Mind the Gap

Navigating a customer focused transition

June 2023

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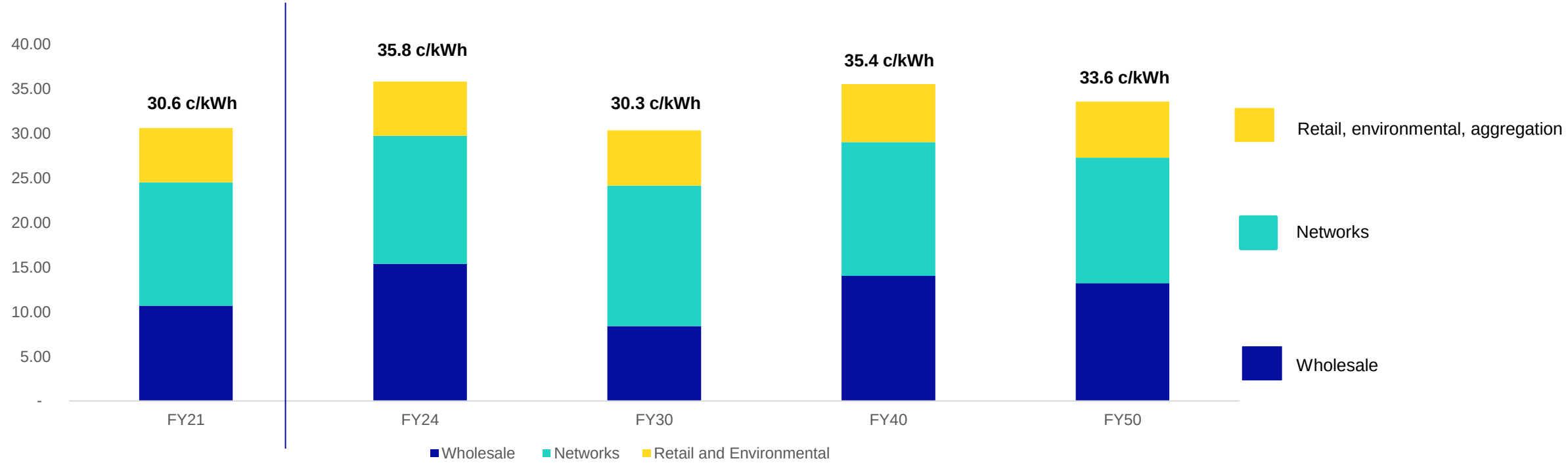
Modelling components of electricity bill

- Modelling has examined changes in the cost components of a residential customer's electricity bill.
- What will change in the **existing** components of the electricity bill - wholesale, backbone transmission network, distribution network, retail and environmental subsidies.
- What **emerging** components - Renewable led transmission infrastructure and aggregators to coordinate CER.

Results for Australian households

- Electricity residential prices (real $2023) are forecast to increase significantly by 2024 due to volatility in international gas prices.
- While prices are forecast to stabilise by 2030 there will be slightly higher network prices due to higher input costs.
- Prices rise again between 2030 and 2040 associated with firming the system to enable the transition to renewable generation.
- Energy sales from electrical vehicles will help reduce network prices by FY2050, helping to bring down energy prices through improved utilisation. However this will be offset by the need for transmission investment to connect renewable zones.

Electricity prices - c/kWh for typical Australian household (real $2023)



