unlikely as moving the starting period or average growth rate only had relatively small impacts.²²

Another possible explanation would be if there had been a major change in the PNG economy other than the addition of the PNG LNG project. For example, if there had been a repeat of the Asian Financial Crisis, this could have pushed down PNG's underlying growth path. However, this has not occurred. PNG did suffer from a major drought in 2015, but had largely recovered by 2016. Commodity prices did fall in late 2014 especially for gas and oil, but all the direct impacts of this are accounted for by using appropriate price deflators in PNG's national accounts. Indeed, the actual value of gas and oil exports in 2016 is almost exactly what was predicted by the

22. For example, if the underlying growth path for GDP was assumed to be only equivalent to the population growth rate of 3%, then the gap would still be 71% using 2008 as the base year or 80% using 2012 as the base year. This is still a massive gap. Indeed, the underlying growth path would need to assume a negative growth rate of 3% per year for every year between 2008 and 2016 – PNG has never had such a long and sustained depression. Future versions of the PNGGEM model actually assumed a higher average growth rate in the 2000s than the 4.8% used in this study – this would increase the gap even further between predictions and actual outcomes.

It is difficult to reconcile the gap between the ACIL-Tasman GDP predictions and what actually happened.

ACIL-Tasman analysis - production quantities are higher which are offsetting slightly lower prices than predicted. There simply was no other major economic shock that could explain even a significant part of the gap.

Even this positive result of an increase in GDP of 10% is based on the Oil and Gas Extraction sector doing well while other parts of the economy have actually gone backwards (more detail in Section 4). As mentioned above, as the resource sector is dominated by foreign companies, it means that most revenues for resource production go overseas. There are some minor local employment effects and indirect impacts through any net tax collections and project contracts with local suppliers, but these are generally picked up through non-resource sectors anyway (for example, construction activity).²³

Moreover, the GDP figures also do not take into account population growth. There are 8 years between the PNG LNG model analysis and 2016. Over this time, there are an extra 2 million people in PNG based on the latest population growth rate estimates of 3.1%. This means the outcomes are much worse in per capita terms than suggested above.²⁴

23. Even earlier commentators on the PNG LNG economic analysis highlighted the risks of using GDP as a leading measure. In a combined paper between staff of PNG's central bank, the Bank of PNG, and Monash University, it was recognised a more appropriate measure would be GNP, and the project's impact on GNP would only be between 4 and 10% (column 5 of Table 1 in Peter B. Dixon, Gae Kauze and Maureen T. Rimmer, 'Effects on the PNG Economy of a Major LNG Project', *Economic Papers: A Journal of Applied Economics and Policy*, Vol. 29, no. 2 (June 2010). (henceforth: Dixon et al., 'Effects on the PNG Economy').

24. Of course, this population point also applies to the model's predictions which weren't put in per capita terms – another way to make the apparent benefits seem larger.

The expectation of an 84% increase in economic well-being throughout PNG households would have been extremely beneficial for the people of PNG. However, rather than improving, this measure has gone backwards.

Household income is a much better measure of well-being than GDP and is generally regarded as a better indicator of economic welfare than GDP measures.²⁵ The expectation of an 84% increase in economic well-being throughout PNG households would have been extremely beneficial for the people of PNG. However, rather than improving, this measure has gone backwards. Once again, the situation is even worse when one considers the impact of population growth – the proxy for household income (non-resource GDP) would now have to be spread out over many more people.

Total government expenditure was predicted to rise by 84% but instead has fallen by 32%. This was marketed as providing an opportunity for major increases in expenditure on education, health, and infrastructure. The drop of government expenditure by 2016 would also have been much worse if the government did not shift from balanced and even surplus budgets in the mid-2000s to the largest deficits in its history including an official budget deficit of 4.6% of GDP in 2016. Section 3 is devoted to a more in-depth discussion of why this prediction was so wrong and why these revenues have not materialised.

Employment was predicted to rise by 42% but has instead fallen 27%. The employment

25. This combines recommendations 1 (“When evaluating material well-being, look at income and consumption rather than production”) and 2 (“Emphasise the household perspective”) of the famous joint Economic Nobel prizewinners Stiglitz/Sen “Report by the Commission on the Measurement of Economic Performance and Social Progress” commissioned by the President of France, Nicholas Sarkozy, in February 2008. Joseph Stiglitz, Report by the Commission on the Measurement of Economic Performance and Social Progress, Eurostat, 14 September 2009.

question is discussed in greater detail in Section 4.3.

In the most divergent result of all, imports fell by 73%, instead of a predicted increase of 58%. The extremely poor outcome on im

ports reflects the foreign exchange shortages that have been plaguing the PNG economy. Although export returns have been high, the repayment of debt means there has been little gain in foreign exchange available to finance imports. The central bank started moving away from a market-based exchange rate in mid-2014, and by 2016 the impacts of foreign exchange shortages were having a dramatic impact (see also Section 5.4).

Section 3: Government revenues

3.1. The predictions vs the reality

Revenues have been much lower than expected from the project. Indeed, this study indicates the net impacts on the budget have been negative and are likely to remain so until 2024. Why is this the case?

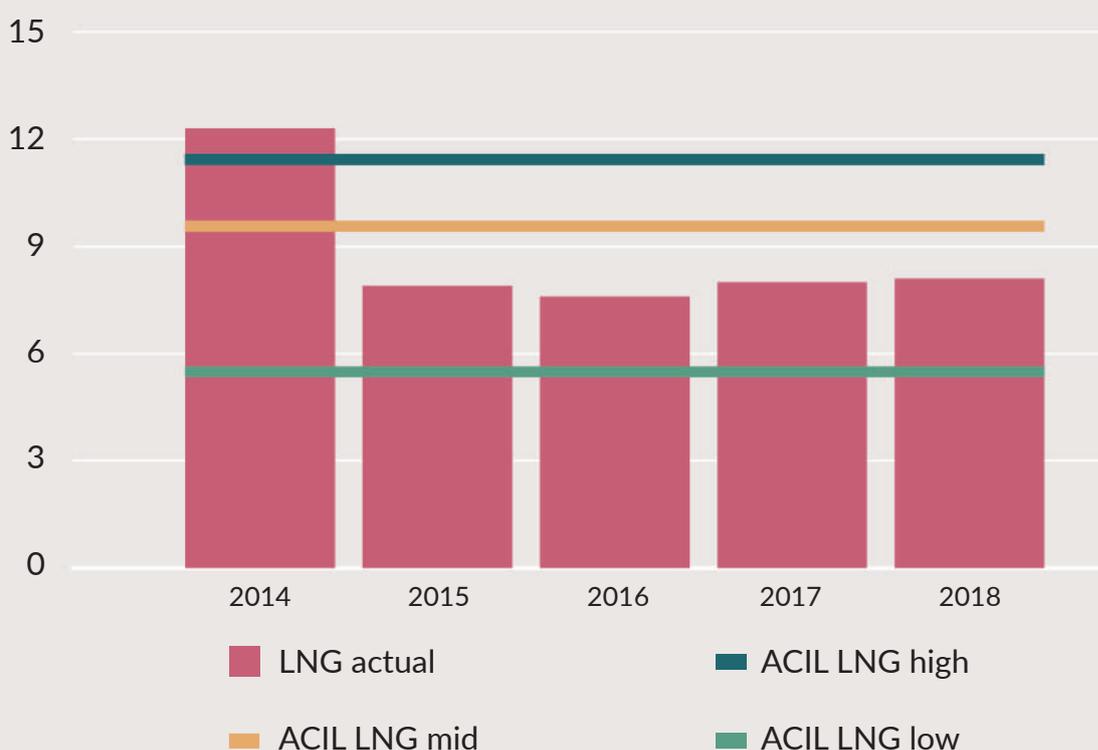
First, could this decrease be explained by a lower than expected gas price? For the direct revenue impacts predictions, the model uses three assumptions. The Low Case was based on an oil price of US\$36 per barrel and equivalent LNG price of \$US5.50 mmbtu; a Mid (or Study) Case based on an oil price of \$65 per barrel and equivalent LNG price of \$US9.35 mmbtu; and a High Case based on an oil price

case of US\$100 per barrel and equivalent LNG price of \$US11.50 mmbtu.^{26 27} Figure 2 provides actual movements in LNG prices since the commencement of the project based on figures from PNG’s central bank, the Bank of Papua New Guinea. While the project commenced with LNG prices above the High case, by the end of 2014 they had dropped to be half-way between the Low Case and the Medium Case. By the end of 2017, prices had recovered to be close to the Medium Case assumption

26. There is no indication in the Final Report that these oil prices are adjusted in any way for inflation. As other input variables to the model also are not adjusted for cost increases, and as the debt repayments are fixed in nominal terms, this effectively means that the benefit figures used in the report could be considered as being in constant prices.

27. The exchange rate assumption is that \$US1=3.60 Kina (or 1 Kina=\$US0.28).

Figure 2: LNG prices - ACIL-Tasman assumptions vs actuals



The actual movement of prices indicates that prices have never fallen below the Low case, and that a mid-way point between the low and medium cases is a reasonable basis for considering the direct benefits that were expected to flow in terms of revenues.

According to ACIL-Tasman’s own projections (see Figure 3 below) estimated revenue impacts would be somewhere between the red and the green lines (i.e. the low and medium case assumptions). This would be around K2 billion for the first decade of the project’s production phase.

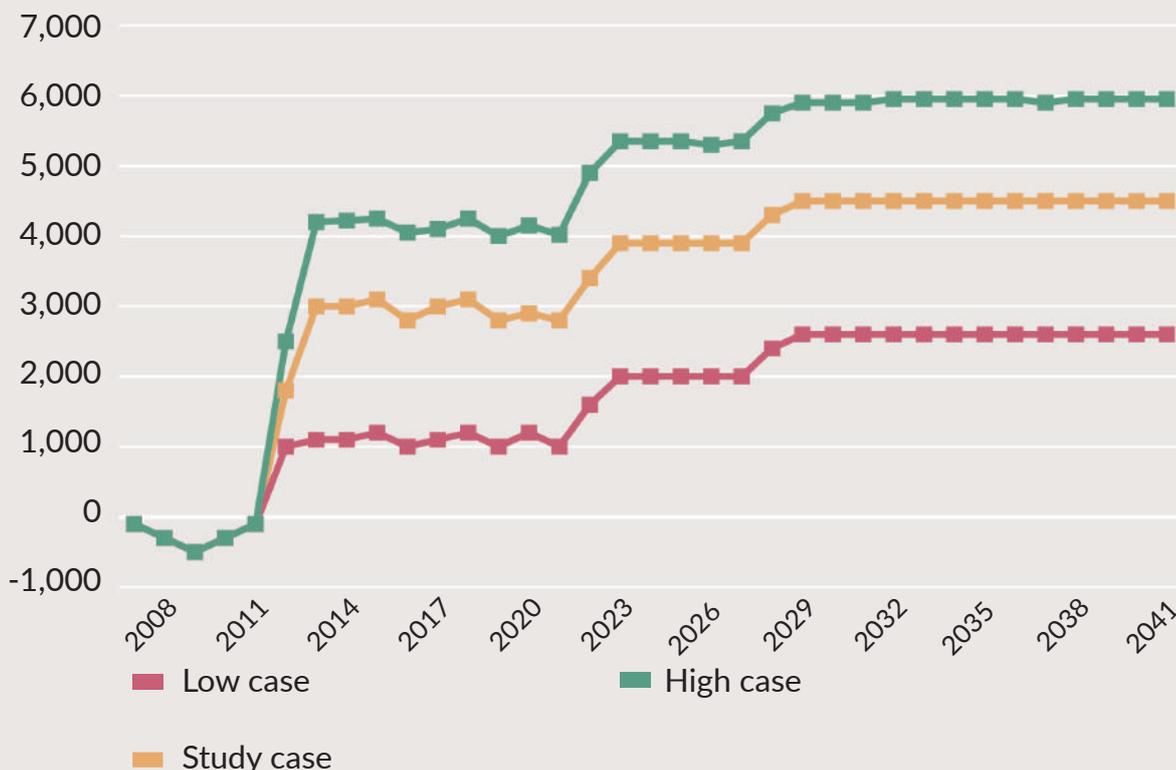
Detailed figures on actual revenues from the PNG LNG project for 2016 are included in a recent report by the Extractive Industries Transparency Initiative (EITI) report for PNG.²⁸ The actual gross revenue figures for 2016 according

