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Initial Views on Rule Changes Proposed by MEU

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Executive Summary

MEU has proposed two rule changes to AEMC:

- Optimisation of the asset base, which would result in a periodic check to see whether the deemed value of the regulated firms' assets could be reduced on the basis that some economies could be achieved in their physical configuration if they were rebuilt anew; and

- Non-replacement of fully depreciated assets that continue to be used and useful.

In assessing these requests, the AEMC is obliged to respect the provisions of the National Gas Law ('NGL'), and the National Electricity Law ('NEL'). These laws set out essentially the same objective, being[1]

> "...to promote efficient investment in, and efficient operation and use of, [energy] services for the long term interests of consumers of [energy] with respect to price, quality safety, reliability and security of supply of [energy]."

My analysis suggests that optimisation would impose additional direct and indirect costs compared with the current arrangements, which involve locking in an asset value and rolling it forward over time with appropriate adjustments for depreciation and investment. This view is based on a first principles analysis, but it also aligns with what appear to be regulatory trends away from optimisation in Australia and New Zealand, while the UK and USA seem to be maintaining their respective historic aversions to ex-post optimisation.

If over-investment, or over-charging for investment, is perceived to be a real problem in the Australian regulated energy sector (and there is no real evidence of that in the MEU proposal), then there may be other, less costly and intrusive ways of addressing that problem. The efficiency sharing approach used in the UK by Ofgem is one example of an alternative to ex-post optimisation.

Turning to the "used and useful" test, this is motivated by the fact that asset lifetimes must be predicted but that predictions will often be in error. In all likelihood, the errors will be approximately symmetric (i.e. the lifetimes of some particular assets will turn out to have been over-estimated while others will be under-estimated). A reasonable regulatory principle is therefore to ensure that neither party (consumers or firms) benefit systematically from these symmetric errors.

The MEU proposal only addresses one error type, however. My analysis suggests that if the AEMC wishes to approve the "used and useful" proposal, it should also ensure that assets that expire before the end of their expected lifetime are written out the asset base

[1] In addition, the NEL objective includes a network-level consideration, namely "the reliability safety and security of the national electricity system". A similar objective may also be appropriate in the gas sector, but in any case these network-level issues are not pivotal for my analysis.

and the loss treated as negative income. This would ensure that neither party gains a systematic advantage. However so would the *absence* of both of these rules.

It seems to me that the two MEU proposals are fundamentally incompatible with one another. If both were adopted, the regulator need to undertake both ex-ante and ex-post assessments of the capital asset base. This would be an invidious position, requiring approving assets and then subsequently, perhaps many years later, optimising some of the approved capital expenditure out of the asset base. Even if legal challenge could be avoided, this would undermine one of the most valuable of regulatory assets: a reputation for commitment.

In summary, I suggest that optimisation should be resisted, though there may be a case for some less costly and intrusive methods for placing more ex-ante discipline on the entry of capital into the regulated asset base. If ex-post optimisation is not adopted, then the case for the used and useful test would be stronger, however the treatment of early death assets (those expiring before their expected lifetime) should be considered jointly with the used and useful test proposal.

1 Introduction

The Australian Energy Market Commission ('AEMC') is currently considering two rule change proposals, one submitted by the regulator (Australian Energy Regulator, or 'AER') and the other submitted by a users' group (Major Energy Users Inc, or 'MEU'). In this report I focus on the issues raised in the MEU proposal, though in doing so, the AER request is borne in mind. Since the AER request predates that of MEU, and MEU says that its proposal seeks to "fill in the gaps" left after the AER proposal, it will ultimately be necessary for the AEMC to view the proposals in aggregate. However, at this point my instructions are to focus on the MEU proposal.

MEU requests two changes:

- Optimisation of the asset base, which would result in a periodic check to see whether the deemed value of the regulated firms' assets could be reduced on the basis that some economies could be achieved in their physical configuration if they were rebuilt anew; and

- Non-replacement of fully depreciated assets that continue to be used and useful.

In assessing these requests, the AEMC is obliged to respect the provisions of the National Gas Law ('NGL'), and the National Electricity Law ('NEL'). These laws set out essentially the same objective, being[2]

> "...to promote efficient investment in, and efficient operation and use of, [energy] services for the long term interests of consumers of [energy] with respect to price, quality safety, reliability and security of supply of [energy]."

In each law, there are also six revenue and pricing principles that expand to some extent on what the objective means in practice. Again, the revenue and pricing principles are extremely similar as between the NEL and the NGL. These objectives and principles are helpful touchstones, but a significant analytical difficulty remains for the AEMC in seeking to evaluate the rule change proposals. The AEMC is obliged to translate what are inevitably very high level considerations into specific rules that will give effect to them, bearing in mind the practical realities of doing business in the Australian energy sector.

In its consultation paper AEMC points to four relevant issues:

- Recovery of efficient costs;
- Efficient utilisation;
- Investment incentives; and
- Regulatory process.

