Review of ETSA Utilities' revised regulatory proposal for the period July 2010 to June 2015

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for the Australian Energy Regulator

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All dollar values in this report are expressed as $m real 2009-10, unless stated otherwise.

Totals in tables may not add due to rounding errors.

1. Introduction

In this section we describe the background to the review and provide details of the terms of reference. We also set out the structure of this report.

1.1 Background to the review

The Australian Energy Regulator (AER), in accordance with its responsibilities under the National Electricity Rules (NER), is to conduct an assessment of the appropriate distribution determination to be applied to direct control services provided by DNSPs in South Australia and Queensland for the period 1 July 2010 to 30 June 2015.

PB provided advice to AER about the ETSA Utilities regulatory proposal in November 2009[1] and the AER released its draft decisions also in November 2009. In January 2010, ETSA Utilities submitted a revised regulatory proposal.

The AER now requires PB to review and provide advice on a number of issues raised in this revised proposal, to inform its final decision and distribution determination.

The areas selected for inclusion in PB's terms of reference were based on a considered view by the AER, in consultation with PB, on the extent of new information included by ETSA Utilities in its revised proposal, the materiality of the expenditure adjustments, and the relevance and experience of PB's previous engagement.

1.2 Terms of reference

PB is required to produce a report providing technical advice and comment on aspects of ETSA Utilities' revised proposal. In preparing its report, PB is to:

- consider any new information provided by the DNSP as part of its revised proposal and advise of any revisions to the recommendations made by it in its previous reports
- provide details of any revisions to the DNSP's revised opex and capex allowances as a result of any changes it recommends
- set out what new information and reasoning has led to the revision of any of its previous recommendations. If no such changes are made in relation to issues raised by the DNSP, PB must set out why the DNSP's responses and new information do not lead to a revised recommendation.

Within its report, PB must have regard to the opex and capex objectives, criteria and factors set out in clauses 6.5.6 and 6.5.7 of the NER.

Table 1.1 outlines the elements under review by PB. These were selected in conjunction with the AER. The type of review is classified as either Detailed or High Level to provide an indication to PB of the weighting, importance and effort to be placed on each of the elements considered.

[1] These reports are available from the AER's website.

Table 1.1 Elements under review by PB

Expenditure category	Type of review
Forecast capex element	
LV network capacity upgrade	Detailed
Replacement capex programs - justification	Detailed
Security of supply capex – network control project	High level
Safety related capex – security and fencing	High level
Forecast opex element	
Emergency response – defect ratios	Detailed
Age based replacement	Detailed
Capex/opex trade-off	High level
Feed-in tariff – forecasting methodology	High level
STPIS element	
Reliability of supply – performance targets 4 years vs. 5 years data	High level
Telephone answering parameter – MED's	High level

Source: AER

PB has primarily undertaken a desktop review of ETSA Utilities' revised proposal, as the timeframe for the review provided only limited opportunity for PB to clarify any new information. PB has, however, sought specific clarification through written requests and responses in areas that it considered important to its findings.

1.3 Report structure

This report is supplementary to and should be read in conjunction with PB's 2009 report, 'Review of ETSA Utilities' regulatory proposal for the period July 2010 to June 2015'. A copy of this report is available from the AER's website.

In Section 2, we review ETSA Utilities revised forecasts for capex. In section 3 we review the revised opex forecasts, while section 4 considers the revised Service Target Performance Incentive Scheme.

2. Forecast Capex

In this section PB reviews the following matters in relation to ETSA Utilities' revised forecast capex proposal:

- LV network capacity upgrade
- replacement capex programs - justification
- security of supply capex – network control project
- safety related capex – security and fencing.

2.1 LV network capacity upgrade

PB is required to review in detail, and provide advice on the prudence and efficiency of the revised low voltage capacity upgrade program proposed in section 6.5.1 of ETSA Utilities' revised proposal.

In its original proposal ETSA Utilities proposed an expenditure of $124.5m (real 2008) for the period associated with changes to its Low Voltage Planning Criteria in response to the risk of repeated peak demand periods similar to those experienced during the 2008 and 2009 heatwaves.

The AER did not consider that the proposed expenditure was efficient on the basis that the After Diversity Maximum Demand (ADMD), equipment ratings and forecasting methodology adopted by ETSA Utilities significantly overestimated the level of forecast replacement required. Similarly, the AER considered that the risk assessment supporting the need for the program overstated the likelihood that ETSA Utilities would be unable to respond to avalanche failures during sustained heat wave conditions.

The AER recommended a reduction of $92.4m (real 2008) to the low voltage network capacity upgrade project based on an estimate of 'business as usual' expenditure and an annual allowance for an additional 51 distribution transformer replacements to mitigate against heat wave events.

2.1.1 Revised proposal and new information

In its revised proposal ETSA Utilities has proposed an expenditure of $73.1m (real 2008)[2]. To support the revised expenditure, ETSA Utilities has provided a report by Evans and Peck (E&P) to support changes made to the following input parameters that were used to forecast the level of required replacement:

- expected frequency of extreme weather
- transformer ratings
- average ADMD

[2] ETSA Utilities Revised Regulatory Proposal 2010-2015, p.86

- assumed demand growth rate

ETSA have applied the revised parameters as inputs to its transformer replacement forecast model resulting in an upward adjustment of $41m (real 2008).

2.1.2 PB findings and recommendation

PB has reviewed ETSA Utilities revised proposal and the supporting material provided for the revised low voltage planning criteria. PB accepts the revised transformer rating criteria outlined by E&P is consistent with the criteria typically applied by other Australian DNSP's.

We also note that the revised average ADMD is consistent with ETSA Utilities historical treatment[3] and that the revised average demand growth rate, whilst not well supported[4], represents a reduction from that proposed in ETSA Utilities original proposal. On this basis the revised figures do not appear to be unreasonable and have been accepted as being prudent for the purpose of testing the forecast methodology.

PB also accepts ETSA Utilities reinstatement of the $0.8m p.a. in capital works for low voltage planning and field load monitoring as this is in accordance with its historical accounting practices.

PB does not agree with E&P's recommendations, however, regarding changes to the expected frequency of extreme weather events or the validity of ETSA Utilities forecasting methodology which remains materially unchanged since the original proposal.

Expected frequency of extreme weather

In its report E&P have considered historical weather data for Adelaide and Kent Town to assess the likelihood of the maximum temperature for a single day exceeding 42^{O}C or the average temperature for a single day exceeding 35^{O}C and concludes that the likelihood of these single day events is about 1 in 5 years[5].

