

Submission to the Essential Services Commission

Re: Electricity Distribution Price Review 2006 – 2010 Draft Decision

S Factor



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Distribution**

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1 Introduction and Overview

United Energy Distribution (UED) has carefully examined the operation of the Essential Service Commission's (Commission) proposed S-factor scheme. UED's analysis shows that the design and formulation of the S-factor mechanism is fundamentally flawed. This submission sets out UED's analysis, and is structured as follows:

- section 2 considers the scheme's impact on UED's revenue under a number of different scenarios of future performance;
- section 3 identifies and analyses some anomalies that arise under the scheme;
- section 4 considers the principles upon which the scheme was built and shows that the scheme violates these principles;
- section 5 proposes alternative approaches to correcting the identified problems with the scheme; and
- section 6 provides details of a number of other concerns that UED has with the proposed mechanism.

Section 2 demonstrates that, under a range of scenarios where the company achieves or beats the Commission's targets the S-factor scheme as proposed by the Commission is likely to have a materially negative impact on UED. This outcome is a major concern to the company, especially given that UED's recent service performance has been excellent.

UED believes that the outcomes analysed in section 2 are unexpected and unintended consequences of a very complex and unconventional (and therefore insufficiently tested) scheme. Thus, section 3 analyses the detailed formulation of the scheme and identifies two errors which largely contribute to these anomalies. The first error is to introduce a "lagged penalty" to prevent a sustained improvement in performance being rewarded indefinitely, when this is in fact not likely to happen anyway because the Commission will adjust future targets in the light of such historical over-performance.

The second error is the failure to deal properly with the proposed year-on-year increases in incentive factors. The consequence of this error is that any over-performance in either 2003 or 2005 leads to substantial revenue penalties, rather than the rewards that would be expected. Appendices 1 and 2 illustrate these errors.

In UED's view, the presence of these two errors means that the scheme will be unable to achieve its aim of incentivising further improvement in reliability performance. It also leads to arbitrary, extreme and unfair penalties on UED, despite our strong historical performance.

Section 4 revisits the principles established by the Commission's predecessor and upon which the S-factor scheme has been developed. UED supports these principles, but the formulation of the S-factor mechanism does not give effect to them. Despite its intention that the mechanism should provide simple, clear and economic incentives for improving



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reliability the Commission is instead proposing a complex and unclear mechanism which can deliver arbitrary or perverse outcomes.

Section 5 considers how the scheme can be corrected to deliver outcomes that are consistent with those originally envisaged. It shows that the removal of the two identified anomalies – through corrections to the formulation – is straightforward. These corrections are shown in Appendix 3. However, even with these corrections, the scheme remains complex and prone to further problems in the future. For this reason, a better alternative may be to rebuild the scheme on the foundations of the agreed principles. UED believes that both of these options should converge to yield very similar outcomes.

A third approach would be to reset the scheme for the start of the next regulatory period in a manner that ensures the perverse and inappropriate outcomes noted in section 2 of this submission are addressed. This option is not preferred.

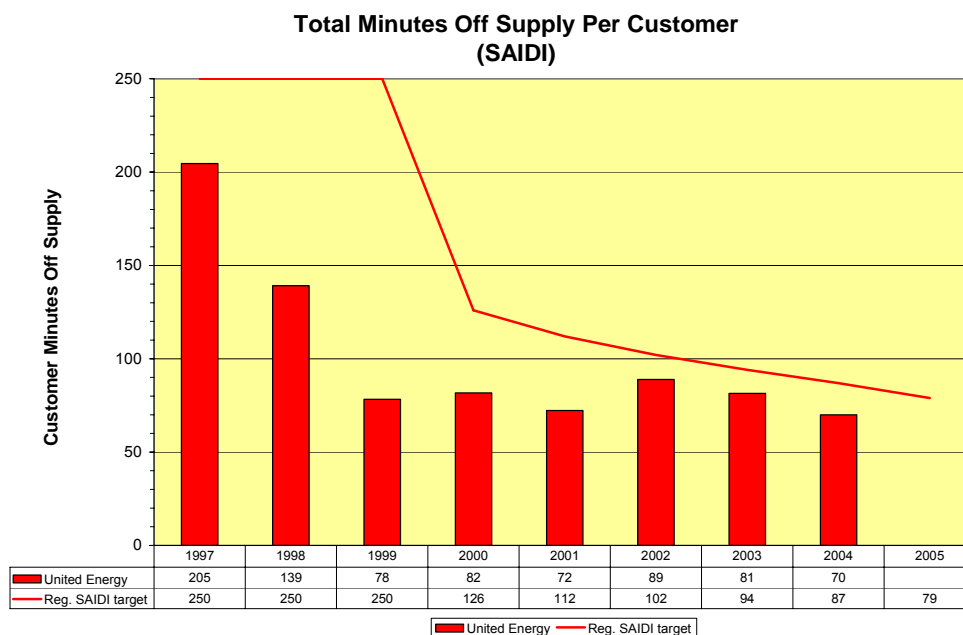
Section 6 concludes the submission by highlighting a number of additional issues of concern to UED. These issues must also be addressed by the Commission.

2 Implications of the Proposed S-factor Scheme for UED

In this section 2, UED analyses the likely outcomes that would arise for the company if the Commission’s proposed S-factor scheme were implemented. In presenting the analysis, UED is conscious of the Commission’s desire to strengthen the company’s accountability for service performance. In fact, UED has always shared and supported the Commission’s desire to provide appropriate financial incentives to deliver improved service performance. The issue therefore is not whether an incentive regime should apply, but rather whether the proposed scheme delivers appropriate outcomes.

In presenting the analysis, it is important to recap on UED’s performance in the current regulatory period. Figure 2.1 shows UED’s performance compared to the Commission’s benchmarks.

Figure 2.1 – UED’s Performance During the Current Regulatory Period



The above figure shows that UED has delivered substantial improvements in performance historically, over and above the tightening performance targets set by the Commission. It should be noted, in particular, that UED delivered better service performance early in the regulatory period, and maintained this improved performance. This observation is relevant when we turn our attention to the “fault lines” in section 3 of



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this submission. In short, the financial incentives that UED believed were inherent in the original S-factor scheme have undoubtedly worked. UED's customers have enjoyed substantial improvements in performance, and UED will make every effort to maintain this positive outcome in the next regulatory period.

2.1 Implications of Achieving Target

On the basis of good historic performance, UED expected that in future it would not suffer any penalties, provided that it continued to meet the Commission's future performance targets. This seems to be consistent with a 'common sense' view of how the S-factor scheme should operate, and indeed, it is how UED understood that the scheme would operate.

UED's analysis, however, shows that the company will face substantial penalties over the forthcoming regulatory period even if it exactly meets the Commission's benchmarks in that period. The analysis and the table below assume that performance in the current year (2005) is precisely to target.

Table 2.1 – S-factor Penalties, assuming that UED meets the Commission's Future Benchmarks

Performance Year	2006	2007	2008	2009	2010
Payment Year	2008	2009	2010	2011	2012
S-factor Calculation – Annual \$m	-0.30	-6.20	-1.90	-2.90	-3.90
S-factor Calculation – Cumulative \$m	-0.30	-6.50	-8.50	-11.40	-15.30

Table 2.1 shows that the cumulative penalties of \$15.3m would payable by UED under the Commission's proposed S-factor scheme, even though the company's performance is assumed to exactly equal the Commission's reliability benchmarks for the coming period.

UED's view is that this penalty is unfair given that the company's performance has bettered the Commission's benchmark in the current regulatory period, and is assumed to meet the Commission's benchmark in the next regulatory period. This outcome is counter-intuitive, and in UED's view suggests very strongly that the mechanism is not working as intended.

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UED has undertaken further analysis that shows that if UED's performance in 2005 (which is not yet complete) matches the company's record performance in 2004, rather than matching the target (but all other aspects of the scenario match the Table 2.1 scenario), the situation for the company is even worse in the next regulatory period. The analysis shows, therefore, that better performance in 2005 will have a detrimental impact on UED in the next regulatory period to the tune of \$30m, with the modelling showing an additional penalty of \$8.7m being payable in the following period (2013) bringing the total penalty to \$53.7m, \$38.5m more than for the first scenario above. This analysis is shown in Table 2.2 below.