[2] In addition, the NEL objective includes a network-level consideration, namely "the reliability safety and security of the national electricity system". A similar objective may also be appropriate in the gas sector, but in any case these network-level issues are not pivotal for my analysis.

I agree that these are all relevant considerations with strong links to the legislated objectives and principles. Based on my reading, I also consider that these objectives and principles offer sufficient criteria against which to assess the MEU proposal, though care is required during the assessment process. Challenges are posed both by the interpretation of the objectives and principles, and their application during the rule change process.

Interpretation

Since the objectives and principles are necessarily framed in general and high-level terms, they offer only quite broad guidance about the analytical tasks AEMC faces in evaluating the MEU proposals. One needs to translate and interpret the objectives and principles in order to discern their meaning in the current context.

This interpretation task is perhaps most important in respect of the concept of "efficiency", a term that features prominently in the objectives and principles. Economists usually distinguish three forms of efficiency: allocative, productive and dynamic. However in considering the MEU proposals it is also helpful to distinguish between ex-ante and ex-post concepts of efficiency.

MEU's optimisation proposal is essentially advocating an ex-post efficiency standard. Summarising aggressively, optimisation would involve periodic re-estimation of the minimum scale and configuration of installed assets, with reference to current demand patterns and modern technology. That modern, notionally redesigned set of assets would then be valued at new prices and depreciated to reflect the lower service potential of the actual physical assets. Thus, under optimisation, assets for which a previous investment decision may have been prudent and efficient on the basis of a forward looking (ex-ante) analysis can subsequently be written out of the asset base.

The interpretation of efficiency concepts for a decision over optimisation is discussed in section 2 below, and the Appendix contains a brief survey of experience with optimisation in other countries and industries.

Application

It is generally accepted that new regulations should have three characteristics. They should:[3]

- address clearly defined problems;
- do so better than relevant alternatives; and
- be expected to deliver benefits in excess of their costs.

[3] These characteristics essentially adapt standard cost-benefit analysis to questions about new regulations. They are consistent with the first two questions in the UK's "Better Regulation Checklist" http://www.bis.gov.uk/policies/bre/better-regulation-framework/better-regulation-checklist

Good regulation is difficult and one cannot reasonably expect perfection in the analysis of proposed new regulations. A disciplined thought process can nevertheless help to avoid serious errors.

In the case of the MEU proposals, the perceived problem is over-investment and subsequent usage charges that are higher than necessary. I have not seen evidence of over-investment[4] but it should be reasonably straightforward to test this proposition. For analysis, I will assume that over-investment has occurred or is likely to in the absence of the rule changes requested by MEU.[5]

Alternative means of addressing the problem of over-investment are not explored in the MEU proposal. It might be possible to gain most of the benefits of optimisation by other means, in which case those other means constitute an alternative to optimisation and should be evaluated alongside (i.e. compared with) the MEU proposal.

The MEU proposal suggests that the additional costs of its proposal will fall only on the AER during the revenue reset process and asserts that they "will be minimal". It may be possible to obtain more accurate estimates of these direct costs of optimisation, from previous experience with the process in Australia and elsewhere. Additionally, indirect costs, such as the potential for under-investment, should also be considered. These application issues are discussed further in section 4.

The "used and useful" test proposed by MEU is based on similar concerns about over-investment. However the economic effects of the proposal raise some different issues, which are discussed in section 3.

[4] Submissions from regulated firms dispute the contention that there is an over-investment problem and argue (correctly in my view) that MEU has not established that this is a real problem.

[5] I note that in its submission on the MEU proposal, the AER "agrees…that there is a need to strengthen incentives on network service providers (NSPs) to only incur efficient capital expenditure.

2 Ex-Post Optimisation

One way to rationalise the use of ex-post optimisation in economic regulation is to appeal to competitive market standards. In effectively (i.e. workably) competitive markets, investors have no guarantees of capital recovery and assets can become stranded when demand falls away. It could be argued that regulation should seek to mimic this form of competitive discipline. MEU uses this argument in sections 1.4 and 3 of its proposal.

A counter argument is that regulation does not seek to completely replicate competitive conditions, an attempt that would in any case be exceptionally difficult (if not futile) in the case of natural monopoly infrastructure. Rather, the objectives and principles can be viewed as suggesting that regulation should seek efficient modifications of the business environment faced by monopolists. Moreover, as APIL noted in its submission, the objectives and principles in the relevant laws do not invoke competitive market standards, but are instead focussed on efficiency.