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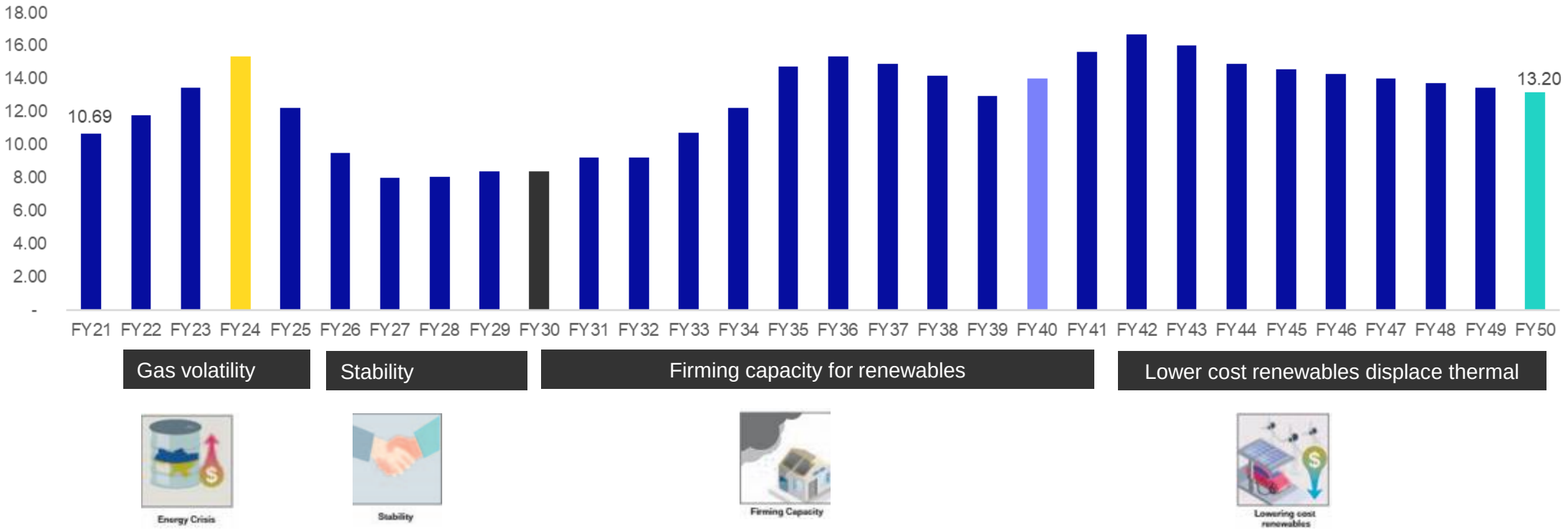
Wholesale

- Wholesale prices increase markedly by 2024 due to high international gas prices, but prices stabilise by 2030.
- Prices increase between 2030 and 2040 to transition from thermal to renewables. More investment to ‘firm’ renewables.
- By 2050, renewables are lower cost and the wholesale market is more stable, leading to lowering prices.

Wholesale component of electricity prices - c/kWh for typical Australian household (real $2023)



Note: Analysis has utilised and re-worked published data from **Endgame Economics**

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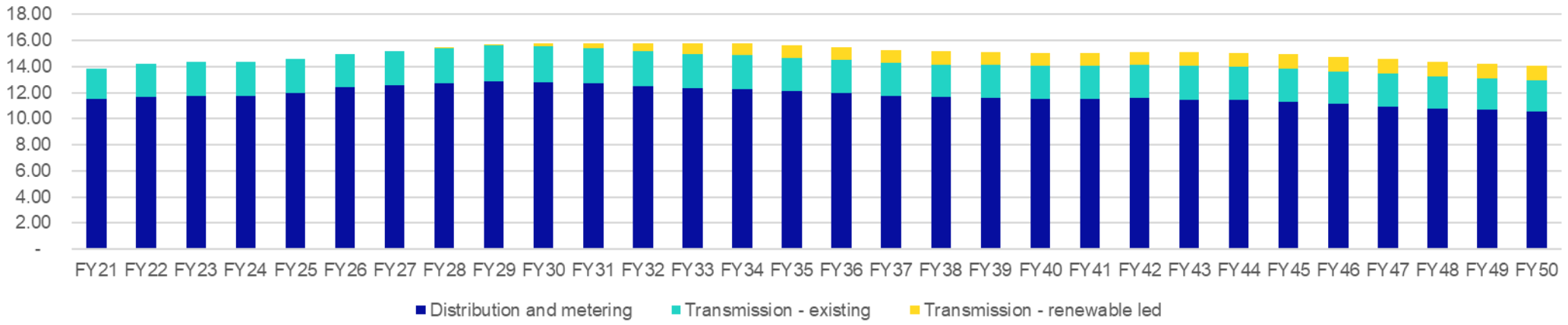
Networks – Distribution, existing transmission, renewable transmission

- Prices stay relatively flat to 2024, consistent with X-factors approved by AER in current determinations.
- Prices rise by 2030 due to higher input costs from a rising interest rate environment, and low energy volume growth from solar self consumption.
- Prices remain flat to 2040. Revenue allowances increases due to increased transmission investment to connect renewables and firm the system, and increased replacement and augmentation. However this is offset by increasing energy sales from EV acceleration.
- Prices reduce between 2040 and 2050 as energy sales from EVs enable lower tariffs to be passed through to customers.