PB accepts E&P's analysis but we note that these events are not representative of the risk that the LV network capacity upgrade program is intended to address. Consistent with E&P's advice that these extremes should be considered in normal planning, PB understands that single day temperature extremes are accommodated within ETSA Utilities normal planning processes and emergency maintenance capacity.

ETSA Utilities has identified that the LV network capacity augmentation program is intended to manage the risk of avalanche failure events during extended heat wave events. In particular, the key risks highlighted by ETSA Utilities in the risk assessment relate to the inability to respond to sustained multi day events, the inability to cope with the volume of customer service calls during these events and the financial cost associated with emergency supply restoration and augmentation[6].

3 ETSA Utilities have proposed an average ADMD of 3.86 kVA per customer compared to a historical figure of 3.9 kVA per customer noted in AMP 1.1.01 p.177.
4 Evans and Peck, Low Voltage Planning Review, 23 November 2009, p.16.
5 ibid, p.8.
6 ETSA Utilities 2009, LV Planning Program risk assessment, SI227 — response to PB question PB.ETS.EM.68, August 2009 p.10.

As E&P have considered the likelihood of an event that is different to that documented by ETSA Utilities in proposing the program, PB remains of the view that ETSA Utilities risk assessment does not support the full scope of the original or revised program.

Forecast methodology

E&P has identified that transformer utilisation should ideally be forecast on the basis of intelligent meters, Maximum Demand Indicators, interconnectivity of GIS, customer and technical information systems and average ADMD approaches. In particular PB notes E&P's statement regarding the forecasting approach adopted by ETSA Utilities:

> ETSA Utilities have proposed the combination of an After Diversity Maximum Demand (ADMD) combined with a count of customer numbers as the basis of assessing the utilisation of substations. Evans & Peck is of the view that, used in isolation, this is a relatively poor basis on which to manage a capital program.[7]

Furthermore E&P identify that the ADMD x Count of Customers approach is most appropriate when used to screen potential overload situations for further investigation (by load monitoring) where no directly measured data is available[8]. E&P identify that this approach is consistent with EnergyAustralia's treatment of LV substations and the approach adopted by the AER in its draft decision.

Notwithstanding its view that a capital program of this nature should be forecast on the basis of more detailed measurements, E&P has undertaken a statistical analysis of the 2008 and 2009 measured data to determine an appropriate average ADMD for use in ETSA Utilities forecast model. Whilst PB remains of the view that the ADMD x Customer Count approach does not result in an efficient scope, we recognise that E&P's revised figure is materially consistent with the historical average figure of 3.9 kVA/customer that has previously been used by ETSA Utilities for planning purposes[9]. To test the validity of the program scope arising from E&P's recommended adjustments. PB used the 2009 monitoring results, ETSA Utilities' forecast methodology[10], and E&P's revised inputs to assess the level of additional works that are implicitly included in ETSA Utilities proposed scope due to the simplifying assumptions. We also tested the extent to which the predicted augmentations aligned with the 27 required augmentations identified by ETSA Utilities based on actual loading during 2009[11]. This analysis demonstrated that:

- ETSA Utilities ADMD based forecast methodology predicts 34 replacements for 2009 against the 27 identified from actual 2009 transformer loading, representing a 26% increase in the total volume of augmentation required
- of the 34 predicted replacements, only 13 are included in the 27 replacements identified by ETSA Utilities, representing an accuracy level of 38% for ETSA Utilities forecasting methodology
- the remaining 21 of the 34 predicted replacements (62%) relate to transformers which had an ADMD below 3.86kVA/customer during the 2009 heat wave event but remained

7 Evans and Peck, Low Voltage Planning Review, 23 November 2009, p.12
8 Ibid, p.15.
9 ETSA Utilities 2009, "AMP1.1.01 Distribution System Planning Report 2010 to 2020", May 2009, p. 177.
10 (Assumed Average ADMD x No. customers) /Transformer Capacity.
11 ETSA Utilities Attachment F.3 Heatwave Test Sample Analysis.xls, Sheet: 'FullSample168points' cell: K173

below E&P's recommended loading criteria. In these cases the augmentation is not supported by the historical data

- the average installed capacity across the sample is 4.5kVA[12] per customer against an average installed capacity across ETSA Utilities distribution transformer population of 5.9kVA per customer[13]. The additional 1.5kVA capacity represents over 13 years load growth at E&P's recommended 2.1% demand growth rate which indicates that there is ample capacity across the network to accommodate the network average ADMD of 3.89kVA recommended by E&P. Therefore the installed capacity within the sample is not representative of the asset population. PB recognises that a lower installed capacity may be symptomatic of older suburbs, smaller dwellings or a higher proportion of apartments than the remainder of the network, however, the significantly lower average installed capacity within the sample would tend to overstate the level of augmentation required when the findings are extrapolated across the remaining population.

PB found that when ETSA Utilities' methodology is applied to its actual monitoring results for the 168 monitoring points, the forecast methodology overstates the total required level of replacement by 26%, with 62% of the predicted 34 replacements representing units that were not supported by the data as they did not exceed E&P's recommended loading criteria during the 2009 heat wave. Given the forecasting methodology is only 38% accurate and noting the significant difference in average installed capacity between the sample and wider population, we conclude that ETSA Utilities' revised load assumptions, and the continued use of a single average ADMD figure to forecast the number of overloaded transformers, still results in the overstatement of the volume of transformer capacity augmentations required and does not represent an efficient scope to base the expenditure forecasts upon.

On this basis, PB recommends that the findings of the AER's draft decision providing allowance for business as usual expenditure with an annual allowance for an additional 51 targeted distribution transformer replacements is maintained.

To assess the impact of E&P's recommended 2.1% annual growth factor to the LV network expenditure, PB has applied ETSA Utilities calculation methodology for its revised proposal to the total $6.3m expenditure recommended in the AER's draft decision. This approach is based on the proportion of LV network to transformer upgrade capex estimated for 2010 with the 2.1% annual growth factor[14], which results in an additional $50k (real 2008) over the regulatory control period. In the context of the $73.1m (real 2008) proposed program, we consider this to be immaterial and on this basis, accept ETSA Utilities revised methodology for estimating the network component.

