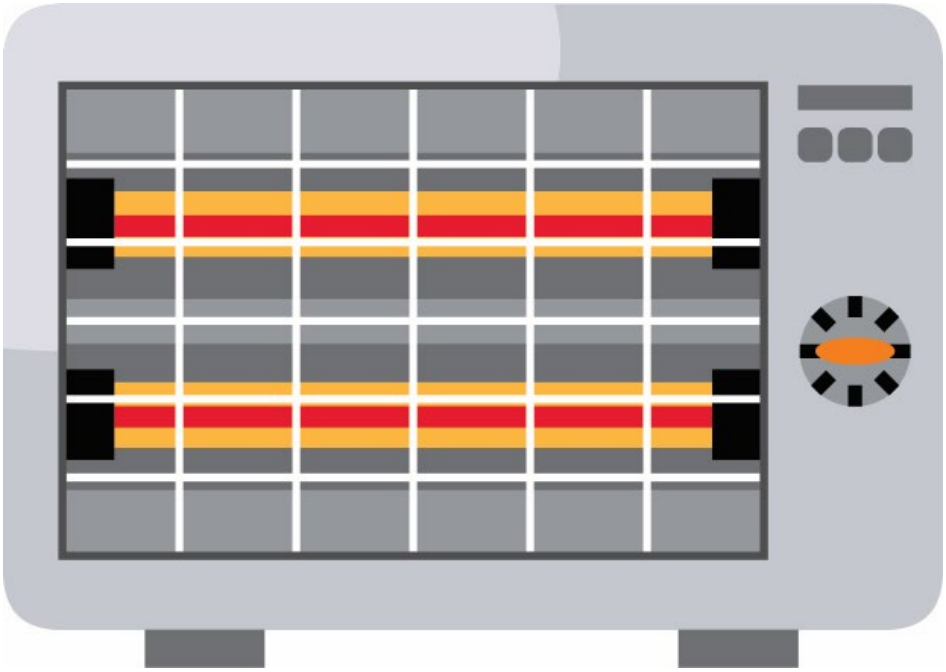
Turning down the gas

Minimising consumer risk



Dynamic Analysis

September 2024

Contents

Summary

In May 2024, we were engaged by Energy Consumers Australia (ECA) to develop a long term model that provides insight into the direction of network prices for Jemena's gas customers in New South Wales. The model reflects the 'step change' scenario in the 2024 Integrated System Plan (ISP) which forecasts a 72% decline in gas consumption for residential and commercial customers by 2043.

Our key findings are:

- **Gas prices will spiral up** – Based on our assumptions, we forecast that gas bills will spiral irrespective of policy settings or expenditure decisions made by Jemena. We found that network gas bills (in today's dollars) would double by 2040 and be 5 times higher for remaining residential and commercial customers by 2055. The regulatory asset base (RAB) would still be $2.3 billion by 2055, leading to a high risk of asset stranding.
- **Minimising new expenditure mitigates risks** – If Jemena focused on minimising new discretionary expenditure, this would partially decrease price pressures. More importantly it would significantly reduce asset stranding risks. **Figure 1** shows that a typical residential customer in 2055 would pay $130 less than under the base scenario. **Figure 2** shows that the RAB would be about $500 million lower by 2055. Our modelling is based on banning new connections, avoiding investment in renewable gas, and reducing metering replacements.
- **Accelerated depreciation is not a sustainable solution** - Accelerating depreciation will result in a typical customer paying about $130 more over the 2026-30 period as seen in **Figure 3**. But this only leads to a 10% reduction in the RAB by 2055 from $2.3 billion to $2.1 billion.

Figure 1 – Projected gas network bill for a typical small customer ($, real 2025)

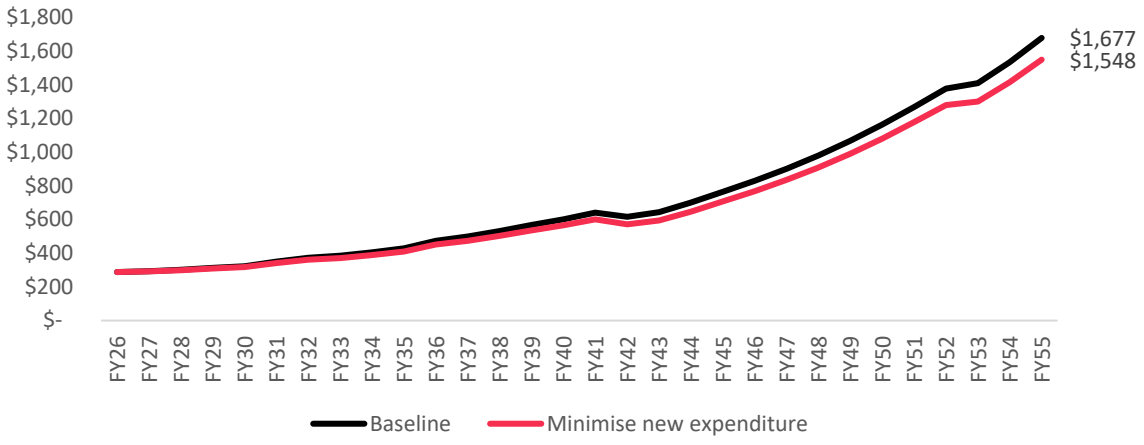


Figure 2 - Value of Jemena's regulatory asset base in 2055 ($m, real 2025)