Network component of electricity prices - c/kWh for typical Australian household (real $2023)



Higher cost of capital

Rising capex, augex, and ISP needs

Utilisation benefits from growing EVs

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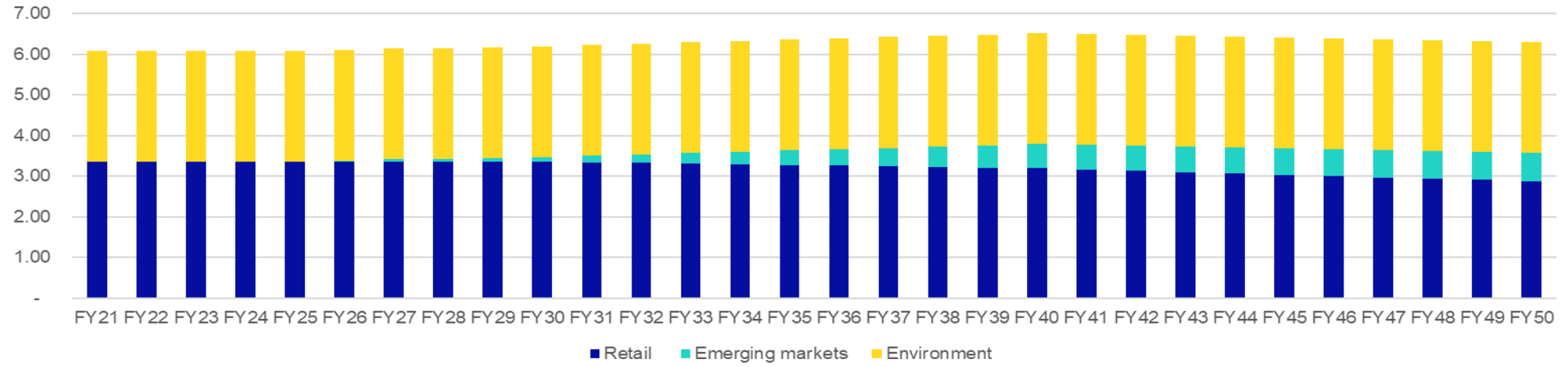
Other costs – Retail, green subsidies and emerging markets

- Prices expected to remain flat to 2030 as no expected change in environmental subsidies or retail costs.
- Prices rise by 2040. Emerging markets to coordinate CER introduce a new cost element (costs more than offset by lower network and wholesale costs). Existing retail reduces due to scale efficiencies. No change in environmental subsidies.
- Prices increase further to FY2050 as emerging markets become more vital. Retail costs further reduce. No change in environmental subsidies.

Retail and environment component of electricity prices - c/kWh for typical Australian household (real $2023)



Scale efficiencies

Emerging coordination markets

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Transport savings from EVs outweigh electricity costs