Table 2.2 - S-factor Penalties, Assuming that UED Meets the Commission's Future Benchmarks and UED's Performance in 2005 is Another Record Year

Performance Year	2006	2007	2008	2009	2010
Payment Year	2008	2009	2010	2011	2012
S-factor Calculation – Annual \$m	-6.40	-12.10	-8.00	-8.90	-9.90
S-factor Calculation – Cumulative \$m	-6.40	-18.50	-26.50	-35.40	-45.30

This scenario shows that if UED's 2005 performance matched the company's record 2004 performance, and then 2006 – 2010 performance matched the Commission's targets exactly, UED would pay \$53.7m in penalties in the next regulatory period. This outcome again seems highly counter-intuitive, and was certainly not envisaged by the company when the S-factor scheme was first designed and implemented in the 2000 Electricity Distribution Price Determination. UED expects that the Commission too would be surprised and concerned by this outcome.

The fact that an improvement in performance for 2005 only - with all other assumptions being held constant across the two scenarios - would result in a \$38.4m additional penalty for UED, highlights that the scheme has some significant anomalies that must be fixed.

2.2 Implications of Maintaining Record Performance

In a further example, UED has assessed a scenario in which the company continues to deliver its record performance in 2004 for each of the years 2005 - 2010. This is an unlikely outcome because 2004 was a benign year with respect to weather and random

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events, which served to assist the record achievement. Nevertheless, for completeness this scenario has also been modelled.

Table 2.3 - S-factor Penalties, Assuming that UED's Record Performance in 2004 is Maintained

Performance Year	2006	2007	2008	2009	2010
Payment Year	2008	2009	2010	2011	2012
S-factor Calculation – Annual \$m	1.80	-4.10	0.20	-0.80	-1.80
S-factor Calculation – Cumulative \$m	1.80	-2.30	-2.10	-2.90	-4.70

Table 2.3 shows that even if UED's performance was maintained rigidly to the company's record 2004 actual performance level for the following 6 years, which is substantially better than the Commission's benchmarks, the company would still have to pay \$4.7m in penalties. This result provides evidence that the proposed S-factor scheme would deliver outcomes that seem counter-intuitive and inimical to the notion that companies that deliver service improvements should benefit.

To summarise, these 3 examples show that:

- UED will be penalised \$15.3 if it meets performance targets over the 2005-10 period;
- UED will be further penalised \$53.7m if it beats the performance target for 2005, before moving to target for 2006-2010 – this represents a \$38.4m additional penalty for improved performance in 2005;
- even if UED maintains the exceptional performance it delivered in 2004, for the following 6 years, it will still be penalised; and
- UED considers these outcomes to be counter-intuitive, unfair and inconsistent with any reasonable expectation of how the S-Factor scheme should operate.

2.3 Danger with Proposed Remedies

The Commission appears to be alive to some of the issues described above, as it has proposed a new exclusion regime for 2005 to address the perverse incentives. The Draft Decision comments that:

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“if it is evident that distributors are not seeking to exclude events during 2005, to benefit from an improvement in performance in 2006 with higher incentive rates, then the Commission will introduce a transition mechanism. Under the transition mechanism the reliability performance for 2005 will be “normalised” by excluding days that meet its new quantitative exclusion criterion.”

Although the Commission describes the above process as “normalising”, it is in fact applying arbitrary adjustments to performance year 2005 in order to address transitional issues. The Commission’s process will not properly address the transitional issues, which can actually be accommodated by modifying the S-factor scheme in accordance with Appendix 3 of this submission.

It is also noted that the Commission’s approach provides practically no benefit to UED because of its treatment of the February storms, but provides a very substantial benefit to Powercor. In fact, if UED’s storm was 3 hours earlier the effect of the Commission’s adjustment would be to provide UED with a substantial windfall gain by increasing SAIDI by approximately 30 minutes. Whilst UED does not believe that it should receive this windfall, the example illustrates very clearly:

- The instability of the scheme as it is now proposed to operate; and
- The risk associated with trying to fix the scheme by adding overlays to what is already a poorly understood and extremely complex mathematical formula.

2.4 Are there Other Factors to Consider?

It has been suggested by the Commission’s staff that the outcomes identified in this section could be corrected by taking an “overall picture” of the operation of the S-factor scheme, including the operation of the efficiency carry-over mechanism. UED believes it understands the point that is being made, but cannot agree with it.

If UED has delivered a service improvement beyond that expected by the benchmarks, then it follows that the company’s expenditure would have been higher than it otherwise would be. In these circumstances, the efficiency carry-over mechanism would penalise the company, compounding the negative financial impacts of the S-factor. UED believes that the analysis presented in this section shows unequivocally that the S-factor scheme is not working as intended, and that this problem cannot be alleviated by appealing to other aspects of the regulatory framework.

The perverse outcomes described in this section have led UED to examine more closely the original design intentions of the S-factor scheme, and to explore the mathematics that defines its operation. At a high-level, it now seems clear that elements of the intended design must have been misconstrued in the final development and implementation of the scheme. To explore this observation in detail UED now turns its



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attention to the original design principles, and then explains the major fault lines in the original S-factor scheme.

3 Understanding the Problems with the S-factor

Given the very significant anomalies highlighted above, UED has tried to analyse the underlying problems with the scheme, to help point to a solution.

UED sees that the anomalies with the proposed scheme are driven by the following issues and characteristics of the scheme

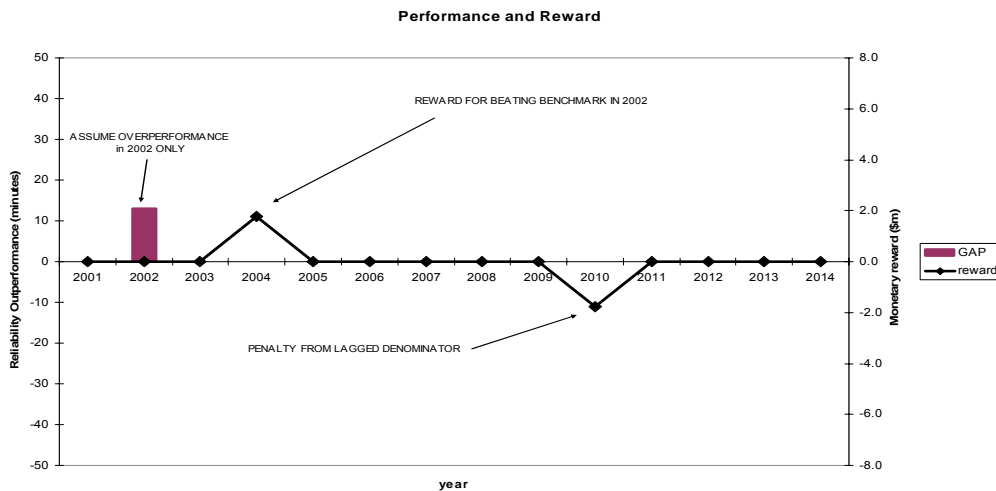
- 1 The “lagging penalty” in the formula;
- 2 UED is being penalised for delivering early against declining targets:
 - a. A special case of the impact the lagging penalty can have.
 - b. Even if the Commission believe that the lagging penalty was intended, there is no way this effect was intended – evidence of the danger of a complex scheme
- 3 The Scheme does not recognise the targets set by the Commission;
- 4 The effect of increasing incentive factors “mid stream” (we can demonstrate the mathematical problems in the formula);
- 5 The effect of changing the measurement and exclusion processes; and
- 6 If the scheme remains – despite the problems - then we have a major transitional problem.

These characteristics are explained as simply as possible in the sections below. It should be noted that the 6 issues are not totally independent of each other. Of the 6 issues two are expressed as flaws with the specific formula proposed (being the lagged penalty and effect of changing the incentive rates mid stream.) If these two aspects were corrected, then the other problems / issues should fall away.

3.1 Lagged Penalty

A mathematical exposition of the lagged penalty is set out in Appendix 1 to this submission. In simple terms, the lagged penalty relates to reliability performance in a particular year driving the value of the S-factor – and hence the level of reward or penalty – 8 years later. This is depicted in a very simple and stylised example below, one year’s favourable performance drives a reward 2 years hence, and strangely generates a penalty 6 years after that.

Figure 3.1 - Effect of Lagged Penalty Based on Hypothetical “Delta” Performance



It is noted that the penalty in the example above occurs some 8 years after the year of good performance. After eight years, there is likely to have been at least one change of management (and probably more) and even if the original management did understand the concept of the pending penalty for the good performance, the new management will surely be totally confused. If this was the intention of the scheme, it is certainly unusual.