PB has recalculated its recommended adjustments to reflect the inclusion of the additional $0.8m (real 2008) p.a. load monitoring program and the small increase associated with the addition of E&P's 2.1% escalation factor to the LV network expenditure component.

PB also notes that contrary to ETSA Utilities presentation in its revised proposal, the recommended 51 augmentations are in addition to the business-as-usual transformer augmentations included in the $4.6m p.a. (real 2008) of the AERs draft decision. In conclusion, PB's recommendations provide for an average of 200 transformer augmentations per annum over the next regulatory control period. We note that this exceeds the average of 184 replacements predicted by ETSA Utilities revised model for the period

12 ibid.
13 ETSA Utilities, CX2003 PB.ETS.EM.31 LV Modelling Spreadsheet.xls.
14 As applied in ETSA Utilities spreadsheet Attachment F.4 Capital Expenditure Costing.xls.

2010 to 2015 when the assumed 2009 backlog of replacements are excluded from the analysis[15].

Table 2.1 PB recommendation - revised low voltage planning criteria ($m 2008 incl. corporate overheads)[16]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	6.3	6.4	6.4	6.5	6.5	32.1
EU revised proposal	14.6	14.6	14.6	14.7	14.7	73.1
PB adjustment	(7.5)	(7.4)	(7.4)	(7.3)	(7.4)	(36.9)
PB recommendation	7.1	7.2	7.2	7.3	7.3	36.2

Source: PB analysis.

2.2 Replacement capex programs - justification

PB is required to review in detail, and provide advice on, the prudence and efficiency of the revised asset replacement expenditures proposed in sections 6.5.2 to 6.5.6 of ETSA Utilities' revised proposal.

In its original proposal ETSA Utilities proposed an expenditure of $417.8m (real 2008) for the period associated with its asset replacement program. ETSA Utilities had proposed a significant change in its asset management strategy from a predominately fix-on-failure approach to incorporate wider scale condition monitoring approaches.

The AER did not consider that the proposed expenditure was efficient on the basis that PB had reviewed the detailed Asset Management Plans and expenditure forecasts covering 52% of the proposed asset replacement expenditure and found that ETSA had not demonstrated that the proposed expenditure was prudent and efficient.

The AER recommended a total reduction of $227m (real 2009-10) to the asset replacement expenditure sought by ETSA Utilities relating to the Circuit Breaker, Substation Transformer, Pole, Unplanned Line Components and Conductor asset categories. This adjustment also included an additional general reduction that was applied to the remaining categories that were not subject to detailed review.

ETSA Utilities has provided additional information to support amendments to five of the specific adjustments applied by the AER in its draft decision. ETSA Utilities' revised proposal has been considered by asset class, below.

2.2.1 Circuit Breakers

In its original proposal ETSA Utilities proposed an expenditure of $45.0m (real 2008) for the period associated with its circuit breaker replacement program. PB recommended that the total expenditure be reduced to $12.4m (real 2008) to remove unsupported adjustments to the risk assessment based on asset age rather than condition.

15 ETSA Utilities, CX2003 PB.ETS.EM.31 LV Modelling Spreadsheet.xls, Sheet: 'Working' , Cells: K12464:Z12464

16 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (LV Augmentation sheet)

Revised proposal and new information

In its revised proposal ETSA Utilities has proposed that $24.5m be reinstated to the capex allowance to reflect the re-inclusion of age based replacements of Circuit Breakers that will exceed an age of 60 years within the period. To support the proposed changes, ETSA Utilities has provided a report from EA Technologies (EAT)[17], which considers the relationship between age, condition, probability of failure and risk. The report also provides an overview of the consultant's experience with bulk oil circuit breakers in the UK and Australia. ETSA Utilities has also provided graphs outlining the change in population age arising from PB's recommended scope.

PB findings and recommendation

PB accepts EAT's position that the maximum expected life for circuit breakers is in the order of 60 years based on industry expectations and that the further consideration of condition and risk issues would enable improved prioritisation and a clearer view of the optimum rate of replacement. However we note ETSA Utilities' mature RCM approach includes a level of condition assessment and maintenance which has demonstrably enabled ETSA Utilities to exceed these life expectations in a number of cases, without a demonstrated impact on reliability or maintenance expenditure.

Similarly PB agrees with EAT's conclusion that more detailed consideration of these issues would be likely to demonstrate that significant replacement would be required over the next 5-10 years. We note that the AER's recommendations have made allowance for an average expenditure of approximately $2.6m (real 2009-10) pa for circuit breaker replacements over the next regulatory control period which represents a 19% increase over the average expenditure in the current regulatory control period.

However the EAT report does not demonstrate that the age related risk of failure is consistent with the outage performance criteria used by ETSA Utilities to determine the scope of the replacement program. The risk assessment criteria assigns an expected failure rate of 1 failure per year for units 55-65 years old and multiple failures to units greater than 65 years old. This level of failure has not been reported for ETSA Utilities existing aged circuit breaker population which includes units over 70 years old. Therefore while PB accepts that the risk of failure may increase with age due to specific time based deterioration modes, ETSA Utilities has not demonstrated that the assumed failure rates are reasonable or that time based deterioration modes are the dominant cause of failure by this asset class.

In establishing the link between condition and age, EAT have relied on four key assumptions:

- circuit breakers will exhibit a 'wear out' phase based on age
- the probability of failure in the 'wear out' phase changes with age
- the relationship between probability of failure and age is cubic
- the assumptions derived from an ideal homogenous population are applicable to ETSA Utilities' diverse population.

[17] EA Technologies, *The significance of asset age in estimating remnant life/end of life for substation plant,* November 2009. (Provided as Attachment F.5 to ETSA Utilities Revised Regulatory Proposal)

EAT also highlight that sufficient data to describe the failure behaviour in the 'wear out' phase is rarely available. This is consistent with EAT's statement that they have dealt with 'a few cases' where asset populations display a rapidly increasing failure rate and that this occurred only in populations with significant numbers of assets in very poor condition[18].

PB notes that the presence of a wear out phase is not always encountered on serviceable assets as they are intentionally designed to allow replacement of the wearing components during maintenance and overhaul operations. This results in a service life that is typically limited to the corrosion or fatigue of non-serviceable parts such as casings, deterioration of insulation or accumulation of multiple minor defects over time. Therefore, the presence of a well defined 'wear out phase' for an asset population is dependent on the commonality of maintenance history, operating environment and vulnerability of the specific design to time based insulation deterioration, corrosion and fatigue effects. In practice, due to the diversity in operating context, the onset of an increasing probability of failure is usually managed through a moderate increase in maintenance expenditure and an investigation of the observed failure modes to identify type vulnerabilities for planned replacement. This is essentially the approach adopted by ETSA Utilities in developing their planned and unplanned replacement forecast.