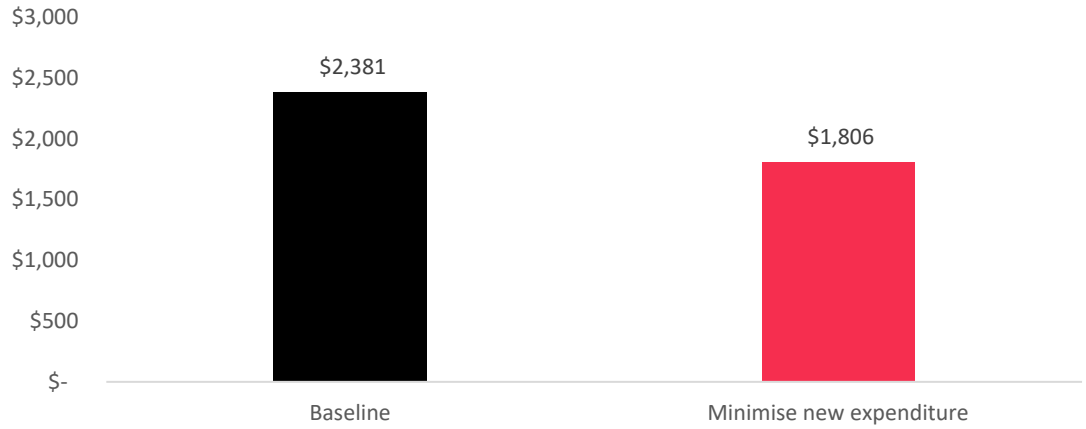
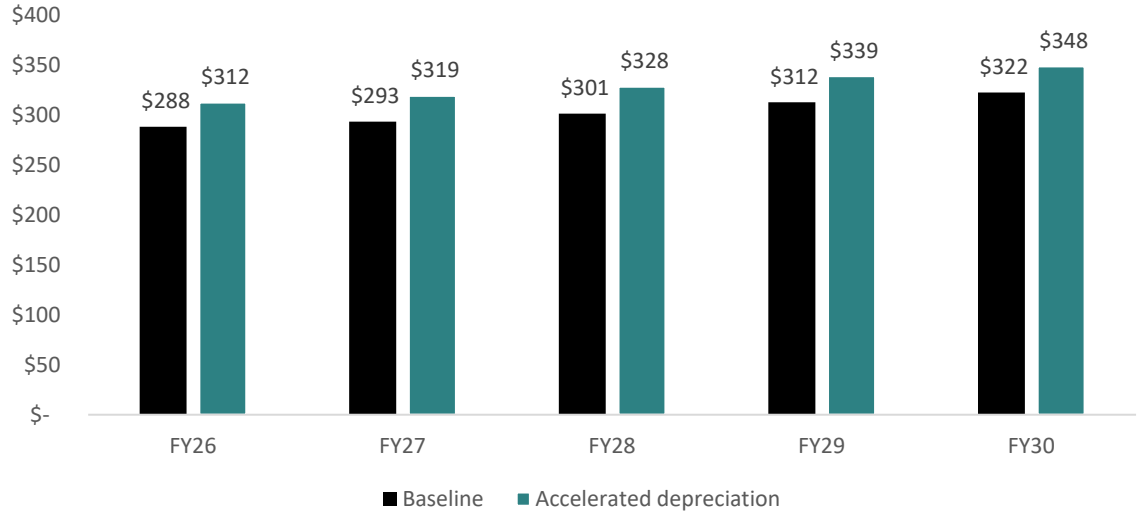


Figure 3 – Projected gas network bill for typical small customer ($, real 2025)



1. Context

The vast majority of residential and commercial gas customers are expected to switch to renewable electricity over the next 3 decades. Electricity is a perfect substitute to fuel homes and small businesses, is affordable, and is on a transition path to 100 per cent clean energy. The expected decline in gas users underscores the importance of succession planning for gas networks in Australia, including policy and business settings that minimise risks to customers and society.

1.1 NSW gas network

This report focuses on the NSW gas network operated by Jemena. While the report has broader implications, we note that there are idiosyncrasies in each state when it comes to gas networks.

The Jemena network services about 1.5 million residential customers, about 34,000 commercial customers and about 400 industrial customers[1]. Industrial customers account for more than 50% of total gas consumption but only comprise 0.03 per cent of the total customer base.

While industrial customers dominate energy consumption, residential and commercial customers appear to pay about 85 per cent of Jemena's annual revenue requirement[2]. Our understanding is that this relates to the cost allocation method used by Jemena which allocates revenue based on the infrastructure that services customer segments. Most of the infrastructure relates to delivering gas to smaller customers across Jemena's footprint area, while industrial customers are located on the trunk of the network.

1.2 Future of gas

Jemena's regulatory proposal includes in-depth modelling on the future of gas, based on scenarios developed with its Consumer Advisor body. The modelling is premised on understanding network prices under different rates of electrification by domestic customers. It appears that the ISP step change scenario is slightly modified and is only considered as a 'scenario' of electrification. In contrast, our modelling uses the ISP step change forecasts for all scenarios. Under the step change scenario, residential and commercial usage will decline by 72 per cent in the next 20 years, but industrial usage will stay at similar levels as today.

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[1] We have used Jemena's classifications and definitions. A residential customer is a homeowner or tenant that uses gas for domestic purposes such as heating or cooking. A commercial customer is a small businesses or commercial owner that uses gas for heating and hot water in offices or shops, or commercial cooking like restaurants and bakeries. Industrial customers are substantial users that use gas for very high heat including chemical production, steel, manufacturing or electricity generation.