Whilst the mechanism in Figure 3.1 may seem simple and predictable (although somewhat strange) from the stylised example above, real world examples are never as simple or predictable as the above. Figure 3.2 below shows how it actually works for UED, which is far more complex and section 3.2 describes the less predictable and even less desirable “incentive” messages that are sent under those circumstances.

Figure 3.2 – Effect of Lagged Penalty Based on UED’s Actual Performance

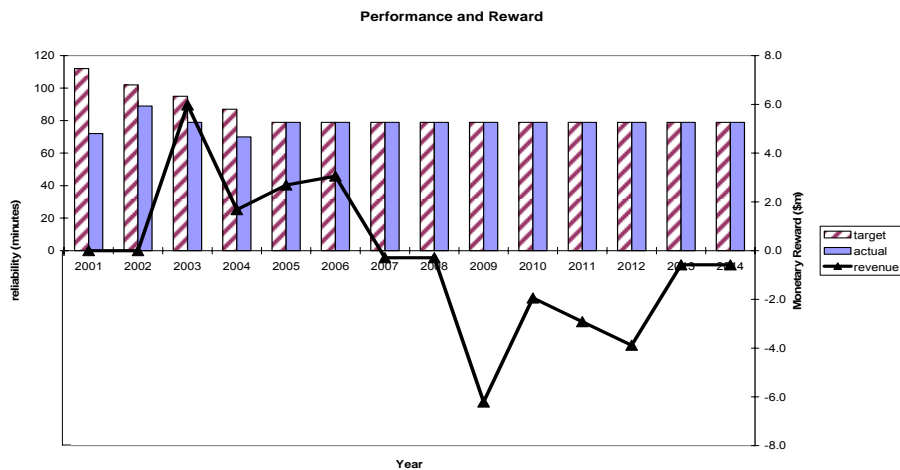


Figure 3.2 above illustrates the effect of the lagged penalty for UED. Because UED has over-performed over the period 2001 - 2004, the lagged penalty causes UED then to be penalised from 2009 - 2012. Note that in Figure 3.2 it is assumed that UED performance is exactly on target for the full period 2005 - 2014, so the penalties arising have nothing to do with future performance; they are, purely and simply, penalties for historical over-performance.

If the scheme is working as intended, what is the purpose of providing UED with a bonus for out-performance in the current period, only to apply a penalty 6 years later? Trying to identify the rationale for such a mechanism is inevitably somewhat speculative, because the Commission’s predecessor (the Office) never properly explained the purpose of the lagged penalty. One obvious conclusion, however, is that there is limited incentive from receiving a bonus in one regulatory period if this bonus must be paid back later on. Despite the Commission’s emphasis on replicating the outcomes of competitive markets, the S-factor scheme is clearly not the type of performance bonus scheme that exists in a commercial and competitive environment. For these reasons, UED considers that the Commission has erred in including a lagged penalty.

¹ Even taking into account the time value of money, the lagged penalty reduces the NPV of the incentive by a factor of almost 10.

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UED recognises that the Commission may argue that the formulae has been in place since 2000 and now cannot be changed, since to do so would amount to retrospective regulation. On this view, the outcomes described in Figure 3.2 must be “correct” because this is what the formulae deliver, and appeals to common sense or commercial practice are irrelevant. UED cannot accept this view. The outcomes in Figure 3.2 are so obviously inappropriate that a change to the formulae is imperative.

In fact, through a detailed examination of the original design of the S-factor scheme (summarised here but set out in full in Appendix 1 of this submission) UED has identified an important and fundamental error in the Commission’s approach.

Despite the rather peculiar timing of bonus and penalty payments under the Commission’s scheme, UED considers that it does actually create appropriate performance incentives, providing that the following conditions are met:

- a. The Commission commits to “flat” target rates for all future regulatory periods;
- b. The Commission commits not to revisit the agreed targets, even if actual performance systematically deviates from the target rates; and
- c. UED accepts that the Commission will honour its commitments in relation to (a) and (b).

These conditions appear to be onerous and unrealistic (and perhaps they are) but - as Appendix 1 demonstrates - without them the Commission’s proposed scheme will not work as intended. For it is only the potential for a company to receive annual rewards in perpetuity that give rise to the need for a lagged penalty to curtail these rewards after 6 years. This potential only arises when the above conditions are met.

To understand this last statement, consider the alternative, and perhaps more realistic, situation where the above conditions are relaxed, allowing that the Commission may reduce the targets over time to reflect actual performance. In this case, rewards will be curtailed once the targets are adjusted to reflect actual performance. In this sense, the adjustment to targets fulfils the intended role of the lagged penalty.

Indeed, if the Commission does adjust the targets to reflect actual performance, but still imposes the lagged penalty then it is making an error: it is “double dipping”. The “perpetual reward” is curtailed once through the adjustment to targets and then again through the lagged penalty. What would have been a justifiable mechanism to curtail rewards instead becomes a mechanism that perversely penalises improved performance.

And yet, this is exactly the scheme – in UED’s view - that the Commission has embarked upon. We do not believe that the conditions above are met, so a lagged penalty is unjustified and incorrect. In the light of this analysis and unless the lagged penalty is



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removed, UED will be very cautious and conservative about any future expenditure on reliability improvement.

We realise that the source of the error and the reasons for it are subtle and complex. Indeed, this in itself causes us major concern. The S-factor scheme was never intended to be complex, and we know from experience how complex schemes can produce unintended and unexpected outcomes.

The analysis above reveals that there is actually a choice between two self-consistent arrangements:

- i. A scheme with fixed targets and a lagged penalty; or
- ii. A scheme with adjustable targets and no lagged penalty.

Given this choice, the Commission may rightly ask which one is preferred. UED believes that any regulatory framework must have flexibility to take account of changing circumstances. Only scheme (ii), above, can provide this flexibility and so this is our preference. Indeed, we would question whether scheme (i) is even feasible, given that the Commission cannot legally bind future regulators in the manner necessary to deliver it².

It should be noted that the Commission's Draft Decision does not make any commitments in relation to future targets, so the conditions that require lagged penalties have not arisen. In fact, as noted in section 3.3 below the Commission has indicated that actual performance will be reflected in future targets, contrary to condition (a) above. It is therefore clear (and, in many respects, not surprising) that the Commission has not understood the onerous and unrealistic conditions that must accompany scheme (i). It is on this basis that we conclude that the Commission has erred in including a lagged penalty in the S-factor mechanism. For the purposes of this submission, UED considers that this represents a fundamental and critical flaw in the Commission's proposed approach.

² Since the Regulator cannot therefore commit to the conditions (a) and (b) listed above. Since UED knows this to be the case, condition (c) is not met either.

3.2 Delivering Early on Declining Targets

Figure 3.2 above sets out the actual situation where UED delivered ahead of program to a set of declining targets, and will now have to pay a substantial penalty.

In this illustration, there is no suggestion that UED's performance has deteriorated. In making that statement we note that the underlying assumption in the scenario is that performance for 2005 - 2010 matches target, and we point out that the headline measure in the target is a SAIDI of 79 minutes, which closely matches the average over the last 5 years (it also closely matches the average SAIDI over the last 3, 4 or 5 years).

The company has performed in an exemplary fashion, delivering service improvements early and sustaining them. As explained in section 2 of this submission, even if UED maintained indefinitely the reliability improvement to 79 minutes, it would *still be penalised*.

The scenario depicted in Figure 3.2 shows that UED's performance meets or exceeds the required benchmark in each year; there is no depiction of a "deterioration" in performance which should attract a penalty. What in fact has happened is that UED has delivered performance improvements earlier than required and relative to a declining target. Customers have benefited from this, and the good performance had not been followed by anything that could be classified as "bad" and worthy of a penalty.

However UED is being required to pay a penalty because it has delivered performance improvements earlier than required against a declining target. It can be seen from the earlier examples that the penalty that UED will have to pay far exceeds the reward that the company has received. We therefore conclude that UED would have been far better off if the company had never delivered any improvements in the first place, and simply delivered performance in accordance with the target in each year. However, customers would be far worse off if UED had adopted that approach.