MEU correctly observes that optimisation would increase risks for regulated firms. In competitive markets, investors require compensation for assuming (systematic) risk which will generally include risk arising from demand variations. The main form of that compensation is through the opportunity to earn economic profits (i.e. earnings in excess of the cost of capital), which profits help to offset the risk of asset stranding. Regulators seeking to promote objectives of the type relevant to this matter rarely permit firms an opportunity to earn economic profits.[6] Instead, compensation for risk typically occurs through the allowed weighted average cost of capital (WACC). In building block regulatory models, optimisation would therefore be expected to lead to an increase in the WACC.[7]

The fact that WACC would increase under optimisation is not necessarily a conclusive argument against optimisation however. From the perspective of consumers, higher WACCs lead to higher prices but an offset occurs whenever assets are written out of the base via optimisation. It is not possible to reliably predict which of these effects would dominate in any given regulatory period.

We can think of a higher WACC to compensate for optimisation/stranding risk as being analogous to an insurance premium paid to the firm by consumers for the service of self-insuring against these risks. Seen this way, provided the WACC increment was properly estimated, it would be actuarially fair compensation, and over the long-run (e.g. several regulatory periods) there would be neither a gain nor a loss to consumers, or to the regulated firm. Errors are likely to me made when determining a WACC increment to compensate for stranding risk of course, but it is interesting to note that in

[6] As submissions have noted (eg Jemena) firms operating in competitive markets have a wide range of conduct available to them, including practices that are (for good reason) not permitted by regulators.

[7] MEU says that regulated WACCs did not change when optimisation was dropped. Assuming this is empirically correct, it does not follow that optimisation *should* make no difference to WACC. It may be that there were offsetting changes in some WACC parameters, such that what would have been a fall in WACC following the abandonment of optimisation instead lead to no material changes.

the absence of such errors there would be no gains or losses to any parties over the long-run, and no reliably predictable gains or losses in the short run.

What then are the predictable effects of optimisation, and to what extent are they aligned with the objectives and principles? These questions are considered in the following sub-sections.

2.1 Practical Impacts of Optimisation

As discussed above, any impact of optimisation on consumer prices will tend to be a short-run phenomenon and we cannot know in advance whether it is positive or negative. Price impacts should therefore be ignored when considering the practical impacts. In what follows, we discuss two main categories of impact:

- Direct impacts, via the cost of optimising; and
- Indirect impacts on investment patterns.

2.1.1 Direct Impacts

The MEU proposal document describes the direct costs as "minimal". The relevant question however is not about the absolute size of direct costs under optimisation, but rather about the difference in direct costs between the two regulatory policy alternatives under consideration here (ex-post optimisation vs ex-ante approval). In my opinion, optimisation costs are likely to exceed the cost of an ex-ante prudency check process. There are two ways in which these alternative methods for regulating the asset base generate different direct costs:

1. Optimisation rules need to be specified in advance; and
2. New build prices need to be obtained under optimisation.

Both of these factors increase the direct costs for optimisation, relative to ex-ante prudency checks. While the cost of developing optimisation rules *should* be a one-time outlay, in practice it is not unusual for such rules to be refined over time in light of experience. Each time changes are requested, some authority needs to assess the proposal. If it is accepted, valuation handbooks and practices then need to be updated.

There are also assessment costs in an ex-ante approvals regime of course, but there is no need for a backward-looking review of the entire asset base, and less need for highly specific and complete descriptions of the circumstances in which assets should be written off. By contrast, under optimisation quite prescriptive rules are needed in order to avoid the risk that valuers will err in either direction (under- or over-optimisation).

It is only proposals for incremental additions to the asset base that matter in an ex-ante approvals regime. Regulators can therefore focus on problems that are narrowly defined (at least relative to the whole-of-network re-assessments needed under optimisation).

The ex-ante approvals process may also be less contentious because there is somewhat less value at stake.

Similar conclusions apply when the direct costs incurred by the regulated firms are considered. Irrespective of whether there is optimisation, prudent firms will undertake a forward-looking appraisal of potential capital investment projects. Such costs are therefore common to both regulatory alternatives. The assumptions, data and output of such analyses are directly relevant to regulators under an ex-ante approvals regime, so the additional costs incurred by the firm will be relatively modest.

The second point above (need for new build prices) is a relatively minor contributor to direct costs since a single set of prices can be applied to all networks in a sector. However it is still has indirect impacts (see below), is a source of potentially costly dispute and is not needed in an ex-ante prudency checking process.

2.1.2 Indirect Impacts

MEU recognise that an indirect impact of optimisation is a risk that certain assets will not be installed. The circumstance MEU envisages is one where the asset may soon be viewed (in an ex-post review) as too small. MEU suggests that in such cases AER should be empowered to "approve an oversized investment". This proposal (on which MEU offers no further detail) underlines the discussion above regarding the need for a clear and complete set of rules.