[2] Jemena does not provide data on revenue received from industrial customers on confidentiality grounds. We have assumed that residential and commercial customers are assigned to three tariff classes including (1) Volume - Individual metered (VI) small (2) Volume - Individual metered (VI) large and 3. Volume - Boundary metered (VB). In 2025-26 Jemena has forecast that these customers would be responsible for paying $528 million of the forecast $609 million revenue requirement.

Our view is that this is the ISP step change scenario – the "central" scenario in that plan – is the most likely scenario to unfold and should be given primary weight in discussions on the pace and scale of electrification in NSW. The ISP forecasts are based on an overarching energy model that solves for Government emission targets developed by the national science agency, CSIRO. The CSIRO report notes that "natural gas use in the residential and commercial sectors approaches zero by 2050" in all scenarios. The report notes that the results are "consistent with similar decarbonisation scenario modelling studies."

Under this model, high emission gas used by residential and commercial customers will need to be displaced by renewable electricity if Governments are to meet emission targets. Aligning scenarios across gas and electricity planning can help ensure that consumers do not pay for two distinct futures – one in which stakeholders expect a highly electric future and another that expects a revolutionised gas sector.

There appears to be no commercially viable method to mass produce and transport low emissions gas. In contrast, electricity is on a clear path to predominantly renewable energy. Further, electricity is a perfect substitute for gas in terms of cooking, heating and hot water. Over time, we expect customers to switch to electricity as gas appliances reach end of life.

1.3 Motivation for this report

ECA engaged Dynamic Analysis to prepare this report as a preparatory step in understanding the optimal policy outcomes for residential and small business customers, recognising the urgent need to develop a long term plan for gas networks in Australia.

ECA were seeking a quantitative view on the bill risks faced by customers that remained connected to the network under existing policy settings. ECA also wanted to understand the stranded asset risk that could be borne by customers (or taxpayers) if Jemena's business becomes unviable. In this context, ECA wanted to understand the levers that could protect customers from risks. Central to this discussion, was whether policymakers or Jemena could do anything different now and into the future to minimise new sources of expenditure:

- New customer connections - A NSW Government ban on new customer connections before the commencement of the next regulatory period, similar to bans enacted in Victoria and the ACT. New connections comprise more than 25 per cent of Jemena's proposed new capital expenditure. This would require Government support to change the 'open access' regime that compels Jemena to connect a new customers. Alternatively, a change to Jemena's model standing offer requiring new connections to pay upfront for the connection would potentially reduce connection rates.
- Connecting renewable gas – While there are some sources of landfill gas that may be viable, large-scale expansion appears non-viable. Given so many of Jemena's customers are expected to leave the network, was it worth investing in new areas.
- Metering expenditure – The largest investment area in Jemena's proposal is on replacing ageing meters. To the extent that there are no demonstrated safety issues with keeping functioning meters in service, there is a question mark about whether greater risk can be tolerated by deferring investment, considering that most customers are likely to be disconnected going forward.

2. Approach

We have used a quantitative approach to forecast network bill impacts for NSW gas customers under three scenarios. The model uses the AER's current method to calculate revenue based on financing and operating costs. The scenarios differ in terms of expenditure levels and depreciation approaches.

In this section, we set out the key questions, key elements of the modelling approach to test the hypotheses, scenarios, and key assumptions.

2.1 Key questions

We have sought to apply a quantitative approach to examine three key questions.

- **What is the extent of customer risk?** - What is the expected price that Jemena's gas customers will pay over the next 30 years given the expected high level of disconnections and associated decline in consumption, and what is the potential risk from asset stranding?
- **How could the risk be reduced?** - What measures could Jemena and policy makers take to reduce potential prices and/or asset stranding, and what is the impact? This includes a focus on policies that ban new customer connections, and other measures that reduce expenditure over 30 years.
- **Is depreciation a solution?** - Will accelerated depreciation have a material impact on reducing asset stranding risks, and what are the costs to Jemena's customers today.

2.2 Model construction

The model draws on previous work undertaken by Dynamic Analysis to understand the drivers of electricity network prices in the long term. We have undertaken analysis for Energy Consumers Australia, Energy Networks Australia, the Australian Energy Regulator (AER) and four networks for similar projects. This has been based on the calculations in the AER's Post Tax Revenue Model(PTRM).

We note that gas networks operate under a very similar framework including the application of the AER's PTRM. Under our approach, we model gas network prices based on projections in revenue and gas consumed by customers.

- Forecasts of energy consumption over the 2025-55 period are based on the ISP step change forecasts of consumption for NSW to 2043, and then extrapolating this trend to 2055.
- Annual revenue requirements – This considers the forecast expenditure from operating expenditure, new customer connections, costs to connect renewable sources of gas, metering capital expenditure, augmentations and replacements, other network capital expenditure, and non-network expenditure. We then develop a long-term prediction of revenue by utilising expenditure and financial inputs that are based on the current formula used by the AER in its PTRM. We use a simplified calculation of the tax building block.

The model then looks at changes in the network bill for three customer types based on the relative change in annual revenue compared to energy consumption. This has been based on

three groups of Jemena's classification of customers in its regulatory proposal– small residential and commercial, large residential and commercial and industrial.[3] In this process we have considered whether the revenue allocated to each customer type would change over time.

2.3 Scenarios

We developed three scenarios that relate to the key questions identified in section 2.1.

