

How long will the Petroleum Fund carry Timor-Leste?

By Charles Scheiner, October 2013 ¹

Abstract

Oil and gas currently provides more than 96% of Timor-Leste state revenues and four-fifths of GDP. Income from exporting non-renewable petroleum wealth is channelled through a Petroleum Fund which already contains US\$14 billion. Many expect that the Fund's balance and investment earnings will pay for state activities after the oil and gas fields are exhausted, which could be by 2025 if the Greater Sunrise project remains stalled. Unfortunately, the Petroleum Fund may be empty by then.

La'o Hamutuk has developed a model to estimate how long the Petroleum Fund can finance state activities. The model incorporates historical and projected data, including recurrent and capital spending, domestic revenues, loans and repayment, petroleum income, and return on Petroleum Fund investment. It allows changes to these parameters as well as to anticipated oil market prices, interest rates and Sunrise development options.

The prospect that the Petroleum Fund could be gone in a decade underscores the urgency to develop Timor-Leste's non-oil economy, increase domestic revenue and use public funds wisely.

Oil and gas currently provide 97% of Timor-Leste's state revenues² and 81% of GDP (RDTL DGS 2013). Income from exporting non-renewable petroleum wealth is channelled through the Petroleum Fund, which recently attained US\$14 billion. Many believe the Fund will pay for state activities after the oil and gas fields are exhausted, which could happen within 12 years, but the Petroleum Fund may be empty by then.³ Timor-Leste has only one or two decades to use its finite oil resources to underpin long-term prosperity and development.

As in all countries, decision-makers in Timor-Leste need solid information to develop sound policies. Aspirations are essential, but planning should not rely on unrealizable dreams. This paper describes a model that estimates how long the Petroleum Fund will be able to finance state activities. The model incorporates historical and projected data, shows the effects of external factors and policy decisions, and tests different assumptions.

When Timor-Leste's state revenues can no longer cover expenses, the nation will enter an 'austerity' phase, with drastic implications for the state and its citizens. This model explores when that will happen and how severe it will be, but not which essential services will be cut.

Petroleum Dependency and the Resource Curse

Timor-Leste is extremely petroleum-export-dependent because its non-petroleum economy is tiny compared with its transient oil and gas reserves. Although 19% of Timor-Leste's economy is 'non-petroleum,' about half of this is re-circulated oil and gas money disbursed by the State. When the wells run dry, this will halt too.

Timor-Leste's economy and politics are typical of the 'resource curse' (Neves, 2013). In addition to high inflation, growing foreign debt and neglect of non-petroleum sectors, the country has a 96% trade deficit (RDTL DGS 2013a). Until recently, its state budget was one of the fastest-growing in the world. Half of state expenditures pay foreign contractors to build infrastructure, while investing in human resources – health and education – is far below international norms. Public money pays for overseas education and health care so a select few can escape inadequate local services.

Timor-Leste does not have enough oil and gas to sustain the country for very long. If the non-oil economy hasn't developed when it runs dry in half a generation, poverty will increase far beyond the current 50%.

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² During 2012 Timor-Leste received \$3,559 million from oil and gas revenues, \$401m from investing the Petroleum Fund (RDTL MoF 2013), and \$136m in other income (RDTL MoF 2013a).

³ Timor-Leste has two producing oil fields. Kitan will end production in 2016 and Bayu-Undan will cease in 2024 (RDTL MoF 2013b). If the political uncertainties currently preventing development of the Greater Sunrise field are resolved, that field could provide revenues to Timor-Leste for 25-30 more years, of the same magnitude as Bayu-Undan.

Sustainable budgeting is not a new idea in Timor-Leste

In 2011, Ministry of Finance advisors wrote:

Policies are fiscally sustainable if: *there is enough money to pay for expenditures in the long term. The Government is not going to run out of money in the future.*

Policies are fiscally unsustainable if: *expenditure is too high to be paid for in the long term. At some point in the future the Government will run out of money and will have to sharply reduce expenditure (RDTL MoF 2013c).*

Fiscal sustainability has been discussed here since before the Petroleum Fund was floated in 2004 (La'o Hamutuk 2005a; La'o Hamutuk 2013). The Fund's 'Estimated Sustainable Income' (ESI) rule aims to continue revenue from investments after the oil is exhausted. La'o Hamutuk explained the need while the Fund was being designed:

Our petroleum wealth will have been entirely transformed into money before the middle of this century. If we have not saved and invested it wisely, preparing for our post-petroleum future, our grandchildren's children may endure worse poverty, unemployment, maternal mortality, illiteracy, disease and lack of services than we live with today. This is the experience of people all over the world.... (La'o Hamutuk 2005)

Unfortunately, the ESI is non-binding;⁴ it was violated from 2008 through 2012.⁵ Fiscal sustainability and inter-generational equity are often invoked by officials, but suggestions for a stronger effort (UNDP 2011; Scheiner 2011; La'o Hamutuk 2012; *Petroleum Economist* 2013) are usually unwelcome (RDTL Spokesperson 2011; RDTL Spokesperson 2013). Nevertheless, the World Bank recently made it a focus of its country partnership strategy (World Bank 2013).

In May 2013, the Ministry of Finance held public workshops on 'Yellow Road'⁶ scenarios for fiscal sustainability (RDTL MoF 2013d). Although they reach similar conclusions to this paper, their recommendations are impractical. Nevertheless, the Government tried to limit 2014 appropriations to \$1.2 billion, but the budget process raised them to \$1.5 billion even before public debate started (La'o Hamutuk 2013b).

Methodology

This model described in this paper defines four main scenarios. Its predictions are not precise because nobody can accurately predict oil prices decades from now. Varying inputs to these scenarios can demonstrate the effects of marginal changes.

The model takes an engineering approach: explicit assumptions and clear causal relationships (e.g. higher world oil prices lead to increased oil revenue and higher-cost generator fuel). It avoids correlations (e.g. building infrastructure results in GDP growth). It does not estimate macroeconomic indicators like GDP, inflation, poverty or trade balance, but simply projects state income and outgo.