Over the last 8 years UED has set out, in good faith, to deliver a superior performance to the benefit of both customers and shareholders (consistent with the outcomes that would be expected under a good incentive scheme). However, if the Commission's proposed scheme is adopted, then UED's good faith actions and trust in the regulatory scheme will be compromised. UED considers that the implications of such a situation would be even more significant than the substantial penalty faced by the company. This is because investor confidence in the regulatory regime would be compromised, and the Commission's objective to safeguard the long term interests of consumers would, as a consequence also be compromised. The company trusts that this will not be the outcome.

Even if the argument is made that the "lagged penalty" described in Figure 3.1 above was intended, UED cannot accept that it was intended to penalise those companies

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(such as UED) who deliver improvements earlier than required and relative to a declining target.

To summarise this section and the previous one, UED does not believe that the regulator would have included a lagged penalty in the 2000 determination if the regulator had realised then how such a mechanism would lead to outcomes so clearly violating its stated principles. Having alerted the Commission to these problems, UED hopes that the problem of the lagged penalty will be addressed.

3.3 The Scheme does not Recognise the Performance Targets set by the Commission

As discussed in more detail in section 3.4 below, the stepped change in the incentive factors in the scheme inadvertently establishes 2005 as a major benchmark year (and 2003 to a lesser extent). UED understands that the scheme was intended to be continuous - flowing from one year to the next – in which the benchmarks had little meaning in absolute terms. Putting aside for the moment UED's view that the benchmarks should have meaning in absolute terms under an effective incentive scheme, the change to the incentive factors has the effect of establishing 2005 (and 2003) actual performance as benchmarks which now must be sustained by the company. This outcome was not foreshadowed by the regulator, and UED believes that it was not intended.

UED is now exposed to substantial risk under the Commission's approach because 2005 performance is not necessarily sustainable. Performance in that year is a data point on a "random walk" that defines actual SAIDI performance, and this can vary within bounds of say, +/-10 minutes. As shown in section 2, a 10 minute unsustained improvement in 2005 performance would have a substantially negative financial impact on UED.

The Draft Decision explains that the benchmark targets are not relevant for the S-factor for those companies that are ahead of the targets, but the 2006 targets will prevail for TXU if they are behind target. UED believes that this approach unfairly penalises UED for improving performance, whereas TXU would benefit from its relatively poor performance. The Commission's approach is not reasonable, and highlights that the targets are in fact relevant, even though the Commission claims that they are not. The Commission must express clearly and unequivocally its views in relation to target-setting so that stakeholders properly understand the Commission's position.

In UED's view, the Commission must honour the service targets for the next regulatory period. This would be achieved if targeted levels for the service measures for the purposes of reporting and monitoring ("reliability benchmarks"), as provided in Chapter 2 of the Draft Decision, were to apply to the service incentive mechanism.

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UED is aware that the Commission thinks that UED is asking for special treatment. The above example highlights that the stepped change proposed by the Commission will affect different Distribution Businesses (DB) differently. The impact of the Commission's proposed S-factor mechanism potentially:

- penalises good performers – particularly those who have delivered early against declining targets;
- rewards poor performers;
- leaves those who are at target indifferent, which is illustrated by the different positions taken by different DBs;

The upside that UED has accrued relative to the targets at the moment is UED's gain or "headroom" that the Commission should not confiscate because:

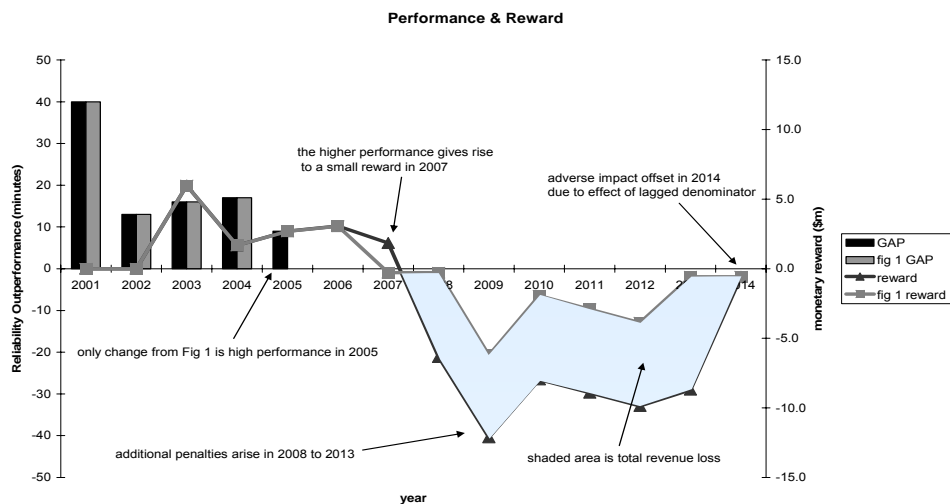
- to do so would destroy any incentives that UED would otherwise have had to beat the performance targets and to declare the gains or "headroom" achieved. Instead, the company would simply manage to the target; and
- the headroom is akin to a property right.

3.4 The Effect of Increasing Incentive Factors

In this section, UED explains the mathematical flaw that exists in the Commission's S-factor scheme. Essentially, the increase in the incentive factors makes the 2005 benchmark year crucial in terms of future S-factor payments. The Commission's approach has the effect of penalising better performing companies such as UED, and rewarding those companies that fail to meet the performance benchmark in 2005.

Figure 3.3 below shows how, compared to the above Figure 3.2 scenario, an improvement in reliability in 2005 only (all other parameters being equal) causes substantial revenue penalties to occur over the period 2008 - 2013. As a result of outperforming the 2005 reliability benchmark by 9 minutes, UED is penalised a total of \$36m over this period – shown by the shade area in Figure 3.3.

Figure 3.3 – Effect of Higher Reliability Performance in 2005



In this example, we have a situation where over-performance in a year (in this case 2005) causes UED to be penalised in future years (2008 - 2013). This outcome also appears to be inconsistent with the principles underpinning the S-factor scheme.

The reason for this outcome is a subtle but fundamental error in the algebra with the current algebra not being designed to handle changes to the incentive scheme. This error is described in detail in Appendix 2 to this submission. A correction to address this flaw and to remove the lagged penalty is presented in Appendix 3. In a sense, the error has always been present since the S-factor scheme was implemented, but is only now being seen because of the incentive factors changing year-on-year.

The error means that any over-performance exactly 3 years prior to an increase in incentive factors gives rise to a penalty, whereas an under-performance in that year gives rise to a reward. The Commission is proposing to increase the incentive factors twice:

- first in 2006, to reflect the effect of the P0 price change, causing any over-performance in 2003 to be penalised; and
- secondly in 2008, to implement a higher incentive factor with the objective of encouraging better reliability in the new regulatory period, causing any over-performance in 2005 to be penalised.

By our calculations, if UED delivers a SAIDI in 2005 of 70 minutes (beating the target of 79 minutes), we calculate that the S-factor for 2008:

- using the Commission’s formula, will be equal to -3.39%; and

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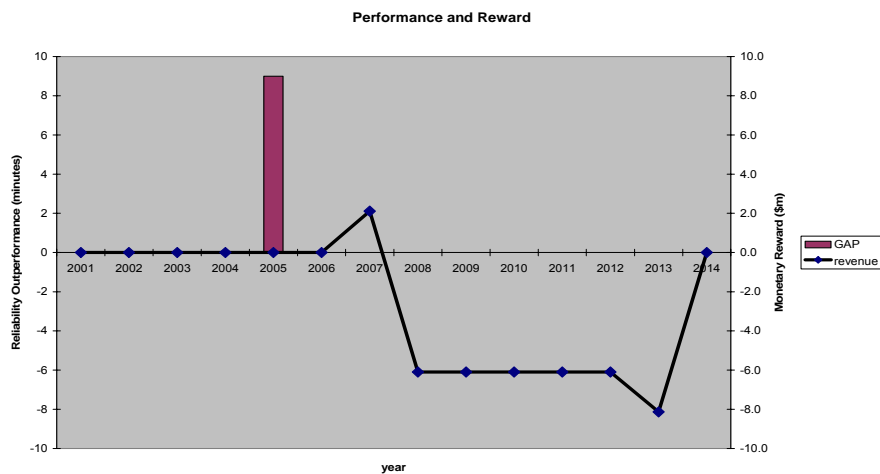
- using the correct formula proposed in the Appendix 3, will be equal to -1.05%, which correctly reflects the assumed decline in performance between 2005 and 2006.