28. Report for 2016, PNG Extractive Industries Transparency Initiative, December 2017. <https://eiti.org/document/papua-new-guinea-eiti-report-2016>. (henceforth 2016 EITI Report).

to the EITI report is some K0.5 billion, less than one-quarter of the K2 billion expected (see the average of the last two columns in Table 2). Indeed, PNG LNG revenues have declined as the project moved from the construction phase into the production phase. The reason for this revenue shortfall is therefore not because of lower oil prices.

Second, could the cost blowouts of the project have reduced the revenue payments to PNG? Certainly, the capital cost of the project was considerably higher than expected – up from US\$10 billion in 2008 to a final cost of US\$19m (some of this just due to project design but there was also a bad bet on currency movements which cost PNG LNG over \$US2 billion). Across project partners, these project costs were funded 30% by equity with the remaining 70% from loans. As the costs increased, the size of PNG’s loans also increased. Based on the ACIL-Tasman report, this doubling in the size of loans for the project would have three impacts. First, in calculating dividends

Figure 3: ACIL-Tasman estimates of PNG LNG revenues to government and landowners



payable to the PNG government, the projected K0.5 billion per annum financing cost would also have doubled to K1 billion and this would have reduced the dividend payable to PNG from a 20% share by K0.5 billion (based on Figure 10 in ACIL-Tasman report). Second, additional interest costs from these larger loans from all project partners would be tax deductible, so this would have reduced company tax payable by around another K0.4 billion (assuming USD 9 billion extra project costs, 70% loan funded, 7.5% average interest rates, KPH not paying company tax, Kina to US exchange rate of 0.30, company tax rate of 30%). Third, the extra \$US9 billion in project costs would be depreciated over 10 years straight-line against company tax, leading to a further loss of company tax in the first 10 years of some K0.7 billion. Combined, the extra debt costs could have reduced total revenues by some K1.6 billion.

Nevertheless, the increased project costs had a considerable financial upside. The actual plant was designed to produce about 5% more LNG than expected in 2008, and actual production has been up to 20% higher than planned capacity. This should have flowed into significantly higher revenue as marginal costs of producing extra LNG are low. An approximate estimate of this upside, noting that project revenues in 2016 were around K10 billion, is that some K2 billion of this extra revenue is from increased production levels. This K2 billion in extra sales revenue, assuming negligible marginal costs, could flow into another K0.5 billion in company tax revenue (K1.6 billion for private shareholders times 30% company tax rate), K0.4 billion from extra dividend payments from PNG's 20% shareholding in the project and K0.1 billion from the combined 4% Development Levy and Royalties. On balance, then, the upsides from 25% higher production levels of K1 billion would offset some of the K1.6 billion in extra debt related costs. So, by our calculation, the K2 billion expected annual revenues by the 2008 ACIL-Tasman report (based on actual gas prices) should be reduced to about K1.4 billion.

3.2. EITI Data - digging a little deeper

This then leaves the mystery of why there remains such a large gap between estimated revenues of K1.4 billion on current prices and actual revenues of K0.5 billion? To examine this question, we can look into the reports by the EITI which are the best source of information on resource company payments to countries like PNG. Indeed, PNG Treasury documents do not provide the same level of detail – and the EITI reports even document some errors in budget statements. The EITI reports also include information on what companies say they have paid each year, and what the relevant government agency says it has received, so that discrepancies may be compared.

Information for the years 2014 to 2016 are shown in Table 2. The primary phenomenon that the EITI data reveal is the extraordinarily low payments in company tax. This study estimates that company tax should be around K0.5 billion.²⁹ So it is extremely worrying that ExxonMobil states in the 2016 EITI report that it paid only K3.2m in company taxes in 2016, only one-thousandth of its expected share of LNG sales from the project in that year. This seems to be extremely low, even in the context of additional tax concessions having been granted to the project. There are wider concerns about very active tax minimisation by large resource companies including ExxonMobil and possibly this is adding to the low level of revenues relative to expectations.³⁰ In Australia, the tax office indicated that “the resources sector is more heavily

29. Figure 8 shows an estimate of K1.7 billion in company taxes under the mid-case, well over half of the estimated K3 billion in total revenue. With an estimate from the ACIL-Tasman analysis of K2 billion, it would be reasonable to assume just over half of this would be from company taxes – so K1.1 billion. This would increase by some K0.5 billion due to higher production, but reduce by K1.1 billion due to higher debt interest deductions and depreciation allowances, suggesting a realistic figure of some K0.5 billion would be expected.

represented in the “related party clusters and related party debt”, as well as marketing hubs were commodities are sold through offshore marketing hubs.³¹ PNG’s tax system is more open to such tax minimisation abuses as its institutional capacity is lower and less well resourced. This is discussed in Sections 5.2 and 5.3.

Second, the greatest source of taxes in 2016 are from PNG LNG employees. In the PNG LNG economic forecasts, these taxes were so small that they can’t actually be seen in the graph in the ACIL-Tasman report. The workers are paying their fair share even if the companies may not be.

Third, the pattern of actual development levy and royalty payments raises several important issues. As both are based on 2% of the net wellhead value, it is surprising that there is such a large difference between these payments – for example, ExxonMobil says it paid K62m in Development Levy in 2016 yet only K11m in Royalties. The ACIL-Tasman report (Figure 8) indicates that these should be the same. It is also extremely worrying that although ExxonMobil says it paid these amounts, the EITI study team was not able to find a part of the PNG Government that said they had received these payments. For Oil Search, there was a smaller but still significant difference between Development Levy and Royalties, but at least they were acknowledged as being received. Given the political sensitivities in the Highlands area about the non-payment of royalties and the development levy to local landowners, these differences should be clarified by the government.

Finally, the EITI data shows how dividend receipts are much lower than expected. These were expected to be around K1 billion per

annum for the first 15 years of the mid-case scenario, rising to K1.5 billion in subsequent years in the mid-case, and a maximum of Ko.87 billion in the low case (no information was provided on the first 15 years for the low case – a conservative estimate would be taking the Ko.6 billion difference in later years and applying that, so a low case scenario of Ko.4 billion per annum for the first 15 years). Once again, with LNG prices roughly equally spread between the low and mid-cases, dividend income of about Ko.7 billion would be expected. Actual dividend payments were Ko.1 billion according to EITI, although Ko.3 billion in the government’s budget documents. This is an area of little transparency, and it is difficult to tell if some of this gap between earlier estimates and actual payments is in fact funds being held by Kumul Petroleum and not released to the government.

3.3. Additional budget costs

A failing of the ACIL-Tasman study is that it did not include budget costs of having the PNG LNG project – these costs need to be set off against revenue gains to have a net budget impact. The major cost is the additional public debt being carried for the K4.3 billion equity buy-in by the PNG government into the project. Such long-term debt costs nearly 13% per annum on the domestic government debt market³², so this alone has an opportunity cost of some K550 million. There are other direct costs to the budget not known at the time of the ACIL-Tasman study but which need to be included. These are primarily those agreed in 2009 in Section 6 of the Umbrella Benefits Sharing Agreement (UBSA) between the National Government, landowners and provincial and local level governments. An example of these project costs are shown in the following table from the 2011 Budget – with actual costs of K385m in 2010 declining to an

30. Michael West, ‘Charge Tax Shark Exxon with Contempt of Parliament’, Michael West Blog, 21 December 2017.

31. Stephen Letts, “Energy Giant Exxon Will Enjoy and 8-year Company Tax Break in Australia, ABC Business, 15 March 2018. <http://www.abc.net.au/news/2018-03-15/exxon-mobil-will-not-pay-tax-until-2021/9549034>.

32. This is based on the interest rate that applies to Treasury Inscribed Stock which stood at 12.8% for 10 year Kina bonds in March 2018.

TABLE 2: EITI REPORTS ON DIRECT REVENUE FLOWS FROM THE PNG LNG PROJECT³³ (In millions of Kina)

Variable	Company	2014		2015		2016	
		Paid*	Re-ceived**	Paid*	Re-ceived**	Paid*	Received*
Company tax	ExxonMobil	159	157	50	52	3	17
	OilSearch	322	315	4	4	37	37
	Santos	1	1	18	19	0	N/A
	JX Nippon	111	130	27	27	1	
Foreign company withholding tax	ExxonMobil	42					
	OilSearch	40					
	KPH	0	414	286	86	100	100
Dividens group tax (so personal income tax for employees)	ExxonMobil	223		171	171	140	140
	OilSearch	98		93	97	85	88
	Santos	0		N/A	0	N/A	0
	JX Nippon	0		N/A	0	N/A	0
Other taxes (various withholding taxes)	ExxonMobil				45		29
	OilSearch				27		18
	Santos				N/A		N/A
	JX Nippon				1		1
National Budget Revenue		997	1017	648	528	366	430
Development Levy (2% well head value)	ExxonMobil	0	0	75	0	62	0
	OilSearch	17	16	16	16	7	7
Royalties (2% well head value)	ExxonMobil	46	47	78	0	11	0
	OilSearch	54	52	31	30	26	26
Landowner and provincial government revenue		117	116	199	47	107	34
Total revenue		1113	1132	847	574	472	464

Note that Oil Search figures would include its earlier oil operations outside of PNG LNG. PNG LNG (33.2% ExxonMobil 29% OilSearch, 13.5% Santos, 4.7% JX Nippon).³⁴

* Reported paid by the company.

** Reported received by the government.

33. 2016 EITI Report.

34. For more details see JARC, *Pipe Dreams*, 24.

estimated K252m in 2011. Without access to on-going data on this, is difficult to estimate what these costs have been since. However, for the purposes of this study, we have estimated continuing budget costs of at least at K170m per annum until 2020 based on K1.7 billion in UBSA commitments (K1.2 bn in Infrastructure Development Grants, Ko.12bn in Business Development Grants and up to Ko.47bn in High-impact Infrastructure) spread across 10 years. We consider this to be

a conservative estimate.