What the model produces

The spreadsheet uses history from 2008 through 2011, Ministry of Finance estimates for 2012 and MoF projections for 2013 (from the 2013 State Budget). For 2014-2066, it makes annual calculations based on the previous year and certain assumptions, yielding the following:

- Government spending for the year, disaggregated into: salaries, transfers, generator fuel, infrastructure operation & maintenance, other goods & services, minor capital, development capital and debt service.

⁴ The ESI rule has weakened over time from Executive interpretation, legal revision and less prudent oil price projections.

⁵ The \$1.65 billion 2013 State Budget withdraws only the \$0.79b ESI from the Petroleum Fund because much more was withdrawn during 2012 than the government could spend (La'o Hamutuk 2013a). The \$1.50b 2014 State Budget will almost certainly exceed ESI (La'o Hamutuk 2013b).

⁶ Timor-Leste's Government has held internal 'Yellow Road' workshops since 2009, but opened them to the public this year. The meaning of the phrase is unknown, although it uneasily recalls the 'Yellow Brick Road' to the sham Wizard of Oz.

- Government revenues for the year, disaggregated into: electricity revenue, taxes the Government pays to itself,⁷ other non-oil taxes and fees, Petroleum Fund withdrawals and loans received.
- Petroleum Fund receipts from Bayu-Undan/Kitan, Sunrise oil, Sunrise gas upstream and Sunrise gas downstream.
- Return on Petroleum Fund investments.
- Based on the above, it calculates outstanding debt, surplus (saved in the Petroleum Fund) or deficit (the severity of 'austerity' spending cuts), Petroleum Fund balance and ESI.

In addition to numbers, the model produces summary, revenues and spending graphs. Calculating is done in dollars-of-the-day, but the graphs can adjust for worldwide inflation.

What the model takes in

The model includes three worksheets:

1. **Petroleum revenues.** Deriving annual revenues from Bayu-Undan, Kitan and Greater Sunrise, based on the following inputs:
 - World crude oil market prices, using the US Energy Information Administration (EIA)'s West Texas Intermediate (WTI) or Brent spot price projections (US EIA 2013).⁸ Users can choose among low, reference and high cases in five increments.
 - Most petroleum income after 2022 will have to come from Sunrise natural gas, but the value of gas is dropping as non-conventional sources come online (Hofman, 2013, 9). EIA projects gas prices for the US market, not global LNG. Therefore, the model uses a long-term gas price equal to one-third (or another ratio) of the value of oil with the same energy content.
 - Bayu-Undan (B-U) has long-term LNG contracts indexed to oil prices, so the model doesn't project gas prices for B-U. However, the model allows enlarging the B-U reserve, which would extend its production.
 - The model also considers when the Sunrise project will be developed, whether its gas will be piped to Timor-Leste, the amount of recoverable gas, and how extraction revenues are divided between Timor-Leste and Australia.⁹
2. **Borrowing and debt service.** Loans are included in state revenues, and debt repayments are included in state expenditures.
 - The model includes \$149 million in contracted loans from the ADB, Japan and the World Bank, and can include \$143 million in other loans listed in the 2013 State Budget.
 - It allows other loans which are not yet decided, including for additional roads and the Tasi Mane Project (Suai Supply Base, highway and refinery, but not the pipeline/LNG plant -- the oil companies should pay for that). Amounts, interest rates and repayment periods can be specified.
 - Timor-Leste might borrow to try to close the budget deficit and hold off austerity. One can specify the date, loan amount, interest rate and repayment period.
3. **The State Budget.** Based on the information above and other inputs, the model calculates annual revenues and expenditures. A few assumptions and relationships are built in, but the following parameters can be changed:
 - Rate of return on investing the Petroleum Fund (simplified as a fixed percentage over time).

⁷ 'Domestic revenue' includes import and corporate taxes paid by Government contractors which are charged against the cost of the contract. In 2012, this comprised about one-fourth of the money taken in from non-oil, non-electricity taxes and fees.

⁸ In the 2013 State Budget, Timor-Leste used WTI price projections from the US EIA Annual Energy Outlook 2012. The Ministry explained that although prices for Brent (European) Crude were closer to what Timor-Leste gets, EIA did not publish high and low cases for Brent. The subsequent 2013 EIA report (US EIA 2013) shifted to Brent, and we expect that the TL Government will also. This model primarily uses Brent, allowing WTI 2012 and 2013 as options.

⁹ Under the current Certain Maritime Arrangements in the Timor Sea (CMATS) Treaty with Australia, Timor-Leste will get 50%, but if CMATS is terminated, TL will get only 18% under the International Unitization Agreement (IUA). However, if a boundary is established under international legal principles, TL will own 100% of Greater Sunrise (La'o Hamutuk 2013c).

- Percentage of electricity generation fuel cost recovered from ratepayers by EDTL, the state electricity agency (currently 12%).
 - Other domestic revenues (taxes and fees). Annual rate of increase can be specified for 2014 and 2030; the model interpolates for 2015-2029.
 - Expenditure to maintain physical infrastructure, as a percentage of the total capital investment.
 - Expenditure to build specific mega-projects (Tasi Mane Project components, Dili Airport and Tibar Port).
 - Recurrent expenditures (salaries, transfers, non-fuel goods & services, minor capital). These are given the same percentage increases, specified for 2014 and 2030; the model interpolates.
 - Discount rate for petroleum revenue (for estimating ESI).
4. Some other assumptions are hard-coded, but could be tested in the future:
- Tax revenues from Government imports (3-4%, see note 7).
 - Annual expenditure on unspecified capital projects (\$450m in 2013, increasing with global inflation).
 - Electricity usage per citizen (estimated to double between 2013 and 2032).
5. In addition to these formula-based projections, the model explores sustainable scenarios from the 'Yellow Road' (RDTL MoF 2013d; RDTL MoF 2013e) and elsewhere:
- a) MoF sustainable spending for 2013-2014; use formulas after that.
 - b) MoF sustainable expenditures for 2013-2030 (RDTL MoF 2013e, slide 18).
 - c) Spend only ESI and domestic revenues.
 - d) Spend ESI and domestic revenues for recurrent costs, additional spending allowed for new capital investment.
 - e) Spend ESI and domestic revenues for recurrent costs, additional spending allowed for new capital investment and to maintain existing capital.