Thus, if implemented the Commission’s approach would apply a transition penalty to UED of 2.34% (the difference between -1.05 and -3.39) of revenue in 2008. Furthermore, there is no self-correcting mechanism, so this revenue loss continues at 2.34% every year for the next 6 years³. UED’s overall revenue loss from the Commission’s formulation is therefore approximately:

$$\text{Total revenue loss} = 2.34\% * \text{annual revenue } (\$240\text{m}) * 6 \text{ years} = \$34\text{m4}$$

Again, we can use a hypothetical example to demonstrate the effect of the Commission’s error very simply. In Figure 3.4, below, it is assumed that a company exactly hits the reliability targets in every year between 2001 and 2014, except in 2005 where it beats the target by 9 minutes.

Figure 3.4 – Effect of Hypothetical Delta Performance in 2005



³ until, fortuitously perhaps in spite of our earlier comments, the lagged penalty reverses the adverse effect on the S-factor and so ensures a correct price level, but only for subsequent years. Without the lagged penalty, the penalty would continue indefinitely.

⁴ The extra \$2m lost is due to the lagged penalty causing a penalty in 2013



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The projected revenue loss from 9 minutes of over-performance is \$36m, or \$9m per minute. This simple example provides clear evidence that the scheme is not working as intended.

Now, it is important to note that this revenue loss will only result if the company's performance is better than the target reliability in 2005. If reliability had been on target in 2005 (which it still could be) this loss would not occur. Furthermore, if 2005 reliability had been worse than target, the error in the formula would deliver UED a windfall gain in revenue. These outcomes are demonstrably perverse and inconsistent with the basic principles underpinning the original S-factor design.

3.5 If the Proposed Scheme Remains – Despite the Problems - then the Commission has a Major Transitional Issue to Address

Given the problems inherent in the S-factor scheme, UED recommends that the proposed scheme is replaced with a simpler scheme. If, contrary to this submission, the scheme remains in place then the Commission has a major transitional issue to address. In particular, section 3.4 illustrates that the change in the incentive rates has the effect of making 2005 a crucial benchmark year. Of course, the performance in 2005 could be substantially higher or lower than the normalised performance because of the effects of weather and other random effects. It is clear that the Commission has not properly addressed transitional issues if variations in 2005 performance produce outcomes that are inconsistent with a scheme that is designed to improve performance. These perverse outcomes currently exist and must be addressed.

This point illustrates the importance of the Commission honouring the reliability targets, rather than basing the S-factor scheme on UED's actual performance.

4 Meeting the Objectives of the S-Factor Scheme

UED is only now becoming aware of the basic design problems inherent in the S-factor scheme. The company expects that the Commission will also be surprised by the analysis presented in this submission. It is now becoming clear that the industry did not properly understand how the scheme would operate in practice when the S-factor scheme was first established, or in fact throughout the current regulatory period.

UED maintained its faith that the S-factor would reward good performance, and given this belief it pursued service performance improvements. Ironically, if the company had understood and reacted to the actual incentives inherent in the scheme, it would have been encouraged to deliver a much poorer level of service to customers. Of course, UED could not have supported a scheme that encouraged and rewarded this type of outcome.

Given the background analysis in section 2 of this submission, it is useful to examine again the design principles for the S-factor scheme as described by the Commission's predecessor (the Office) and as understood by the industry. The principles underlying the scheme were described in the Office's Draft Determination for the 2001 Electricity Distribution Price Review as follows:

- (a) the incentives should be specified clearly and in advance, to maximise their effectiveness;
- (b) the scheme should be as simple as possible to understand for both distributors and customers, without distorting the incentives;
- (c) the incentives should be based on reliable and verifiable performance measures, with independent scrutiny of the distributors' measurement of their performance;
- (d) the incentives should address worst-case performance as well as average performance, to ensure that benefits flow to all customers;
- (e) the incentives should encompass both penalties for under-performance and rewards for superior performance;
- (f) the amount of revenue that distributors stand to gain or lose under the incentives should be limited, but large enough to provide meaningful commercial incentives at the margin. The amount of the incentives should be greater than the cost to distributors of achieving an increment of reliability, but less than the value that customers place on that increment of reliability;
- (g) there should be *no exclusions for external events*, such as severe storms or load shedding due to a shortfall in generation capacity. Such risks are better

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allocated to distributors than customers, given that distributors have a greater capacity to mitigate their impact;

- (h) where incentive payments are to be paid directly to specific customers for specific events, the scheme should provide for *automatic payments* rather than payment on application by the customer; and
- (i) customers should retain any right they currently have to seek *additional compensation* for specific losses caused by supply interruptions.

With the exception of principle (g), which the Office later determined to be inappropriate, the subsequent 2001 Electricity Distribution Price Determination attempted to embody these principles in the design of the S-factor scheme and to codify them in algebraic terms in Appendix D of that Determination.

It is important to recall that the original S-factor scheme was developed relatively quickly in response to stakeholder support for an incentive mechanism to encourage the distributors to achieve, or exceed, the service targets and standards established by the determination. UED now believes that some characteristics of the scheme (as developed in the mathematics) were not properly understood – and actually work in an unintended manner.

We now turn our attention back to the Office's principles and the analysis presented in section 2 of this submission. It is apparent that the Commission's proposed S-factor scheme appears to be behaving in a way which is contrary to design principles. Specifically, the outcomes described in section 2 of this submission can be compared to the design principles outline by the Office. This comparison is presented in Table 4.1.

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Table 4.1 – Comparison of the Office’s Design Principles and UED’s Analysis of the Outcomes as Presented in Section 2 of this Submission

Office’s Design Principles	UED’s analysis of outcomes
(a) the incentives should be specified clearly and in advance, to maximise their effectiveness.	It is evident that the incentive properties of the scheme were not properly understood because the proposed scheme actually rewards poor performance. UED’s performance in the current period has been excellent as shown in Figure 2.1 of this submission, yet the analysis in section 2 demonstrates that the company now faces substantial financial penalties under the scheme.
(b) the scheme should be as simple as possible to understand for both distributors and customers, without distorting the incentives.	The fact that the scheme can give rise to the unexpected and counter-intuitive outcomes presented in section 2 demonstrates that it is poorly understood.
(e) the incentives should encompass both penalties for under-performance and rewards for superior performance;	The existing scheme instead gives rise to <i>rewards</i> for under-performance and <i>penalties</i> for superior performance;
(f) the amount of revenue that distributors stand to gain or lose under the incentives should be limited, but large enough to provide meaningful commercial incentives at the margin.	It is clear from the analysis presented in section 2 of this submission that the incentives provided by the S-factor scheme are not meaningful. In particular, it appears that the company would benefit if performance in 2005 deteriorates

Table 4.1 confirms UED’s view that the outcomes described in section 2 of this submission are not consistent with the design principles that UED, and presumably the Commission, believed that the S-factor would deliver. In the next section, we turn our attention to explaining the nature of the two major fault lines that were unwittingly

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included in the original S-factor scheme. In section 5, UED develops some potential solutions to the problems presented.

5 Way Forward

UED reiterates that it supports the concept of the S-factor scheme, providing that the scheme operates in accordance with the original design principles set out by the Office and understood by industry participants. In this submission, UED has illustrated that the expected outcomes from the operation of the S-factor scheme are counter-intuitive and inconsistent with the design principles. These expected outcomes have been detailed in section 2 of the submission.

In section 3 of this submission UED has described the two apparent causes of the unfair outcomes that S-factor proposal would deliver. The first is the lagged penalty, the second is the change in the incentive rates. UED's submission is that the Commission is wrongly combining the lagged penalty with adjustable reliability targets. This is an error that leads to perverse outcomes.

The second apparent cause of the unintended outcomes produced by the scheme is the change in the incentive rates. In relation to this issue, it seems to UED that the Commission's mathematical formulation of the S-factor did not properly take account of the impact of changing incentive rates. To some extent this is not surprising, as there was no expectation in the original S-factor scheme that the incentive rates would change. The outcomes illustrated in section 2 of this submission illustrate clearly that the Commission's formulation is not appropriate.