As Figure 4 shows, in 2016 the project made a negative net contribution to the PNG budget (the yellow line).

3.4. Estimation of future revenues

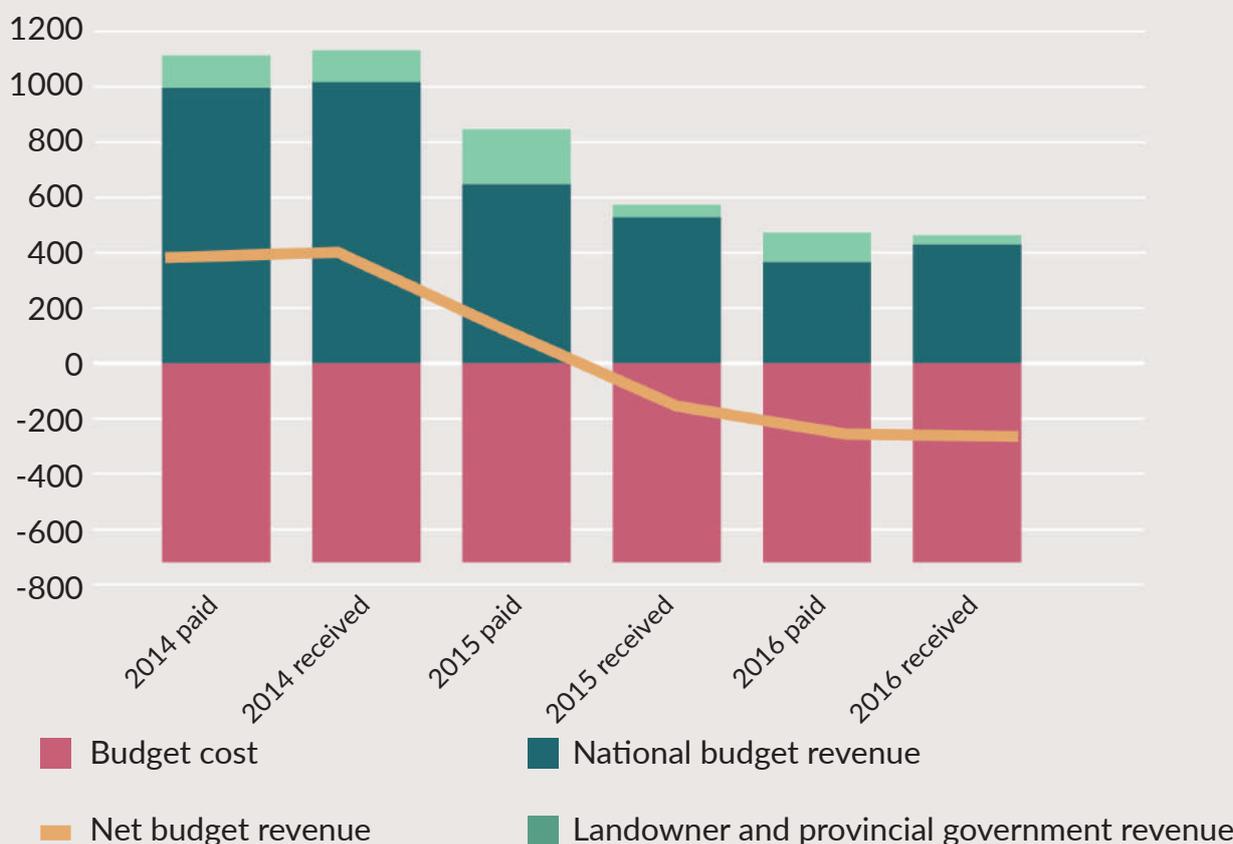
If the short run predictions of revenues from

Table 3: Example of PNG LNG UBSA Budget Costs

Description	2010 budget	2010 supplementary	2011 budget
Business development grant	120.0		
Infrastructure development grant	120.0		120.0
High impact infrastructure projects		40.0	100.0
Feasibility studies for high impact projects	5.0		
PNG LNG related MOA's		100.0	32.1
Total	24.0	140.0	252.1

Source: 2011 Budget Volume 1 Table 21

Figure 4: PNG LNG net budget revenues

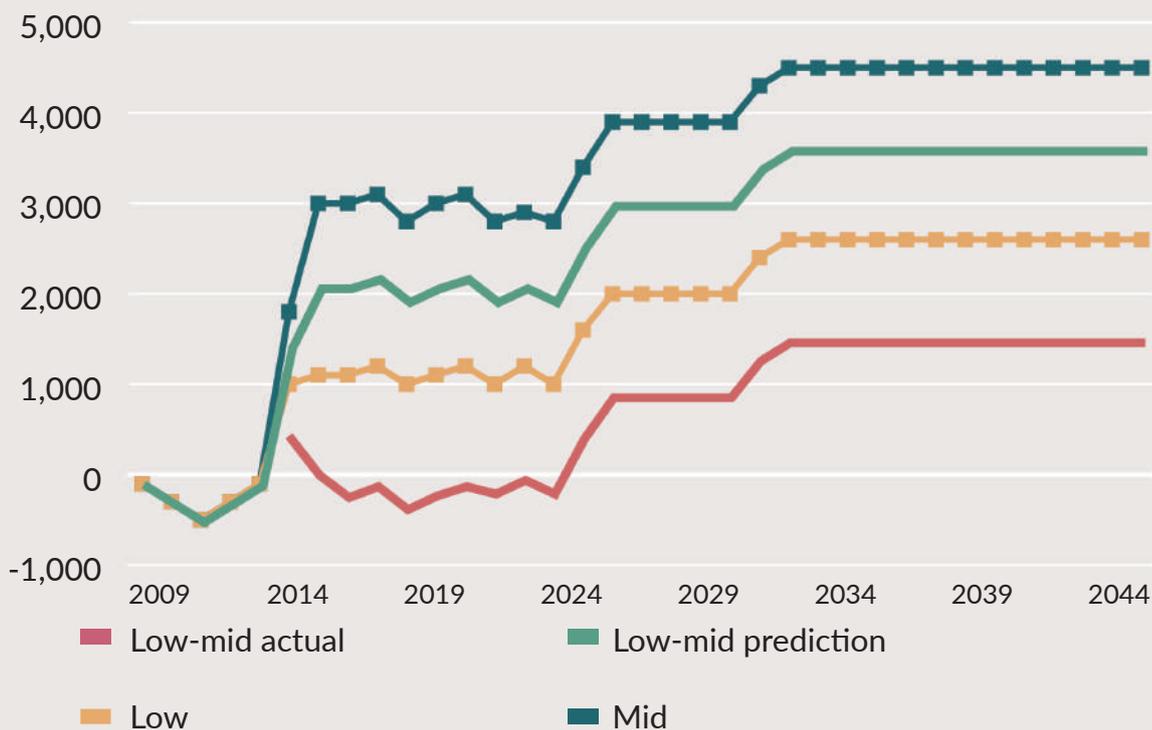


PNG LNG production have been disappointing, to say the least will things not improve? Obviously it is difficult to know this with any certainty. But if reasonable assumptions are made about the project given the trends that were discussed in section 3.1 above (prices continuing at the low-mid level and a continuation of a K1 billion gap between expected revenues of K1.4 billion and receipts of just under K0.5 billion), as well as the on-going opportunity costs of the equity contribution (K550m) and UBSA at K170m until 2020, predictions are possible that will at least be more accurate than the 2008 ACIL-Tasman scenarios. With these assumptions, the revised estimates are that PNG LNG will not

start to contribute net revenue to the budget until 2024, building to around K1.5 billion per year from 2031. This is all illustrated in Figure 5 below (yellow line).

Of course, this will be a much smaller percentage of the economy and the budget given real GDP and budget growth over the next decades. We estimate the total net revenue at K23 billion from the project, which is about one-quarter of the K86 billion estimated by ACIL Tasman if oil prices stayed around \$US50 per barrel and one-fifth of the K113 billion estimate for the mid-case of \$US65 per barrel.

Figure 5: Projected future PNG LNG budget net revenues



Section 4: Broader impacts

4.1. Sectoral impacts³⁵

The ACIL-Tasman model also failed to accurately predict the PNG LNG project's impact on the sectors of the PNG economy. The prediction errors at this more detailed sectoral level feed into the GDP and non-resource GDP macroeconomic errors discussed in Section 2. To understand how far off the ACIL-Tasman report was in this regard, let us compare its predictions about the project's expected effect on sectors of the PNG economy with how these sectors actually performed.

ACIL-Tasman's predictions about the sectoral impacts are summarised in the middle column of Table 4. We can compare these with how PNG's economic sectors have actually performed by 2016 relative to the underlying growth path scenario (i.e. no PNG LNG project) in the right hand column of the table.³⁶

As Table 4 shows, outside of the Oil and Gas Extraction sector, every single sector in the PNG economy has shrunk relative to the underlying growth path scenario. More specifically, every part of the PNG economy is below its underlying growth path in 2016 apart from the oil and gas sector which actually had a 440% predicted increase in export values discussed earlier. All other parts of the PNG economy have performed much worse than if its growth performance had simply continued in the growth pattern of the late-2000s without the PNG LNG project.

Some further discussion is needed about the project's negative 40% impact on agricultural exports.

35. Problems of the sectoral impact predictions and likely problems with Dutch Disease also discussed in JARC, *Pipe Dreams* 39-41.

36. Once again, an explanation for how the underlying growth path is calculated is provided in Appendix 2.

TABLE 4: PNG'S SECTORAL PERFORMANCE RELATIVE TO PNG LNG PROJECT PREDICTIONS

Variable	PNG LNG prediction	Actual relative to underlying growth path
Health	84.2%	-33.2%
Education	84.0%	-14.0%
Govt admin	83.8%	-1.1%
Electricity	50.3%	-2.1%
Financial services	42.6%	-39.5%
Transport	25.3%	-8.9%
Construction	19.6%	-18.6%
Manufacturing	19.4%	-23.2%
Commerce	10.2%	-12.8%
Mining	-0.9%	-48.6%
Agricultural exports	-19.7%	-40.1%

Source: ACIL-Tasman report Table 3 p32 for the middle column, right column using the underlying growth path method described in Appendix 2 with all data drawn from the detailed GDP sectoral information in Table 1 Appendix 3 of the 2018 Budget.

