Network of Illawarra Consumers of Energy

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AER Review of Expenditure Incentives

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Summary

This submission is made by the Network of Illawarra Consumers of Energy (NICE), a recently formed entity advocating for the energy transition to a net-zero carbon future to be managed with the interests of consumers at heart. It is a preliminary submission on the topic of the review of expenditure incentives, and will be followed by a separate submission that focuses on the questions posed by the AER in its consultation paper.

We are making a preliminary submission to draw attention to limitations in the approach to the review provided by the AER in its discussion paper. We find these deficiencies cover three areas.

The first of these is the description of the objective of regulation and the description of the Australian framework. We explain that regulation needs to mimic the processes of competition, that the framework is best described as Performance-Based Regulation.

The submission then describes the arbitrary nature of the existing expenditure incentives and recommends the scrapping totally of the CESS.

We conclude with some suggestions of how to improve incentive regulation by simplifying the expenditure incentives, applying different strength incentives to different networks, and utilising more outcome incentives that relate inputs to outputs.

The intention of this submission is to encourage the AER and other stakeholders to think more deeply about the incentives we want in our PBR framework rather than merely how we might tweak a regime that has been developed in a piecemeal manner with little regard to established analysis of the economics of incentives.

Contents

Glossary

AER	Australian Energy Regulator
ARM	Attrition Relief Mechanism – a component of PBR
ARoR	Allowed Rate of Return
CESS	Capital Efficiency Sharing Scheme
CPI	Consumer Price Index (Australian measure of inflation)
CPI-X	Australian implementation of the UK RPI-X regulatory framework
CSIS	Customer Service Incentive Scheme
DEA	Data Envelopment Analysis
EBSS	Efficiency Benefit Sharing Scheme
ESM	Efficiency Sharing Mechanism – a component of PBR
MRP	Multi-Year Rate Plan – used in the description of Performance Based Regulation
NICE	Network of Illawarra Consumers of Energy
PBR	Performance Based Regulation
PIM	Performance Incentive Mechanism – a component of PBR
PV	Photovoltaic – a shorthand for solar panels located on consumer premises
STPIS	Service Target Performance Incentive Scheme
TFP	Total Factor Productivity, used to determine X in some versions of CPI-X or RPI-X price caps

Introduction

NICE

The Network of Illawarra Consumers of Energy (NICE) is a recently formed informal network advocating for the energy transition to a net-zero carbon future to be managed with the interests of consumers at heart.[1] This necessary transition needs to occur at least cost to consumers while maintaining reliability and security of energy services, appropriate consumer protections for essential services and a just transition for affected workforces.

We believe there is a role for regionally based advocacy within the context of nationally consistent energy policy. The choice and options for energy supply differ by geographic region because of different climatic conditions affecting demand and supply options and different risk factors impacting resilience planning. David Havyatt, the sole author, has prepared this submission.[2]

This Submission

We appreciate the opportunity to comment on the Australian Energy Regulator's (AER) *Review of Expenditure Incentive Schemes Discussion Paper* (the Paper). This preliminary submission does not respond to the issues raised in the Paper. The Paper, quite reasonably, is a continuation of the piecemeal approach that has accompanied the development of an 'incentive-based' regulatory framework. Consequently, the Paper takes a particular view on the objectives of regulation and the framework's structure.

The Background section of the paper discusses four critical issues. Firstly, it makes a case for adopting the term 'Performance-Based Regulation' (PBR) for the Australian regime. This is not only a more accurate descriptor but also places our regime at the forefront of current regulatory thinking. Secondly, it distinguishes between an objective of mimicking the outcomes of competitive processes and mimicking the process itself. The former has the unfortunate consequence of setting regulation up to fail when contrasted with the largely mythical outcomes expected of competition at equilibrium in orthodox economics. Finally, the section concludes with two observations about management; that all efficiency gains require managerial action and that management itself has incomplete information (more accurately, knowledge) about the cost reduction opportunities available.