- **Scenario 1 – Baseline**: Under this scenario, we have applied the ISP forecasts of a decline in gas consumption of residential and commercial customers, but relatively stable industry consumption. We have applied expenditure forecasts with Jemena's 2026-30 regulatory proposal, and estimated a forecast for 2030-2055 that aligns with these principles. We have not applied Jemena's accelerated depreciation approach in 2026-2030.
- **Scenario 2 – Minimise expenditure:** This scenario applies alternative assumptions to minimise Jemena's expenditure over the next 30 years. This includes zero dollars on connecting customers (which also reduces energy consumption), avoiding investment in renewable gas sources, and minimising metering expenditure.
- **Scenario 3 – Apply accelerated depreciation** – This scenario was a variant of the baseline scenario, but applied Jemena's proposal to apply $350 million of accelerated depreciation in the 2026-30 regulatory period.

2.4 Key Assumptions

In general, our assumptions rely on high level analysis rather than detailed analysis, due to data limitations and detailed knowledge of Jemena's assets. For this reason, we advise that caution should be applied to the final results. The underlying logic and drivers should be the focus in interpreting the results. We have also included an attachment A which identifies key data that should be made public through rule changes or AER Regulatory Information Notices.

The core assumptions consistent across all scenarios are:

- **Expenditure forecasts** – We have applied the expenditure forecasts in Jemena's 2026-30 regulatory proposal. We have applied the average expenditure for capex categories and opex as a starting point for forecasting from 2030 onwards, with the exception of new customer connections where we have continued the downward trend from 2026-2030. For certain categories of expenditure, we have made downward adjustments to account for declining customer numbers including metering and opex. We have added the abolishment of meters as an additional cost ($1000 per meter) and assumed that a higher proportion of disconnections will result in the need for abolition rather than temporary disconnection. Further information on quantitative inputs is contained in Chapter 3.
- **Revenue forecasts** – We have applied Jemena's proposed PTRM methods including 'year on year' tracking and financial metrics directly into our 30 year PTRM model. We have used the expenditure forecasts to calculate revenue based on the logic of the PTRM with the exception of the tax building block, where we have applied a 1.5 per cent of revenue assumption. In the accelerated depreciation scenario we have directly applied Jemena's approach of creating a new asset class to perform the calculation. In all other scenarios we

[3] Jemena does not differentiate between its residential and commercial customers in terms of its tariff offerings. Customers pay tariffs based on how much gas they use.

have assumed that this asset class is zero dollars, and the amount was allocated back to the original asset class where depreciation had been accelerated.

- **Energy forecasts** – We have applied the percentage change in gas consumption contained in the 2024 ISP Step Change scenario for NSW as a basis for forecasting annual gas consumption by Jemena's customer types. Given that the ISP forecasts do not contain specific information on customers or energy efficiency per customer, we have developed our own model that ultimately equates to the energy forecasts in the ISP.
- **Bill impacts** – We have used a simple approach to calculate bill impacts. Our first step was to allocate the total revenue requirement to the three customer groups each year based on a small year on year re-allocation of revenue to industrial customers. We have then calculated a % change in $/joule each year, and applied this to today's typical bill for each customer group. While this simplifies the tariff approach that would be taken in practice, it provides a means of understanding the difference in prices paid by respective customer groups. A key assumption is that smaller customers continue to pay a high proportion of revenue given that much of the infrastructure that services this segment would remain in service, and this would be reflected in revenue allocation consistent with today.

3. Findings

Residential and commercial customers who remain connected to Jemena's network will face extraordinary higher prices by 2040. There is also the risk that society will be asked to pay a share in over $2 billion of stranded assets. Minimising expenditure today can help to mitigate the risks to customers down the line. We also find that accelerated depreciation is not a solution, and question whether customers today should pay more today.

3.1 Prices rise rapidly under baseline scenario

As discussed in the previous chapter, the baseline scenario seeks to understand the risk to customer bills and risk of asset stranding given the material decline in gas consumption forecast for residential and commercial customers.

Energy consumption falls faster than costs and revenue

Under the baseline scenario, gas consumption will deteriorate significantly for residential and commercial customers as seen in **Figure 4**, but remains at today's levels for industrial customers.

Under the baseline scenario, Jemena's expenditure falls between 2030 and 2055 for capex and opex compared to the 2026-30 regulatory proposal. This is largely due to declining customer numbers and also reflects declining levels of new connections. However, offsetting cost reductions is an increase in the costs of abolishing meters. This can be seen in **Figure 5**.

Due to both lower expenditure, and a one-off reduction in depreciation levels in 2042 cause revenue to reduce in total levels compared to today. This can be seen in **Figure 6**.

Similarly, we see a tapering off in the Regulatory Asset Base compared to today's levels as can be seen in **Figure 7**.

Figure 4 - Gas consumption of residential and commercial customers (PJ)

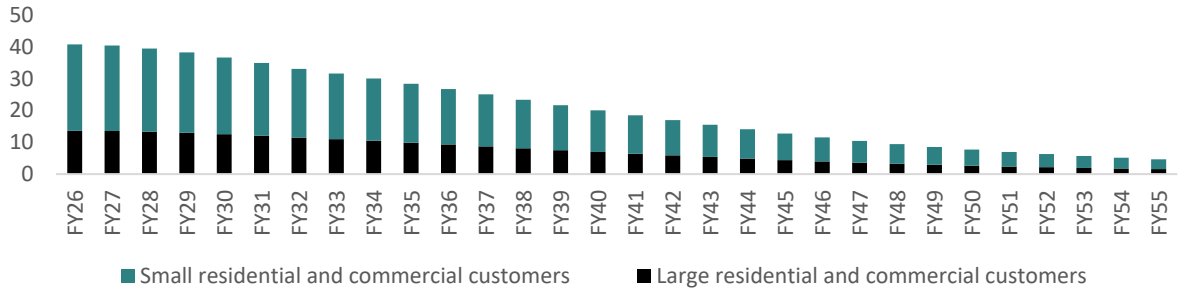


Figure 5 – Forecast expenditure under baseline scenario ($m, real 2025)