Moreover, the scenario is only one of several that might give rise to under-investment.[8] The New Zealand Commerce Commission has recently noted several other such cases that have been described to it, in submissions by regulated firms.[9] They arise from differences between actual capital expenditure (even when incurred at least cost) and the optimised value ascribed to them in the valuation handbook. Such differences can arise because, among other things:

- the standard replacement costs in the handbook are based on Modern Equivalent Assets (MEAs), which may be different from the assets actually installed;

- the costs of the MEAs are based on an assumption of a large scale of construction, and incremental investment does not necessarily enjoy the same scale economies as assumed under a whole-of-network optimisation; and

- at least some incremental investment involves working around other utility services, maintaining supply to existing customers, and removing existing assets (all factors which increase actual efficiently incurred expenditures).

[8] For current purposes, think of under-investment as being a situation where firms do not install assets that would be valued by current consumers in excess of their costs.

[9] New Zealand Commerce Commission, "Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons paper", December 2010, from page 359.

In submissions APIA correctly note that looping investments, which are used to add incremental capacity to gas pipelines in response to demand growth, will generally suffer under a whole of network optimisation process, because a single larger pipe would be cheaper to build. I also agree with Grid Australia's submission to the effect that optimisation will tend to deter investment in assets for which demand is relatively difficult to predict.[10]

For these practical reasons, periodic optimisation can lead to under-investment. Notice that these matters are not readily finessed through careful drafting of the valuation handbook. Rather, they arise from a fundamental conflict between whole-of-network optimisation processes which envisage greenfields or scorched node rebuilds, and the reality that investment is actually undertaken on an incremental basis while maintaining services as much as possible.

There is also theoretical support for the proposition that linking access (usage) prices to current rather than historic costs can lead to under-investment.[11] Those results rely not on the optimisation process itself, but rather on the fact that the relevant cost standard is current rather than historic costs.

2.2 Can Optimisation Promote Efficiency?

In assessing the MEU proposal AEMC will need a clear view on how optimisation would affect efficiency. It is helpful to distinguish three forms of efficiency:

- Allocative efficiency means that prices are as low as possible given production costs so that uptake ("efficient use") is maximised, as are the gains from trade (i.e. the aggregate surpluses received by consumers and producers combined);

- Productive efficiency means that the costs used in assessing allocative efficiency are as low as possible; and

- Dynamic efficiency means that the assets on which the productive process relies are installed and renewed in a pattern that generates maximum value over the longer-term.

It seems that MEU are not greatly concerned about allocative efficiency. It trusts that prices will be closely linked to whatever "costs" emerge from the regulatory process, or at least its proposal does not seek to modify the linkages between costs and prices.

MEU's focus is instead on the definition and estimation of costs. Since it is effectively seeking to push down the cost curve, the proposal can be viewed as targeting productive efficiency, at least in the first instance. Importantly however, the MEU

[10] On the other hand, as Ergon noted in its submission, it is not unusual for NSPs to carry obligations to connect customers (Queensland DNSPs were cited by Ergon) in which case any necessary capital expenditure cannot be deferred, even if the DNSP perceives a real risk that demand will erode before the asset's cost has been recovered.

[11] G. Guthrie, J. Small and J. Wright, 2006, "Pricing Access: Forward versus Backward Looking Cost Rules", European Economic Review, 50, 1767-1789.

proposal is aimed at capital rather than operating costs. It is the assets themselves, rather than the way they are managed, that MEU wishes to target.

This focus on assets brings dynamic efficiency issues into play. If investment patterns are dynamically efficient, the production cost curve for regulated firms will evolve (i.e. shift) efficiently. Dynamic efficiency is also relevant in view of the risks of under-investment noted in section 2.1.2.

All deliberate changes to a given set of installed assets are based on forward-looking considerations. This is clearly true for investment, but it also applies to the retirement or scrapping of assets. Irrespective of the precise motivations for scrapping an asset, the reasons will depend on a forward-looking appraisal of relevant factors.

While it is possible to use backward-looking analysis to assess how dynamically efficient a firm or industry *has been*, a negative finding from such analysis has little practical value unless future decisions can be improved.

A Thought Experiment

Suppose for example that an optimisation model is applied to the assets of a single regulated firm, and it shows that a particular spur line is too large given current and expected future demand. In this circumstance, MEU would advocate writing down the value of the assets accordingly. But this tells us nothing about whether the spur line was part of a dynamically efficient investment plan when it was originally installed.

One possibility is that demand conditions at the time of the investment did justify the larger capacity. If at that time investors had perfect foresight, they would realise however that these conditions would not persist, and under the regime proposed by MEU investors would have two choices:

- Not invest in order to avoid a partial stranding of capital once the line capacity was written down; or

- Negotiate accelerated depreciation for the portion of the investment that would otherwise be stranded, and then invest.

The first choice would deny service to some customers; the second would allow those customers the opportunity to fully fund the assets needed to serve them and is therefore likely to be a more efficient outcome. In general terms, if customers are willing to pay the full costs of serving them, not serving them is inefficient (some gains from trade are foregone).

In the real world, investors (and regulators) lack perfect foresight, so the above choices are less clearly defined. The MEU proposal would create some probability (i.e. risk) of the asset scale being optimised downwards, but the timing and indeed the downscaling itself are not certain. The same two choices are available but the choice between them is more difficult.