The following section on the application of the current incentives identifies the arbitrary nature of the strength of the expenditure reduction schemes. This is followed by a critique of the approach to forecasting. Two simple conclusions are reached. The first is that the EBSS has an inconsistent design and that the assessment of sharing of benefits is mathematical fiction. The second is that the regulatory scheme imposes a form of cognitive dissonance on the business. It has an incentive to not think of efficiency improvements leading into the forecast period. For

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[1] The network has not yet started actively recruiting participants.
[2] Mr Havyatt was employed as Senior Economist at Energy Consumers Australia from October 2015 to August 2020. For the avoidance of doubt, nothing in this submission is the position of Energy Consumers Australia.

this reason, the CESS should be abandoned and other approaches to incentivising capital efficiency employed.

The final section proposes a wider consideration of alternatives than the AER's. The first is that the AER should use the average of the last five years opex as the basis for calculating the opex allowance, and as a consequence, abandon the EBSS. The second is that benchmarking shouldn't be used to identify an expenditure trend. Instead, it should be employed to determine differential strengths of efficiency incentives for businesses based on their relative efficiency. The third suggestion is that rather than separate incentives on inputs and outputs, the framework should include incentives on outcomes involving ratios or other relationships between critical inputs and critical outputs. Finally, a means of combining incentives to overcome the Equal Compensation Principle is introduced.

We intend to make a separate submission responding more directly to the Paper. This preliminary submission is being made separately in the hope that it might achieve more attention than is usually paid to pre-amble commentary in submissions. Any questions relating to this submission should be directed to [redacted]

Background

Performance-Based Regulation

Section 2 of the Paper says, 'the framework is incentive-based.' This is an accurate yet inadequate description of the framework. Kahn (1970, 1971) observed that any system of regulation creates incentives for the management of the regulated firm. He gives as examples of the incentives that apply under US-style rate of return regulation; regulatory lag, bias towards capital expenditure and cost-padding (Vol II. Pp 47-58).

The AER uses the term explicitly to refer to the overall 'CPI-X' framework adopted after its use in the UK and is frequently referred to as incentive regulation (Littlechild 2003, 2021). However, the term 'incentive regulation' has long been used in the US to refer to a broader set of incentive mechanisms than merely setting a multi-year revenue allowance (Joskow & Schmalensee 1986). Indeed, it is an often overlooked consequence that a simple revenue or price-cap approach creates an incentive for utilities to reduce quality as part of reducing costs, so performance incentives are usually added (Alexander 1996; Costello 2019).

The Australian approach to economic regulation of electricity networks is most accurately described as an instance of Performance-Based Regulation. Regulation occurs through Multi-Year Rate Plans (MRP) with Attrition Relief Mechanisms (ARMs) to adjust for factors outside of control, Efficiency Sharing Mechanisms (ESMs) to distribute savings made under the incentives arrangements (CESS and EBSS) and Performance Incentive Mechanisms (PIMs) to reward quality improvement (STPIS, CSIS) (Lowry & Woolf 2016).

It has been observed that standard incentive regulation hinders the integration of renewable energy generation (Nykamp et al. 2012). Like Lowry and Woolf (2016), we favour the use of the PBR label because we anticipate that the changing role of networks will introduce additional performance incentives. While the AER frames the Paper as being about 'expenditure incentives', we contend that these cannot be considered in isolation from performance incentives.

The objective of regulation

The Paper (P.7) makes the not-uncommon claim that "The framework is designed to mimic the outcomes from effectively competitive markets."[3] Unfortunately, this formulation leads regulators and stakeholders down the path of assuming that effectively competitive markets result in both allocative efficiency (prices equal costs – or efficient pricing) and productive efficiency (costs are as low as possible – or efficient costs). This is the outcome that orthodox economics tells us is delivered by the competitive market in equilibrium.

This is not the case in most real-world competitive markets. The process of rivalry results in innovation by firms to either reduce costs or provide additional value (quality improvement) to consumers. These firms do not pass all the benefits of innovation to consumers. For example, a

[3] For example McDermott (1995, p. 181) states 'Implicit in the traditional approach to regulation is the goal of replicating the outcome of a perfectly competitive market.'

profit-maximising firm able to supply at least cost will price at a point above cost that allows them to grow market share, but otherwise convert the cost-saving to economic profit. While competitors will respond and attempt to emulate the innovation, the process doesn't end in the equilibrium imagined in orthodox theory. Dynamic efficiency properly understood is not about investing in additional capacity[4]; it is about innovation (Havyatt 2017).