For the assumed end of life failure pattern, EAT identify that the presence of an age range where the failure rate starts to rise significantly is applicable for a group of similar assets operating in similar conditions[19]. For individual assets EAT identify that the time to reach the wear out phase will be very dependent on the operating context (duty, environment, maintenance regime etc.)[20].

PB accepts that for a group of similar assets, installed at the same time, in similar environmental conditions, subject to the same periodic maintenance regime and extreme events, the failure pattern of the population would most likely exhibit an increased probability of failure corresponding with the ultimate deterioration of the non-serviceable parts. However the diversity of the operating environment, network location, corrosion zones and ETSA Utilities established RCM based maintenance strategy indicates that the assets have not in fact been operating under similar conditions and in many cases, have been subject to periodic overhauls which materially alter the expected life of the asset. On this basis PB considers that the age based application of an uncalibrated, assumed end of life failure curve to ETSA Utilities Circuit Breaker population is not well supported.

EAT states:

> "If it is accepted that there is a zone where the POF rises rapidly, the consequences for allowing many assets to move into this zone are serious. Regardless of the exact form of the relationship, the overall failure rate and risk (manifest by significant deterioration in network performance) will increase substantially"[21]

EAT has acknowledged the absence of supporting data to define the shape and absolute magnitude in the 'wear out' phase[22], and the need to calibrate the assessment to the specific operating context of the asset[23]. Despite the lack of supporting data, EAT has assumed a cubic function to approximate the failure behaviour in the wear out zone based on ' a

18 Ibid, p. 4.
19 Ibid p. 2.
20 Ibid
21 Ibid p. 4
22 Ibid
23 Ibid p. 2

combination of mathematical modelling and pragmatism'[24] and used this to conclude that the probability of failure would increase by a factor of 10 over 5-10 years.

PB consider that the accuracy of the forecast and rigour of the methodology should be considered in determining the extent to which it is prudent to use it as a basis for expenditure requirements. In this case, EAT acknowledge that their estimate is based on an uncalibrated and assumed function to describe the increasing probability of failure (not the expected failure rate) on the assumption that a wear out phase will be encountered. Therefore in the absence of asset specific calibration to ETSA Utilities network, the CBRM model remains driven by the age based assumptions that do not consider the condition of the assets or their maintenance history.

Noting that ETSA Utilities maintenance strategy includes a well established periodic diagnostic and condition monitoring inspection component for all substation circuit breakers[25] this view is supported by EAT's statement:

> "The extent to which the definition of condition is based on specific condition information rather than age and engineering knowledge and experience, varies for different classes of assets depending on the viability/availability of reliable and economic condition assessment procedures"[26]

Notwithstanding the above, PB has considered the extent to which our recommendations may result in ETSA Utilities operating outside their historical capacity for maintaining older assets and EAT's maximum life expectations. Taking the upper end of EAT's maximum expected life range of 65 years for well maintained units[27], the maximum age of ETSA Utilities 11kV circuit breakers under the AER's draft decision will remain below 65 years until 2015[28]. Similarly, the number of 33kV circuit breakers over 65 years of age will reduce from 20 units in 2008 (with 17 older than 70 years) to 18 units in 2015 (with none older than 70 years)[29] whilst the number of 66kV Circuit breakers over 65 years will increase from zero to two units[30]. Therefore the ages of the assets under the draft determination recommendations are not materially inconsistent with those achieved within ETSA Utilities existing asset base or EAT's maximum life expectations.

PB Recommendation

PB recognises that ETSA Utilities has a mature RCM culture of monitoring the condition and performance of assets to extend the service life which is supported by the clear identification of the condition based replacements identified in the Asset Management Plan (AMP). Furthermore ETSA Utilities undertakes periodic overhauls, diagnostic tests and condition monitoring of all circuit breakers to assess performance, and this is reflected in the extended circuit breaker life that ETSA Utilities has been able to achieve. Given the detailed condition information available to ETSA Utilities, the application of EAT's high level age based approach, without calibration is not well supported.

On this basis and considering the advanced nature of ETSA Utilities existing circuit breaker replacement planning, PB considers that the extended life is reflective of an effective RCM based approach and that no further age based replacements are supported by the additional

24 ibid p.4.
25 ETSA Utilities AMP 3.2.05 Substation Circuit Breakers, May 2009, p.11.
26 EA Technologies, The significance of asset age in estimating remnant life/end of life for substation plant, November 2009, p.3-4.
27 Ibid p.5.
28 ETSA utilities CX2007 11 and 7.6kV CB Forecast Age Profile.xls.
29 ETSA Utilities CX2008 33kV CB Forecast Age Profile.xls.
30 ETSA Utilities CX2009 66kV CB Forecast Age Profile.xls.

information provided. Therefore PB recommends that the circuit breaker capex allowance included in the AER's draft decision is retained, as shown in Table 2.2.

Table 2.2 PB recommendation - revised circuit breaker replacement ($m 2008 incl. corporate overheads)[31]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	3.0	3.1	2.4	2.2	1.7	12.4
EU revised proposal	7.6	8.8	7.6	7.1	5.9	36.9
PB adjustment	(4.6)	(5.7)	(5.2)	(4.9)	(4.2)	(24.5)
PB recommendation	3.0	3.1	2.4	2.2	1.7	12.4

Source: PB analysis.

2.2.2 Substation transformers

In its original proposal ETSA Utilities proposed an expenditure of $36.2m (real 2008) for the period associated with its substation transformer replacement program. PB recommended that the total expenditure be reduced to $20.5m (real 2008) to remove unsupported adjustments to the risk assessment based on asset age rather than condition.

Revised proposal and new information

In its revised proposal, ETSA Utilities has generally accepted the AER's draft decision. However to manage the risk associated with its transformer fleet, ETSA Utilities has proposed three additional allowances:

- $0.8m for one additional unplanned 66kV transformer over the period on the basis of the failure history
- $1.0m for increased spares holding to support the CBD transformers that were to be replaced
- $1.0m for the planned replacement of one additional Tyree class E465 transformer on the basis of the documented design weakness.