In the circumstances outlined by this thought experiment, optimisation alone will not promote efficient investment. On the contrary, unless combined with a flexible depreciation methodology, it would leave some demand unserved.

Ex Post Efficiency

The ex-post optimisation process is not a test of dynamic efficiency. A test of dynamic efficiency would seek to stand in the shoes of investors, at the time of investment, and ask whether the decision to invest (or not invest) was reasonable and prudent given the information available at that time. By contrast, ex-post optimisation is a notional reconfiguration of assets based on *current* information about demand and costs. Market conditions at the time of investment are irrelevant to the process.

Neither does ex-post optimisation enforce or promote dynamic efficiency. On the contrary, as the thought experiment shows, further mechanisms such as flexible depreciation regimes are required to offset what would otherwise be inefficient under-investment.

The above analysis strongly suggests that efficient investment should be assessed and tested from an ex-ante perspective, even if that assessment is done after assets are installed. That would be consistent with the way investors actually make decisions in the real world. It points towards something closer to the existing ex-ante processes for determining how regulated asset values should evolve, though those processes might nevertheless benefit from adjustments.

The imposition of asset write-offs through optimisation ultimately rests on an ex-post view of efficiency. When the assets are typically lumpy and sunk, as they are for electricity and gas infrastructure, this is likely to undermine rather than promote efficient investment.

3 Used and Useful Test

The second aspect of the MEU proposal is that assets that are fully depreciated in the accounts but still used and useful, should remain in the asset base at their depreciated value (i.e. zero). In the detailed wording proposed by MEU, a similar provision would apply to partially depreciated assets scheduled for replacement. The practical effect of this "used and useful" proposal would be to deny regulated firms the ability to replace some old assets with new assets.

Submissions from regulated firms generally deny that they replace assets for financial reasons. Ausgrid, for example, claims that approximately 88% of its 33kV HSL cables were older than the standard life of 45 years in 2010.

The proposal itself is similar to requests that have been made to the AER by user groups in the past.[12] It assumes that allowed rates of return err on the high side of the true cost of capital, so that firms have an incentive to maximise the value of their asset base. Whether or not that has in fact occurred, it certainly could occur, so it is not unreasonable for users to perceive some risk.

The used and useful proposal raises two sets of issues.

- What is the balance of risks and rewards that the proposal seeks to address?
- How does it link with the optimisation proposal?

These are addressed in the next two subsections.

3.1 Asset Lifetime Prediction Error

The fundamental source of the issue MEU seeks to address is that asset lifetimes are uncertain. Predictions need to be made for the purpose of setting depreciation schedules, but those predictions will often turn out to be wrong. Errors could be in either direction: asset lifetimes could be under- or over-estimated.

- When lifetimes are under-estimated, the asset remains useful after it is fully depreciated in the accounts.
- When lifetimes are over-estimated, the asset expires before it is fully depreciated and will generally be replaced by new equipment.

For analysis, let us assume that either of these errors could occur with approximately equal probabilities. In other words, there is no systematic bias in the lifetime estimates. Any such bias could be detected and would presumably be corrected.

[12] The Energy Users of Victoria made a submission to AER in 2007, of which section 5.1 was devoted to this issue.

A question now arises as to whether either party (firms or consumers) bears an unequal burden from these broadly symmetric errors. If not, i.e. if the burden is shared approximately evenly, then there is no serious problem because although consumers may "lose" from under-estimation they will gain about the same amount from over-estimation, and conversely for regulated firms.

I am not yet sufficiently familiar with the details of regulatory practice to know how AER treats the over-estimation case. There are basically two options:

- Approval for replacement investment could be granted without making specifically linked adjustments to the asset base to remove the book value of the early-expired asset; or

- Such adjustment could be made.

The adjustment described above has the same economic and financial effect as ex-post optimisation: in both cases any remaining residual book value is written off. If this is the current practice, then

- the firm suffers a capital loss when asset lifetimes are over-estimated; and

- it would be reasonable for the firm to benefit from the opposite error (under-estimation).

This line of thinking focuses on capital gains and losses however, whereas the efficiency effects are related more directly to the cash implications of these capital movements.

3.1.1 Treatment of Revaluation Gains & Losses as Income

The above discussion concerned the potential for an optimisation-like adjustment to impose a loss (in the case of asset lifetime over-estimation) that offsets the gain from replacing assets that expire earlier than expected. The regulatory treatment of capital gains and losses also bears on this question.