The consequence of this view of rivalry is that there is always an economic profit made in the industry; it is the price paid for innovation. Laffont and Tirole (1986) reached the same conclusion in their analysis of incentive regulation. The regulator has incomplete information about the cost reduction opportunities available to the regulated firm and management's effort in realising these opportunities.[5]

The second of these informational issues is often ignored in discussions of the theory of incentive regulation. As an example, on page 32, the Paper states, "One of the benefits from incentive schemes is that they contribute to revealing information about the efficient costs of providing levels of services valued by customers. This revealed information is used in setting revenue allowances and performance targets in subsequent regulatory periods."

However, these lower costs have been realised only because of managerial effort. No information about the total level of cost reduction opportunities is revealed; only how much of those opportunities have thus far been realised. Ultimately, incentive regulation aims to motivate the effort to realise cost reductions.

The first conclusion that Laffont and Tirole demonstrate is that economic rent is the price that needs to be paid for obtaining managerial effort. The menu of contracts, for which they are more famous, is the mechanism by which they propose a regulator procures the optimal amount of effort at least rent.

This point could be regarded as mere sophistry as a correct reading of mimicking the 'outcomes' of competitive markets would include the need for rent as a reward for innovation. However, experience dictates that many participants interpret the 'outcome' to be that determined at equilibrium in the orthodox model.

Managerial control

Holding an agent (regulated firm or an individual in a managerial pay context[6]) accountable only for items in their control is a general principle in designing incentives of all kinds. A corollary is that the agent shouldn't be rewarded for outcomes over which they had no control.

Consequently, incentive scheme designers often try to distinguish between cost variations that resulted from management and those that were outside their control. Indexing dollar values by

[4] This was the interpretation Telstra gave to dynamic efficiency around the turn of the century.

[5]

[6] For an application of the theory of incentives to employee compensation see the chapter on incentives in (Roberts & Milgrom 1992).

CPI is one device used to ensure management is not penalised for variations beyond their control.

For expenditure incentives, a distinction is drawn between changes in CPI and changes in the specific costs of inputs. As an example, costs of technology usually increase more slowly than CPI. The original design of the 'CPI-X' regime applied these differential rates with X representing the change in Total Factor Productivity for the regulated sector. In this formulation, the ASM 'X' is applied to total revenue, not just operating expenditure.[7]

Instead, the AER applies an adjustment to the input costs, as the 'trend' in the base-step-trend methodology. As a result, 'X' no longer has a meaning as an ASM but is instead purely used as a means to reprofile revenue allowances over the regulatory period.[8]

The validity of this approach is questionable. The realisation of an industry-wide level of productivity improvement is not effortless. Obtaining the benefit of reduced input costs requires positive action, such as retendering or recontracting suppliers. It may include more long-term and external actions such as the campaigns waged by businesses in the 1980s to reduce input costs where monopolies provided supply. The reform of electricity markets themselves was one such example.

The important empirical conclusion is the one generated by Leibenstein (1966). This found that the consequences of allocative inefficiency were much less than the consequences of 'X-inefficiency.' This – primarily productive inefficiency – was found to have three primary causes; (a) incomplete contracts for labour, (b) the production function is not completely specified or known, and (c) not all inputs are marketed or are not available on equal terms to, all buy. Further, it concludes that even in 'competitive' markets:

> *Firms and economies do not operate on an outer-bound production possibility surface consistent with their resources. Rather they actually work on a production surface that is well within that outer bound. This means that for a variety of reasons people and organisations normally work neither as hard nor as effectively as they could.*

This suggests that a principal should exercise caution when applying an agent's historic trend into the next control period.

Limits of Information Asymmetry

A related conclusion is that while the regulated business has better information about its cost reduction possibilities than the regulator, that information is also not complete.