Only Scenario (b) is truly sustainable, but (d) or (e) might last long enough to develop the non-oil economy.

Results

In each graph below, text at upper left summarizes the assumptions, while the box at upper right summarizes the outcomes. The vertical scale is in millions of US dollars, and the horizontal axis shows years from 2008 to 2040, although the underlying calculations go through 2066. All dollar amounts in the graphs and tables are in dollars-of-the day. The background turns red during austerity -- when desired spending exceeds available money.

The **Reference Case** is a best estimate of recent history with a few plausible improvements. It is not prudent enough for planning purposes, but is an optimistic base to compare with other scenarios. It makes hopeful assumptions for oil prices and Petroleum Fund investment return, and expects Sunrise gas to be piped to Timor-Leste. It assumes only contracted and budgeted loans and that the Suai Supply Base and South Coast Highway will be built, but not the refinery. Under this scenario, Timor-Leste cannot finance its full budget after 2028, and will have to cut 61% of desired spending starting in 2030.

Figure 1. Reference Case summary

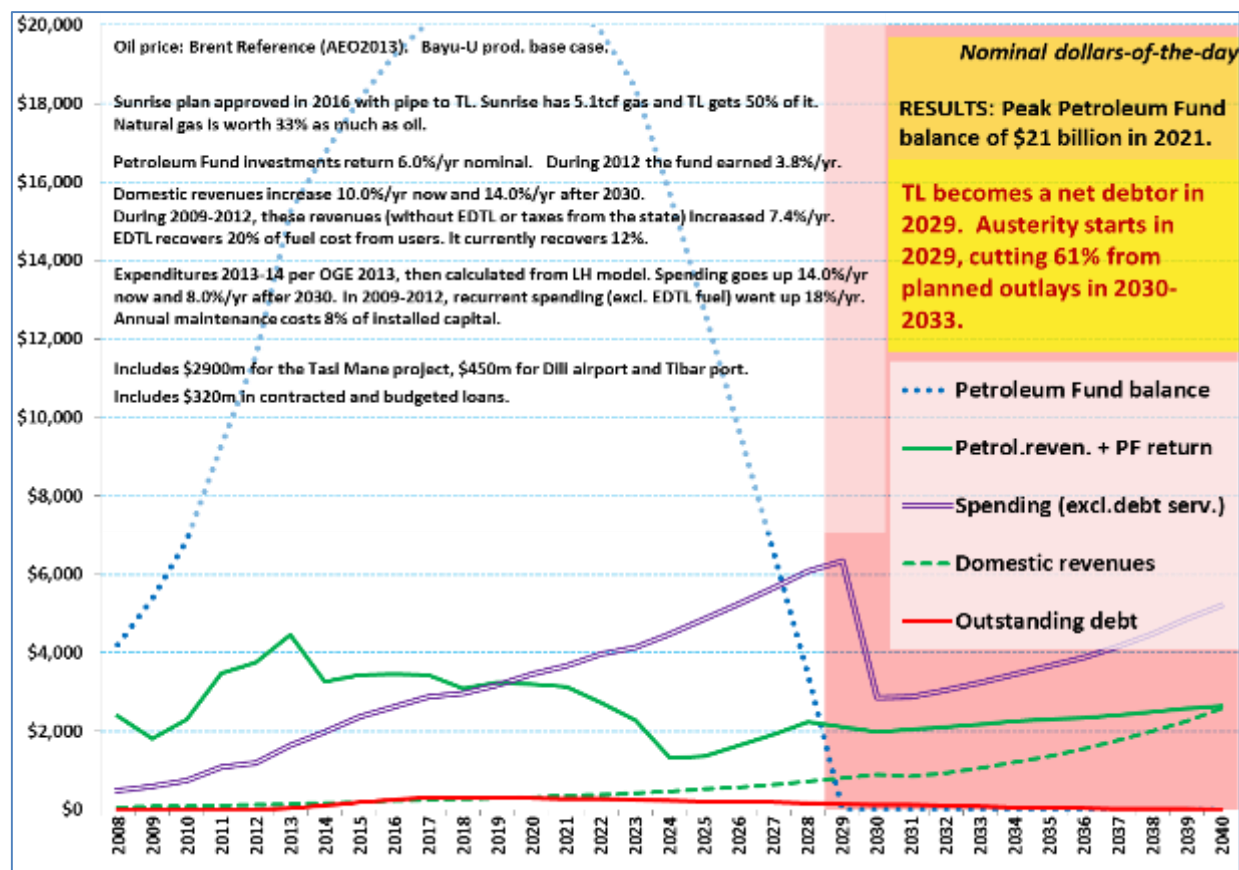


Figure 2. Reference Case spending

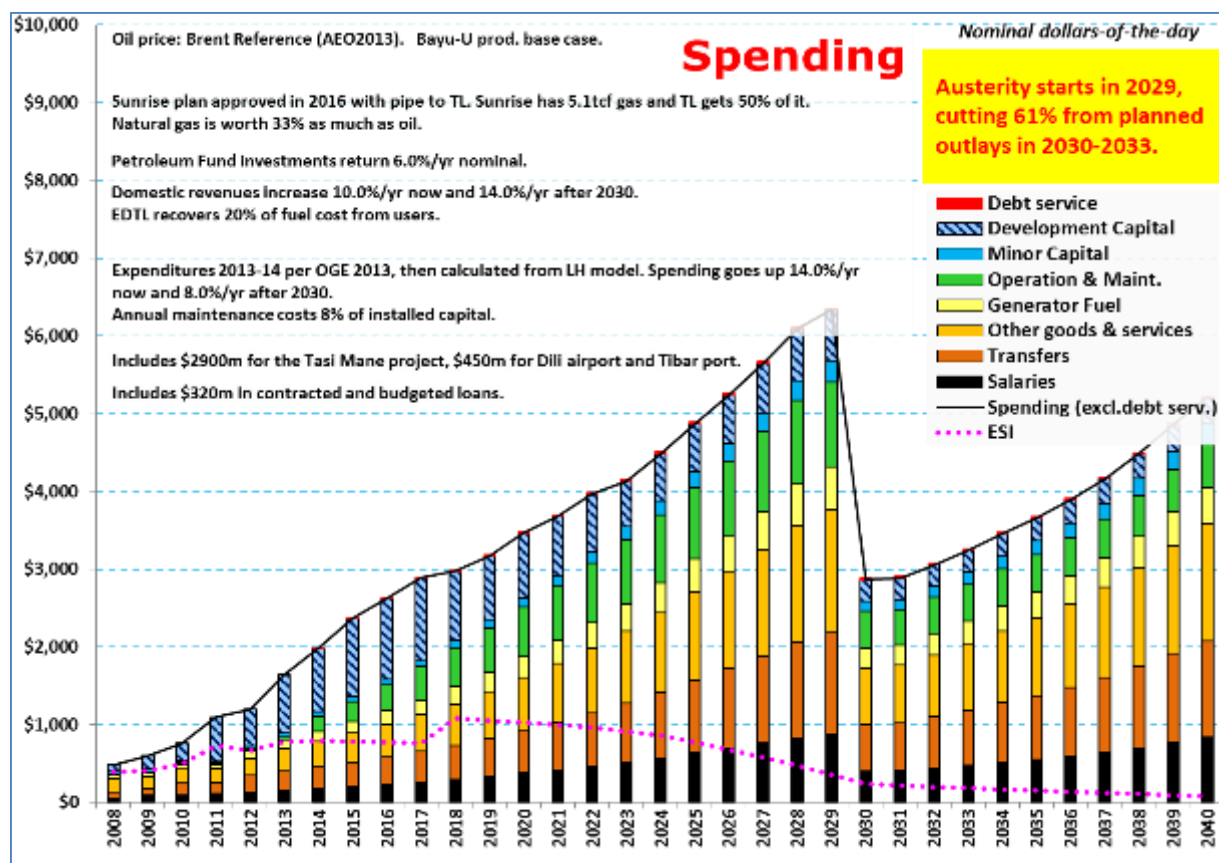
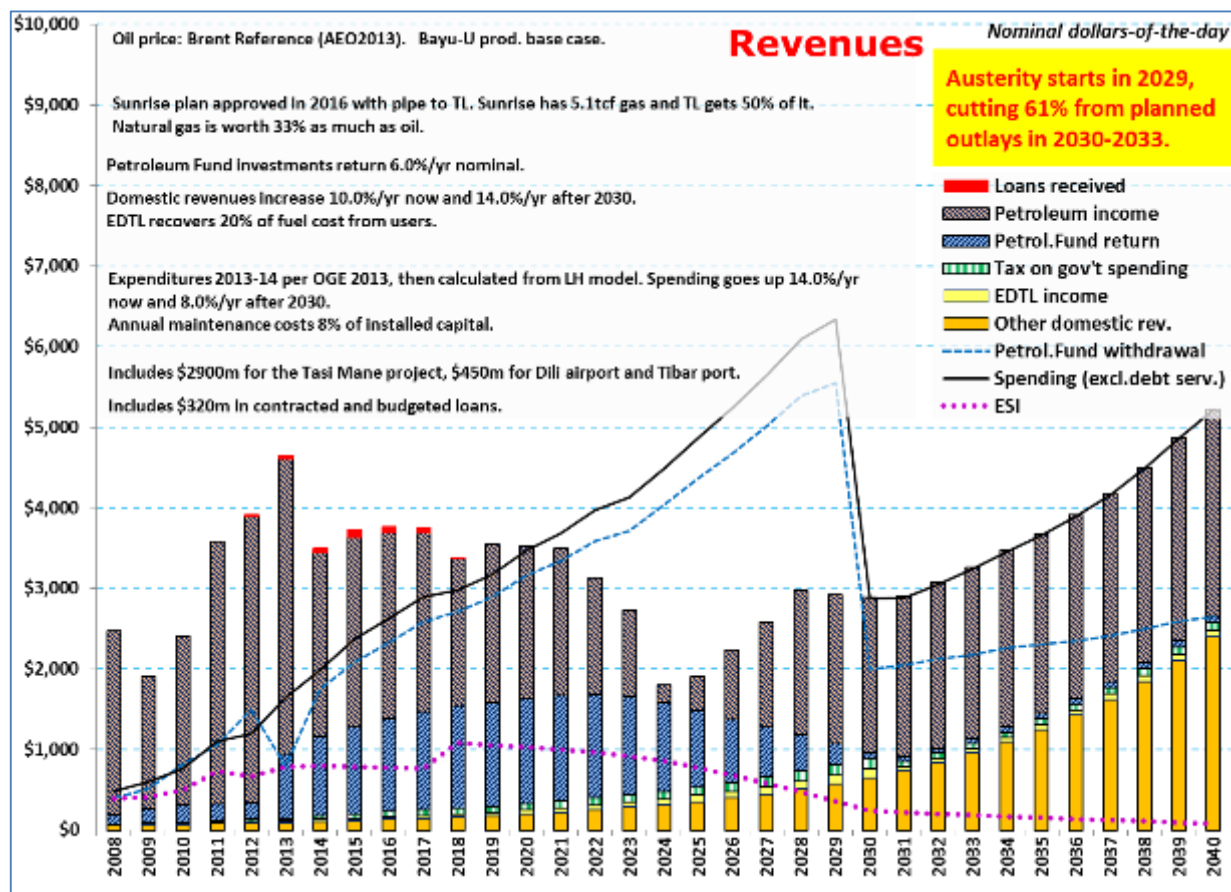
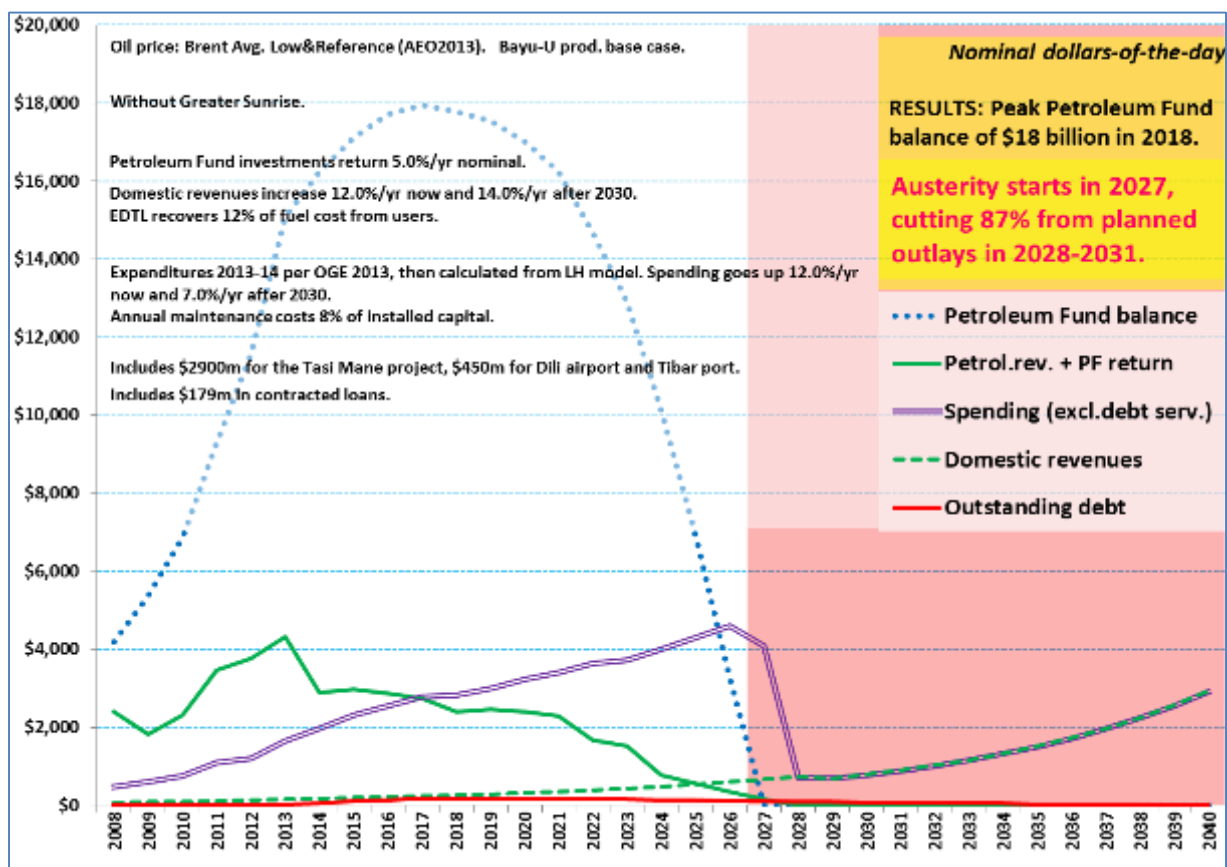