The agriculture sector is extremely important for the livelihoods of the people of PNG. Some 85% of the population are subsistence farmers, with some income from cash

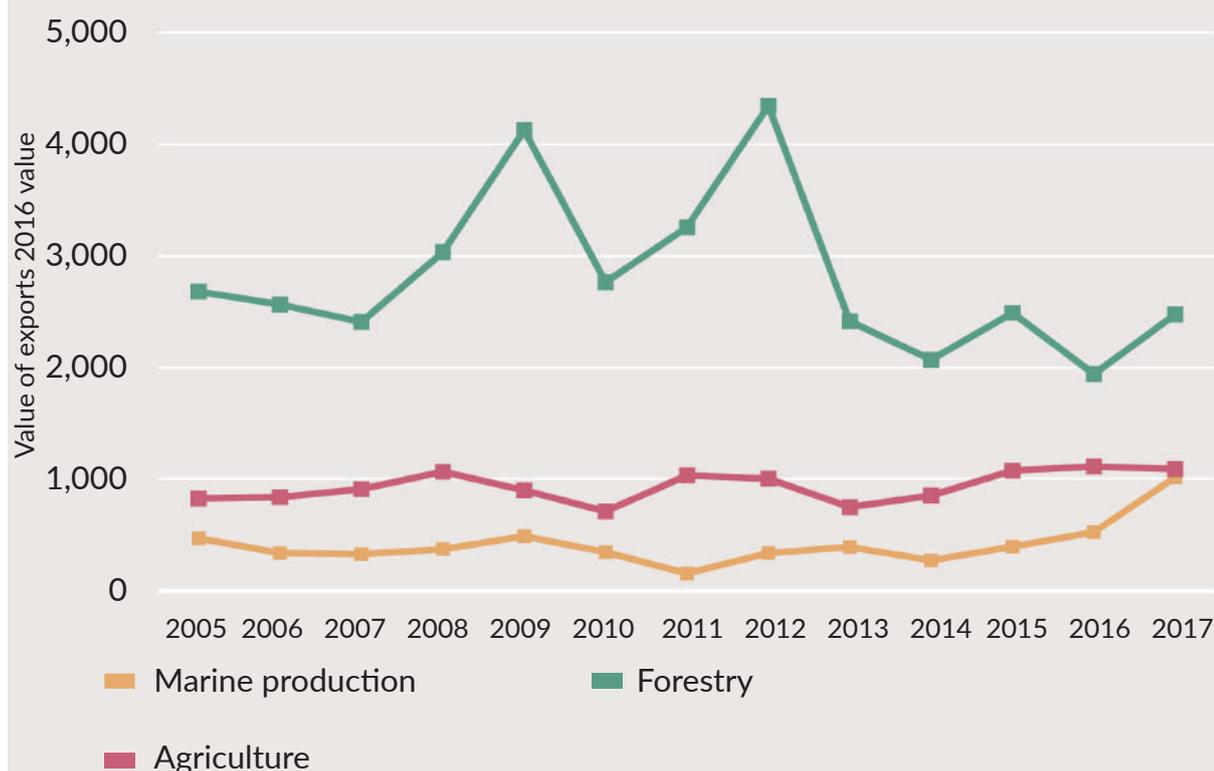
cropping. Understanding the distribution of benefits from the PNG LNG project on this sector as a whole is important. However, the ACIL-Tasman model did not attempt to make any predictions of the project on subsistence agriculture beyond indirect benefits flowing from the massive predicted increased government revenues (not just PNG LNG revenues but from the expected near doubling of GDP which would generate even more revenues) of an 84% increase in government expenditures. Rather, the model focused on predicted impacts on essentially PNG’s exported agricultural production – coffee, cocoa, palm oil, and copra from smallholders and plantations. These agriculture exports were predicted to decline on average by 19.7% relative to the underlying growth path.

In contrast, this study estimates that the value of agricultural exports has actually fallen by 40% (to K2.5 billion) relative to the underlying growth path scenario (K4.1 billion). Within the agriculture sector, the data shows that palm oil (41% of agriculture exports in 2016) and

copra (3%) have done well, but coffee (26%), cocoa (15%), rubber (1%), tea (1%) and copra oil (2%) have done poorly (remainder is “other agriculture”). Plantation palm oil is the new behemoth in the agriculture sector, growing in export values from K391m in 2005 to K1,015m in 2016—but this sector has a higher share of foreign ownership and hence smaller local benefits than other agricultural activities.

Although ACIL-Tasman did not consider fisheries or forestry, this study finds that these sectors have not suffered over this period and have in fact performed well. Forestry exports are 46% above the underlying growth path—although this probably reflects the poor administration of the SABL scheme and for many schemes their hidden adverse cultural and environmental adverse impacts. Meanwhile, fishing exports are also 46% above the underlying growth path, possibly reflecting much higher prices following the success of the Nauru agreement on properly controlling the Pacific tuna fisheries. These trends are also reflected in Figure 6.

Figure 6: Details on agriculture, forestry and fishing



4.2 Exchange rate impacts

The 20% reduction relative to the underlying growth path predicted with respect to agricultural exports were also mirrored with respect to other tradeable industries such as mining and manufacturing. These negative predictions were the result of the so-called “Dutch Disease”: other tradable sectors of the economy are hurt when the exchange rate increases due to an increase in gas exports.

The higher outcomes predicted by ACIL-Tasman for losses to agricultural exports, manufacturing and mining were probably due to its underestimation of the appreciation effects that the project would have on the exchange rate and then the extraordinary action by the Bank of PNG starting in 2014 to move the exchange rate towards an overvalued fixed exchange rate.

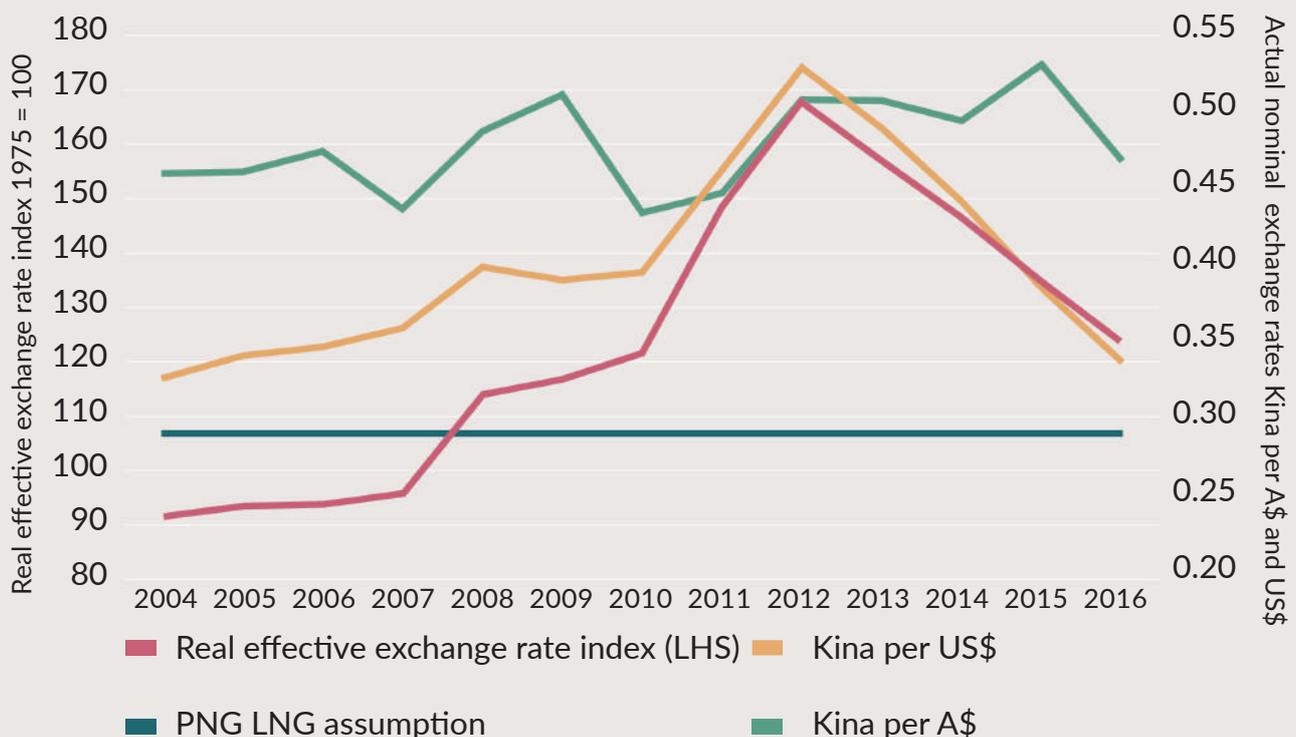
Unfortunately, ACIL-Tasman used a very low exchange rate based on just the Kina/US

These negative predictions were the result of the so-called “Dutch Disease”: other tradable sectors of the economy are hurt when the exchange rate increases due to an increase in gas exports.

dollar.³⁷ This meant that the appreciation effects were somewhat exaggerated in the model but underestimated in reality. A better measure would have been the Real Effective Exchange Rate – it considers all trading currencies (the Trade Weighted Index) and then adjusts this for inflation differences. Between 2005 and 2009, the REER averaged 102. From 2012 to 2016, it averaged 146– a 42 real appreciation on average. This greater appreciation

37. Specifically, the model assumed an exchange rate of \$US1=3.60 Kina (or 1 Kina=\$US0.28). However, the exchange rate at the time (November 2007 to Feb 2008) was 1 Kina=\$US0.36. The Kina to US dollar exchange rate had not been at the \$US0.28 level since June 2004. By 2016, the exchange rate was \$US0.32.

Figure 7: Comparison of exchange rate movements



of the key measure of competitiveness helps explain why the impacts of the project on the agriculture, manufacturing and mining sectors are actually worse than predicted by the ACIL-Tasman model.

4.3. Employment impacts

The PNG LNG analysis included both CGE modelling (which covered the macroeconomic and sectoral impacts discussed above) as well as more direct estimates for employment and revenue.