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[7] The two alternatives described as 'CPI-X derived by means of a building blocks methodology' and 'CPI-X derived by means of a total factor productivity (TFP) based methodology' were considered by the Expert Panel on Energy Access Pricing that advised energy Ministers on the national regime. The report favoured a TFP methodology being included as an option (Beale et al. 2006).

[8] One could argue that as X no longer reflects productivity improvement, some other letter should be used to represent it in the calculation.

This simple conclusion arises from what Herbert Simon described as 'bounded rationality' (Simon 1997 (1945)). Bounded rationality belongs to a brace of human characteristics that in behavioural economics are referred to as 'biases' and 'heuristics' (Tversky & Kahneman 1974).[9]

Management cannot fully reveal its cost-saving opportunities because they themselves don't know their full extent.

Put another way, even identifying cost savings available requires managerial effort. Hence, the objective of incentive regimes is primarily to obtain this effort and the effort to implement the cost savings.

[9] Other terms for the same characteristics are found in other fields such as 'paradigm' in philosophy of science, 'rules', 'informal institutions' or 'conventional wisdom' in institutional economics, and 'socio-technical regimes' in transition studies (Havyatt 2019).

The Application of the Current Incentives

Strength of the Incentives

The Paper (P.34) notes that the EBSS 'provides financial rewards by allowing network service providers to retain benefits of operating expenditure efficiencies for six years.' This characteristic of the scheme is, as later explained, a consequence of attempting to give the network business a continuous incentive to seek efficiencies.

As the fourth year of the previous period is used as the base for the opex forecast, a saving made in the fifth year would provide six years of benefit to the network business. Therefore, the decision to allow the network business to retain six years of benefit for saving made in any year (P.41) is just the simplest way to provide a continuous incentive.

The AER also notes that the 'assessed strength of the existing EBSS' is 30% assuming a 6% allowed rate of return, before noting that the strength is currently lower given prevailing interest rates. However, the claim that the network share is 30% at a 6% rate of return deserves more scrutiny.

The present value of a single unit of benefit made over an infinite period, for a discount rate *r*, is:

$$PV_{1,\infty} = \sum_{t=1}^{\infty} {}^{1}/_{(1+r)^t} = {}^{1}/_{r}$$

The value for the benefit retained by the network for a retention period *s* (*i.e.* control period (*s-1*)) - is (as the benefit is obtained for *s* years):

$$PV_{1,s} = \sum_{t=1}^{s} {}^{1}/_{(1+r)^t} = \frac{1-(1+r)^{-s}}{r}$$

And the value retained by the consumers is:

$$PV_{s+1,\infty} = \sum_{t=s+1}^{\infty} {}^{1}/_{(1+r)^t} = \frac{(1+r)^{-s}}{r}$$

And more simply, the sharing ratio is $(1-(1+r)^{-s}):(1+r)^{-s}$. Therefore, the sharing ratio is a very simple function of the regulatory control period and the discount rate.

Figure 1 below is an alternate representation of the notional network share of the saving for different discount rates and benefit retention period lengths. This is a more general version of Figure 10 in the paper.