Figure 3. Reference case revenues



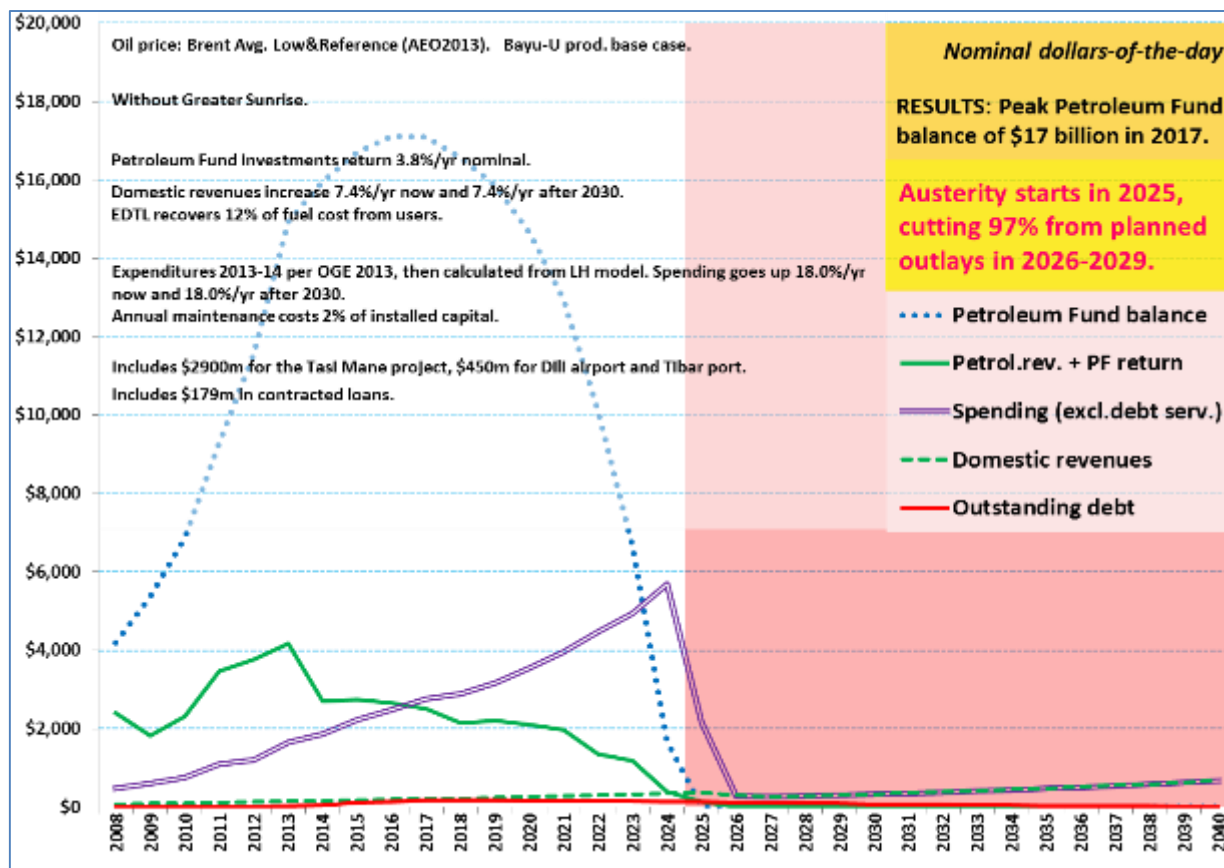
Estimating too high is more dangerous than being too cautious, as it can led to irreversible neglect (malnutrition, uneducated children, death). For planning purposes, we define a **Prudent Case**: lower oil prices, more conservative investment returns, no Sunrise project, lower non-oil revenues and higher state expenditures. Austerity comes two years earlier than the **Reference Case**, with much deeper cuts.

