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review of the rate of return guidelines

APA submission responding to AER issues paper

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1 This submission

APA Group (APA) responds, in this submission, to the questions raised in the Issues Paper, published by the Australian Energy Regulator (AER) in October 2017, as part its review of the current Rate of Return Guideline.

APA has participated, with other transmission pipeline service providers, in the preparation of the submission on the Issues Paper which has been made by the Australian Pipelines and Gas Association (APGA).

In this submission, APA elaborates on a number of specific matters which were addressed in somewhat less detail in the APGA submission.

2 APA responses to the AER's questions

2.1 Question 1: achieving the objectives

In your view, to what extent has the current approach to setting the allowed rate of return achieved the National Electricity Objective (NEO) and the National Gas Objective (NGO), the Allowed Rate of Return Objective (ARORO), and the related revenue and pricing principles (RPPs)?

The current approach to setting the allowed rate of return uses forward-looking indicators of the rates of return investors require on equity investments in electricity and gas transmission and distribution networks, and of the cost of debt financing those networks.

The current approach also assumes that a target gearing is maintained, even though the value of assets to be financed changes over time as new capital is added to the regulatory asset base, and as capital is returned via depreciation.

APA is of the view that an approach which assumes the maintenance of a target gearing, and uses appropriate forward-looking indicators of the rate of return on equity and the cost of debt is a model which approximates the way in which energy networks are financed, and the cost of that financing. By providing an estimate of a rate of return which is potentially commensurate with the efficient financing costs of a relevant benchmark efficient entity, it can contribute to the achieving the NEO, the NGO, and the ARORO. It can also assist in satisfying the relevant requirements of the revenue and pricing principles. In particular, such an approach can

- provide a service provider with a reasonable opportunity of recovering its efficiently incurred financing costs
- provide incentives for efficient investment, efficient service provision, and efficient pipeline use
- contribute to the setting of reference tariffs which should allow a return commensurate with regulatory and commercial risks.

There are, however, issues about particular aspects of the current approach which preclude a definitive answer to the AER's question.

For example, basing estimation of the rate of return on equity on the Sharpe-Lintner CAPM, which is conceptually simple, easily applied, and widely used, but of doubtful validity, raises the question of whether the foundation model can

provide a basis for estimating a rate of return on equity which can contribute to the ARORO.

A trailing average has the potential to capture an important aspect of service provider debt financing (portfolios of debt with staggered maturities). But, during the transition into the trailing average, the estimated rate of return on debt will not be the cost of debt financing of the relevant benchmark efficient entity.

2.2 Question 2: profitability, asset sales and other information

Should information on profitability, asset sales, financeability and any other financial information be used when assessing outcomes against the NEO and NGO, ARORO, and the related RPPs?

Information on profitability, and asset sales, and other financial information, which might be used when assessing outcomes against the NEO and NGO, the ARORO, and the related RPPs, will be largely irrelevant to assessing allowed rates of return.

The schemes of incentive regulation in the National Electricity Law and Rules, and in the National Gas Law and Rules, are "forward-looking", requiring forecasts of the rate of return on equity and the cost of debt. Those forecasts will be conceptually different from the measures of rate of return which might be constructed from historical information on profitability and asset sales, and from other financial information.

Financeability is a potentially important consideration in assessing the forecasts of rates of return applied in a scheme of incentive regulation. Providers of finance to regulated businesses have regard to allowed rates of return. They also have regard to a wide range of other factors. The relevant concept of financeability is forward-looking: the financeability of the benchmark efficient entity over the future regulatory period.

Forward looking rates of return on equity and costs of debt must incorporate expectations about the future. Those expectations may not be realised and, even if they are, there will be other factors driving the measures of rate of return which might be constructed from historical information. Disentangling the effects different expectations and realizations, and of changes in other factors driving profitability (for example, unanticipated increase in labour costs) would be a major and contentious undertaking, which would contribute little to assessing allowed rates of return.

2.3 Question 3: benchmark term and level of gearing

Is the current approach to setting the benchmark term and level of gearing appropriate?

The Explanatory Statement accompanying the current Rate of Return Guideline explains some of the difficulties in establishing the term of debt issued by the benchmark efficient entity, and sets out the AER's rationale for adoption of a benchmark term of 10 years.

APA concurs with the view in the Explanatory Statement that regulated energy network businesses will, within the constraints imposed by lenders, issue longer term debt which seeks to match the economic lives of the assets being financed.