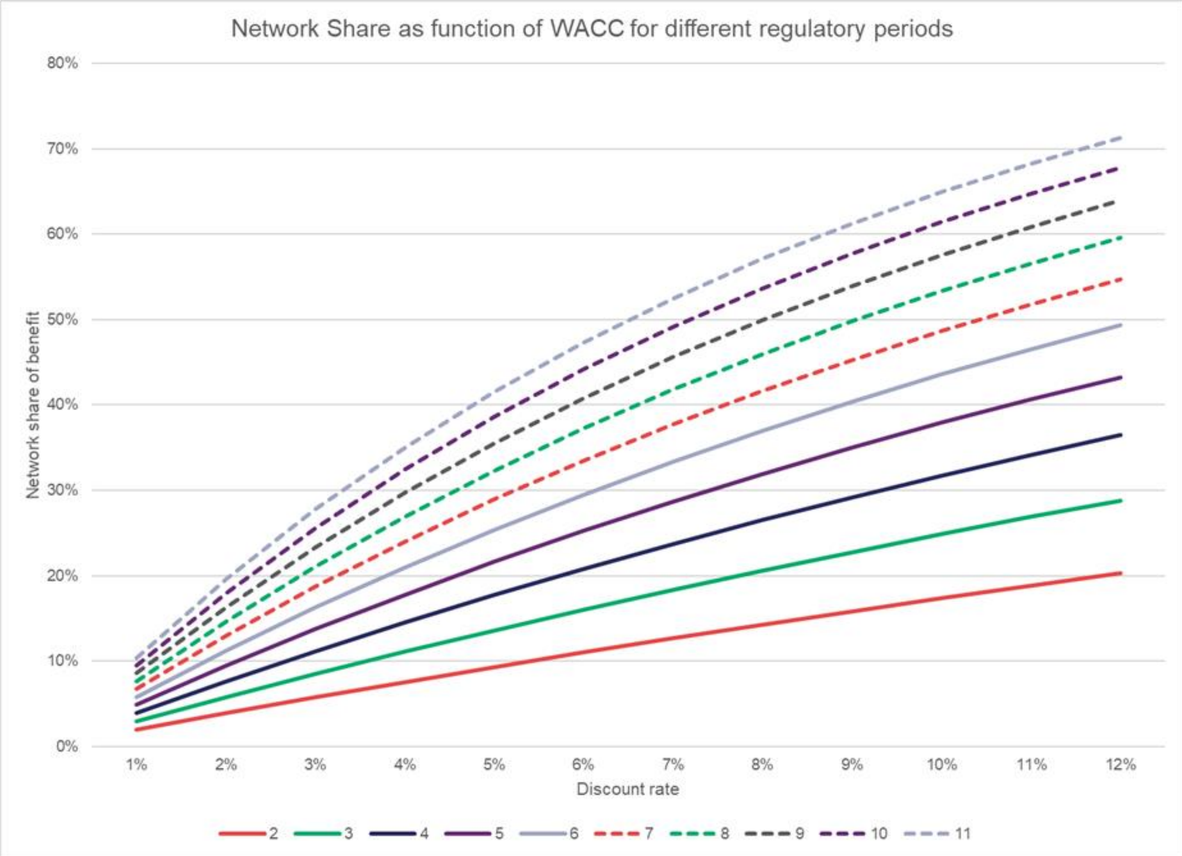

Figure 1Network share of savings benefit as a proportion of total savings for different WACC and control periods

Using just the 6% and five year control period, we can also map the overall cumulative benefit and the share of consumers and the network business. This is shown in Figure 2.

This demonstrates that consumers get no benefit until year seven and wait until year 16 before their savings match the network's benefit. More importantly, it graphically demonstrates that summing the benefits to infinity makes for easy mathematics but poor application.