Figure 4. Prudent Case summary



The previous cases assume that budgetary discipline will improve in the next few years. If it does not – if revenues and expenditures grow at 2011-2013 rates – this **Recent History** scenario will occur, with austerity in 12 years and almost no money after that.¹⁰

Figure 5. Recent History scenario summary



It is difficult to envision a scenario which does not hit a brick wall within a generation. The Ministry of Finance's 'Yellow Road' demands immediate salary and other unachievable cuts, and expects the GDP to continue double-digit growth while the state budget shrinks, which is unlikely.

However, there is a way for Timor-Leste's Petroleum Fund, known reserves and fiscal discipline to carry the country for nearly 40 years, enough time for a strategic, concerted effort to develop non-oil revenues and economic activity. This **Almost Sustainable Scenario** involves cancelling most of the Tasi Mane Project, eschewing further borrowing, accepting floating LNG for expeditious Sunrise development, and limiting recurrent spending (salaries, transfers and goods & services) to the Estimated Sustainable Income plus domestic revenues. Spending above this level would be permitted for construction and maintenance of essential capital infrastructure. In this scenario, the budget in 2025 is about half of the **Reference Case**.

¹⁰ The **Recent History** scenario spends 2% of the value of capital infrastructure annually on Operation and Maintenance (O&M), approximately the amount budgeted in 2012-2013. Such neglect will drastically shorten the life of infrastructure, requiring premature and expensive replacement, and these additional costs are not in the model. Because of planners' consensus that infrastructure must be maintained, all other scenarios in this paper allocate 8% for O&M, as envisioned by the Ministry of Finance (RDTL MoF 2013c). If 8% were spent in this scenario, austerity would hit a year earlier, in 2024.