To support the age based replacement of the Tyree class E465 transformer, ETSA Utilities has provided a report identifying the design weakness observed in the investigation of the 2003 failure.

PB findings and recommendation

PB has reviewed the revised information provided by ETSA Utilities and accepts that the additional unplanned 66kV transformer failure is supported by the recent failure history when the Tyree E465 transformer failure and repeat failure of a refurbished transformer are included.

Similarly, PB accepts that the increased spares holding for the CBD transformers is a prudent risk management response given the consequence of failure. However we are concerned that no economic assessment has been undertaken for this asset class to demonstrate that the purchase of increased insurance spares is more efficient than the

31 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (Circuit Breakers sheet).

planned replacement of the units over the longer term. In the absence of this assessment, the provision of an additional insurance spare will enable the life of the remaining transformers to be maximised, whilst minimising cost over the next regulatory control period.

With regard to the additional allowance for one Tyree class E465 transformer, PB recognises the presence of the design weakness and notes that failure is expected following a serious fault. In the 2003 case, this occurred 16 years after the recording of a serious fault and the highest risk Croydon unit has remained in service, without incident, for 23 years after a similar 1987 event[32]. Due to the random nature of faults (lightning strikes and power system faults) and significant life of the transformers following serious faults, the justification for reducing the retirement age by 10 years to mitigate against the risk of failure in the remaining population is not well supported as the occurrence of these faults is not age related.

The report provided by ETSA Utilities does not recommend the replacement of the asset class or support ETSA Utilities decision to reduce their expected life by 10 years. Instead the report acknowledges that the degradation is due to repeated faults on the system and that although unusual, it may be possible to address the issue by taking measures to limit the fault current through the windings[33]. While ETSA Utilities has not specifically considered the option of limiting the fault current in the AMP, PB acknowledges that this option was contingent on obtaining design data that may not have been retained by the manufacturer. In either case, the degradation of the transformers under this failure mode is directly due to the cumulative effect of fault events on an individual unit and not by age.

Therefore the reduction of the expected life by 10 years used by ETSA in its risk assessment is arbitrary and PB remains of the view that the efficient response would be to schedule planned replacements following the recording of a serious fault. ETSA Utilities has only identified the Croydon site in this category and allowance for these replacements has been made in the AER's draft decision. Therefore PB does not consider that the additional allowance proposed by ETSA Utilities represents efficient expenditure.

Table 2.3 PB recommendation - revised substation transformer replacement ($m 2008 incl. corporate overheads)[34]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	4.4	4.1	3.7	4.1	4.2	20.5
EU revised proposal	5.6	5.3	3.9	4.3	4.4	23.3
PB adjustment	-	(1.0)	-	-	-	(1.0)
PB recommendation	5.6	4.3	3.9	4.3	4.4	22.3

Source: PB analysis.

2.2.3 Poles

In its original proposal ETSA Utilities proposed an expenditure of $38.0m (real 2008) for the period associated with its pole replacement program. PB recommended that the total expenditure be reduced to $18.6m (real 2008) to reflect an increased proportion of pole refurbishment rather than replacement.

32 ETSA Utilities, CX113 - AMP 3.2.01 Substation Power Transformers, p. 27.
33 Park Consultants, *Failed Tyree Transformers 21MVA 66/11kV,* March 2003 p. 3.
34 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (Transformers sheet).

Revised proposal and new information

In its revised proposal, ETSA Utilities has proposed that an additional $8.6m (real 2008) be added to the AER's draft decision to take account of the historical ratio of replacement to refurbishment defects. To support its position, ETSA Utilities has provided a graph of the historical replacement to refurbishment defect ratios[35] and a spreadsheet outlining the calculation of the revised proposal[36].

PB findings and recommendation

PB has reviewed ETSA Utilities revised proposal and notes that ETSA Utilities has applied its current refurbishment to replacement ratios to the total number of estimated pole replacements. In our original report, PB noted that the expected volume of pole replacements under a refurbishment strategy was between 7,837 and 11,360 over the next regulatory control period. The analysis assumed that refurbishment would occur 5 to 10 years in advance of poles deteriorating to the point that they require replacement.

In comparing ETSA Utilities forecast model to the historical condition inspection results, PB did not agree with ETSA Utilities forecasting methodology and noted that the "assumed failure or population distributions in ETSA Utilities' model are not consistent with the actual failure profile". In particular, PB did not consider that the assumed average age, standard deviation of distributions characteristics were supported, or that ETSA Utilities forecast took into account the known condition of the assets. However, as ETSA Utilities had forecast 11,687 refurbishments/replacements over the period PB considered that the forecast volume of refurbishments/replacements was reasonable if refurbishment occurred 10 years prior to the pole reaching the replacement criterion.

Given the significant deferral benefits of refurbishment over replacement, the high historical ratio of pole replacements to refurbishments reflects the current approach of refurbishing or replacing a pole once it reaches the 50% metal loss replacement criterion. In PB's view, an efficient program would identify poles well in advance of exceeding the criterion and replacements would be limited to a small minority of cases where the defect is due to factors other than ground line corrosion. PB notes that this is broadly in line with the approach originally proposed by ETSA Utilities.

In its revised proposal, ETSA Utilities has proposed that the historical performance be used as the basis for estimating the future refurbishment and replacement volumes. Essentially this reflects a business as usual approach, which requires adjustment to both the replacement/refurbishment mix and the number of poles addressed by the program. In its revised proposal, ETSA Utilities has only proposed changes to the former. In calculating its replacement ratios, ETSA Utilities has double counted defects which may move from a priority 3 defect in one year to a priority 2 or priority 1 defect in subsequent years and, it has also allowed for the replacement or refurbishment of poles with less than 20% metal loss (which is inconsistent with ETSA Utilities current replacement practice which typically addresses poles much closer to the 50% metal loss replacement criterion[37].

Should action be initiated when a pole reaches the 50% replacement criterion rather than 10 years prior as originally considered, the expected number of poles requiring intervention over the period would be materially lower but the proportion of more costly replacements would be higher. Based on the historical defect data provided by ETSA Utilities for the original

35 ETSA Utilities Revised Proposal p. 95.
36 ETSA Utilities, Attachment F.6 to the revised proposal.
37 SI220 EM82PoleCriteria p.3.25-3.

proposal[38], PB identified that approximately 4,300 poles would require assessment over the regulatory control period under the most aggressive scenario where no action is taken until the threshold criterion is reached. Using the same methodology PB estimates that approximately 4900 poles would require assessment if action is taken 2 years prior to the criterion being reached, broadly in line with the timeframe for addressing Priority 3 defects in ETSA Utilities maintenance practices.