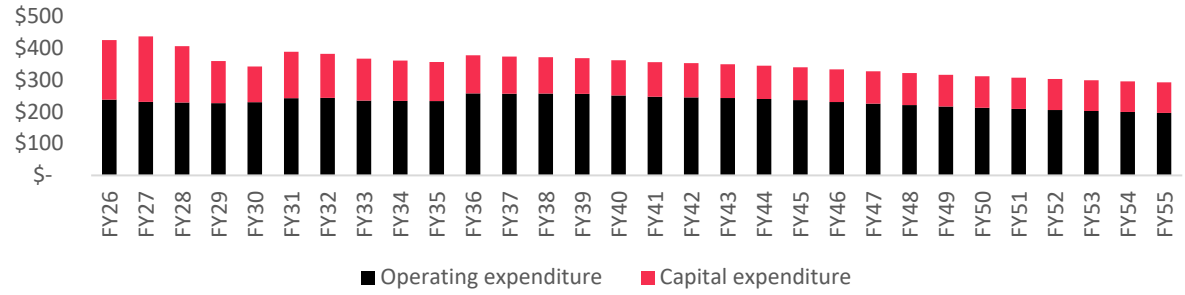


Figure 6 - Forecast revenue requirements ($m, real 2025)

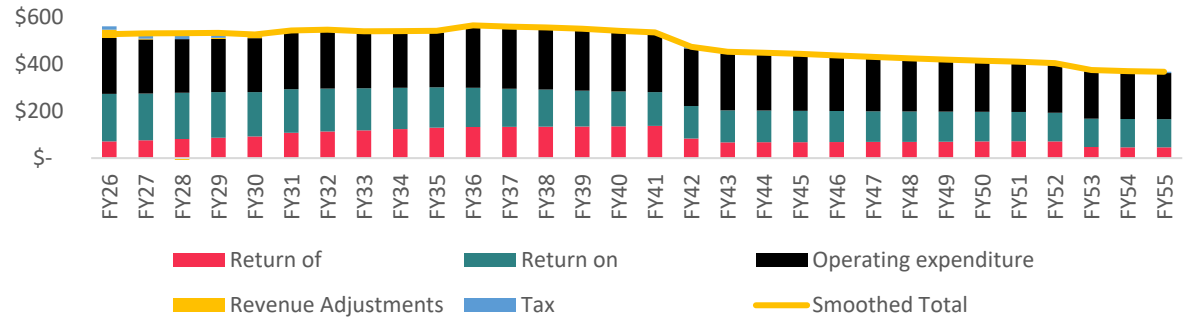
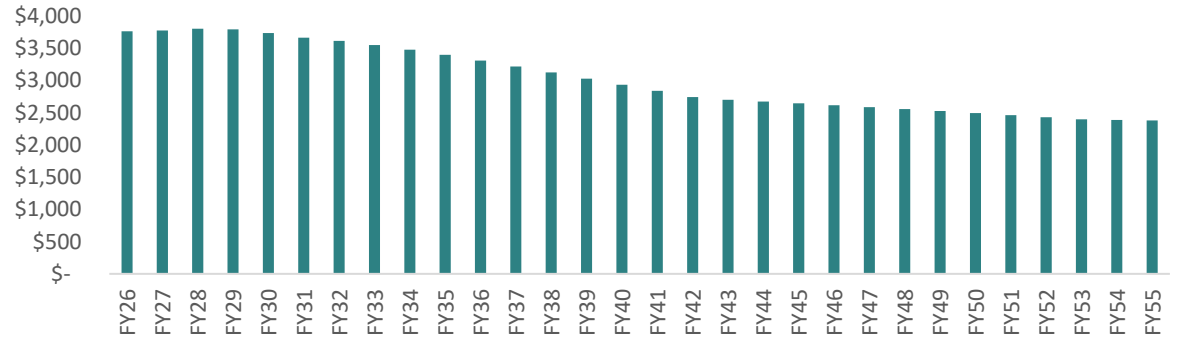


Figure 7 - Regulatory Asset Base ($m, real 2025)



Customer bills rise rapidly

Prices rise significantly for residential and commercial customers due to gas consumption falling faster than revenue. **Figures 8** show that network prices for small residential and commercial customers rise rapidly from close to $300 today to $600 by 2040, and rapidly increase from that point on. **Figure 9** shows a similar trajectory for large residential and commercial customers.

Industrial customers face an increase in prices of about 30 per cent by 2040 as seen in **Figure 10.** This reflects a modelling assumption where industrial customers are allocated more revenue as smaller customers drop off the network. There is a drop off in prices in 2042 reflecting the depreciation level reduction. It is unclear whether Jemena would take this approach, but to do otherwise would further increase the price for residential and commercial customers.