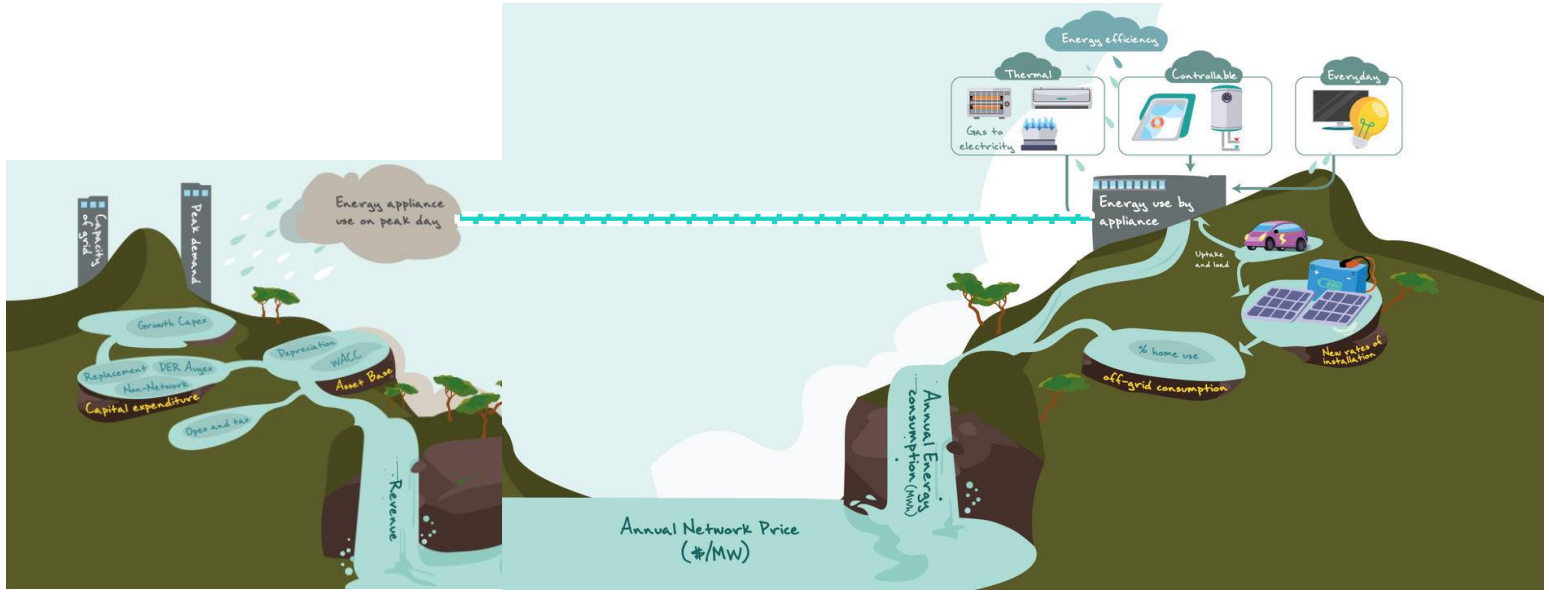
- A key assumption in the model is that energy growth and peak demand grow at the same rate (ie: EVs do not impact the daily load shape). This helps to reduce network prices through improved utilisation, offsetting higher costs in the wholesale market.
- Customers with an EV get a further saving advantage from lower transport costs.
- Customers driving 13,000 kilometres a year save well over a $1000 from powering 1 car with electricity rather than fuel. This means the combined transport and electricity costs are much lower in FY2050 for customer.

Total annual transport and electricity costs for an Australian household consuming 5MW – petrol vs EV car ($, real 2023)

Appendix A

Further analysis on distribution network results and assumptions

- The model to predict prices for most sectors has been high level, drawing on public sources and broad assumptions.
- However, the pricing for networks has been more detailed in particular distribution network pricing. For the first time, the mechanics of the AER's Post Tax Revenue Model have been used to predict prices for individual networks.
- While the analysis still relies on assumptions, the results have more predictive depth than for other sectors.



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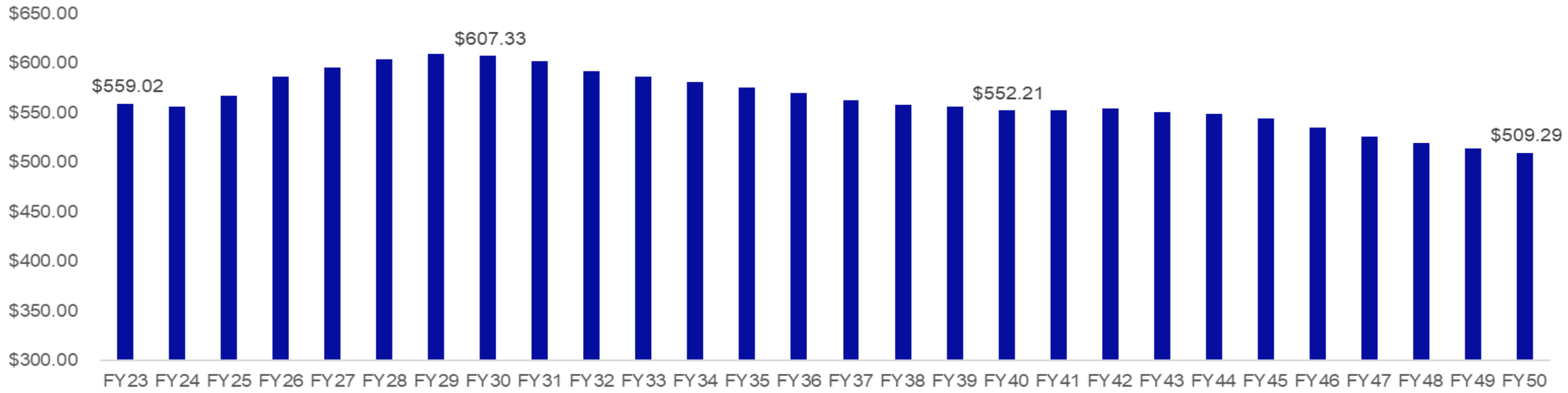
Energy bill for a customer consuming 5MWh – NEM results