Consider a regulatory model based on current (i.e. replacement) costs. If replacement costs are rising as is the case for electricity and gas infrastructure, this would lead to rising asset values over time. However, most regulators would require the attendant capital gains to be treated as income. In that case, capital gains would translate into lower allowed cash earnings so that current consumers could actually be advantaged through lower prices.[13]

By contrast, optimisation imposes capital losses. A symmetric treatment by regulators would therefore require that cash earnings be permitted to increase, to the disadvantage of current consumers. Viewed this way, at least in the short-run, consumers would prefer not to penalise the firm for over-estimating asset lifetimes (because they will end up paying the penalty). Indeed, a reasonable regulatory aim which would benefit both

[13] Ultimately, the new higher asset values will be recovered through depreciation however, so this advantage will not persist over the long-term.

parties (consumers and firms) is that neither party should systematically lose or benefit from errors in predicting asset lifetimes.

3.1.2 Summary

The MEU addresses a natural phenomenon (prediction error) by proposing a physical constraint (non-replacement of used and useful assets) that has financial implications for consumers and firms. Specifically, it would prevent firms from earning whatever margin is available between the project cost of capital and the regulatory WACC.[14]

Assume that prediction errors are symmetric and that consider two polices:

- Ex-post optimisation from the asset base of assets that expire early and are replaced, with the loss treated as negative income for revenue purposes; and
- A used and useful test along the lines proposed by MEU.

If enacted, each would apply in approximately 50% of cases by number and value. If the regulator wants to ensure that consumers and firms are treated equally, then it should mandate *both or neither* of these policies. To see why consider the following table, which extrapolates and summarises the above analysis.

Parties	Policy Mix	Event	
		Early Expiry	Late Expiry
Firms	Both	+	-
	Neither	-	+
Consumers	Both	-	+
	Neither	+	-

The + and – signs indicate the cash impact on each party (not capital gains and losses). By looking across the rows, we can see that no row has two signs the same. Since early and late expiry represent random events with about the same probability, no party would be disadvantaged by either of these policy combinations.

[14] The project-specific cost of capital for asset replacements will tend to vary across distribution and transmission networks, so some must be lower than the single WACC figure.

3.2 Linkage with Optimisation Proposal

There is an interesting contrast between this proposal and the optimisation proposal, since the used and useful constraint is most easily and naturally implemented in an ex-ante investment approval process. Indeed, this is the context used by MEU in its proposal which states:

> "When approving a replacement for an asset that has been fully depreciated, the regulator must ensure that the asset to be replaced has passed its useful life and cannot be used productively for further service."

If the AEMC was to accept both of MEU's proposals therefore, it would require the AER to undertake ex-ante *and* ex-post reviews of the asset base. I am not a lawyer but this sounds like something that might expose the regulator to legal challenge: is it reasonable for a regulator to initially approve additions to the asset base, and then subsequently write them off?

There is also a substantial economic literature on regulatory commitment, emphasising its desirability and efficiency.[15] At its most basic, this literature notes that de-risking investment saves costs, which savings can be shared with consumers. Regulatory commitment is a form of reputation; it is a cultural asset that takes time and care to grow. Ex ante approval of capital, after which it remains in the asset base until fully depreciated, is a good way to cultivate a reputation for regulatory commitment. The combination proposed by MEU (ex-ante *and* ex-post regulation of capital) would lean in the opposite direction, undermining the regulator's existing reputation.

3.3 International Experience

Physical assessments of whether assets are "used and useful" have been included in a number of regulatory regimes. It is common to refer to backward looking assessments as "prudency" reviews and to reserve the "used and useful" terminology for forward looking assessments.

Used and useful tests have a long history in the USA, though Hoecker (1987)[16] argues that their application there was not thought through as carefully as it could have been. Lesser (2003) confirms that these tests continue to be applied in the USA, though he challenges a move towards using an economic as distinct from a physical version of the test.[17]

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[15] See for example Richard J. Gilbert and David M. Newbery, 1994, "The Dynamic Efficiency of Regulatory Constitutions", RAND Journal of Economics, 25 (4) pp. 538-554.

[16] J. J. Hoecker, 1987, Used and Useful: Autopsy of a Rate Making Policy, Energy Jaw Journal, available online at http://felj.org/elj/Energy%20Journals/Vol8_No2_1987_Used_and_Utemaking_Policy.pdf

[17] J. A. Lesser, 2003, The Used and Useful Test: Implications for a Restructured Electric Industry, Energy Journal, online version at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=347921

Baumol and Sidak (2002) argue that physical investment creates a valuable *option* for customers to use the asset, even if they are unlikely to use it in the next regulatory period. In that sense, even assets that are not physically used are being used to create the value of the option.[18] This point is related to the widely accepted notion that, due to economies of scale, it is often efficient to build infrastructure ahead of demand.

It seems that used and useful tests are less common in the UK and Europe. Newbery contrasts the US and the UK approaches. He notes that used and useful tests in the US help to create pressure for compensation for stranded assets. In the UK, this problem is tackled structurally by specifying "the general framework for regulation and the duties of the regulator in Acts of Parliament" while placing "the main body of regulation in legally enforceable utility licences".[19]

In New Zealand, the used and useful test does have some application, albeit limited. In its "input methodologies" determination for airports, the Commerce Commission requires airports' information disclosures to include:

> **description of use** (significant assets) [which] means a description of how significant assets are *used* to provide specified airport services that is sufficiently detailed to allow interested persons to assess the *usefulness* of the asset in providing specified airport services;[20] (emphasis added).