Figure 6. Summary of 'Almost Sustainable' scenario

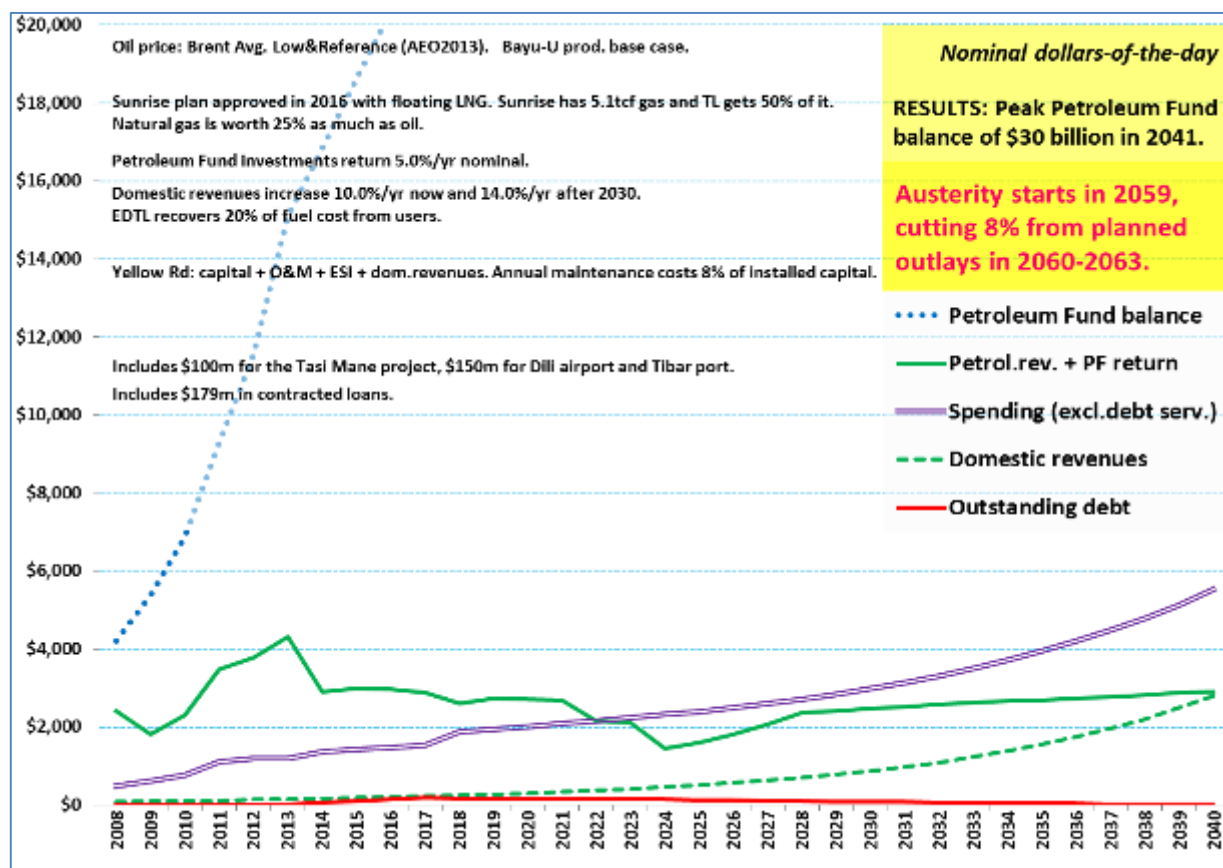


Figure 7. Revenues in 'Almost Sustainable' scenario

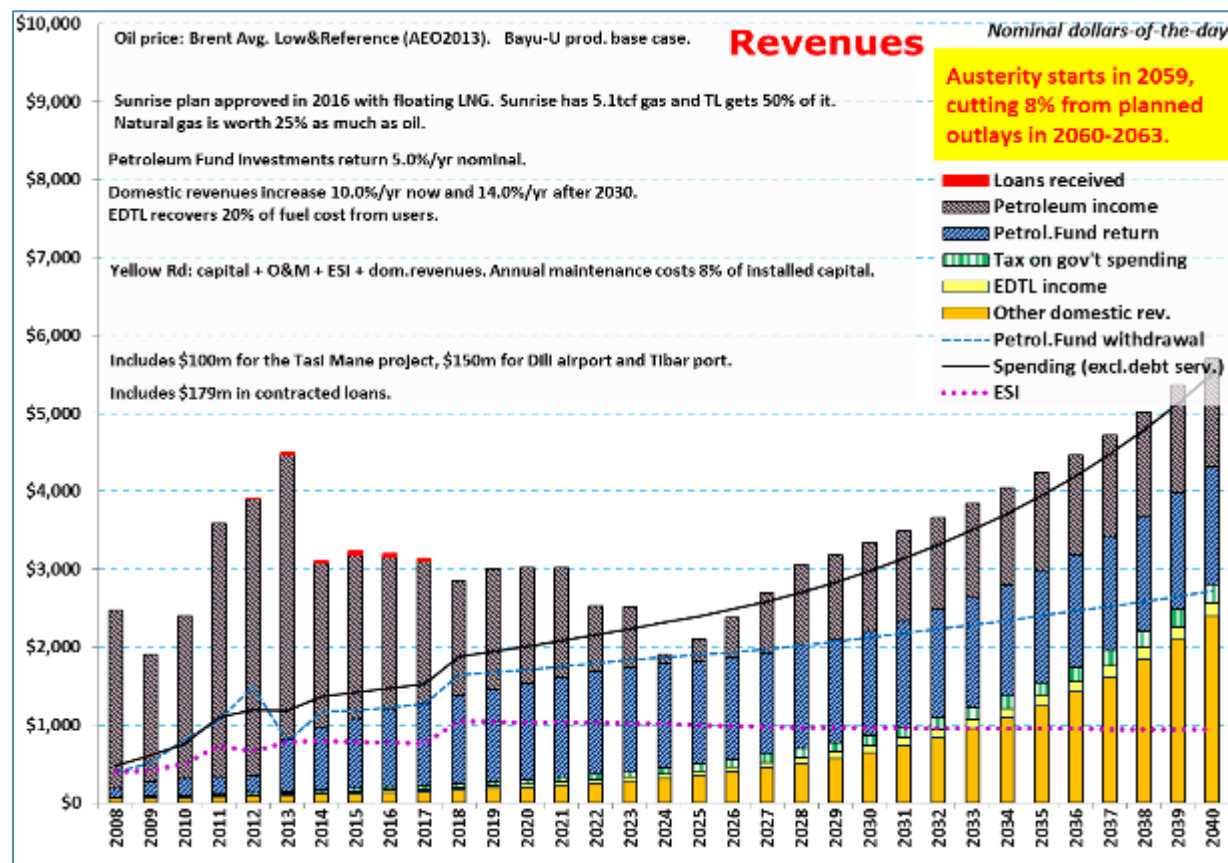


Table 1 summarizes the assumptions and results from these four scenarios. **Highlighted bold** shows differences from the **Reference Case**.

Table 1. Comparison of four basic scenarios

	Reference	Prudent	Extrapolate recent history	'Almost Sustainable'
Results	Pre-austerity budget (\$b)	\$6.1	\$4.7	\$5.7
	Austerity starts (year)	2029	2027	2025
	Austerity depth (how much must be cut)	61%	87%	97%
	Petroleum Fund (PF) peak amount (\$b)	\$21	\$18	\$17
	PF peak (year)	2021	2018	2017
	PF used up (year)	2029	2027	2025
	Total debt service costs (\$b)	\$0.11	\$0.05	\$0.05
Oil and gas	Oil price assumption	Brent Reference case	Brent Avg. Low & Reference	Brent Avg. Low & Reference
	Bayu-Undan production	Base case	Base case	Base case
	Sunrise gas liquefied where?	Beasu	none	Floating
	When Sunrise agreed (year)	2016		2016
	Sunrise reserve (tcf)	5.13		5.13
	TL share of Sunrise upstream	50%		50%
	Gas/oil price ratio	33%		25%
Revenues	PF annual return	6.0%	5.0%	3.8%
	Annual increase 2014	10.0%	12.0%	7.4%
	Annual increase after 2030	14.0%	14.0%	7.4%
	EDTL cost recovery (% of fuel outlay)	20.0%	12.0%	12.0%
Expenditures	Infra. O&M (% of investment)	8.0%	8.0%	2.0%
	'Yellow Road' scenario	2013-14 per OGE 2013, then LH model.	2013-14 per OGE 2013, then LH model.	2013-14 per OGE 2013, then LH model.
	Annual increase 2014-15	14.0%	12.0%	18.0%
	Annual increase after 2030	8.0%	7.0%	18.0%
	Dili airport & Tibar Port invest.	\$0.45	\$0.45	\$0.45
	Tasi Mane project investment	\$2.90	\$2.90	\$2.90
Loans	Tasi Mane project loans (\$b)	\$0.03	\$0.03	\$0.03
	Tasi Mane interest rate	4.0%	0.0%	0.0%
	Other loans (\$b)	\$0.29	\$0.15	\$0.15

Table 2 (rotated from the top of Table 1) shows the effects of petroleum-related variables.