» Distribution network prices for a customer consuming 5MWh will be higher by FY2030 due to input cost increases, and low energy volume growth from solar self-consumption.

» Prices start to decline after 2030. While revenue allowances climb due to increased repex and augex, the system costs are offset by increasing energy volume from electric vehicles and electrification of other appliances.

» By 2050, distribution network prices will be more than 10 per cent lower than FY23.

Annual network electricity bill for customer consuming 5MWh ($, real 2023)[1]



[1]Results have been weighted by the customers in each network.

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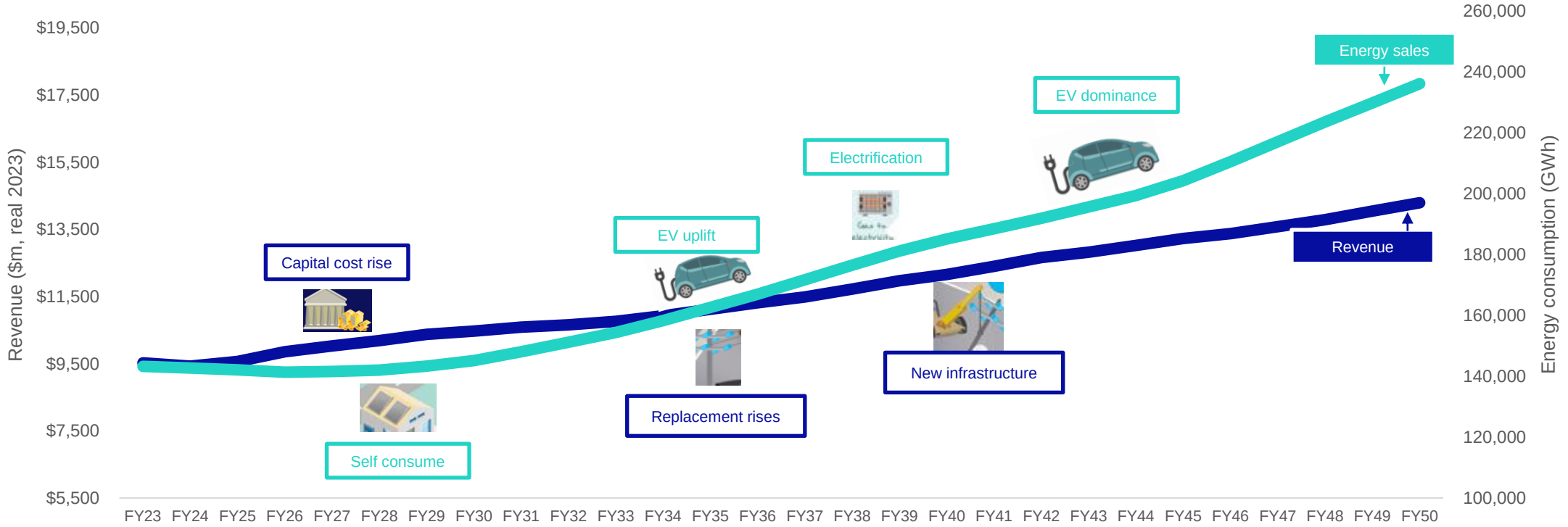
Dynamics at play – Energy sales outstrip revenue growth

- Average network prices will fall in real terms on average if energy sales growth outstrips revenue growth in real terms.
- In the period to 2030, revenue grows due to higher cost of capital and emerging cost drivers such as higher repex, while energy consumption is relatively subdued from increasing solar self-consumption.
- This flips from 2030 onwards when EVs drive a large change in energy sales. Revenue increases due to growing repex and augex. However, this is offset by energy sales growth from EV acceleration and electrification.