UED and the Commission must now turn its attention to potential solutions to the issues identified in this submission. At a high-level, UED has identified three options:

- Option 1A – revise the S-factor scheme, having regard to the principles outlined by the Office in the 2001 Determination and create a simple scheme; or
- Option 1B: retain the existing S-factor concept, but adopt the mathematical formulation which corrects for the errors that we have identified. The formula is set out in Appendix 3 of this submission. The outcomes from these corrections should converge to those that would result from Option 1A,
- Option 2 – retains the Commission's current formulation of the S-factor scheme, ensures that the transitional issues associated with other changes being introduced by the Commission (incentives and exclusions) are properly addressed. One way to

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achieve that objective would be to reset the scheme for the start of the next regulatory period in a manner that ensures the perverse and inappropriate outcomes in section 2 of this submission are addressed.

Each of these options is briefly discussed in turn.

5.1 Option 1A - A Simple Scheme

In relation to Option 1A, the key benefit is that the s-factor scheme could be redesigned to have proper regard to the principles established by the Office, including the principle of simplicity. UED's proposed scheme would have the following characteristics:

- 1 year reward/penalty for each year's performance – with a 2 year lag;
- Actual performance with appropriate exclusions should be measured against target; and
- Adopt the Commission's enhanced incentives factors.

Other design characteristics of the scheme would be:

- DBs that have already delivered significant improvements in performance are not disadvantaged compared to other DBs;
- DBs are encouraged (rather than discouraged) to deliver service improvements no matter where their starting point is; and
- DBs that meet the compliance targets (on average) do not suffer penalty payments

UED emphasises that in proposing this solution, UED does not want "special treatment"; it simply wants the S-factor scheme to operate fairly and in accordance with the basic principles set out in the 2000 price determination. It is also noted that this option may allow the Commission more scope to resolve some of the additional issues noted in section 6 of this submission.

5.2 Option 1B - Correcting the Formulae can Resolve to Matching the Simple Scheme

Option 1B addresses the mathematical issues arising from the lagged penalty and the change in the incentive rates, which together cause a number of the perverse outcomes described in section 2 of this submission. UED's proposed solution assumes that the reliability target will be adjusted over time, as explained in section 3.1 of this submission. In addition, UED's proposed solution also recognises that the S-factor should be capable

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of accommodating the change in the incentive rates, without creating perverse outcomes. UED's solution is described in Appendix 3 to this submission.

It is possible that correcting the formulae can deliver the same outcome as adopting a simple scheme, as described in Option 1A. However, UED is concerned that to some degree adding further complexity to the existing scheme (albeit to correct identified problems) does not remove the possibility of further unintended consequences that may become apparent at some later date. UED believes that the Office was alive to this risk when it established the principle that the S-factor scheme "should be as simple as possible to understand for both distributors and customers, without distorting the incentives." On balance, therefore, Option 1A is preferred.

5.3 Option 2 - If the Commission insisted in keeping their existing proposal

In relation to Option 2, if the Commission insists on maintaining the scheme as proposed, UED can see no other option but to restart the scheme. From our analysis all other options create anomalies of the kind described elsewhere in this submission. The Commission must recognise that keeping the existing scheme has the weakness of preserving the problems that are inherent in the scheme (as described in section 3 of this submission).

By resetting the scheme we mean that performance in the current regulatory period (which is rewarded at the lower rates) cannot affect S-factor payments in the next regulatory period. In other words, the scheme is essentially forward-looking and does not seek to penalise UED for the performance improvements it has delivered to date, or the fact that these improvements have been remunerated at lower rates. To achieve this outcome, the Commission should:

- measure 2006 actual performance against target; and
- ensure there is no penalty arising from UED's over-performance in the current regulatory period.

Whilst the option is attractive if it can neutralise the perverse outcomes described in section 2 of this submission, it is not the preferred solution.

UED would ask the Commission to note that it is willing to work constructively with the Commission to ensure that these important matters are resolved in a timely manner. At present, UED must emphasise that the proposed scheme is not acceptable principally because of the unintended outcomes described in section 2 of this submission, and the inherent problems described in section 3.

6 Additional Issues

UED would also like to bring the following additional issues to the Commission's attention, as these are also relevant to the Commission's deliberations on the S-factor.

6.1 Asymmetric Risk

Whichever formulation of the S-factor scheme is finally adopted, UED will need to be compensated for any increase in risk that arises from the scheme, including asymmetric risk. The Commission has been considering this matter in relation to its proposed S-factor scheme, but of course this scheme cannot be implemented for the reasons described in this submission. This issue will need to be reconsidered once the proposed scheme is properly defined.

6.2 No Negative Carryovers

Depending on the final formulation of the S-factor scheme, the Commission should consider the principle that there should be no negative S-factor applied in any year, similar to the operation of the efficiency carry-over mechanism. The purpose of this rule would be to ensure that the operation of the S-factor scheme does not cause the business to earn less than its efficient costs in any one year. This would ensure that the efficiency carry-over and the S-factor mechanisms operate on a consistent basis. UED recognises that this is an additional principle to those presented in section 2 of this submission, but it is nevertheless an important wider regulatory principle that is worthy of consideration.

6.3 Exclusion Regime for the Next Regulatory Period

Whichever formulation of the S-factor scheme is finally adopted, the new S-factor scheme will need to adopt an appropriate exclusion regime. There is overwhelming national support for the use of SAIDI to define Major Day Event (MDE) in performance monitoring regimes applying to electricity distributors. It follows that criteria for exclusion of MDEs from the operation of the S-factor scheme should be consistent with the national framework for performance measures. In light of this, UED's view is that the new S-factor scheme should adopt SAIDI as the basis for defining events to be excluded from the S-factor scheme. For further discussion of these issues, please refer to UED's submission to the Draft Decision on service standards.

The following issues are also addressed in UED's submission on service standards:

- S factor for call centre performance;



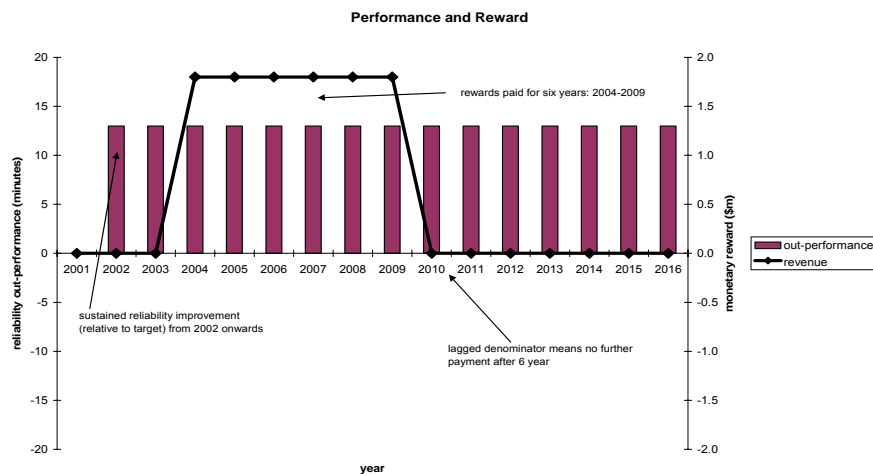
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- GSL thresholds and funding;
- Power quality measures;
- Additional reporting requirements;
- The Annual Health Card; and
- Distribution Losses.

Appendix 1: Target Setting and the Lagged Penalty

The reason given in the 2000 Determination for including a lagged penalty is to ensure that a DB only is only paid for six years the revenue rewards flowing from a sustained improvement in reliability, relative to the reliability target. The effect of the lagged penalty is illustrated in figure A1.1, below. Figure A1.1 assumes the same improvement in reliability in 2002 as shown in Figure 3.1. However, unlike in Figure 3.1, Figure A1.1 assumes that the 2002 reliability improvement is to be sustained indefinitely.