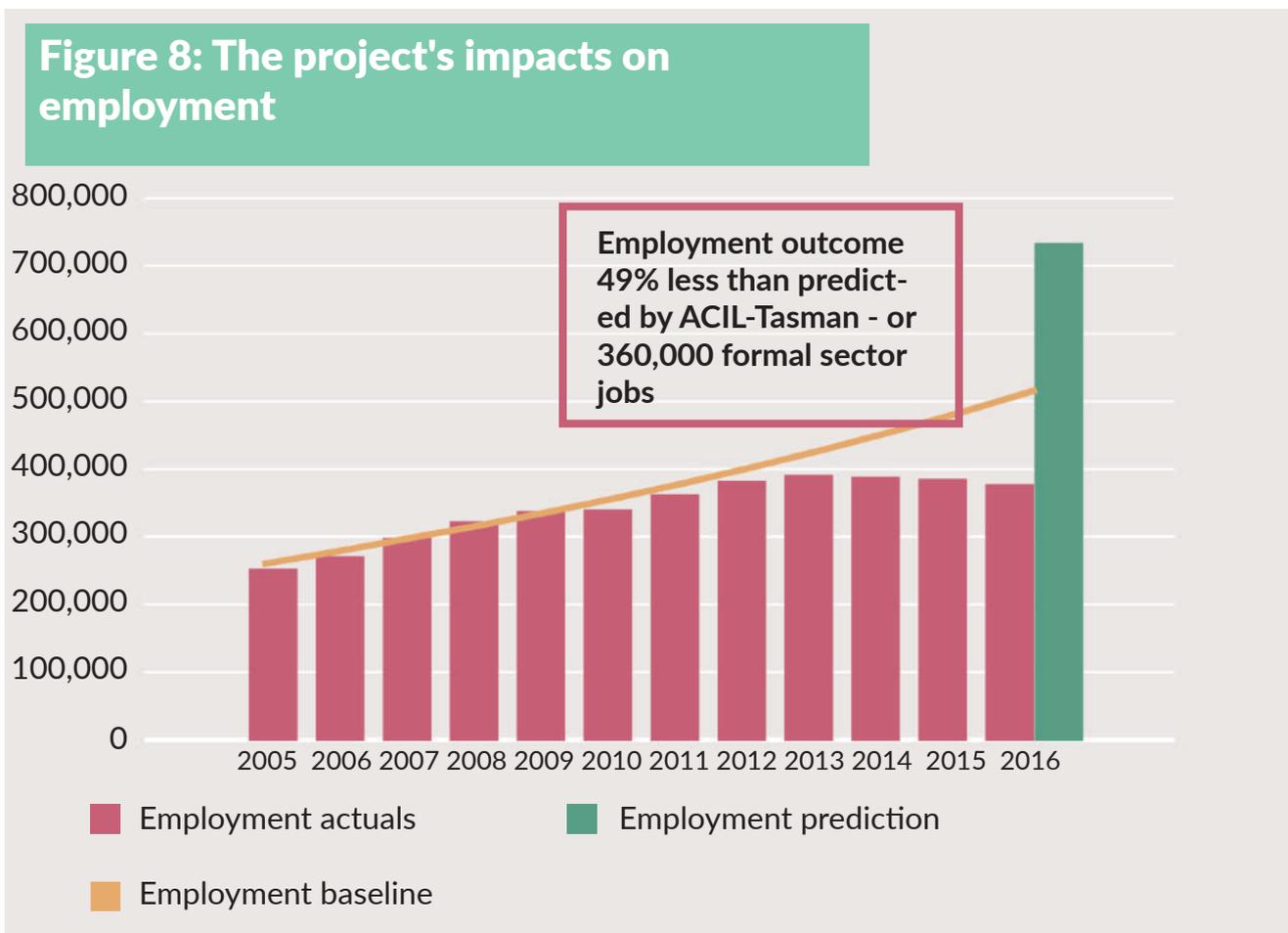
The direct employment effects of the project have been considerably larger than included in the PNG LNG economic study. The ACIL-Tasman analysis expected the employment to peak to 7,500 workers in 2010, with another 800 to 850 workers during the operational phase. The latest EITI report states that employment peaked at 21,200 in 2012 and 2,500 workers, 82% of them PNG citizens, were engaged on PNG LNG operations in

As Figure 8 shows, the ACIL-Tasman predictions on employment have proved to be extremely disappointing—with 2016 employment figures falling 49% short of predictions.

2016.³⁸ These underestimations were at least in part due to the increase in construction budget referred to earlier in the report.

However, these direct impacts must be balanced with the indirect impacts of the PNG LNG project on employment, which were vastly overestimated. The ACIL-Tasman model assumed rural skilled and unskilled employment would fall by some 17% relative to the underlying growth path, consistent with the expected fall in the agriculture sector. Urban employment, the location for most formal sector jobs, was expected to increase by 49%. The net impact was estimated by ACIL-Tasman to be a gain in formal employment of

38. 2016 EITI Report, 32.



42% or an increase of 220,000 jobs across the economy.³⁹

As Figure 8 shows, the ACIL-Tasman predictions on employment have proved to be extremely disappointing—with 2016 employment figures falling 49% short of predictions. From 2005 to 2009, formal employment was growing at 6.4% a year and had reached some 300,000 by 2007. If that growth trend had continued, by 2016 formal employment would have been 515,000 – the underlying growth path estimate. ACIL-Tasman predicted that employment would actually be 42% higher than this, or an increase of 220,000 formal sector jobs across the country. However, employment levels started declining from 2013 and by 2016 formal sector employment was 375,000 – 27% below the underlying growth path scenario and 360,000 jobs less than predicted by ACIL-Tasman.

Once again, the question must be asked, how did the ACIL-Tasman predictions get it so wrong? The answer reflects that employment outcomes are closely linked to movements in key sectors of the PNG economy – primarily the non-resource elements as the resource sector accounts for less than 5% of formal sector employment. Growth in the non-resource elements of PNG's economy has slowed well below the underlying growth path (Section 4.1) and this would have moved employment outcomes well below underlying growth. The actual declines in formal sector employment levels over the last three years is of great concern, and combined with other data, including the preliminary 2015 National Statistics Office GDP figures, which indicate a significant decline in non-resource GDP, suggests PNG

39. The ACIL-Tasman model includes estimates for skilled and unskilled employment. The only source of annual employment information is from the Bank of PNG and it does not provide data in this way. This analysis uses the BPNG indexes and converts them to job numbers based on the 2011 census. The focus is on formal sector jobs. Formal wage employment represents about 10% of employment in PNG, with the remainder being in the subsistence and informal sectors.

has been in a significant recession from at least 2015.⁴⁰

40. Nelson Atip Nema and Stephen Howes, 'Looking at the PNG Economy Through a Tax Lens', ANU Development Policy Centre, December 2017. <http://www.devpolicy.org/looking-png-economy-tax-lens-20171208/>

Section 5: How did this happen?

How do we explain the vast discrepancies between the predicted great economic benefits and the reality unveiled by this study? Some answers to this question will have already revealed themselves in the previous three sections, but this section provides a systematic account of the various reasons for this extraordinary result.

5.1. Flaws in the ACIL-Tasman/PNGGEM model

It should now be abundantly clear that the ACIL-Tasman model was excessively optimistic about the possible upside impacts of the PNG LNG project. One would have expected some economic gains from a major increase in exports. However, the upside magnitudes of the gains – up to a near doubling in the size of GDP within only 2 years and other major increases such as estimated government expenditure by 84% within a similar period - do indeed seem too good to be true. Clearly, there were.

Unfortunately, the model is not transparent – it is a complicated black box. The quality of CGE models depend greatly on having good background statistical information. Unfortunately, the quality of statistics in PNG is poor. For example, CGE models depend on most of their parameters linking parts of the economy to what are known as input-output tables. PNG's last input-output table was prepared in 1970.⁴¹ There have been updates including a major one in 1991, but this was based on Indonesian information.⁴² Even when land reform was added to the model in 2010, it used land

41. M. L. Parker, 'An Input-Output View of Agriculture in Papua New Guinea', *Australian Journal of Agricultural Economics* (1974): 32-47.

42. Theodore Levantis, 'CGE model of Papua New Guinea', *Economics Division Working Papers 98/1*, *Research School of Pacific and Asian Studies*, ANU (1998) 36.

information from 1990 except for forestry and subsistence agriculture where Fiji information was used.⁴³ The database on variables can be updated each year, and these can be used to make assumptions about parameters in equations to help with internal model consistency, but there is no substitute for actually having a statistical survey for an updated input-output model for determining the underlying relationships.

On top of this, the model is very ambitious in the way it builds policy reforms such as law and order and land reform into its calculations. The parameters for gains in such equations, based on the gap between predictions and outcomes, appear poorly specified. Future analysis will explore in more detail issues with the PNGGEM model and its overall adverse impact on good policy-making for PNG.

5.2. Generous tax concessions

One of the disappointing results from PNG LNG relates to the much smaller level of revenues being paid for by the companies into the national budget. Although the detailed commercial agreement between the PNG LNG joint venturers remains secret, even the publicly available information on elements such as depreciation arrangements over 10 years relative to a project life of 30 plus years, the way wellhead value is calculated on a net basis rather than a gross basis, and generous GST concessions, makes it clear that one main reason for the small size of this revenues was that very generous fiscal terms were offered as part of securing the deal.

43. Lindsay Fairhead, Gai Kauzi and Charles Yala, 'Land Reform in Papua New Guinea: Quantifying the Economic Impacts', *National Research Institute Discussion Paper 108* (2010), 13.

The desire for the Government to secure a deal and the pressure being applied by the companies to keep to certain deadlines may have played a role here, as may have been the release of the ACIL-Tasman report. The report came out only 3 months before the fiscal terms for the project were finalised on 22 May 2008.⁴⁴ In the context of the massive expected revenues, the door was opened to negotiate away tax concessions.

There are some in PNG who are aware that mistakes have been made. Once again, current Treasurer Charles Abel made these comments in 2017:

We need to develop a mineral and petroleum regime where we take a smaller equity for free and a higher royalty rate, introduce domestic market obligation and local content. We need to understand why a large current account surplus (from mineral and petroleum exports) still leaves us with a foreign exchange shortage.

Nevertheless, despite warnings from the IMF, World Bank and ADB, along with its own internal tax revenue, that tax settings were too low on the oil and LNG sector, these were cut yet again in the 2017 Budget.⁴⁵

5.3. The use of tax havens

But it seems other factors are contributing to the low revenue collections. Research has demonstrated that in both PNG and Australia, ExxonMobil has been paying a paltry amount of tax despite huge earnings. Exxon appears to be employing the same techniques in both jurisdictions to avoid paying taxes.

44. Government of Papua New Guinea, *2012 Budget Volume 1*, November 2011, 136. (henceforth 2012 Budget Volume 1).

45. The 2017 budget reduced the company tax rate on oil projects from 50% or 45% down to 30%. There was a partial off-setting increase in Dividend With-holding Tax but this still led to a significant reduction in effective tax rates on oil resource companies (especially Oil Search). (GoPNG, 2016, p. 33).

Exxon disclosed to an Australian Senate Inquiry in March that it did not expect to pay tax in Australia until 2021.

In fact, Exxon has paid no tax in Australia despite earnings of between AUD \$6.7 and \$9.6 billion annually over the last three years. Exxon disclosed to an Australian Senate Inquiry in March that it did not expect to pay tax in Australia until 2021.⁴⁶ The company claims that this behaviour is justified because it is reinvesting these earnings into gas exploration and new infrastructure in the country (current Australian tax law enables these sort of investments to be a tax write off.)

However, in both Australia and PNG, there does seem to be more going on here than just an opportunistic use of friendly tax laws. Tax Justice Network Australia and the Make Exxon Pay Coalition have found that Exxon's Australian holdings are all owned by a Dutch-based company called ExxonMobil Australia Holdings B.V. This Dutch company in turn is 100% owned by a company registered in the Bahamas called ExxonMobil Asia Pacific Holding Ltd.⁴⁷ When pressed in the recent Senate Inquiry about the four Dutch Directors of the company that owns all Exxon's Australian holdings, Exxon executives were unable to say anything about who these gentlemen were or what they did.⁴⁸

A recent submission to the Australian Senate by the Tax Justice Network and the Make

46. Christopher Knaus, "ExxonMobil says it doesn't expect to pay any corporate tax until 2021", *The Guardian*, 14 March 2018, <https://www.theguardian.com/business/2018/mar/14/exxonmobil-doesnt-expect-to-pay-any-australian-tax-until-2021-inquiry-hears>.

47. Make Exxon Pay & Tax Justice Network Australia, 'Is Exxon Paying a Fair Share of Tax in Australia?' *Corporate Tax Avoidance Inquiry, Submission 136*: Supplementary Submission, December 2017.

48. Christopher Knaus, "ExxonMobil says it doesn't expect to pay any corporate tax until 2021", *The Guardian*, 14 March 2018, <https://www.theguardian.com/business/2018/mar/14/exxonmobil-doesnt-expect-to-pay-any-australian-tax-until-2021-inquiry-hears>.