Figure 8 – Typical Small residential & commercial customer gas network bills ($, real 2025)

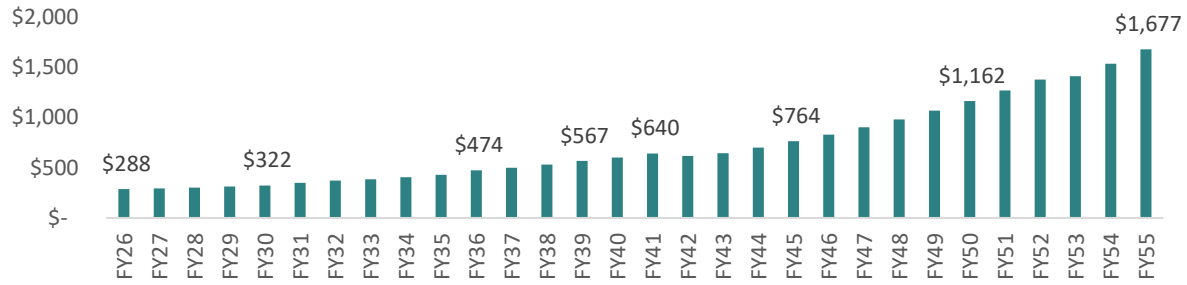


Figure 9 - Typical Large residential & commercial customer gas network bills ($, real 2025)

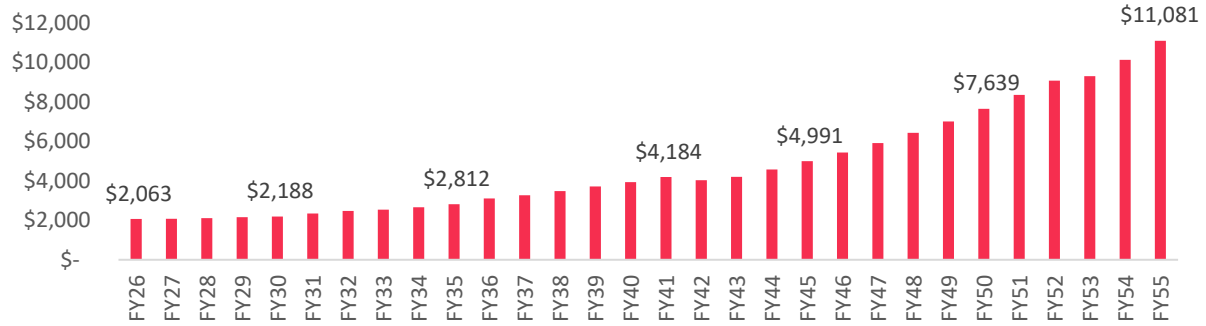
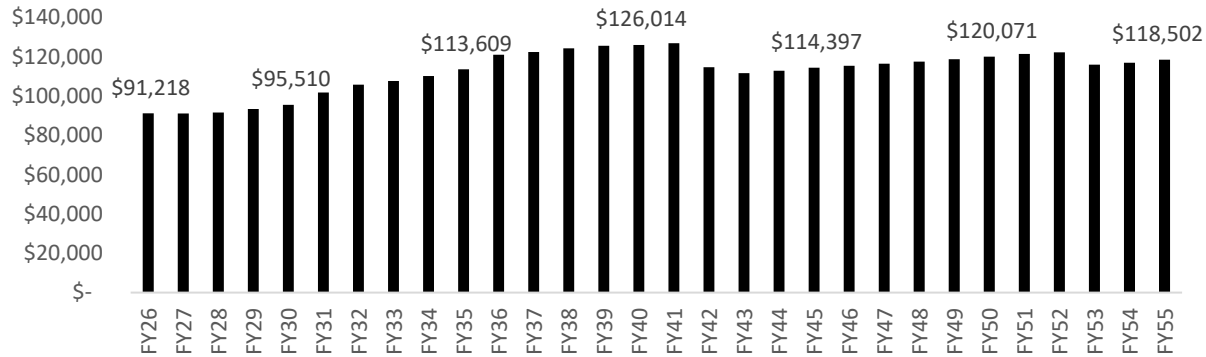


Figure 10 – Typical Industrial customer gas network bills ($, real 2025)



3.2 Minimising expenditure will reduce risks

A key hypothesis motivating our report was the prudency of acting today to minimise new expenditure on Jemena's network.

This brought into reflection serious questions about the current policy settings including:

- Why is Jemena obligated to connect new customers, given they are likely to face high bills in the future and drop off when prices rise?
- Is it prudent to replacing ageing meters (a significant proportion of capex) when 70 per cent of customers are likely to disconnect in the next 20 years?
- Does it makes sense to invest in renewable gas sources when the customers connected to these sources are likely to drop off?

Examining these questions from a quantitative point of view would establish how material these issues are for customers and society.

Expenditure and RAB comparisons

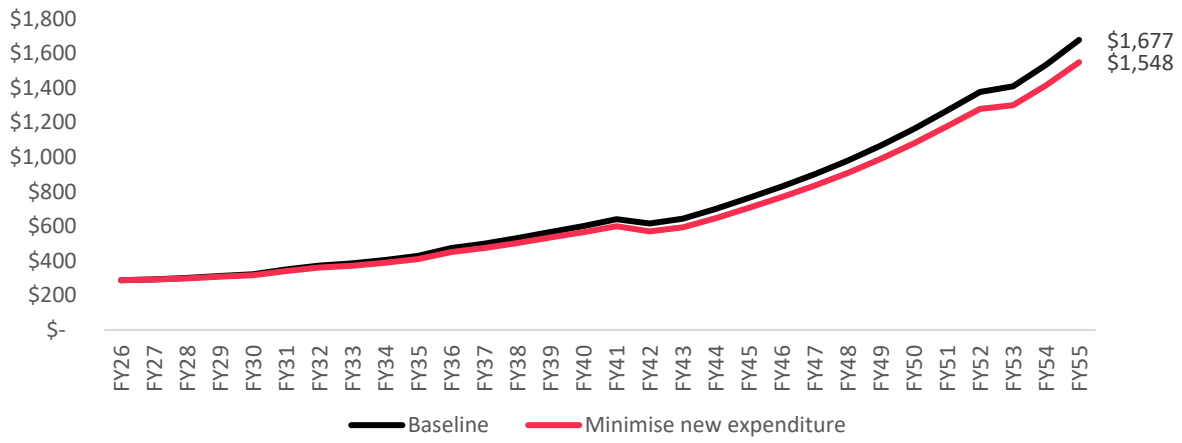
Figure 11 shows that capital expenditure significantly reduces under the minimise expenditure scenario (left) compared to the baseline (right). This assumes no new connections, no investment in renewable sources of gas, and significantly less expenditure in metering (about 50% reduction). Putting a hold on new capex helps to reduce the RAB by $500 million, significantly reducing asset stranding risks.