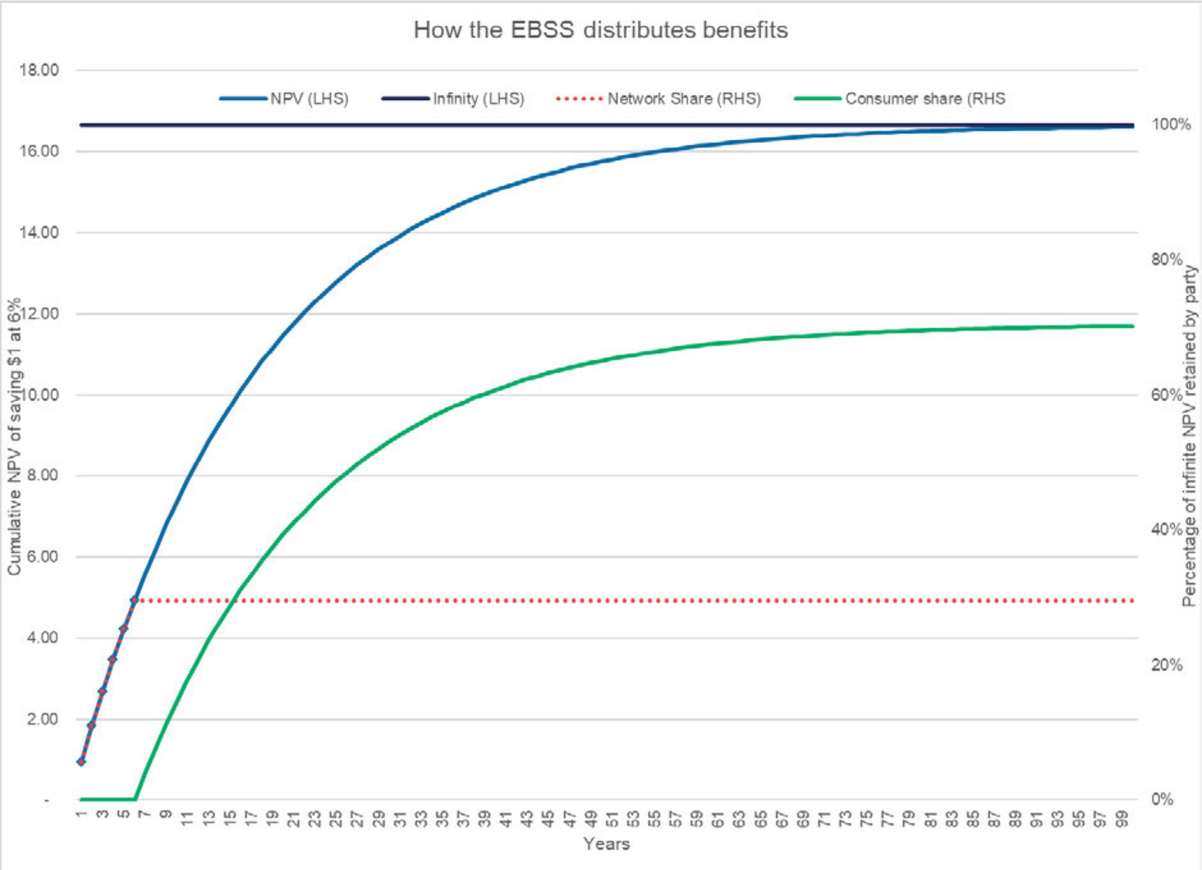

Figure 2: Consumer and network shares of efficiency savings

Additionally, just as the shares vary with the allowed rate of return, the time before consumers benefit matches the networks also varies with the allowed rate of return, as shown below.

ARoR	Network share	Years till consumers gain equal share
2%	11%	12
3%	16%	13
4%	21%	13
5%	25%	14
6%	30%	15
7%	33%	15
8%	37%	17
9%	40%	18
10%	44%	22
11%	47%	26
12%	49%	34

In short, the EBSS has an inconsistent design as the strength depends on the discount rate, the calculation of the strength is almost a mathematical fiction, and consumers wait far too long to gain an amount of savings equal to the network.

Role of forecasting

The Paper notes 'several consumer stakeholders have raised concerns about expenditure over-forecasting and whether network service providers are being rewarded for genuine efficiency gains.' This concern particularly relates to capital expenditure forecasting and the CESS; however, it also affects the network's attitude to the step and trend elements of opex forecasting.

The CESS does not make any sense whatsoever and should be scrapped. Because capital expenditure is all by nature 'one off', the decision on what allowance to make for capex under the AER's approach hinges almost entirely on the forecast. Manifestly, any reduction in capex below this level is then, by definition, a forecasting error.

The approval of the expenditure by the regulator doesn't change this fact; it merely demonstrates that the AER's assessment techniques are flawed. We believe that the requirement under the law and rules that a network has the opportunity to recover its efficient costs means that the revenue allowance always has to be more than efficient costs. A consequence is that the AER's assessment techniques of capex are necessarily flawed.

Notwithstanding these comments, there remains a regulatory problem of removing the incentive for over-capitalisation that exists merely by virtue of the AER's approach to the allowed rate of return (for the same reasons) means it will be greater than the real cost of capital. That will be addressed later in this preliminary submission.