Figure A1.1 – Effect of Lagged Penalty Assuming that Target Performance is NOT Benchmarked Against Historical Actuals



For simplicity, figure A1.1 removes the effect of the changes to incentive factors that is discussed in Appendix 2⁵. The net present value of the rewards flowing from the reliability improvement – in 2002 money – is \$7.9m. Now, since the incentive factors for the 2001 - 2005 regulatory period have been calibrated to give rewards broadly

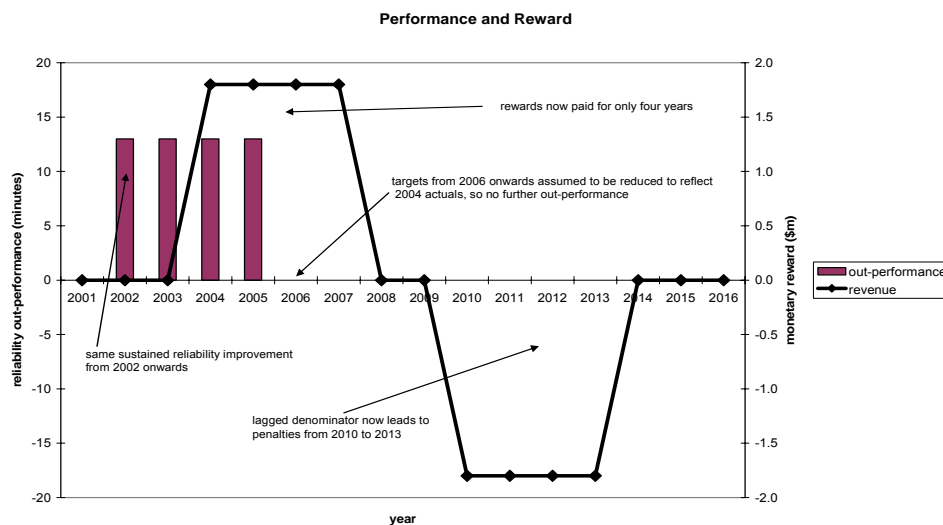
⁵ It also makes other simplifying assumptions, such as that the base revenue is constant over 2001-2005. This assumption is made to simplify the illustration and does not have significant effect on the outcome.

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equivalent to costs⁶, we can expect that the net cost to the DB – taking into account the effects of the efficiency carryover mechanism – of making the reliability improvement is also in the region of \$7.9m

For the out-performance in 2002-05 to be sustained over future regulatory periods, it must implicitly be assumed that the Commission – in setting future performance targets – *takes no account of historical reliability*. If, on the other hand, the Commission *were* to take historical reliability into account in setting future performance targets, the out-performance would *not* be sustained. This is because the Commission would see the historical out-performance of 13 minutes over 2002-2004 and factor this into the reliability targets for 2006 onwards by reducing these targets by 13 minutes. In this scenario, there will be no further out-performance from 2006 onwards: the reduction in the targets will have closed the gap between targets and actuals. This scenario is presented in Figure A1.2, below.

Figure A1.2 – Effect of Lagged Penalty Assuming that Target Performance IS Benchmarked Against Historical Actuals



⁶ 2000 Determination, Volume 1, P25

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As figure A1.2 shows, the resetting of the targets in 2006 has two separate effects:

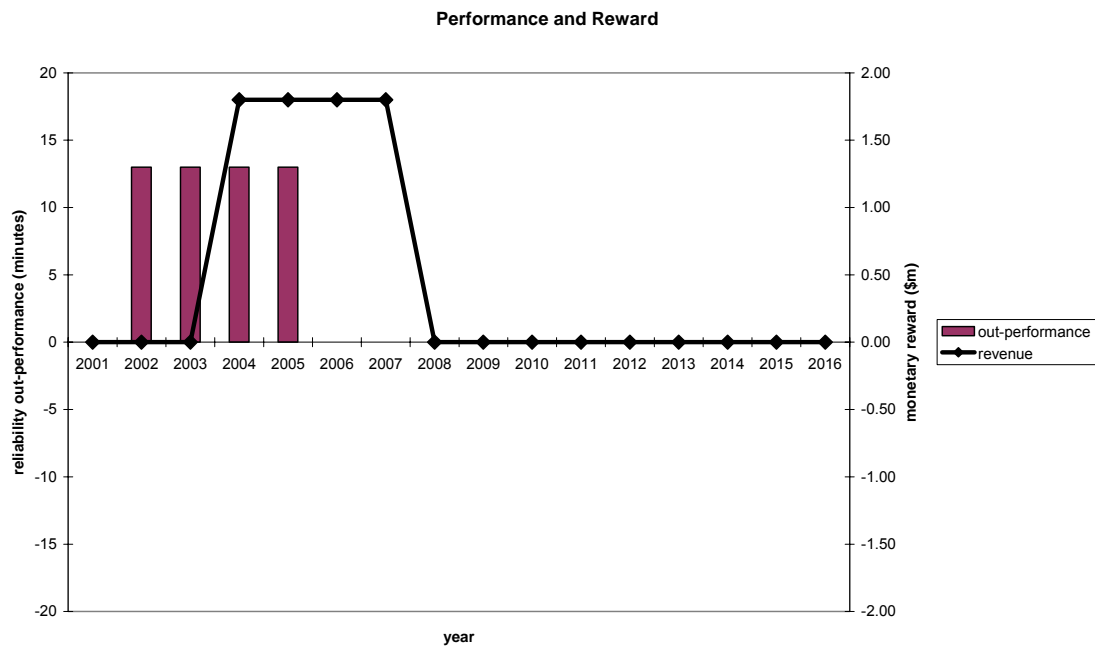
- the rewards for over-performance are now only paid for 4 years – they are curtailed from 2008 onwards; and
- because there are no continuing rewards accruing, the effect of the lagged penalty is now to create revenue penalties – from 2010 to 2013 – which exactly offset (in nominal terms) the four years of rewards.

The NPV of the rewards and penalties shown in Figure A1.2 – in 2002 money – is \$1.6m, around one-fifth of the cost of the reliability improvements. Clearly, no DB would undertake an investment with such a poor payoff.

Therefore, the question that a DB must ask before spending money on improving reliability is: how will this expenditure, and the consequential improvements in reliability, affect the level of reliability targets in future regulatory periods? In the absence of any commitment from the Commission that future targets will *not* be affected, common-sense and past regulatory experience would suggest that historical performance is highly likely to influence future target setting. Thus, the incentive for a DB to spend money to improve quality is substantially diluted.

Figure A1.2 demonstrates that, if the Commission is going to base future reliability targets on historical performance, then the lagged penalty is inappropriate. Figure A1.3 illustrates the rewards that would accrue if the lagged penalty were removed, as described in Appendix 3.

Figure A1.3 – Effect of Removing Lagged Penalty Assuming that Target Performance IS Benchmarked Against Historical Actuals



The revenue rewards shown in Figure A1.3 are similar to those arising in Figure A1.1. This demonstrates that there are two possible, equivalent models that can be used to provide appropriate incentives for improving reliability performance:

- EITHER the formulation proposed by the Commission – including a lagged penalty – together with a *guarantee* that future performance targets will *not* take actual reliability performance into account;
- OR a formulation without the lagged penalty, together with an expectation and acceptance that future performance targets *will* take historical reliability performance into account;

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It will be seen that the scenario shown in figure A1.3 only provides rewards for four periods (and an NPV of \$5.6m), whereas the scenario shown in figure A3.1 provides rewards for six periods (and an NPV of \$7.9m). This is because the over-performance in A1.3 is curtailed at the end of the regulatory period, due to the resetting of the performance targets⁷. This issue could potentially be addressed by:

- a mechanism similar to the efficiency carryover mechanism – although this may be complex;
- a recalibration of the incentive factors to compensate for the shorter payback period, although the problem of incentives reducing towards the end of the regulatory period would remain; or
- a target-setting process that would be weighted towards historical performance in the middle, rather than the end, of the previous regulatory period, to allow rewards from performance improvement at the end of the regulatory period to flow through into the next regulatory period.

To summarise, the lagged penalty is only appropriate where performance targets in the future are known by DBs to be independent of actual performance. In the more likely situation where future targets are dependent upon actual performance, the lagged penalty should be removed.

⁷ A similar issue arises in relation to capex and opex savings, which is addressed by the efficiency carryover mechanism.

Appendix 2: Mathematical Errors in the Proposed Formulation

6.4 The Lagged Penalty

The first equation in the formulation proposed by the Commission is:

$$S_t = \frac{1 + S'_t}{1 + S'_{t-6}} \quad (1)$$

If a DB delivers an improved performance in a particular year $t=T-2$ during the previous regulatory period, compared to the previous year $t=T-3$, then:

- S'_T will be greater than zero; meaning that
- S_T will be greater than one⁸; and
- a general increase in tariff revenue is allowed

This is the way that the S-factor is expected to operate.

However, six years later, in year $t=T+6$, the S-factor will be:

$$S_{T+6} = \frac{1 + S'_{T+6}}{1 + S'_T} \quad (2)$$

This means that:

- Since S'_T is greater than zero, the denominator in equation (2) above will be greater than one; so
- S_{T+6} will be less than one⁹; and
- a general decrease in tariff revenue will be required.

