

Submission to Australian Energy Regulator on Rate of Return Guidelines

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December 2017

General context – is WACC the appropriate model?

The Regulator is grappling with the problem of applying a model developed in and for competitive markets to a situation of natural monopoly.

The WACC model is not appropriate model. Not only are electricity transmission and distribution networks natural monopolies, but also they have other characteristics that take them even further from the textbook models of competitive markets.

Networks have important pure public good properties

First, they have two public good characteristics – non-rivalry and non-excludability. These are the defining characteristics of pure public goods.

Up to the limit of capacity, one consumer's benefit does not detract from the benefit to be enjoyed by other consumers. To that extent they are non-rival.

And by any reasonable criteria of what constitutes people's basic needs, electricity connection and supply of the first few kWh a day would be considered as morally non-excludable.¹ Of course they are physically excludable, as demonstrated by the number of disconnections. But so too are goods, such as emergency services and education that may be physically excludable, but which are morally non-excludable. Electricity connection and basic supply should fall into the same category.

Excludability through pricing is a normal market function, and indeed it serves an allocative function for heavy energy users. A rising marginal price reduces demand for expensive transmission and distribution facilities and given our present fuel mix it helps reduce GHG emissions. Such price signals operate over the range in which electricity consumption is discretionary, but among the vast majority of customers, demand for the first few kWh a day used for refrigeration, cooking and lighting, is non-discretionary and therefore is price inelastic.

For those who cannot afford connection, for example those who are disconnected for non-payment of accounts, there are significant negative externalities, in terms of health, education and emergency services, costs which are met by governments and by charities.

This makes electricity networks somewhat different from most other natural monopolies, such as public transport, where excludability serves an allocative purpose.

There is no *prima facie* case therefore to favour prices that may prevail in a hypothetical market. An allocatively efficient distribution of prices may involve free connection to the grid, free or token charges for initial units, with a steeply rising tariff, with connection fees met

¹ The case for reticulated gas is less clear-cut, in that there are reasonably-available alternatives.

with cross-subsidies from those who use more electricity (essentially a progressive sales tax) or from general revenue.

Such an outcome is unlikely to occur in the NEM as it is presently constructed, with market forces at the generation and retail end, and with an emulated market in between. Given the fixed-cost nature of most elements along the supply chain, particularly transmission and distribution, costs tend to be passed along the chain as fixed charges, resulting in the allocative distortions covered above.

Power lines, switches and transformers use mature technologies

Second, most of the physical assets in transmission and distribution use mature technologies. The industry is 130 years old. Markets bring benefits to consumers in terms of product and process innovations. But in a commodity as basic as electricity transmission and distribution there is virtually no scope for product innovation, and there are few breakthroughs in process innovation. That is not to deny a possibility of efficiency gains in transformers, switches and transmission lines, but such gains are likely to be incremental. The generation end of electricity is rich in innovation, and there is potential for innovation at the retail end, particularly in demand management, but not in networks.

In well-functioning markets the possibility of profits (i.e. economic profits) gives an incentive for innovation and cost reduction. In a cost-benefit sense temporary economic profits are the costs which are outweighed by consumer benefits. But it is hard to justify a profit incentive when there are so few such benefits to be realized.

The present WACC model can exacerbate the “death spiral”

Third, and unlike virtually any other regulated industry, networks are subject to the “death spiral” risk. That is the positive feedback mechanism that sees customers, generally commercial, industrial and more prosperous households, going off-grid, leaving the fixed costs to be absorbed over a smaller customer base. It’s hard to predict where this mechanism will lead, but it’s a reasonably safe rule of systems with positive feedback that the outcomes are messy and expensive.

Some consumers may be going off-grid for “irrational reasons”. Research in behavioural economics demonstrates that many consumers are willing to bear a personal net cost in order to “punish” a supplier that they perceive to be acting unfairly. Generally such action performs a socially-beneficial market-perfecting function, but in electricity the outcome of such behaviour is generally socially costly on both equity and allocative grounds.

Also, as the price of storage and self-generation falls, going off-grid will become less an emotive decision and more a rational household and business decision.

Even if the future sees more localised electricity services, there is likely to be an ongoing net public benefit in having a transmission network rather than a patchwork of islands, small and large, of disconnected communities, businesses and individuals. In all but the most isolated situations (which generally have their own supplies already), there is a case for prices that do not encourage users to go off-grid. Again, this economic objective is not necessarily compatible with a simulated market guaranteed return, which, being revenue-based, compensates for a shrinking market.

The for-profit model is therefore dysfunctional on many fronts

For all these reasons, there is a strong case to regard networks not as a for-profit industry managed for the benefit of shareholders but rather to regard them as basic public utilities, as indeed they were until they were commercialized and privatized. Commercial incentives, be

they in private businesses or GBEs, generally do not serve useful allocative or equity purposes.