Applying ETSA Utilities advised historical replacement/refurbishment ratios of 31%, 36% and 77% for the high, medium and low corrosion zones respectively, the expected total cost to refurbish or replace the 4,900 poles over the period would be $17.1m (real 2008), which is lower that the allowance in the AER's draft decision and ETSA Utilities' revised proposal. Furthermore, the reduction in replacement volumes expected by ETSA Utilities in the high corrosion zone approximately halfway through the period would reduce the required expenditure over the next regulatory control period further.

However, PB notes that the higher proportion of replacements to refurbishments under this approach does not represent efficient long term investment due to the approximately 30 year deferral benefit associated with refurbishment over replacement[39]. Noting ETSA Utilities concern regarding the management of aging assets, PB recommends that the pole capex allowance included in AER's draft decision be retained on the basis that it represents a prudent and efficient long term approach.

Table 2.4 PB recommendation - revised pole replacement ($m 2008 incl. corporate overheads)[40]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	3.5	3.6	3.7	3.8	4.0	18.6
EU revised proposal	5.2	5.6	5.4	5.3	5.7	27.2
PB adjustment	(1.7)	(2.0)	(1.7)	(1.5)	(1.7)	(8.6)
PB recommendation	3.5	3.6	3.7	3.8	4.0	18.6

Source: PB analysis.

2.2.4 Unplanned Lines

In its original proposal ETSA Utilities proposed an expenditure of $71.2m (real 2008) for the period associated with its unplanned replacements of line components. PB recommended that the total expenditure be reduced to $48.5m (real 2008) to reflect the historical levels of line component replacement categories and to correct for unsupported compounding escalation factors.

Revised proposal and new information

In its revised proposal, ETSA Utilities has proposed that an additional $9.9m (real 2008) be added to the AER's draft decision capex allowance to take account of the trends in historical expenditure. To support its position, ETSA Utilities has proposed the adjustment on the basis that:

38 SI218 EM PoleDefects.xls provided in response to question PB.ETS.EM.81.
39 Refer PB Report, p.64.
40 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (Poles sheet).

- significant increases in the level of unplanned line expenditure over the current period are expected to continue into the future.
- the adjustment methodology used for Ergon Energy's Asset Replacement expenditure yields a higher figure when applied to ETSA Utilities unplanned lines expenditure
- the high level forecasting approach under the revised proposal is consistent with ETSA Utilities' approach for forecasting supply restoration operating expenditure.

PB findings and recommendation

PB has reviewed the additional supporting information provided by ETSA Utilities and recognises that there have been significant expenditure increases in most component categories over the current regulatory control period. However PB does not consider that the assumption that expenditure increases will continue to increase in the manner proposed by ETSA Utilities is well supported.

ETSA Utilities original proposal was based on a top down forecast of each line component category based on historical cost and failure information. PB reviewed the historical information and established that the upward trend in failures was not universal or consistent but was comprised of step changes in expenditure for most categories occurring in 2006 and 2007 (refer to Figure 2.1). Figure 2.2 shows that the failure history for the largest category, which comprised 26% of the original $71.2m expenditure proposal. The failure history demonstrates that the recent increase in failure rates is not unprecedented, with a similar level of failures occurring in 2000 and 2001 before an abrupt decline in 2002. Significantly, the expenditure data for these years has not been included in ETSA Utilities analysis for either the original or revised proposal and no expenditure forecasts at an asset category level have been provided to support the revised proposal.

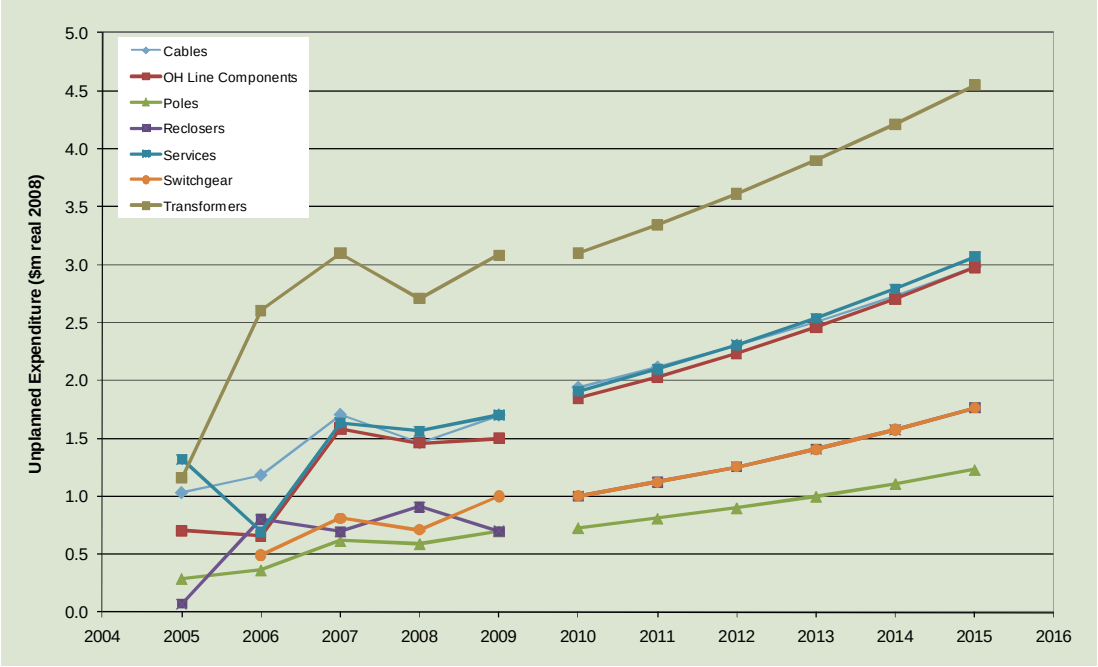

Figure 2.1 Unplanned lines expenditure by category (real 2008) – original proposal