This practice may be seen as effecting a trade-off between the higher costs of long term debt, and the costs associated with multiple short term issues with attendant refinancing risks.

In 2013, the AER observed that debt portfolio information available to it indicated weighted average terms between 6.7 and 16.3 years, with a mean of 8.7 years.

On the basis of its observations on debt financing practice and portfolio terms, the AER concluded that 10 years was an appropriate benchmark term.

The AER may, as the Explanatory Statement advises, continue to monitor the average term at issuance of the debt of regulated network service providers against the benchmark term. However, APA is of the view that the current approach to setting the return on debt, including the benchmark term of 10 years, should be allowed to continue as service provider and users gain experience with the approach, and with a regime in which there is annual updating of the rate of return on debt.

APA has a similar view on the benchmark credit rating. The benchmark credit rating is as much a matter of judgement as it is of precise calculation, and there is little reason, at the present time, to change from the BBB+ benchmark. Certainly, the AER should continue to monitor the credit ratings of regulated network service providers against the benchmark credit rating. But the AER should also continue to apply the BBB+ benchmark – with the reasonable and practical convention that, where relevant cost of debt data are available only for businesses with credit ratings in the BBB range, those data should be used.

APA's response is to this question is made in the broader context of retention of the current approach to the benchmark efficient entity.

The benchmark itself should be reconsidered

In *Applications by Public Interest Advocacy Centre Ltd and Ausgrid* [2016] ACompT 1, the Australian Competition Tribunal found that the benchmark efficient entity need not necessarily be the one entity for the purpose of all regulatory decision-making (paragraph 907): once it is accepted that different service providers have different degrees of risk, there will not be an identical benchmark efficient entity for all service providers (paragraph 916).

These findings were reinforced by the Federal Court in *Australian Energy Regulator v Australian Competition Tribunal* (No 2) [2017] FCAFC 79.

The decisions of the Tribunal and the Federal Court indicate that the starting point for specification of the benchmark efficient entity is the degree of risk which applies to the service provider for which a regulatory decision is to be made. The degree of risk which applies to the service provider is, then, the degree of risk to be attributed to the benchmark efficient entity.

The current conceptual specification of the benchmark efficient entity may be appropriate but, in APA's view, only if it can be demonstrated that benchmark has the same degree of risk as the service provider for which a regulatory decision is to be made.

There is a real prospect that different entities have different degrees of risk. The degree of risk may not be common across electricity distribution, electricity transmission, gas distribution, and gas transmission. There may be similarity in degree of risk between, for example, gas transmission service providers, but not between those service providers and service providers in the electricity sector. Indeed, there may be significant within-sector differences: a gas transmission pipeline supplying a small number of mining and minerals process operations is likely to have different risk to a pipeline supplying mainly gas retailers in a large urban area.

How is the degree of risk of the service provider to be established? Not by reference to a hypothetical business in a broad class of potentially relevant entities. As the Federal Court found: degree of risk" was not directed to the risk of investing in a business of a generalised type (paragraph 535).

The degree of risk of the service provider must be assessed as a starting point for specifying the benchmark efficient entity for rate of return determination. This is likely to raise difficult conceptual and measurement issues. These issues should,

in APA's view, be discussed and resolved in the process of Rate of Return Guideline review.

2.4 Question 4: averaging periods

Should the conditions and process for setting averaging periods be refined?

APA sees no reason for "refining" the conditions and process for setting averaging periods. Such refinement would lead to unnecessary inflexibility.

In several recent access arrangement revision and revenue proposal processes, the AER has asked APA to amend its proposed averaging periods. On a number of occasions, this was to accommodate the timing of the regulator's final decision. This was done without issue. Set in future, simplicity. Go to market at same point.

2.5 Question 5: transition to trailing average

To what extent are changes required to the current approach of transitioning from an on-the-day rate to a trailing average?

The current approach to estimation of the rate of return on debt is a transition from an on-the-day estimate to a trailing average estimate. During the transition, the estimated rate of rate return on debt will not be the cost of debt financing of the relevant benchmark efficient entity. The estimated rate of return on debt will not, then, be the rate of return required by the ARORO, it will not provide the service provider with the opportunity to recover its efficiently incurred financing costs, and it will not, as appropriate, contribute to achievement of the NEO or the NGO.

APA explained this in its August 2017 submission responding to the AER's draft decision on proposed revisions to the access arrangement for the Victorian Transmission System.

If the current approach of transitioning from an on-the-day rate to a trailing average estimate of the rate of return on debt is to be continued, APA is of the view that no change is required to the process of transition.