Exxon Pay Coalition has revealed that Exxon and Oil Search have a similar corporate structure for their PNG LNG project. The project has created shell companies in Holland and the Bahamas to receive the company revenues from PNG LNG.⁴⁹ With respect to the Bahamas connection the submission says:

This use of the Bahamas-based entity is very likely to reduce taxable profit in PNG and Australia and book profit in the Bahamas where the corporate income tax rate is zero.

The ultimate owners of Exxon's PNG and its Australian operations is the Exxon Overseas Development Corporation, which is registered in the U.S. state of Delaware. The Bahamas and Delaware are known tax havens.

5.4. The resource curse

Being overly optimistic does not explain why most measures of the PNG's economy in 2016 are below the expected underlying growth path. As noted in section 2.2, there were no major external shocks that could have driven the PNG economy down in 2016. However, there has been a series of economic policy decisions that would have damaged growth – and many of these are directly related to the expectations around the PNG LNG project. There have been many poor policy decisions made since the start of the project which reflect “the resource curse”.

The “Resource Curse” is a well-documented phenomenon where countries with large resource riches nevertheless suffer poor development outcomes. There are three important aspects of preventing the harmful impacts of what is also known as ‘Dutch Disease’: (1) refraining from using the promise of new revenues to overspend and bring on budget pressures;⁵⁰ (2) implementing policies to

49. Make Exxon Pay & Tax Justice Network Australia, Submission to the Senate Economic References Committee for the Inquiry into Corporate Tax Avoidance, 9 February 2018, 5-7.

mitigate exchange rate effects on other sectors; and (3) setting up effective institutions to manage the new resource revenues that do flow through.

At the start of the 2000s, PNG was trying to rebuild from the impact of earlier resource curses. The government was supporting a major structural adjustment program from the IMF, aided by other countries and international agencies. Many elements of this program built on earlier efforts to escape the resource curse of the Kutubu/Porgera collapse in the mid-90s. PNG was freeing itself of many of the “resource curse” policies of earlier years.

However, the prospect of the PNG LNG “transformational” resource project resource led to poor policy choices made by the government, including:

- a 57% increase in expenditure from 2013 before revenues arrived and expensive speculative decisions (see Section 5.5);
- the intervention in the foreign exchange markets which has led to a major overvaluation of the exchange rate and inevitable Kina shortages which are seen as the most pressing issue facing business growth, has contributed to the collapse in imports, and has started to see PNG increase tariffs and other protectionist measures for other traded industries such as agriculture and manufacturing (see Section 5.6);
- the diversion of policy focus away from other sectors (see Section 5.7).

It is very reasonable to argue that none of these decisions would have occurred without another large resource project such as the

50. This has also been called the “Presource Curse” by the IMF – the tendency to spend up big before revenues arrive – and sometimes they don't creating significant budgetary problems. James Cust and David Mihalyi, ‘The Presource Curse’, Finance and Development Vol. 54, no. 4 (December 2017). (henceforth: Cust and Mihalyi, ‘The Presource Curse’)

PNG LNG project. These poor policy decisions are a reflection of PNG getting caught up yet again in the “resource curse” after the work in the 2000s to escape. It is in this sense that PNG LNG has not just failed to live up to its promises, but it has also been bad for PNG’s economy because it has allowed PNG to fall yet again into the resource curse – and the rest of the economy is suffering because of this.

5.5. Government over-spending

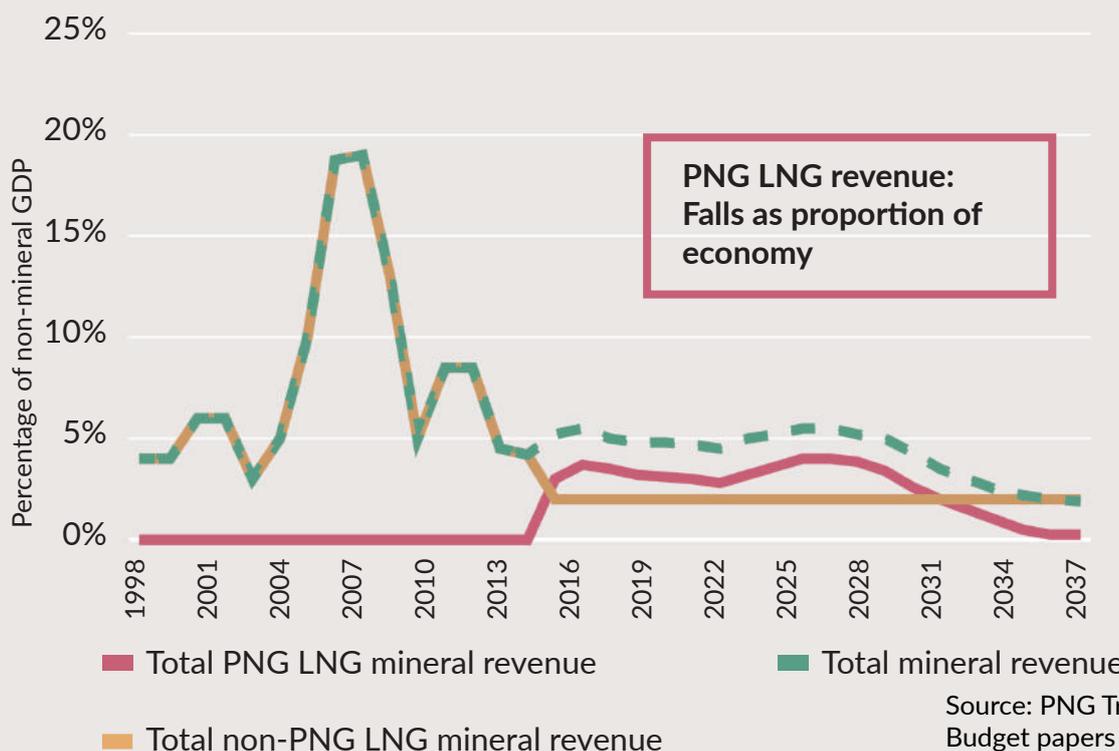
The Government of PNG had a lot of advice in the early years of the project that warned of how serious the consequences of overspending could be. A BPNG/Monash study set out lower expectations of gains, but also made clear that actions such as a “conservative” fiscal policy were important for maximising the

broader economic gains from the project.⁵¹ Governor Loi Bakani of the central bank was also promoting the importance of a conservative fiscal approach.⁵² The Jubilee Australia report on the PNG LNG project also discussed the restraint vs spending dilemma confronting the project.⁵³

The PNG Treasury initially seemed quite aware of the dangers. The revenue estimates it made for 2015 & 2016 in its 2012 Budget papers demonstrated clearly that PNG LNG revenues would only be replacing the lost resource revenues from a decline in mining revenues over the same period.⁵⁴ See also Figure 9 below from those papers.

51. Dixon et. al., ‘Effects on the PNG Economy’.
 52. Loi M. Bakani, *The LNG project and Papua New Guinea's Economy: Presentation at the Consultative Implementation and Monitoring Council*. Port Moresby, 31 March 2010. <https://www.bis.org/review/r110503b.pdf>.
 53. JARC, *Pipe Dreams*, 40-42.

Figure 9: PNG LNG revenues vs total resource revenues



In the PNG Treasurer's 2012 Budget Speech, Don Polye stated:

Mr. Speaker, it is important that our expectations are realistic. Even when we look ahead to beyond 2015 when PNG LNG revenue starts flowing, we see that there will not be as much money as many people think. PNG LNG revenues will be important, but they will simply replace mineral revenue from projects which are winding down or becoming less profitable. Money does not grow on trees, and for all of its importance, the PNG LNG project is not a magic saviour to the PNG economy.⁵⁵

However, when the newly re-elected Prime Minister O'Neill unveiled the 2013 Budget, any move towards pursuing this cautious approach was quickly discarded.⁵⁶ The 2013 Budget moved from the previous approach of largely balanced budgets and slow reduction in government debt to a massively expansionary budget. Expenditure jumped from K9.9bn in 2012 to K13.2 bn in 2013, and then again to K15.6 bn in 2014 – an increase of 57% over two years. The budget deficit jumped from K0.5bn to K3.3bn, from 1.1% of GDP in 2012 to 6.9% of GDP in 2013 and 6.3% in 2014. Deficits have continued just under the 5% level since leading to a massive explosion in debt, and interest costs quadrupling from K0.4bn to K1.6bn – now the largest area of government expenditure other than transfers to Provincial Governments and administration.⁵⁷

At the time, Prime Minister O'Neill did not listen to any of the warning messages from

54. *2012 Budget Volume 1*, 144. When describing the operation of the proposed Sovereign Wealth Fund, the PNG Treasury stated "in 2015 and 2016, all mineral revenues are expected to flow through the proposed Sovereign Wealth Fund and into the budget process for allocation. This is because the level of mineral revenues as a share of non-mining GDP is expected to be below the long-term average."

55. Don Pomb Polye, '2012 Budget Speech: Sharing the Wealth and Empowering Our People' *PNG Treasury Department*, 6 December 2012, 22. This statement was also cited in JARC, *Pipe Dreams*, 41-42.

56. Cust and Mihalyi, 'The Presource Curse'.

“**Money does not grow on trees, and for all of its importance, the PNG LNG project is not a magic saviour to the PNG economy.**

- Don Polye.

key advisors in BPNG and Treasury or even his Treasurer. When talking about the 2013 Budget at an investment conference in Australia, he stated:

The budget is a deficit budget. I make no apology for that, none whatsoever. We are borrowing now certain in the knowledge the revenue inflows from mining and LNG projects will make repayment manageable. I have noted with approval that many analysts have endorsed this strategy.⁵⁸

O'Neill soon dismissed Treasurer Poyle after he raised questions about the legality of Prime Minister O'Neill deciding to borrow \$US1.2 billion to buy a 10% interest in Oil Search - a decision closely related to the PNG LNG project and its equity financing. This poor investment ended up costing PNG at least \$US254m in losses when the interest was sold in 2017.⁵⁹ Such loans were increasingly hidden off-budget, damaging PNG's credibility. Moody's rating agency downgraded PNG's credit rating from four levels below investment grade to five levels below in 2016 (from B1 to B2), and in March 2018, moved them onto a "negative watch" given concerns about the growth in short-term debt. S&P downgraded PNG's

57. The restraint vs spending dilemma that the project was destined to fall into was discussed in JARC, *Pipe Dreams*, 40-42.. The new O'Neill/Abel Government is targeting a medium-term move back to fiscal sustainability but the 16% increase in government spending in the 2018 Budget raises questions as to whether the adjustment is underway

58. Peter O'Neill, 'Presentation: PNG Resource Development--A Foundation for Growth', *Mining and Petroleum Investment Conference*, 4 December 2012.

59. Eric Tlozek, 'PNG Sells Oil Search Stake After Deal Leaves Government Massively Out of Pocket', ABC News, 22 September 2017. <http://www.abc.net.au/news/2017-09-22/png-government-sells-stake-in-oil-search/8976648>.

credit rating on 16 April 2018, only the second S&P downgrade in PNG's history.⁶⁰

5.6. Managing the impact on other sectors

Dealing with the resource curse also means taking actions to make other tradable sectors more competitive in international markets. The vast majority of PNG's rural poor partly rely on income from selling agricultural products such as coffee and cocoa to foreign markets.