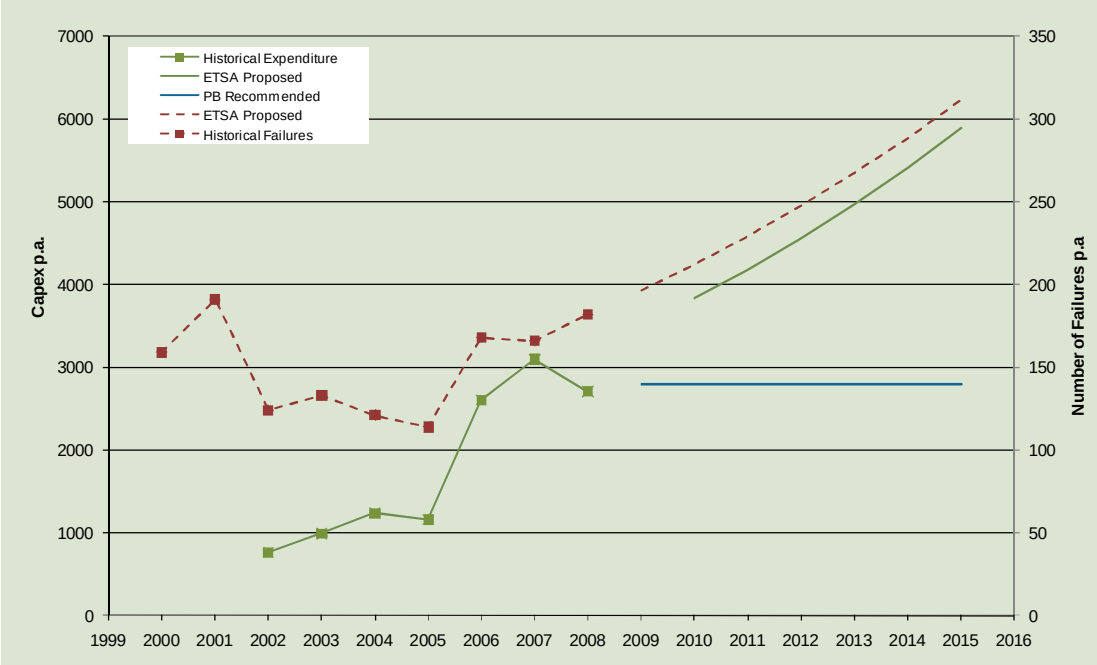

Figure 2.2 Transformer expenditure (real 2008) and failure history – original proposal

Due to the materiality of the transformers category in the original proposal and the recent step changes that have been observed in most categories, PB considers that ETSA Utilities assumption of continued expenditure growth is not supported and that there is a reasonable basis for expecting that ETSA Utilities' future capital expenditure on unplanned line components may remain constant or return to historical levels over the next regulatory control period as targeted maintenance practices and capacity augmentations address the assets at highest risk of failure due to condition or insufficient capacity.

PB also notes that ETSA Utilities had previously prepared a bottom up forecast of overhead line components which was provided in AMP 3.1.06[41]. The bottom up forecast for each component category is based on the following statement:

> "In 2007, the cost of unplanned capital expenditure for all overhead line components was $1,531,000. It is anticipated that the rate of increase in cost (at 2008 unit costs) will be 20% for 2008 and 2009 and 5% thereafter."[42]

No justification for the assumed 20% and 5% compounding growth rates was provided in the AMP. In place of the AMP forecast, ETSA Utilities substituted a top down forecast for each asset category which effectively allows for 11% compounding growth for 2008 and 2009 followed by 10% per annum thereafter with an additional high level adjustment to curtail the compounding growth.

In its revised proposal, ETSA Utilities has proposed a third high level forecast that is based on the treatment of growth escalators in its supply restoration opex allowance. This forecast is again comprised of compounding escalators of between 2.5% and 3.0% per annum applied to the 2008-09 expenditure. PB notes that this approach assumes that the level of

41 ETSA Utilities, AMP 3.1.06 Overhead Line Components.
42 ibid p. 12.

unplanned line capital expenditure in 2008-09 is efficient and void of distortions due to the periodic nature of capital expenditure.

PB is concerned that ETSA Utilities revised unplanned lines expenditure remains unsupported by known condition information, historical failure rates or a bottom up estimate consistent with the approach taken to support the remainder of the forecast capex allowance. Furthermore, based on ETSA Utilities original assumptions of significantly higher growth in 2008 and 2009 followed by a much lower growth rate over the next regulatory control period, PB is concerned that the 2008-09 unplanned lines capex is influenced by the findings of the targeted lines inspections undertaken since 2007[43]. This view is supported by the significant increase in the size of maintenance backlog against a stabilising or reducing incidence of functional failure for the cross arm and insulator asset categories outlined in ETSA Utilities supporting documentation[44].

As shown in Figure 2.1 ETSA Utilities' assumption of a relatively consistent annual expenditure growth rate over the next period is not supported by the expenditure history at an asset category level over the current period.

With regard to the adjustment applied to Ergon Energy, PB notes that the adjustment approach was applied across the entire asset replacement portfolio, rather than a single asset grouping. ETSA Utilities has provided detailed information by asset class for the unplanned lines grouping which has enabled analysis at a more detailed level as discussed above. PB accepts ETSA Utilities observation that the approach adopted by Ergon Energy may, in some cases, overestimate the level of capital expenditure that is required. Therefore PB considers that capex forecasts should be supported by bottom up estimation of replacement volumes. Notwithstanding this, PB's original recommendations for ETSA Utilities asset replacement expenditure yield broadly similar results to the methodology used for Ergon Energy when compared at a portfolio level.

Therefore PB considers that the assumed linear growth in unplanned lines expenditure is not supported by ETSA Utilities failure and expenditure history over the current regulatory control period. PB is also concerned that the historical expenditure is influenced by ETSA Utilities' recent adoption of targeted inspection cycles for distribution line assets. Furthermore the application of a high level capex forecast without reference to the failure history or the known condition of assets as proposed in ETSA Utilities revised forecast is not supported and inconsistent with the capex estimating methodology used for the remainder of the capex proposal. On this basis PB recommends that the original adjustment applied in the AER draft decision is retained, as shown in Table 2.5.

Table 2.5 PB recommendation - revised unplanned lines replacement ($m 2008 incl. corporate overheads)[45]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	9.7	9.7	9.7	9.7	9.7	48.5
EU revised proposal	11.1	11.4	11.7	12.0	12.3	58.4
PB adjustment	(1.4)	(1.7)	(2.0)	(2.3)	(2.6)	(9.9)
PB recommendation	9.7	9.7	9.7	9.7	9.7	48.5

Source: PB analysis.