Figure 11 - Comparison of expenditure - baseline vs minimise expenditure ($m, real 2025)

Impact on prices

Minimising new expenditure also helps with mitigating some of the price shocks but does not solve the inherent issue of declining energy sales. **Figure 12** show that it reduces network bills of remaining small residential and commercial customers by about $130 by 2055, and in total it saves $1300 over the 30 year outlook. Similar trends occur for large residential and commercial customers.

Figure 12 – Typical small customer gas network prices - baseline vs minimise ($, real 2025)



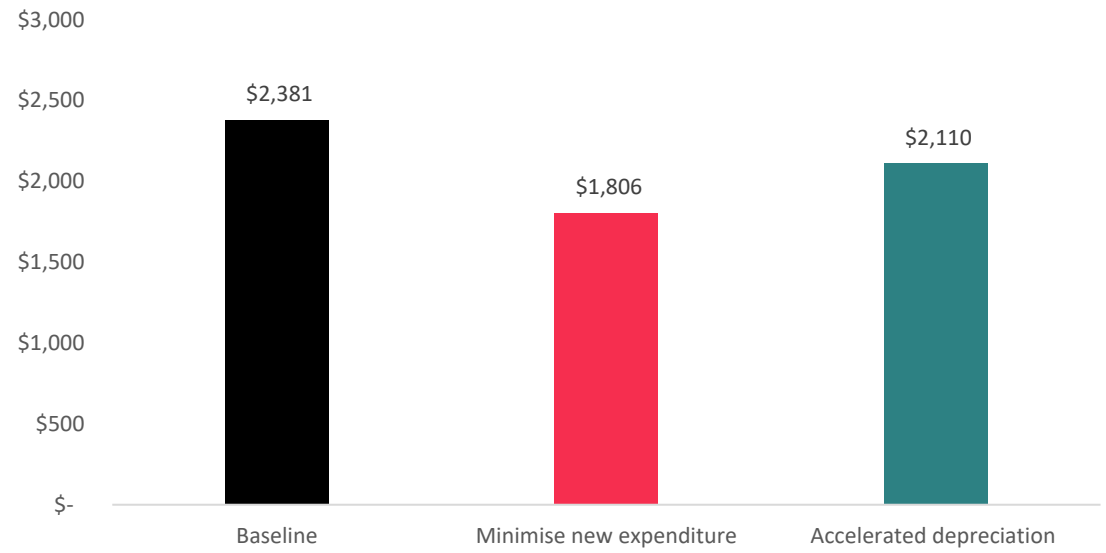
3.3 Accelerated depreciation is not a sustainable solution

We have also tested the impact of Jemena's proposal to accelerate depreciation of its assets to reduce the risk of asset stranding in the future. Accelerated depreciation is like paying off a mortgage earlier than required. While it reduces future liability, it also means that you are paying more money today.

Jemena proposes to bring forward about $350 million (about 10% of its RAB) of future repayments to the 2026-30 period. It has done so by creating a new asset class ("The future of gas") and transferring its opening asset value on its mains pipeline asset class. Our baseline scenario removed this adjustment.