PNG's policy on exchange rates is one obvious way in which the expected harm to the agricultural sector could have been minimised, but was not. The Bank of PNG's intervention in the foreign exchange markets from mid-2014, moving the currency away from a market-based exchange rate and to one essentially fixed against the US dollar, has had significant impacts on the competitiveness of the agriculture and manufacturing sectors. The Real Effective Exchange Rate has started moving back upwards since 2016, even though the damaging foreign exchange shortages being experienced by PNG suggests the currency is already overvalued.

From mid-2014, this fundamental shock absorber for countries with large export resource sectors has been undermined. In turn, this has led to massive foreign exchange shortfalls which are now considered by over three-quarters of CEOs in the country as the greatest impediment to business.⁶¹

In addition, the over-valuation of the exchange rate, even above the "resource curse" levels expected from the PNG LNG project, inevitably leads to other political pressures. The manufacturing and agricultural sectors complain that it is hard for them to compete with imports, yet alone build up exports. Over the last year, PNG has moved to a more protectionist approach towards trade.⁶² This has included significant increases in tariffs, a move away from a tariff reduction program and planned increased equity injections into agricultural projects.

5.7. Institutional weaknesses

A final aspect of managing resource revenues is to build and maintain strong economic governance institutions. A well-managed mecha-

60. The first downgrade was in August 2001 during PNG's last major economic crisis

61. James, *PNG 100 CEO Survey 2018*.



Local produce market in PNG

Selling their produce in local markets is an important source of income for rural Papua New Guineans.

Credit: Clive Parabou

nism for the management of revenues is necessary to reduce the pressures for appreciation, manage resource revenue volatility and to prevent funds being siphoned off. Likewise, a strong and independent central bank is important to maintain sound monetary and exchange rate policy, and a strong PNG Treasury to maintain sound budget policy. Unfortunately, weaknesses have crept in to the institutions in PNG that could put a brake on imprudent economic decision-making.

In the early years of the PNG LNG project, there was some hope that creating a Sovereign Wealth Fund (SWF) could ameliorate some of the expected negative macroeconomic effects of the resource sector. In 2012, the PNG Parliament passed a SWF that was a reasonably designed fund which promised improved operations and governance relative to the eventual failure of PNG's first SWF, the MRSF. This initial fund required all resource revenues, including dividends, to flow into the SWF. There was no opportunity for diversion of PNG LNG dividends away from the budget. It consisted of a Stabilisation Fund which aimed to reduce revenue volatility. If resource revenues were above a 15 year average, the excess revenues would be saved until resource revenues dropped again. Funds were held offshore to reduce pressures on the exchange rate. There was also a Development Fund to finance priority development investments, all approved through the annual budget process, equivalent to at least the level of all PNG LNG dividends.⁶³

However, many of these virtues were stripped in the 2014 version that went through Parliament. One key change is that PNG LNG dividends are now paid into Kumul Petroleum, a PNG State Owned Enterprise. There is no

obligation on Kumul to direct all these PNG LNG dividends to the budget – they can be spent on other purposes (such as oil exploration) without budgetary consideration of whether the funds could be better spent on health and education. The withdrawal rule from the Stabilisation Fund is also considered opaque. Rather than a development fund aiming to invest in key development projects, there is a Savings Fund focused on intergenerational issues. Arguably, the latter is not as pressing a priority as taking action now to address PNG's development challenges.⁶⁴

The same trend has been observed when it comes to financial policy more. An independent central bank was created in 1999 as one of the lessons from the 1990s economic crises. However, this role has been increasingly undermined especially in effectively printing money to fund the highest government deficits in PNG's history.⁶⁵ There is also increasing criticism of the reliability of PNG Treasury figures such as PNG's Shadow Treasurer raising questions in March 2018 about the accounting methods used in the 2017 Final Budget Outcome.

62. Loop Business, 'Ling-Stuckey: PNG Families Hit Hard by Nine Hundred Tariff Increases in 2018', 8 January 2018. <http://www.looppng.com/business/families-suffer-govt's-tariff-increases-ling-stuckey-71985>.

63. A good summary of the initial fund is provided on page 166 and pages 173-79 of the 2013 Budget (Government of Papua New Guinea, *2013 National Budget Volume 1*, 2012).

64. The PNG National Research Institute organised two studies of the revised SWF. Both make strong recommendation about needed improvements in the design of the new law, especially around the deposit and withdrawal rules, and calling for changes to "compel the Government's holding companies to make appropriate disbursements; and the need for all mineral and petroleum receipts to be managed by the SWF, without exceptions" D. Osborne, 'Review of the Legislation Establishing the Sovereign Wealth Fund in Papua New Guinea', *The National Research Institute Issues Paper* 16, December 2015. In a similar study, the Professor of Finance at UNSW Satish Chand concludes "The opaqueness of the formula for withdrawals from the SWF is to the cost of transparency that is necessary for public scrutiny and critical to the mitigation of the risks of mismanagement of the SWF that may lead to its exhaustion." Satish Chand, 'Papua New Guinea Sovereign Wealth Fund: The Efficacy of the Withdrawal Formula', *National Research Institute Issues Paper* 17, December 2015.

65. Paul Flanagan, *PNG's Sept 17 Monetary Policy Statement - Printing Money Explanations Not Convincing (October 2017)*. <http://pneconomics.org/2017/10/pngs-sept-17-monetary-policy-statement-2-printing-money-explanations-not-credible/>.

Section 6: Conclusion and recommendations

The PNG LNG project positioned itself, on the back of bullish economic impact projections from ACIL-Tasman, as a major transformational project for the PNG economy. Unfortunately, that has not happened. Resource exports are up, some individuals have gained, but the wider economy has fallen down the “resource curse” path for the third time.

The aim of this study was to compare the projected benefits for the early years of the PNG LNG project with the actual outcomes. The study has found that over the ‘short-term’, outside of resource exports, the project has not delivered any of the outcomes that were predicted in the ACIL-Tasman model.

The only area of the PNG economy that has benefitted from the PNG LNG project is the resource sector itself. This is reflected in strong resource export growth, and an increase in the resource element of GDP. The latter means there has been a 10% increase in GDP relative to there being no project, but this is still much less than the prediction of a near doubling of GDP.

On every other measure of economic welfare (household incomes, employment, government expenditure, imports and every non-resource sector of the economy), the PNG economy currently would have been better off without the PNG LNG project, often drastically so. There were larger indirect benefits during the construction phase, and some individuals and companies have done well, but overall the economy is in a worse situation than if there was no PNG LNG project.

Despite slightly sluggish global gas prices and construction costs blowout, we estimate that revenues should still be K1.4 billion per year in the past few years. Instead, they were only

The only area of the PNG economy that has benefitted from the PNG LNG project is the resource sector itself. This is reflected in strong resource export growth, and an increase in the resource element of GDP.

about one-third that level in 2016. This is difficult to explain other than noting the very favourable tax regime/fiscal terms given to the project, and the adoption of aggressive tax avoidance measures by the companies involved.

This enormous gap between almost all predictions by the ACIL-Tasman analysis and the actual outcomes has two key components. First, there is a “broken promises” gap – the tendency for what are now clearly “too good to be true” claims of massive benefits above the underlying growth path. Gains of 20 or 30 per cent might have been understandable, but the ACIL-Tasman model constantly made claims of gains of over 80 per cent. This gap results partly from excessively optimistic economic modelling as well as lower than expected revenues payments coming from the companies to the government and landowners.

The second gap is that the PNG economy is generally performing worse than its underlying growth path. When examining the government’s policy decisions from around 2013 on the budget, monetary policy, exchange rate policy and supporting strong institutions, PNG has slipped into the known traps of the “resource curse”. This is the “resource curse gap”, the economic underperformance associated with not handling issues around major resource projects.

The PNG LNG project represents the third

There is a need for the PNGGEM to be made more transparent and independently peer reviewed and updated. PNG deserves a better tool to help inform future policy decision-making.

major phase of PNG's resource curse and potentially its most damaging. PNG's resource sector is actually not that large – averaging only about 15% of the economy and taxes, and only 0.4% of employment since 1980. The benefits of this resource wealth could in theory be able to be tapped without damaging the rest of the economy. But it would require very different choices by the PNG's policymakers.

Going forward, PNG should be more cautious in trusting the results of a CGE model. As the ACIL-Tasman report even indicated “it is important not to interpret the modelled outcomes as forecasts or accurate estimates of the size of the economic impacts.” It is then surprising that the report proceeded to do so. It is especially surprising as such models are considered better dealing with smaller policy changes than a massive once-off shock such as a major new gas project. In addition to this caution, there is a need for the PNGGEM to be made more transparent and independently peer reviewed and updated. PNG deserves a better tool to help inform future policy decision-making.

6.1. Recommendations to the government of PNG

If PNG were to embark on any future resource projects, including especially the major LNG expansions being considered, it should not do so unless the lessons learned from this experience are digested and new institutional frameworks adopted.

1. PNG should return to more inclusive development policies while better managing the resource curse. There is a need to address the overvalued exchange rate, ensure the new medium-term fiscal plans are im-

plemented in a transparent fashion, and re-design the SWF to ensure all resource revenues flow to the budget.

2. PNG should establish a clear policy framework for all future resource projects (and extensions) that ensures PNG gets a better and earlier share of the resource pie than current agreements.⁶⁶ No new resource projects should be approved until this framework is completed and publicly released.
3. Projects should not be approved without the production and release of a transparent, verifiable, contestable and independent economic modelling by the government; this modelling should include a completely new PNGGEM model independent of current authors that includes net costs to the budget.
4. PNG should urgently clarify some of the confusing figures in the most recent EITI reports that royalties and development levies paid by ExxonMobil are not being received, and explanations provided as to why the level of what should be identical payments are so different.

6.2. Recommendations to the government of Australia

Australia also bears significant responsibility for the economic disappointments of the PNG LNG project. Australian economic consultants produced the widely inaccurate forecasts that gave false hope of the people PNG that this project would bring them prosperity. Australian tax laws encourage the companies involved in this project, many of whom have significant operations in Australia, to participate in aggressive tax avoidance. And last but not least, the Australian Government directed its export credit agency to lend to the project at least partly on the assumption that it would

66. For examples see Bogan, *PNG Tax Review* and 2017 Article IV Consultation PNG' December 2017, 8.

Australia also bears significant responsibility for the economic disappointments of that the PNG LNG project.

benefit PNG—and yet the advice that led to this decision remains secret. The funding was provided in a policy context where PNG was not following its own local laws – this is a troublesome context to commit Australian taxpayer funds and should not be repeated.

1. The Australian government should develop a code of conduct for economic modellers as recommended by the Australia Institute. This would include requirements such as discussion of assumptions used, a declaration of authorship and a requirement that authors take responsibility for the plausibility of the results and the appropriateness of the presentation, including by those who commissioned the work– this includes work by modellers for the PNG economy.
2. The Australian Government should immediately release the 2009 National Interest Assessment by DFAT which it provided to the Trade Minister recommending Efic support for the PNG LNG project. It should also compel Efic to immediately release all risk analysis it has compiled in connection to the project.
3. The Australian Government should require that any further investments by Efic on the national interest account are taken in the context of ensuring that local law has been followed (such as land ownership determination before construction begins as required under PNG’s Oil and Gas Act).
4. The Australian Government should crack down on the use of tax havens.