The current approach should continue, allowing service providers and users the opportunity to gain experience with it.

2.6 Question 6: data for return on debt estimation

Is it appropriate for us to review the return on debt implementation approach by performing a review of the four third party debt data series currently available to us? Please also explain if you think there is further value in broadening this scope of debt implementation issues and why you hold this view?

It is appropriate, in APA's view, for the AER to assess additional third-party data sources which might be used in estimating the rate of return on debt.

2.7 Question 7: equity risk premium

Would a more prescriptive approach to setting the equity risk premium be appropriate? If the Guideline has a more prescriptive approach to estimating equity risk premium, what set of conditions for reopening the Guideline would best achieve the national gas and electricity objectives and the allowed rate of return objective?

Before a more a more prescriptive approach to setting the market (equity) risk premium is adopted, consideration should be given to the model of equity returns for which that premium is required.

The AER advises, in the Explanatory Statement accompanying the Rate of Return Guideline, and in its subsequent regulatory decisions, that, in estimating the market risk premium, it places most reliance on historical excess returns. Historical excess returns provide a baseline range for the AER's market risk premium. Other information, including the results from dividend growth models, informs the selection of a point estimate.

The use of a historical average of excess returns implies that the market risk premium is estimated as

$$\frac{1}{n}\sum_{t=1}^{n}(r_{Mt} - r_{ft}) = \bar{r}_M - \bar{r}_f$$

where $\bar{r}_M$ is the average return on the market over the n years of the averaging period, and $\bar{r}_f$ is the average risk free rate over the same historical period.

But this is not an estimate of the market risk premium of the Sharpe-Lintner CAPM.

The Sharpe-Lintner CAPM has its foundations in mean-variance analysis of portfolio choice. The market risk premium – the term $E(r_M) - r_f$ as it appears in the model – is simply the difference between the conceptually distinct risk free rate

of return (r_f) and the expected return on the market portfolio ($E(r_M)$) assumed for that analysis.

The market risk premium of the Sharpe-Lintner CAPM is not a single parameter to be estimated separately and independently of estimation of the risk free rate and the expected return on the market portfolio.

A historical average of excess returns does not estimate the market risk premium of the Sharpe-Lintner CAPM.

Through its use of a market risk premium determined as a historical average of excess returns, the AER's "foundation model" is a single factor model of returns. The single factor is the excess return on the market.

To the extent that such models – linear factor models – have theoretical support, it is to be found in linearization of the intertemporal marginal rate of substitution in consumption-based asset pricing models, and in arbitrage pricing theories. It is not found in the mean-variance analysis which provides the foundations of the Sharpe-Lintner CAPM.

The AER's foundation model appears isomorphic with the Sharpe-Lintner CAPM, but it is a different model. As Professor Stephen Ross has noted:

The above approach [arbitrage pricing with excess return on the market as a single factor], *however, is substantially different from the usual mean-variance analysis and constitutes a related but quite distinct theory.*[1]

A choice must be made between the AER's foundation – single factor – model and the Sharpe-Lintner CAPM.

If the Sharpe-Lintner CAPM is to be used to estimate the rate of return on equity, then it must be applied in a way consistent with its conceptual and theoretical foundations. The market risk premium must be estimated consistently with those conceptual and theoretical foundations. It must be estimated, at the time the model is applied, as the difference between:

- the return that investors expect, at that time, to earn on a market portfolio of assets
- the rate of return on the risk free asset which is assumed to be available to investors at that time.

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[1] Stephen A Ross (1973), "The Arbitrage Theory of Capital Asset Pricing", Journal of Economic Theory, 13: page 343.

Applying the Sharpe-Lintner CAPM in any other way leads to an estimate which is not an estimate of the equilibrium expected rate of return on equity, and which, in consequence, could have no claim to be a rate of return on equity which contributes to achievement of the ARORO.[2]

The alternative is to recognise the use of linear factor models, and the single factor model which is the AER's foundation model. The current empirical support for these models – as in the work of Fama and French – strongly suggests that multiple factors are required for the explanation of asset prices. An important issue in their application is whether those factors are to be derived from the characteristics of asset portfolios (Fama and French), or whether they are to be obtained empirically as key macroeconomic variables which describe the state of the economy (as in the pioneering application of arbitrage pricing theory by Chen, Roll and Ross).[3]

Either the Sharpe-Lintner CAPM, properly applied in a way consistent with its conceptual and theoretical foundations, should be adopted for the Rate of Return Guideline or the Guideline should endorse the use of linear factor models.