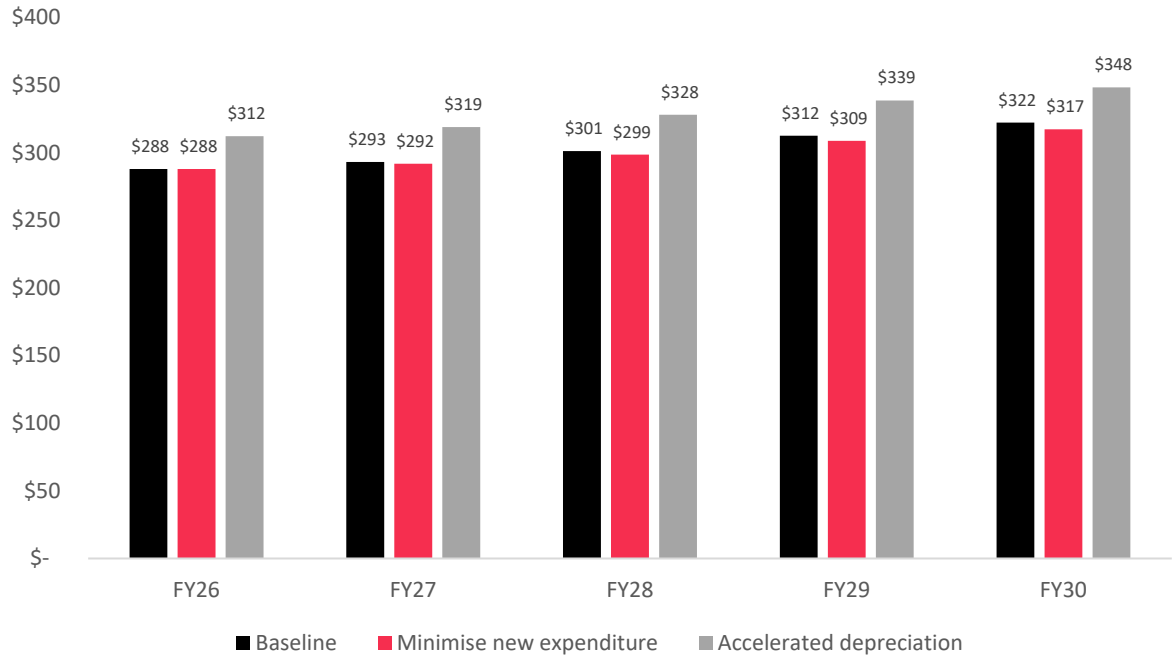
For Scenario 3, we re-introduce accelerated depreciation to understand the extent to which it reduces the RAB (a proxy for asset stranding) in 30 years time. As can be seen in Figure 13, accelerated depreciation reduces the RAB by about 10% by 2055. This is not as effective as minimising expenditure where the RAB is reduced by about 20%. This suggests that accelerated depreciation does not represent an effective solution to address risks of future asset stranding.

Figure 13 - Value of RAB in 2055 - Baseline vs Minimise Expenditure vs Accelerated Depreciation ($m, real 2025)



Unlike the minimise expenditure scenario, today's customers are being asked to pay future liabilities earlier. Our modelling indicates that a typical residential customer is being asked to pay more than $100 extra in the 2026-30 period (see Figure 14) to reduce the risk of asset stranding in the future. This raises the deeper question of who should pay for Jemena's asset stranding – consumers, government or the network business itself, and whether accelerated depreciation is a means of transferring risk from the network business or the government to Jemena's customers today.

Figure 14 – Typical small customer bill impact in FY26-30 period - baseline vs accelerated depreciation vs minimise expenditure ($, real 2025)



Appendix – Data limitations

The model has relied on public data available from Jemena's regulatory proposal submission and information required in the AER's Regulatory Information Notice. In many cases we have had to make high level assumptions due to lack of data that would ordinarily be available for electricity networks.

High level comparison of information sources – gas vs electricity

We consider that public data will be critical to inform debate on policy measures that seek to protect gas customer's best interests. Gas networks are not required to provide as much information as electricity networks. This is most apparent in four domains:

- **Planning reports** - Electricity networks are required to publish annual planning reports for distribution and transmission respectively. The publications provide a wealth of information on planned investments over a 5-to-10-year time horizon including ratings of major assets, replacement needs, and demand forecasts. There is no equivalent requirement for gas networks to publish such information. This prevents adequate understanding of emerging issues and new constraints.
- **Regulatory Investment Tests (RITs)** - Electricity networks undertake RITs for investments over $6 million for distribution and $12 million for transmission investments. This requires electricity networks to clearly identify a need for investment and seek solutions from the market for non-network solutions. Such requirements are not required for gas networks, preventing possibilities such as electrification of a suburb when gas infrastructure requires renewal.
- **Integrated System Plan (ISP)** - The ISP is silent on the transition path for gas networks in Australia, beyond high level assumptions on the continued presence of industrial customers. Our understanding is that new rule change proposals on gas and the ISP are focused on the role of gas in electricity generation and not the impact of declining gas demand on gas distribution networks.
- **AER's Regulatory Information Notice** – The AER's RIN seeks much less information from gas networks relative to electricity networks. Certain data requests are excluded such as age of assets, information on residential customers, and cost allocation methods.

Specific information that should be publicly available

Below we have set out specific information that would benefit external stakeholders in understanding the future of gas:

- **Information on asset age and health** – While Jemena has proposed minimal replacement expenditure on gas infrastructure in the 2026-30 period, it states that this is due to deferral rather than need. This gives rise to a risk of an uplift in asset replacement post 2030 at a time when customers are leaving the network, adding pressure to price spikes. Further information should be provided on age of infrastructure by asset type and standard lives, similar to the AER's repex model for electricity. Jemena should also provide further information on its asset class plans including failure modes, current condition, maintenance plans, and risks of failure. The information should be presented geographically and potentially presented with locationally-specific demand trends and forecasts to

understand where there may be alignment of asset replacement and customer disconnections. This may aid the possibility of electricity networks planning ahead for the total switch to electricity in a suburb or region.

- **Meter volumes and condition** – Jemena has identified that information on meter volumes is confidential, and there appears to be no further information on condition, failure modes, and risks. Given this is a significant proportion of proposed capital expenditure, it does not enable stakeholders to understand the risks of deferral.
- **Residential customer information** – The AER's RIN for electricity seeks specific information on residential customers in terms of revenue and energy consumption. This provides a lens as to how much residential customers will bear of revenue requirements, and also provides insights into which customers are likely to disconnect.
- **Cost allocation method** - The proposed tariff methodology is not accompanied by specific information and models that help show how Jemena allocates revenue to its tariff classes. It would be useful to understand why Jemena's industrial customers pay such a low price for gas on a $/joule basis compared to residential and commercial customers.
- **Method to explain depreciation** – It appears that Jemena has simply accelerated depreciation for a single asset class, without explaining why this is appropriate.