This context (NZ airports) is quite different to the situation facing the AEMC in Australia however, because airports are not subject to any price control. Instead, they are obliged to disclose certain specified information, in sufficient detail to allow "interested persons" to assess whether the legislative purpose is being achieved.

In summary, it seems fair to say the following regarding international application of "used and useful" tests:

1. They are used in some jurisdictions (notably the USA);

2. When applied in the context of price control regulation they are controversial (Baumol & Sidak); and

3. Their merits need to be assessed alongside all of the other features of the regulatory regime.

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[18] W.A. Baumol, and J.G. Sidak, 2002, The Pig in the Python: Is Lumpy Capacity Investment Used and Useful? Energy Law Journal, online at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=302762

[19] D.M.Newbery, 1997, Rate-of-return regulation versus price regulation for public utilities, Palgrave, online at http://www.econ.cam.ac.uk/faculty/newbery/files/palgrave.pdf

[20] NZ Commerce Commission, 2012, Decision No. 715, Airport Information Disclosure Determination, page 17.

4 Applying the Objectives and Principles

The objectives of both relevant laws involve promoting "*efficient investment in, and efficient ... use of [energy] services for the long term interests of consumers*". From an economic perspective, these objectives clearly point to the customers of regulated firms as being the primary beneficiaries of regulation. Maximising consumer surplus, rather than total surplus, is therefore the statutory objective.

However the "long term" qualifier is important. If prices or revenues fall earned by the regulated firm are too low, it will cease to invest and defer maintenance. That might be of great benefit to consumers in the short run, but it is not a sustainable situation. The longer it persists, the lower the level of service available and the less likely it is that green-field developments will receive energy services. The "long term interests of customers" are served through prices/revenues that are held down to a level that is consistent with the firm continuing to maintain its assets prudently and to undertake efficient investment. At such levels, the *usage* of energy services will be broadly efficient.[21]

An analytical framework for giving effect to the relevant objectives and principles was outlined above (section 1 regarding "application") and there is little I can add to flesh out that skeleton at present. However it is relevant to note that, when this analysis is undertaken, it will be complicated by the presence of a range of possible alternative policies and also by interactions between them.

In the case of the MEU proposals, the AEMC may wish to consider:

- Alternatives to ex-post optimisation;
- Complements to the used and useful rule; and
- The interaction between the two proposed rule changes.

Two of these have been discussed already. Section 3.1.2 concluded in effect that the efficiency of the proposed used and useful rule depends on whether or not a complementary policy (ex-post optimisation of assets that expiry before the end of their expected lifetime) exists, and that the relevant choice is between either both these policies or neither.

It was also suggested (section 3.2) that there is a fundamental conflict between the two MEU proposals because in combination they would place the regulator in the invidious position of writing off previously approved assets.

It remains to consider alternatives to the MEU ex-post optimisation proposal. In doing so, it is relevant to consider the way the current gas rules handle this issue. Section 85 of those rules permits the AER to require insertion into access arrangements of a clause

[21] This discussion abstracts from tariff design issues which can influence usage patterns, push them closer to, or further away from efficient levels.

that would remove "redundant" assets from the RAB in subsequent control periods. On its face, this appears to allow ex-post optimisation of the sort proposed by MEU. In its submission, MEU argues that section 85 only becomes operative if both the firm and the AER agree, but that seems wrong since 85(1) clearly empowers the AER to "require" an access arrangement to contain provisions for redundant assets. Jemena submits that section 85 relates only to individual assets rather than full network optimisation, but does not offer detailed support for that assertion, and such an interpretation is not obvious to me.

Since section 85 does appear to permit ex-post optimisation, it is interesting to note that it has been rarely used. This may be attributable in part to sections 85(3) and 85(4), both of which introduce additional considerations for the AER (regarding sharing of costs between the firm and users, and having regard to "the uncertainty such a mechanism would cause". Along the same lines, I note that section 84 allows for capital to be placed in a holding account, where it could accrue interest at the rate of the allowed WACC, for subsequent inclusion in the RAB when demand conditions require it. In all likelihood, regulated firms would seek this status for "redundant" capital (a point raised by Ergon in submissions).

In view of the AER rule change proposals, it is interesting to note that sections 84 and 85 grant it considerable discretion. For example, AER may require capital redundancy provisions but need not, and it can also make its own determinations as to whether to allow for interest on speculative capital account and if so at what rate.

Stepping back slightly, it strikes me as odd (and undesirable) to have optimisation provisions (via section 85) in the gas rules but nothing comparable for electricity; and to leave to the AER's discretion the question of whether, when and where to use or not-use of optimisation. I would tend to favour removing section 85 rather than inserting something similar into the electricity rules.