This is a matter appropriately dealt with in the Rate of Return Guidelines review.

Once model form has been discussed and resolved, a decision then be made on whether a more prescriptive approach to setting the market risk premium is required.

2.8 Question 8: selection of an equity beta point estimate

Is the theory underlying the Black CAPM still appropriate for informing an equity beta point estimate? In its place, should alternative information guide the selection of an equity beta point estimate?

The theory underlying the Black CAPM remains appropriate if the Sharpe-Lintner CAPM is used to estimate the rate of return on equity. That theory does not directly inform the estimation of the equity beta, but it can guide the choice of parameters for the Sharpe-Lintner CAPM, contributing to a rate of return on equity estimate which, in turn, contributes to achievement of the ARORO.

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2 This is not the so-called Wright CAPM, which the AER advises is an unacceptable historical/alternative specification of the Sharpe-Lintner CAPM requiring additional and theoretically unjustified assumptions.

3 Nai-fu Chen, Richard Roll, Stephen A Ross (1986), "Economic Forces and the Stock Market", Journal of Business, 59(3): pages 383-403.

The Black CAPM and the Sharpe-Lintner CAPM are not separate and distinct models. The foundations for both are mean-variance analysis of portfolio choice, and the Sharpe-Lintner CAPM is embedded within the more general framework of the Black CAPM.

The relatively simple theoretical result which is the Sharpe-Lintner CAPM is derived from a view in which, in addition to a number of risky assets, a risk free asset is available to investors seeking to minimise risk. Those investors are assumed to be able to borrow and lend freely at the rate of return on the risk free asset.

But the risk free asset is a theoretical construct. No financial asset is without risk, although some assets are less risky than others. Furthermore, even if a suitable proxy can be found for the risk free asset, few investors will be able to borrow or lend freely at the rate of return on that asset.

The theory underlying the Black CAPM indicates a higher expected return on equity than is indicated by the Sharpe-Lintner CAPM when the equity beta is less than one (and the expected return on the zero-beta portfolio is positive).

Ideally, estimates of the return on equity should be made using the Black CAPM rather than the Sharpe-Lintner CAPM, but APA understands the difficulties inherent in estimating the more general model.

In these circumstances, the Sharpe-Lintner CAPM (which is more easily estimated) might be used to estimate equity returns. But regulated energy network service providers generally have equity betas less than one, with the implication that estimates of the expected return on equity obtained applying the Sharpe-Lintner CAPM understate the true expected return.

One way of recognising this – a way which is qualitative and pragmatic – is to apply the Sharpe-Lintner CAPM using the upper limit of the range of statistical estimates for the equity beta.

The advice the AER has received from its rate of return experts, Professor McKenzie and Associate Professor Partington, is correct: the theory of the Black CAPM does not necessarily support an uplift in the equity beta. But the regulatory regimes of the National Electricity Rules and the National Gas Rules do not call for estimation of the rate of return on equity using the Sharpe-Lintner CAPM. They require an estimate of the rate of return on equity which contributes to the ARORO. If the Sharpe-Lintner CAPM cannot deliver that estimate (because it understates expected returns on equity when the equity

beta is less than one), then there is a clear case for adjusting the outcome obtained using the model to achieve the regulatory objective.

Estimating beta

APA's response to this question about selection of an equity beta point estimate proceeds from a view that there is a suitable range of beta estimates for the Sharpe-Lintner CAPM.

This was previously the case. Statistical estimations of beta by Professor Henry, in April 2014, used relatively long series of data for nine listed electricity and gas businesses. These businesses were: Alinta, AGL Energy, APA Group, DUET Group, Envestra, GasNet, Hastings Diversified Utilities Fund, Spark Infrastructure, and SP AusNet.

As a result of corporate restructurings, and merger and acquisition activity, only four listed businesses remain. They are: AGL Energy, APA Group, Spark Infrastructure and AusNet Services.

If data for the nine businesses were still to be relied upon, the resulting beta estimates would be made using obsolete data, and may be biased by unusual share price activity around the times Alinta, DUET Group, Envestra, GasNet and Hastings Diversified Utilities Fund were delisted. Were such beta estimates to be used to estimate a rate of return on equity, that rate would not be estimated having regard to prevailing conditions in the market for equity funds.