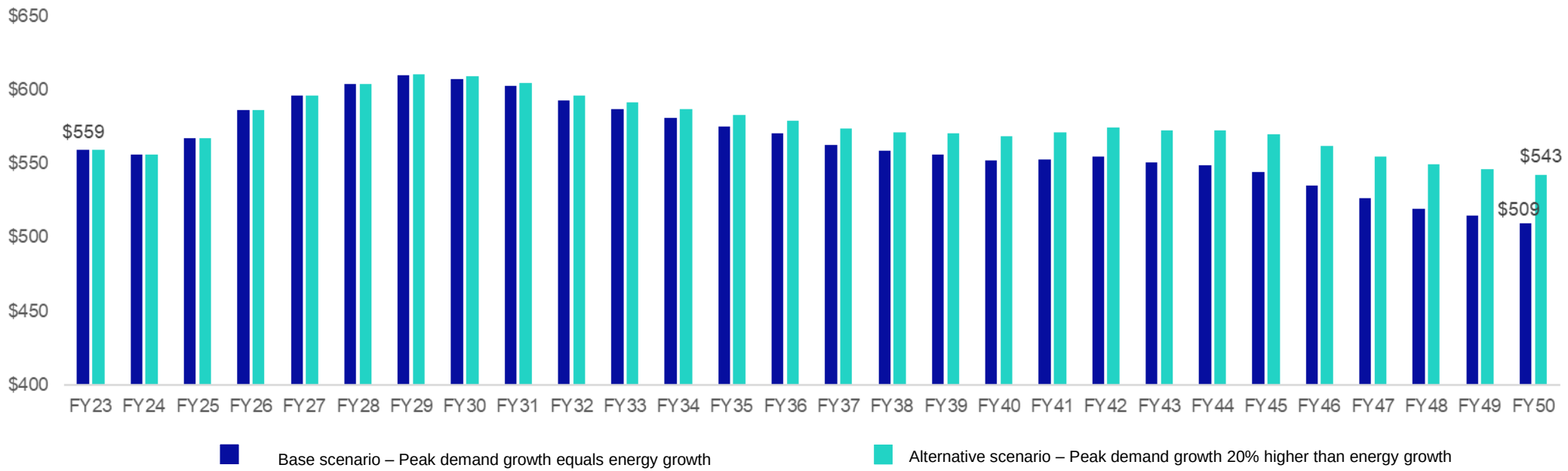
Total revenue ($m, real 2023) and energy consumption (GWh) across 14 distribution networks