However, the forecast expenditure issue highlights a significant cognitive problem for the management of a network business. Even if we assume that management is entirely honest and doesn't engage in cost-padding, we must acknowledge that cost-reduction effort is entirely discretionary.

If the AER exclusively uses the fourth year opex as the basis for future expenditure and does not try to overlay this with a trend derived from productivity measurement, then the timing of effort – by design of the EBSS – is irrelevant. However, the moment a cost reduction trend is incorporated, the network business has an incentive to reduce costs in the third and fourth years.

That means there will be an on-again/off-again approach to cost reduction. Technically this mimics what happens in competitive markets, where the cost leader puts in less effort while the others exercise more significant effort to catch up[10]. However, the motivation and timing are different.

[10] Or, as frequently happens, cost reduction is triggered by a fall of revenue below forecast. It is surprising how much cost reduction firms identify at these times – another demonstration of X-inefficiency in action.

Similarly, the network business has an incentive to identify additional expenditure as a step and underestimate what other cost savings may occur as a consequence. This is typically the case with varieties of ICT expenditure.

A Wider Consideration of Alternatives

Simpler opex estimates.

The AER chooses to use the fourth year of the prior regulatory period as the base for operating expenditure forecasts. As this provides a different incentive for making savings in each year of the regulatory control period, the EBSS was introduced to make the incentive the same for each year.

Biggar (2004) has demonstrated that using a weighted average of the expenditure from every year of a regulatory control period, the incentive to reduce expenditure in any year is the same. Pint (1992) observed that gains accrue mostly to the regulated firm under a test year approach. The use of average costs from the entire regulatory period increased social welfare and provided the most benefit to consumers.

Clearly, elements of opex are volume driven and consequently future allowances need to adjust for changing volumes (e.g. number of kilometres of overhead low voltage cable drives vegetation clearing costs). But the AER can, and should, simplify the approach to opex estimates and remove the need for the EBSS by using expenditure averages.

Differential Powered Incentives

Laffont and Tirole's (1986, 1993) conclusion is that the most efficient firm requires the strongest incentives to generate further savings. The highest level of saving occurs by allowing the firm to be the residual claimant of all cost reduction. This is in the context of a 'single shot' contract, and the value is delivered in overall social welfare.[11]

Designing a menu of contracts is complex. While various reports suggest that menus have been used, the most commonly cited example is only a menu in relation to the forecast costs of the firm and the subsequent 'cost revelation' of the regulator's assessment of those costs. However, as we noted in passing above, just as the firm's forecasts are fallible, so are the regulator's assessments.

However, it is possible to discern which of a collection of similar businesses is the most efficient relative to the others. The most effective way is using Data Envelopment Analysis as a form of benchmarking. DEA identifies from a set of observations which of the businesses is the most efficient relative to the others; the frontier it develops is a realised frontier of efficiency, not a full productivity frontier. There may be more than one business identified as being efficient.

Unfortunately, the AER, in all its benchmarking work, has focussed on measures of productivity attempting to identify changes in Total Factor Productivity between businesses, despite the

[11] Note, the Laffont and Tirole results are derived using a model where lump sum payments are made by government, and so there is a shadow cost of taxation involved in the calculation. Armstrong and Sappington (2005) note the conclusions can be also reached without transfers so long as a preference is given for consumer surplus over producer surplus.

incentive regime not being based on TFP (see above). The AER then uses these measures to determine the trend in costs, i.e. why CPI might not be the appropriate price inflator.[12]

An alternative is to think of a different interpretation of X in the CPI-X formula; it can be a means to ensure that a network business isn't the residual claimant of all cost savings. In this formulation, efficient businesses should face an X of zero. Conversely, the inefficient businesses should face an X that becomes greater the more inefficient they are.

The DEA calculation should give an idea of what percentage improvement made each year over five years would bring a business to the efficient frontier. Of course, these would be the maximum X values, and a little more investigation is required to determine the optimal value between the maximum and zero.

More Complex Outcome Incentives

The current incentives provide incentives for cost reduction and then separate incentives for outputs like reliability and customer service. This reflects the history of the development of the incentives rather than a direct approach.