⁸ Assuming, for simplicity, that $S'_{T-6}=0$

⁹ Assuming for simplicity that $S'_{T+6}=0$



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Therefore, the effect of the denominator in equation (1) is that a performance improvement in year T-2 will lead, other things being equal, to a revenue penalty in year T+6: ie eight years later. In fact, as S_{T+6} will be the reciprocal of S_T , the revenue penalty in year T+6 will exactly equal¹⁰ the revenue reward in year T.

6.5 The Effect of Increasing Incentive Factors

The perverse effect that occurs when incentive factors change arises because the Commission has based its proposed formulation for 2006 - 2010, compared to the original formulation for the 2001-2005 regulatory period. When the original mechanism was formulated, it was never anticipated that these factors would change. UED is not arguing that the incentive factors should not change, simply that the S-factor formulation should properly accommodate such changes.

To understand why the effect arises, first of all, consider a simplified version of the S-factor algebra:

$$S_t = s * (GAP_{t-2} - GAP_{t-3}) \quad (3)$$

$$= -s * GAP_{t-3} + s * GAP_{t-2} \quad (4)$$

UED understands and agrees with the concept underlying this formula: that a single year (t-2) of high supply reliability should provide a single year (t) of revenue reward. The reason that this simple concept requires *two* terms (as shown in equation (4)) is because the S-factor applies to the current year's price, which in turn depends upon the reliability delivered in year t-3. To work as intended, therefore, the S-factor for year t must:

- firstly, strip out the effect of year t-3 reliability in order to obtain the "base price" (which is achieved by the first term in equation (4)); and
- secondly, add in the effect of year t-2 reliability in order to obtain the year t price (which is achieved by the second term in equation (4)).

¹⁰ Assuming that the base revenue in years T and T+6 is the same. In fact, the formulation applies a P0-based correction to the lagged S-factors to offset the effect of changes in base revenue

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Without the first term, any one-off high reliability year would cause a sustained increase in prices and a much higher level of revenue reward, than is justified under the principles on which the scheme is based. Up to this point, therefore, the S-factor scheme is apparently working as intended.

Note that in the above equation, the term s for the incentive factor does not have a t -suffix, which suggests that it is invariant in time. Indeed, for the first regulatory period, it was invariant in time because the incentive factors did not change (and there was no suggestion that they would change in the future). However, the Commission is now proposing two changes to the incentive factors:

- a change between 2005 and 2006 to reflect the effect of the P0 price change; and
- a change between 2007 and 2008 to implement a higher incentive factor with the objective of encouraging better reliability in the new regulatory period.

So, s now requires a t -suffix to make it clear which year's incentive factor is to be applied. Now, we have noted that the first term strips out the effect of the incentive factors in the previous year, and therefore must refer to the incentive factors *in that year*: ie year $t-1$. The second term adds in the effect of the incentive factors in the current year: ie year t . So, a reasonable formulation of the equation (A4) to allow for changing incentive factors is:

$$S_t = -s_{t-1} * GAP_{t-3} + s_t * GAP_{t-2} \quad (5)$$

Now, the Commission's proposed formulation is:

$$S_t = s * (GAP_{t-2} - GAP_{t-3}) \quad (6)$$

Note that the Commission has not included a t -suffix on the s variable in its proposed formulation. It uses the same basic equation as that from the 2001-05 regulatory period, when the incentive factors were constant. In the absence of any t -suffix, we interpret the Commission's formula to be referring to incentive factors in the current year: ie:

$$S_t = s_t * (GAP_{t-2} - GAP_{t-3}) \quad (7)$$

$$= -s_t * GAP_{t-3} + s_t * GAP_{t-2} \quad (8)$$

The difference between equation (8) (the Commission's proposed formulation) and equation (5) (which we believe to be a correct formulation) may appear to be subtle but it

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is also very material. In the year that incentive factors increase (ie 2008¹¹), the Commission's formulation strips out the effect of the *prior* year's (ie 2007's) reliability adjustment by incorrectly applying the *current* year's (ie 2008's) incentive factor. The Commission's formulation therefore unduly penalises companies such as UED which delivered above-benchmark performance in the historical year, t-3 (ie 2005). The magnitude of this penalty is calculated as follows:

$$\text{Transition Penalty} = (s_t - s_{t-1}) * \text{GAP}_{t-3} \quad (9)$$

Since the incentive factors are increasing, s_t is greater than s_{t-1} , which means that:

- if GAP_{t-3} is greater than zero (indicating over-performance), the penalty is positive;
- if GAP_{t-3} is less than zero (indicating under-performance), the penalty is negative: ie a reward

For UED, we estimate the magnitude of the penalty to be approximately \$4m for each minute of over-performance on SAIDI.

In summary:

- as a result of not changing its formulation to allow for changing incentive factors, the Commission has inadvertently introduced a perverse incentive on companies to deliver poor performance in 2005;
- unfortunately for UED (and possibly other DBs), the company's performance in 2005 is likely to be good, leading to UED being penalised;
- the materiality of the penalty is quite extreme, at around \$4m for each minute of over-performance;
- we have identified a simple but effective change to the formulation which removes the perverse incentive and the undue penalty on good performance;
- we strongly recommend to the Commission that the formulation of the S-factor be corrected accordingly.

¹¹ Meaning the 2008 *payment* year, based on 2005 and 2006 reliability performance. Note that Incentive factors also increase in 2006, where there is a similar – but smaller – transition effect



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Appendix 3: Option 1B – A revised S-factor Formulation

As noted in the main body of this submission, there are two “fault-lines” in the proposed S-factor formulation, which lead to violation of the S-factor principles:

- firstly, the lagged penalty;
- secondly, the transitional affect of increasing incentive factors

These fault-lines can be removed by changing the formulation to:

- firstly, remove the lagged penalty; and
- secondly, ensure that the incentive factors from the correct year are chosen.

The current formulation proposed in the draft determination is:

$$S_t = \frac{1 + S'_t}{1 + S'_{t-6}}$$
$$S'_t = S''_t + (1 + \text{pretaxWACC}_D) * S_{\text{bank},t-1}$$
$$S''_t = -S_{\text{bank},t} + \sum_{r,n} s^{r,n} (GAP_{t-2}^{r,n} - GAP_{t-3}^{r,n})$$
$$S'_{t-6} = \frac{S_{t-6}}{1 - X_{0,S}}$$

To correct the problem of the lagged penalty, it is sufficient simply to remove the denominator from the first equation in the formulation. In this case, the last equation is no longer required and the formulation becomes:

$$S_t = 1 + S'_t$$
$$S'_t = S''_t + (1 + \text{pretaxWACC}_D) * S_{\text{bank},t-1}$$
$$S''_t = -S_{\text{bank},t} + \sum_{r,n} s^{r,n} (GAP_{t-2}^{r,n} - GAP_{t-3}^{r,n})$$

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On the other hand, to correct instead the problem arising from increasing incentive factors, the appropriate t-suffices need to be added to the s terms as described in Appendix 2, above. So, the original formulation must be changed to give:

$$S_t = \frac{1 + S'_t}{1 + S'_{t-6}}$$

$$S'_t = S''_t + (1 + \text{pretaxWACC}_D) * S_{bank,t-1}$$

$$S''_t = -S_{bank,t} + \sum_{r,n} (s_t^{r,n} GAP_{t-2}^{r,n} - s_{t-1}^{r,n} GAP_{t-3}^{r,n})$$

$$S'_{t-6} = \frac{S_{t-6}}{1 - X_{0,S}}$$

Finally, to correct both problems together, we need to remove the lagged penalty term *and* add the correct t-suffices to the s terms, giving the formulation:

$$S_t = 1 + S'_t$$

$$S'_t = S''_t + (1 + \text{pretaxWACC}_D) * S_{bank,t-1}$$

$$S''_t = -S_{bank,t} + \sum_{r,n} (s_t^{r,n} GAP_{t-2}^{r,n} - s_{t-1}^{r,n} GAP_{t-3}^{r,n})$$

For simplicity, the three equations in the above formulation above can easily be combined into a single equation:

$$S_t = 1 + \sum_{r,n} (s_t^{r,n} GAP_{t-2}^{r,n} - s_{t-1}^{r,n} GAP_{t-3}^{r,n}) + (1 + \text{pretaxWACC}_D) * S_{bank,t-1} - S_{bank,t}$$