APA is of the view that consideration should be given to the data potentially available for beta estimation for the benchmark efficient entity. The statistical ideal of long data series for multiple entities may have to be replaced with reliance on monthly data for a shorter period and for a smaller set of entities. The issues should be discussed and resolved in the Rate of Return Guideline review.

2.9 Question 9: dividend growth models

What is the appropriate role of dividend growth models in setting the allowed return on equity?

In the context of determining the allowed return on equity, dividend growth models have an important role in estimating the expected return on the market portfolio.

The estimate of the rate of return on equity made using the Sharpe-Lintner CAPM is a forward-looking rate of return. It is the rate of return for the period ahead.

The expected return on the market used when applying the model is, then, the forward looking expectation for that period ahead.

The expected return on the market is often estimated as an average of realised returns, but this assumes that realised returns are a good proxy for expected returns. It assumes, although the assumption is usually unspecified, rational expectations formation. There is growing doubt about the use of such an assumption, whether clearly specified or not, in the context of asset pricing. The reasons for this doubt are:

- realised returns are "noisy", and the noise is likely to be large
- information "surprises" (which "cancel out" in the rational expectations view) are often persistent and may not cancel out over the relevant period
- learning by agents in financial markets implies that realised returns may be biased estimates of expected returns.

Dividend growth models directly estimate the forward-looking expected return on the market. Certainly, a number of assumptions must be made when using dividend growth models, and those assumptions are potentially contentious. But they are no more contentious than the assumption of rational expectations.

If the Sharpe-Lintner CAPM is to be used to estimate the rate of return on equity, then dividend growth models have an important role in estimating the expected return on the market portfolio.

2.10 Question 10: valuation of imputation credits

Is it appropriate to limit the review of the valuation of imputation credits to updating the empirical analysis? Are there any particular issues we should take into account when updating the empirical analysis?

Rule 74(2) of the National Gas Rules (there is no equivalent rule in the National Electricity Rules) requires that a forecast or estimate be made on a reasonable basis, and be the best forecast or estimate possible in the circumstances.

The value to be attributed to imputation credits is in the nature of a forecast and an estimate. Compliance with Rule 74(2) precludes limiting the review of the valuation of those credits to the updating of earlier empirical analysis.

2.11 Question 11: expected inflation

Should expected inflation and its interaction with the allowed rate of return be a priority under the Guideline review?

Expected inflation and its interaction with the allowed rate of return should not be a priority of the Rate of Return Guideline review.

The interaction between inflation and asset prices is an issue of some complexity. If expected inflation and its interaction with the allowed rate of return were now to become a focus, all aspects of rate of return determination, including the use of the allowed rate of return in post-tax revenue modelling, would need to be reviewed.

Strictly, the Sharpe-Lintner CAPM does not apply in an inflationary economy. It must be modified to take into account the risk associated with unexpected changes in inflation. When inflation is uncertain, the relation between nominal rates of return and expected inflation is no longer the simple Fisher equation.[4]

A coherent view of inflation and asset pricing involves consideration of another asset – money – because inflation is primarily a monetary phenomenon. In consequence, monetary policy plays a role: it not only affects inflation expectations; it also impacts on asset prices through a number of channels. Again, this is not the world of simple asset pricing models including the Sharpe-Lintner CAPM. Nor is it the world of the "model" the AER uses to estimate the return on debt.

During periods of changing inflation, the equity beta of the Sharpe-Lintner CAPM may or may not be stable. Its stability depends on, among other things, whether or not the return on the market portfolio is invariant with respect to inflation.

This may be a reason for the ambiguity in the results of the stability tests which Professor Henry undertook for the AER in 2014.

These issues are not easily resolved by targeting a real rate of return.

As noted above, when inflation is uncertain, the Fisher equation does not hold, and cannot be used to derive real rates from nominal rates of return.

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4 For an "early" discussion of the interaction between inflation and asset prices, see Richard Roll (1973), "Assets, Money, and Commodity Price Inflation under Uncertainty", Journal of Money, Banking and Credit, 5(4): pages 903- 923.

In the economies in which energy network service providers borrow (Australia, North America, Western Europe), debt contracts are usually in nominal terms; they are not indexed. The reasons for this are not entirely clear. That, in these circumstances, a real rate of return should be targeted, and that service providers should borrow using indexed bonds, is an ill-considered proposal.

The current treatment of expected inflation and its interaction with the allowed rate of return are pragmatic responses to complex market circumstances. They have gained acceptance through use. APA is of the view that, in the absence of a clear reason for change – and, so far, none has been advanced – they should not be unnecessarily disturbed.