Combining inputs and outputs into one measure that can then be subject to an incentive payment is possible. For example, assume for a moment that distribution networks could observe how much electricity is self-consumed by owners of rooftop PV. In this case, a measure of whether capex increases the capacity of the network to accommodate more PV and overall efficiency would be the total amount of electricity consumed (both self-generated and delivered by the grid) divided by the total amount of network assets involved (which would be measured on an inflated undepreciated historic cost base).

Similarly, it is possible to provide direct incentives for networks to utilise their pricing, marketing and other capabilities to increase the load factor on their networks.

Combining Incentives

A risk of having multiple incentives is that the regulated business can choose which activities to give attention to.

In the context of employee compensation, Roberts and Milgrom (1992, p. 228) state the Equal Compensation Principle. This states:

> *If an employee's allocation of time or attention between two different activities cannot be monitored by the employer, then either the marginal rate of return to the employee from time or attention spent in each of the two activities must be equal, or the activity with the lower marginal rate of return receives no time or attention.*

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[12] The AERs choice of measures also results in measures that are dependent on a host of separately estimated values for inclusion in the formulas, including a revenue apportionment between cost drivers and a computed value of VCR. DEA on the other hand generates weights for inputs and outputs by setting them to maximise the efficiency score for each business in turn subject to a constraint that no business becomes more than 100% efficient. This, however, is not the place for a critique of benchmarking.

In our context, this means:

> *If the effort devoted by a regulated business to two different activities cannot be monitored by the regulator, then either the marginal rate of return from effort for the business must be the same for the two activities, or the activity with the lower marginal rate of return receives no effort.*[13]

There are two observations to make about this principle. The first is that the marginal rate of return from effort in what is measured for the incentive will be, as in all things in economics, diminishing with greater effort. Were it not so, then if a level of effort *e* reduced costs by 1%, a level of effort of *100*e* would reduce costs to zero.

The second is that the principle holds so long as the pay-offs for incentives are combined as a simple sum. That is, assume incentives are specified as a proportion of revenue allowance then the total pay-off from levels of effort in two fields, *A* and *B*, e_A and e_B, which we denote individually as $p_A(e_A)$ and $p_B(e_B)$. If the pay-offs are simply added, then the total incentive payment is:

$$R * (p_A(e_A) + p_B(e_B))$$

where *R* equals allowed revenue. A better scheme that would keep total pay-off within the same range as the allowed values of the individual components would be to use the average of the two incentives so that the total incentive payment would be:

$$R * (p_A(e_A) + p_B(e_B))/_2$$

The equal compensation principle can be subverted by using a geometric average to calculate the incentive payment:

$$R * \sqrt{p_A(e_A) \times p_B(e_B)}$$

Differential weights between the two incentives could be applied by using a weighted geometric average.

[13] This paraphrasing is based on a similar approach by Biggar (2004), though he substitutes 'power of the incentives' for 'marginal rate of return for effort'..

Conclusion

We have presented a holistic view of the framework as an instance of Performance-Based Regulation. We propose avenues for development that are not a continuation of the piecemeal development of the framework that has occurred to date. While a subsequent submission will respond to the AER's specific issues, we hope this submission provides some motivation for a more comprehensive consideration than the issues included in the Paper.

Early in this submission, we drew a distinction between regulation mimicking the outcome of competition from mimicking the process. In the orthodox economic model, the equilibrium outcome is that all firms price at cost and all cost reductions are realised. However, understanding the dynamics of competitive processes reveals that economic profit always exists in competitive markets. The theory of incentive regulation shows economic profit is the price the regulator has to pay to induce effort from regulated firms.

Consequently, regulation isn't a zero-sum game; contrary to the Hope judgment conclusions in the USA,it isn't simply balancing the interests of networks (utilities) and consumers. A well-designed Performance-Based Regulatory framework will deliver ongoing price reductions and quality (outcome) improvements to consumers while at the same time allowing regulated businesses to earn returns greater than their cost of capital. Regulation can, and should, be a win-win framework.

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