Appendix 1: The ACIL-Tasman analysis and PNGGEM

The ACIL-Tasman Computable General Equilibrium (CGE) model focuses on the production phase of the project. PNG LNG production began in May 2014, with 2015 as the first full-year of production. For the purposes of the comparative static analysis used in ACIL Tasman's model, the "Short-run" is considered about 2 years, and the "Long-run" as 5-10 years. The model's "Short run" estimates can then be compared to actual outcomes in 2016. The model is based around assessing the impacts on the rest of the economy if there was a 440% increase in oil and gas exports from the production phase. This 440% increase is the "shock" applied to the CGE model. Hydrocarbon exports from PNG in 2013 were valued at K2 billion, slightly down from the K2.4 billion ten year average.⁶⁷ Export values increased to K9.2 billion in the partial year of new gas exports in 2014 (a 350% increase), then K12.3 billion in 2015 (a 500% increase) and then dropped slightly to K11 billion in 2016 (a 440% increase from 2013). These changes are very close to the 440% shock driving the model, so it is reasonable to compare model predictions with the actual outcomes of 2016.⁶⁸ The accurate prediction of a 440% increase in the value of gas and oil exports means that the fall in oil prices from 2014 actually does not explain the gaps between the model's predictions and outcomes.

The model is based on underlying growth paths for the economy. It then makes predictions of how this 440% gain in hydrocarbon export values due to the PNG LNG project flows through the rest of the economy. The predictions are expressed as percentage changes from the underlying growth path. Both short-run (about 2 years) and long-run (5 to 10 year) predictions are made.

The ACIL Tasman report does include some caveats about the nature of the model. For example, the report states on page 30 that "it is important not to interpret the modelled outcomes as forecasts or accurate estimates of the size of the economic impacts. What is more meaningful about the analysis is that it helps to identify the industry sectors that stand to benefit from the project, and those that are potentially disadvantaged, thereby allowing policy makers to focus on how best to manage these impacts."

However, the report then immediately goes on to give figures on the order of magnitude of those impacts and then states: "The modelling highlights the fact that the proposed LNG project will have a massive impact on the PNG economy. The following statistics provide a sense of the order of magnitude of the project's impacts."⁶⁹

Issues with the model are discussed in Section 5.1.

67. Bank of Papua New Guinea, Quarterly Economic Statistics Table 8.2, 10 March 2018.

68. The increase in the Oil and LNG sector as measured by the National Accounts was even larger – in comparison to 2013 (the latest year prior to production) the sector has grown by 500% in nominal terms and 530% in real terms compared to the average of returns between 2014 and 2016. This means the comparison is being somewhat conservative – even larger benefits could have been expected to flow if these higher GDP figures were used.

69. ACIL-Tasman, 'Economic Impacts of the PNG LNG Project', 30.

The ACIL-Tasman model is still being extensively used in PNG and it continues to produce very unreliable and upbeat results. The model is now called the Papua New Guinea's General Equilibrium Model, or PNGGEM. The model is described in the 2011-2015 Medium-Term Development Plan (MTDP) as "the Government's high-tech model of the PNG economy".⁷⁰ It was used as the basis also for the 2010-2030 Development Strategic Plan (DSP) and Vision 2050, two other key planning documents in PNG. It was also used as the basis for three discussion papers over 2015 and 2016 at the National Research Institute.

70. In fact, it is described this way on 5 occasions starting under Graph 1.1. (National Planning and Monitoring, 2010).

Appendix 2: Method used for this analysis

What was the key challenge in analysing the ACIL-Tasman predictions?

The predictions from the ACIL-Tasman model were not specific figures such as the Kina size of GDP or the actual number of jobs generated across the entire PNG economy. If they were, they could be directly compared to actual figures from PNG government data. Rather, the ACIL-Tasman predictions from their CGE model are described as “Values expressed as percentage changes from the underlying growth path.” Just percentages were provided: actual numerical estimates for the underlying growth path used by ACIL-Tasman were not available. Therefore, this study was required to make its own estimate of the “underlying growth path” and what value this would have been in 2016--on the assumption that it would likely have been similar to the path calculated by ACIL-Tasman. Fortunately, this type of trend analysis is relatively simple.

What data was used?

The latest sources of consistent data from the PNG Government for the relevant indicator was used not only to source the actual 2016 figures, but also to provide the data on which the underlying growth path was calculated.

For the GDP figures in Table 1, we used the relevant National Statistics Office National Accounts tables. As this information was only consistently available from 2007 to 2014, they were supplemented with PNG Treasury estimates for 2015 and 2016 contained in Table 1 of Appendix 3 of the 2018 Budget Volume 1. This was the same source for all the sectoral indicators in Table 4. As PNG no longer collects information on household income, the closest proxy was to use non-resource GDP and this was obtained in the same way as other National Accounts information.

For most of the other figures in Table 1 (such as employment and balance of payments (exports and imports), Bank of PNG data was used which was available from 2005.

How were underlying growth path figures calculated?

The underlying growth paths figures were calculated, depending on available information, on either the 5-year period 2005 to 2009, or the shorter 3-year period 2007 to 2009 for GDP based calculations (as consistent National Accounts data does not go back to 2005). When calculating the underlying growth path for figures expressed in Kina, all prices were converted into 2016 values using GDP deflators where available (including for total exports) or CPI in the case of government expenditure, agricultural exports (where no separate GDP deflator was available and imports). Either 3 or 5-year averages have been made (depending on what data is available) to determine underlying real growth rates (this helps deal with one-off events in particular

years). These average real growth rates were then applied to a base year. When 2005 to 2009 data was available, this base year was 2007 and was the average of 2005 to 2009 data. When only 2007 to 2009 data was available, the base year is 2008 and was an average of the 2007 to 2009 period.

The underlying growth path figures were calculated prior to the construction phase of the project in 2010, otherwise the underlying growth path could be artificially inflated by the project itself. Although there was some preliminary work going on during the 2000s (as there had been around the gas fields for more than a decade), there was no clear step-up in economic activity until 2010. This is confirmed by import data on goods and services which stayed at similar levels throughout the 2007 to 2009 period, before increasing from K13bn to K17bn in 2010.

Some of the indicators (such as employment) are based on indexes, so there was no need to convert these to 2016 values. Calculating real export growth was more challenging given the impact of fluctuating commodity prices. To get around this, the export values were converted into 2016 prices by using the relevant deflators from the national accounts.

Calculating underlying growth path

The following table shows the estimates used for determining the underlying growth path for all analysis in this study. A more detailed example is provided in section 2.2 of the text for GDP. Similar graphs can be generated for all the underlying growth analysis. For some of the data, there is a mismatch between the tables in the ACIL-Tasman analysis and what is available from PNG Government sources. For agricultural exports, the model dealt with 8 categories so the average of these 8 categories were used when comparing to PNG Government statistics for agricultural exports - more specifically 2005-2009 data from BPNG. For manufacturing, 5 sub-categories were covered in the ACIL-Tasman model and the average of these have been compared to the PNG Government's aggregate manufacturing data for 2007-2009 from NSO.

In coming to the 2016 underlying growth figure, the following simple formula is used:

2016 underlying growth figure = (late 2000s average figure) times $(1 + \text{late 2000s average growth figure})^n$ where n is the number of years between 2016 and either 2007 or 2008 depending on the data – so either 8 or 9 years of compounding growth. All the GDP figures are in 2016 prices.

In the case of GDP, for example, the formula is:

2016 underlying growth figure for GDP = K42.3bn * $(1 + .0477)^8$ = K61.4bn

TABLE 5: ESTIMATES USED FOR DETERMINING UNDERLYING GROWTH PATH

	Years	Unit	Base value	Growth rate	2016 underlying growth estimate	2016 actual	ACIL-Tasman prediction	ACIL-Tasman prediction %	Actual relative to underlying growth %
Macro-economic (Table 2 in ACIL-Tasman report)									
Real aggregate foreign currency exports	2005-09	K billions	15.3	-2.5%	12.2	26.1	25.1	106.0%	114.3%
Real GDP	2007-09	K billions	42.3	4.8%	61.4	67.8	120.7	96.6%	10.4%
Household disposable income (proxy non-resource GDP)	2007-09	K billions	35.9	5.3%	54.4	51.1	100.1	84.2%	-5.9%
Total government expenditure	2005-09	K billions	11.1	7.2%	19.9	13.6	36.9	85.3%	-31.8%
Aggregate employment	2005-09	Thousands	295	6.4%	515	376	732	42.2%	-27.0%
Real aggregate foreign currency imports	2005-09	K billions	19.4	7.2%	36.4	9.9	57.5	57.7%	-72.9%
GDP sectors (Table 3 in ACIL-Tasman report)									
Health	2007-09	K millions	850	10.5%	1889	1261	3480	84.2%	-33.2%
Education	2007-09	K millions	1146	8.3%	2169	1866	3991	84.0%	-14.0%
Govt admin	2007-09	K millions	2150	5.7%	3348	3312	6154	83.8%	-1.1%
Electricity	2007-09	K millions	409	5.4%	622	609	935	50.3%	-2.1%
Financial services	2007-09	K millions	1465	8.5%	2815	1703	4014	42.6%	-39.5%
Transport	2007-09	K millions	1004	5.8%	1576	1437	1975	25.3%	-8.9%
Construction	2007-09	K millions	2950	10.6%	6621	5391	7918	19.6%	-18.6%
Manufacturing	2007-09	K millions	1215	5.4%	1846	1417	2204	19.4%	-23.2%
Commerce	2007-09	K millions	5594	4.3%	7854	6847	8655	10.2%	-12.8%
Mining	2007-09	K millions	5370	9.1%	10806	5553	10712	-0.9%	-48.6%
Agricultural exports	2005-09	K millions	2980	3.7%	4135	2478	3320	-19.7%	-40.1%

Notes: All Kina prices are in 2016 prices. Government information is not available on some of the ACIL-Tasman predictions (such as investment and consumption)

Abbreviations

ADB	Asian Development Bank
BPNG	Bank of Papua New Guinea
CGE	Computable General Equilibrium (A type of economic model)
CPI	Consumer Price Index
DFAT	Department of Foreign Affairs & Trade (Commonwealth of Australia)
IMF	International Monetary Fund
GDP	Gross Domestic Product
GST	Goods and Services Tax
Efic	The Export Finance Insurance Corporation
EITI	The Extractive Industries Transparency Initiative
K	Kina (PNG Unit of Currency)
LNG	Liquified Natural Gas
MRSF	Mineral Resources Stabilisation Fund
MTDP	Medium Term Development Plan
NSO	National Statistic Office
PNG	Papua New Guinea
PNGGEM	PNG Generalised Equilibrium Model
SABL	Special Agricultural Business Lease
S&P	Standard & Poor—Credit Rating Agency
SWF	Sovereign Wealth Fund
UBSA	The Umbrella Benefits Sharing Agreement