But if the Regulator is constrained to use the WACC and within the WACC the Cap-m pricing model, then the following are suggested as considerations.

Risk – β or an insurance expense?

The parameter β , presently 0.7, is considered to be an indicator of systematic risk for an investor in a security. It's a large leap, however, to interpret it as a measure of risk faced by a firm or industry.

It is actually an indicator of *volatility*, which, for a short-term investor may equate to risk, but over the longer term, in an industry with a guaranteed revenue, day-to-day share-price volatility is largely irrelevant. A β calculated over short-term sampling periods carries little information about the risk faced by long-term investors. It is influenced by the noise of stock brokers' recommendations, gut feelings, sentiment and speculation about government policy – of which in relation to energy there has been a great deal over the last few years.

Conceptually a β calculated over very long sampling periods may be appropriate, but there is no practical way to make such a measure. In other words, β and therefore the Cap-m model appears to be inappropriate for long-term investors.

It is a reasonable assumption that there are operational risks to transmission and distribution assets, such as fire or storm. But firms would either be self-insuring or buying insurance to cover such risks, which means they would be covered in operating costs, not in the return on capital.

There is a risk that the regulatory regime will not endure. But that's a political risk, and it would be a matter for the government and the firms to deal with compensation.

WACC by sector – different industries?

It is not clear why electricity transmission lines, gas pipelines and electricity distribution networks should all be subject to the same WACC. Gas pipelines have exposure to foreign markets, while (apart from lines to aluminium smelters) electricity transmission lines and distribution networks are serving a domestic market. Whatever happens to the generation mix (coal, gas, hydro, solar, wind), low voltage (11 KV) distribution lines and transformers will probably be subject to little change.

Debt-equity ratios – too far from reality?

The modelling assumption that firms will be financed with 60 percent debt, 40 percent equity, is not borne out empirically.

If firms are using more leveraged finance it's probably a rational move on their part.

But that may be in recognition of the generosity of the present guidelines.

The argument that this high leverage is a result of the 60-40 model has some validity. It is plausible that firms can use a high ratio *because* of the security of the 60-40 model. If the model were to go all the way to 90-10, which would be in line with the practice of some firms,

then in view of less generous modelling the firms would probably settle on some lower level, but not all the way to 60-40.

An advantage of a more leveraged assumption (perhaps 80-20 for example), is that even if an excessively high β is allowed, its effect will be reduced by a lower weight in the WACC.

Market return – r_m historical or prospective?

Long-term studies, such as those undertaken by Dimson, Marsh and Staunton², and updated by Credit Suisse, suggest that Australian firms have enjoyed very high returns on equity over the hundred or more years that measures have been available.

That's a historical perspective, but the same data sets suggest that returns may now be falling – a possibility confirmed by Australian firms in recent times having set themselves very high *irr* hurdles, and, not finding opportunities, have been returning funds to shareholders.

Also, to the extent that there is substantial foreign ownership in transmission and distribution assets, is an Australian value of r_m appropriate?

The possible use of an arithmetic calculation of the MRP is questionable, for in converting price changes to percentages, it is something of an artificial construct (the absolute price changes are what count to the investor). The geometric mean, which is almost always lower, is closer to an accurate indicator of the market risk premium. (It is not clear what weights the various methods of calculating the MRP have in determining r_m .)

Enduring profits – an indication of economic rent?

A basic principle of public administration is that any intervention should incorporate feedback to allow the policymaker to assess the effect of that intervention. Such feedback generally presents interpretative difficulties, but its availability is better than flying blind.

If there is evidence of enduring economic profits in transmission and distribution companies, then there is *prima facie* evidence that the allowed WACC is in the realm of providing economic rent to the companies: it is pitched at a level beyond what is necessary to provide incentives for innovation and cost-reduction. In a genuinely competitive industry economic profits should trend to zero.

Asset base – what is adequate investment?

It is not clear what constitutes the regulated asset base in terms of standards of *reliability and security of supply*. Presumably it's the AEMC benchmark of 2 MWh outage per 100 000 MWh. It is possible that reliability standards are greater than those required by consumers, particularly in light of possible battery technologies allowing consumers to ride out cuts in supply. (These are much smaller batteries than those that allow people to go off-grid.) Also there are emerging simple technologies allowing commercial users to reduce demand at times of capacity constraints.

² Elroy Dimson, Paul Marsh, Mike Staunton *Triumph of the Optimists: 101 Years of Global Investment Returns* Princeton 2002.

Because provision for peak use is a large part of the regulated asset base, it is important that those reviewing rate of return guidelines know of possible changes in the criteria for the base.

Although I am a board member of CARE Financial Services ACT, a body whose clients are concerned with electricity charges, I make this submission as a former academic teaching public sector finance, and as one who has done a great deal of paid and pro bono work for consumer organizations and government consumer agencies, Australian and foreign.

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