The MEU proposal discloses some ways in which it the asset base might be controlled that lean in the same direction as ex-post optimisation but retain a strong ex-ante flavour.

According to the MEU (section 1.4.1 on optimisation), the current arrangements would allow the following outcomes:

- A firm could spend less on a capital project than the regulator allowed, and book the entire approved amount in its regulatory accounts; and

- A firm could spend more on a capital project than the regulator allowed, and book the actual expenditure in its regulatory accounts.

If these are both true, then the firm is in a no-lose position once it receives regulatory approval. It then has little incentive to maintain cost control during the actual physical investment stage. Indeed, it may seek to game the process by deliberately over-

forecasting capital outlays.[22] I note that there are some constraints on such conduct however. For example, in the gas rules, section 79 gives the AER the power to determine what capital expenditure plans are "conforming" and therefore permitted to enter the RAB. Similar provisions exist in the electricity rules (section 6.5.6). Also, the Jemena submission shows that these powers are actually used; table 2 of the submission details an average reduction of 65% from expenditure forecasts submitted by Victorian DNSPs.

Nevertheless, there remains an open question over how best to elicit accurate information from regulated firms, and test the validity of that information. In addressing this issue, a sharing-based approach is likely to be efficient. In effect one needs to incentivise the firm in ways that make truthful forecasting desirable.[23] The efficiency sharing scheme proposed by Ofgem (see Appendix) is an example of such a strategy.

I was also interested in the distinction drawn in submissions by Grid Australia between a "prudence" test and "optimisation". A prudence test would focus on capital expenditure in the previous control period only (rather than the entire asset base), and it would only write off expenditure if it was judged imprudent given the information set available at the time of investment. Such a prudence test would place some extra discipline on firms while avoiding the worst features of full optimisation. It could be worth further consideration.

[22] Discussion of these opportunities are contained in Tooraj Jamasb & Michael Pollitt, 2007, "Incentive Regulation of Electricity Distribution Networks - Lessons from Britain", available online at http://www.dspace.cam.ac.uk/bitstream/1810/194689/1/0709%26EPRG0701.pdf

[23] Regulators often either audit forecasts or do their own from scratch, but the firm retains the best information about what expenditures are really necessary.

Appendix: Other Optimisation Treatments

The history of optimisation in the Australian energy sector will be will known to AEMC. Whereas optimisation was widely used in the past, there was a move to locking-in the asset base from about 2004.[24]

Optimisation has also been widely used in the Australian telecommunications sector, to set access prices for copper loop and other services. In December 2009, the ACCC commenced a review of the 1997 access pricing principles for fixed line telecommunications services and on 17 September 2010 released a draft report for public consultation. This report proposed a shift from valuing assets based on optimised current costs to a building block model with a locked-in asset base. On 21 December 2010 the ACCC suspended the review as a result of legislative changes under the Telecommunications Legislation Amendment (Competition and Consumer Safeguards) Act 2010. Telstra strongly supported a move away from optimisation, and cited an AEMC survey in its submission.

In New Zealand, energy network assets have been valued at ODV for many years.[25] However in December 2010 the Commerce Commission released its Input Methodologies determinations which included a switch to a locked-in asset base. These determinations are currently being appealed by regulated firms, but these firms appear less concerned about abandoning optimisation and more concerned about the initial asset value at which the new regime will commence.

In the UK, Ofgem has also recently modified its regulatory approach, adopting (in October 2010) what it calls the "Revenue using Incentives to deliver Innovation and Outputs" or RIIO framework.[26] This seems to retain a locked-in and rolled-forward asset base. It also retains an "*efficiency incentive rate*" that shares between investors and consumers any benefits from under-spending and any costs of over-spending, relative to forecast. This applies to capital expenditure as well as operating expenditure, so it leans against the risk of over-forecasting capital outlays outlined by MEU in section 1.4.1 and discussed in section 4 above. Ofgem (at page 88) also tries to build regulatory commitment by emphasising that ex-post optimisation will be used only in "exceptional circumstances".

The United States of America has a very long tradition of rate of return regulation, and has successfully regulated private capital investors for over 100 years. There are numerous state-based regulators, plus the Federal Energy Regulatory Commission. However all are subject to the constitution, the Fifth Amendment of which prohibits the federal government from taking property for public use without "just compensation". This has not prevented situations in which regulations have been said to not offer

[24] AER, Statement of principles for the regulation of electricity transmission revenues (Decision), December 2004.

[25] In most cases, ODV turns out to be the same as ODRC, so this history mirrors Australian practice quite closely.

[26] Ofgem RIIO: a New Way to Regulate Energy Networks, Final Decision, Oct 2010.

sufficient investment incentives, but on the other hand, ex-post optimisation without compensation would be legally difficult in the USA.