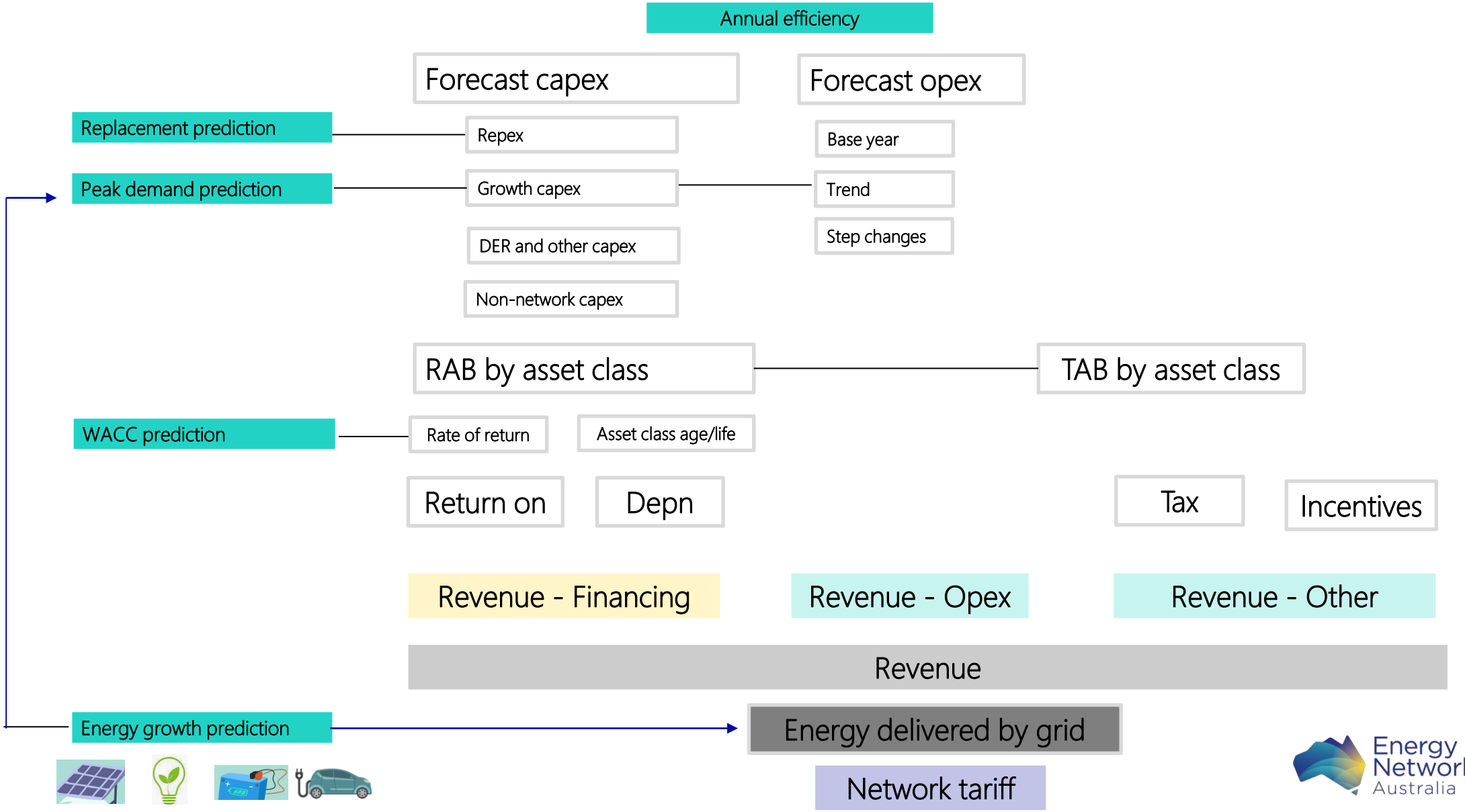
Testing sensitivity of EV charging – what if peak demand is higher than energy growth?

- We tested an alternative scenario where peak demand is 20 per cent higher than energy growth, reflecting the possibility that customers will disproportionately charge EVs in peak periods.
- This significantly increased predictions of augmentation capex for all networks, which in turn increased the prediction of revenue allowances
- The results show that prices would only fall by 2 per cent compared to the base case of 10 per cent.

Network bill for customer consuming 5MW (base and alternative scenario) – weighted by customer size



Model architecture – network prices



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Key assumptions

Assumption	Comment
Energy growth forecasts reflect state data that has been derived from the ISP.	This is a highly sensitive assumption, and further independent analysis should be undertaken to test the results. This includes the impact of solar, batteries and EVs on demand from the grid for each network
Peak demand grows at same rate as energy growth (ie: there is no improvement or deterioration in the time of day curve)	This is a simplifying and highly sensitive assumption. There is some recent trial evidence to suggest that convenience charging in the evening peak is less likely to occur.
Networks will replace 30 per cent of the replacement value of the network between FY23 and FY50.	This is based on derivations of replacement value of core asset groups using RIN data and assumptions that some assets can survive longer than standard lives. This is at the low end of replacement predictions.
Growth related capex is a function of the replacement value of the network, and the function assumes there is some capacity to meet peak demand growth. This capacity is assumed to be equal across networks.	This assumes that growth related capex will not increase at the same rate as peak demand growth.
The current WACC used in the recent NSW proposals will stay consistent over time.	The latest WACC estimate reflects long term averages of interest rates.
PTRM methods of revenue calculation will stay consistent over the next 30 years.	With the exception of the tax and incentives building blocks we have used a 30 year PTRM to calculate revenue based on expenditure and rate of return inputs.

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