Table 2. Effects of changes in petroleum prices and production

Case	Results					Oil and gas						
	Pre-austerity budget	Austerity starts	Austerity depth	PF peak balance	PF peak year	Oil prices	Bayu-Undan prod.	Sunrise LNG	Sunrise agreed	Sunrise reserve (tcf)	TL part GS up-stream	Gas/oil price ratio
Reference case	\$6.1	2029	61%	\$21	2021	Brent Ref.	Base case	Beasu	2016	5.13	50%	33%
Higher oil prices	\$7.7	2032	58%	\$26	2023	Brent avg. hi & ref.	Base case	Beasu	2016	5.13	50%	33%
Lower oil prices	\$4.7	2026	71%	\$18	2017	Brent Low	Base case	Beasu	2016	5.13	50%	33%
Larger Bayu-Undan reserve	\$7.1	2031	62%	\$23	2022	Brent Ref.	10% over base case	Beasu	2016	5.13	50%	33%
No Sunrise project	\$5.7	2028	90%	\$21	2021	Brent Ref.	Base case	None	Never	--	--	--
Floating LNG for Sunrise	\$6.1	2029	66%	\$21	2021	Brent Ref.	Base case	FLNG	2016	5.13	50%	33%
Sunrise delayed five years	\$5.7	2028	79%	\$21	2021	Brent Ref.	Base case	Beasu	2021	5.13	50%	33%
Lower gas prices	\$6.1	2029	65%	\$21	2021	Brent Ref.	Base case	Beasu	2016	5.13	50%	25%
Larger Sunrise reserve	\$6.6	2030	57%	\$21	2021	Brent Ref.	Base case	Beasu	2016	7.00	50%	33%

Table 3. Effects of changes in investment return, revenue and expenditure growth

Case	Results					Revenue				Expenditure		
	Pre-austerity budget	Austerity starts	Austerity depth	PF peak balance	PF peak year	PF invest. return	Rev. increase 2014-	Rev. increase 2031-	EDTL cost recovery	Annual infra. O&M	Expend. increase 2014-	Expend. increase 2031-
Reference	\$6.1	2029	61%	\$21	2021	6%	10%	14%	20%	8%	14%	8%
8% Petrol. Fund return	\$8.1	2033	62%	\$25	2022	8%	10%	14%	20%	8%	14%	8%
3% Petrol. Fund return	\$5.2	2027	61%	\$17	2018	3%	10%	14%	20%	8%	14%	8%
High dom. rev. growth	\$6.6	2030	57%	\$21	2021	6%	12%	16%	20%	8%	14%	8%
Low dom. rev. growth	\$6.1	2029	65%	\$21	2021	6%	8%	10%	20%	8%	14%	8%
Hi expenditure growth	\$6.6	2028	69%	\$20	2020	6%	10%	14%	20%	8%	16%	10%
Lo expenditure growth	\$6.2	2032	51%	\$22	2022	6%	10%	14%	20%	8%	12%	6%
Recover 80% EDTL fuel costs	\$7.1	2031	60%	\$22	2022	6%	10%	14%	80%	8%	14%	8%
Neglect infra. O&M	\$7.8	2035	57%	\$25	2023	6%	10%	14%	20%	0%	14%	8%

The last two lines of Table 3 show the impact of policy decisions. Charging most electricity users the cost of generator fuel would delay austerity by two years. Austerity can be averted for six years by not maintaining physical infrastructure, but the model does not include the additional cost of premature failure or replacement, as described in footnote 10.

Table 4. Effects of cancelling or debt-financing infrastructure projects

Case	Results						Project & borrowing			
	Pre-austerity budget	Austerity starts	Austerity depth	PF peak balance	PF peak year	Debt service costs	Tasi Mane invest.	Tasi Mane loans	Tasi Mane rate	Other loans
Reference	\$6.1	2029	61%	\$21	2021	\$0.1	\$2.9			\$0.3
Cancel Tasi Mane Project	\$7.4	2032	61%	\$25	2022	\$0.1	\$0			\$0.3
Cancel \$2b South Coast highway	\$6.9	2031	61%	\$23	2022	\$0.1	\$0.9			\$0.3
Finance highway with loan	\$6.6	2030	63%	\$23	2021	\$0.7	\$2.9	\$2.0	4%	\$0.3
Build \$4b Betano refinery	\$5.7	2027	62%	\$20	2020	\$0.1	\$6.9			\$0.3
Finance refinery with loan	\$6.0	2028	67%	\$22	2021	\$2.8	\$6.9	\$4.1	5%	\$0.3
Borrow \$10b at 5% to hold off austerity	\$7.6	2032	72%	\$21	2021	\$6.9	\$2.9			\$10.3

The last line in Table 4 explores if debt financing could avert austerity. Borrowing \$10 billion¹¹ during 2029-2031 would delay austerity by three years but increase the severity of the cuts from 61% to 72%. In other words, there will be 30% less money available during austerity than without loans. Furthermore, no one will lend when there is no likelihood of repayment.

Conclusion

Without drastic changes, Timor-Leste's Petroleum Fund will be used up around 2029. Although changes in external factors and internal policies can add or subtract as much as five years, the result is surprisingly robust. Higher oil prices and reserve sizes, Sunrise LNG in Timor-Leste, and higher Petroleum Fund investment returns will each only add 1-3 years. Developing Greater Sunrise (regardless of where the gas is liquefied) could reduce the severity of budget cuts during austerity, but will still provide revenue for only about one-third of desired outlays.

Slower expenditure and faster revenue growth help, but geometrically growing budgets will inevitably consume finite petroleum wealth. Only the **Almost Sustainable** scenario, which requires stronger fiscal restraint than most countries can achieve, holds off austerity beyond one generation.

This version of the model incorporates some key factors, but others would be worth exploring:

- Population impacts as the post-1999 baby boom grows up.
- Local inflation, which is higher than global and stimulated by state spending.
- Additional capital projects and sectors (water, roads, bridges), with variable financing.
- Replacement costs for physical infrastructure.
- More refined recurrent spending, including veterans' and other pensions.
- Additional oil and gas discoveries.

This spreadsheet is 'open source'.¹² We hope that others will deepen this analysis or conduct their own research, and that it will help everyone 'take context as the starting point'¹³ for decisions which benefit current and future generations of Timor-Leste's people.

¹¹ The example assumes 5% interest, 25 years to repay, and a five-year grace period.

¹² This spreadsheet, methodological notes and other related materials will be regularly updated and linked to from <http://www.laohamutuk.org/econ/model/13PFSustainability.htm>

¹³ This the Principle No. 1 for 'Good International Engagement in Fragile States and Situations' (OECD 2007).

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