43 ETSA Utilities, AMP 3.1.05 Poles, p.20.
44 ETSA Utilities, AMP 3.1.06 Overhead Line Components, pp.27-28.
45 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (Unplanned lines sheet).

2.2.5 General adjustment

In the AER's draft decision, a general adjustment of $96.7m (real 2008) was applied to the proportion of ETSA Utilities asset replacement portfolio that was not subject to detailed review. The adjustment was based on the extrapolation of the findings from PB's detailed reviews across the remainder of the proposed asset replacement expenditure.

Revised proposal and new information

In its revised proposal, ETSA Utilities has proposed that unplanned lines expenditure category should be excluded from the calculation of the general adjustment on the basis that the unplanned lines expenditure was the only category of expenditure that was forecast using a top down estimating methodology.

In addition, ETSA Utilities has proposed that the general adjustment should not be applied to the metering or telecommunications expenditure categories on the basis that they are largely driven by equipment obsolescence or compliance obligations and that this is fundamentally different to the methodology underpinning the lines and substation AMPs.

To support its revised position, ETSA Utilities has provided an analysis that demonstrates the calculation of its proposed adjustment to the portion of the portfolio that was not reviewed by PB.

PB findings and recommendation

PB has reviewed ETSA Utilities revised methodology for calculating the general adjustment and accepts that PB's detailed review covered the entire unplanned lines expenditure category and that this category was estimated using a different methodology.

Furthermore PB has conducted a high level review of the metering AMP and agrees with ETSA Utilities assertion that the expenditure is generally required to meet its compliance obligations under the NER and SA Electricity Metering Code. PB also notes that the management of ageing meters is based on identifying increasing deterioration within meter groups rather than scheduled age based replacement and that the rationalisation of meter types is based on an assessment of the cost effectiveness of maintaining the required testing program[46].

PB has also reviewed the Telecommunication Structures AMP 3.3.13 referenced by ETSA Utilities in its revised proposal and the Pilot Cable Network AMP 3.3.03 which is the most material AMP in the telecommunications expenditure category.

PB notes that no risk assessment is detailed in the telecommunications structures AMP other than the statements that the assets are generally 'low risk and low priority'[47] and that a low level of risk will be maintained[48]. In the absence of a risk assessment, it is not clear how the expenditure has been prioritised within ETSA Utilities' budgeting procedures. The AMP also contains a similar corrosion zone based assessment methodology to the Poles AMP that was reviewed by PB and the limited support for the assumed average life and standard deviation noted for the Poles AMP is also relevant in this instance.

Similarly PB is concerned that the Pilot Cables AMP details a proposal to replace approximately 400km of pilot cable network with optical fibre over the period 2008 to 2020.

46 ETSA Utilities, AMP 3.4.01, Metering, p.17.
47 ETSA Utilities, AMP 3.3.13, Telecommunications Structures, p.16 & 17.
48 ibid p.22.

The need to replace the existing network with optic fibre is not demonstrated and the AMP also does not consider whether replacing the existing pilot cable network is more efficient than repairing the most affected sections. Furthermore the risk assessment identifies that the existing level of risk is low:

> "It is expected that the implementation of the base plan will maintain present level of services for the considered 2008- 2020 period, and as such it will provide a risk rating as low."[49]

On this basis PB considers that the Pilot Cables AMP and the Telecommunications Structures AMP do not demonstrate that the proposed expenditure is efficient. These AMP's also include deficiencies in the risk assessments used to determine whether the program is included in ETSA Utilities capital expenditure forecast. Therefore PB considers that the telecommunications expenditure category exhibits issues that are similar to those found for the lines and substations categories and should not be excluded from the general adjustment.

Therefore PB has recalculated the general adjustment using ETSA Utilities calculation methodology and taking into account our recommendations from the revised proposal, including the exclusion of metering expenditure from the calculation. For the telecommunications expenditure category PB has applied the average 48% reduction applied in the draft decision and we note that this figure is lower than the pro-rata reductions that were applied for the lines and substations categories following the incorporation of PB's findings from ETSA Utilities revised proposal. This results in a $44.9m (real 2008) reduction to ETSA Utilities revised proposal, as shown in Table 2.6.

Table 2.6 PB recommendation - general adjustment ($m 2008 incl. corporate overheads)[50]

Expenditure category	Original Proposal ($m)	PB Reviewed Capex ($m)	PB Adjustments ($m)	PB Adjustments (%)	General Adjustment (%)	General Adjustment ($m)	Unreviewed Replacement Capex ($m)	PB Recommended ($m)
Lines Assets - Planned	160.7	66.1	(35.5)	(54%)	(54%)	(50.8)	94.6	43.8
Lines Assets - Unplanned	71.2	71.2	(22.7)	(32%)	-	-	-	-
Substations Assets	139.4	81.2	(46.5)	(57%)	(57%)	(33.3)	58.2	24.9
Telecommunication Assets	29.9	-	-	-	(48%)[1]	(14.3)	29.9	15.6
Metering Assets	15.8	-	-	-	-	-	15.8	15.8
Total	417.1	218.6	(104.7)	(48%)	-	(98.4)	198.5	100.1

[1]Adjustment based on the total adjustment % for the replacement portfolio

Source: PB analysis.

49 ETSA Utilities AMP 3.3.03, Pilot Cables p. 12.

50 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (AssetReplGeneralAdjustment sheet).

Table 2.7 PB recommendation - replacement capex not specifically reviewed ($m 2008 incl. corporate overheads)[51]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision[1]	17.6	20.3	20.8	21.5	21.1	101.2
EU revised proposed	25.3	29.3	29.7	30.6	30.1	145.0
PB adjustment	(7.7)	(9.3)	(9.2)	(9.5)	(9.2)	(44.9)
PB recommendation	17.6	20.0	20.5	21.1	20.9	100.1

[1]Based on 51% of ETSA Utilities $198.5m (real 2008) unreviewed asset replacement capex

Source: PB analysis.

2.3 Security of supply capex – network control project

PB is required to review at a high level, and provide advice on, the prudence and efficiency of the revised network control project expenditures proposed in section 6.5.8 of ETSA Utilities' revised proposal.

In its original proposal ETSA Utilities proposed an expenditure of $46m (real 2008) for the period associated with changes to its network control project. The AER did not consider that the proposed expenditure was efficient on the basis that the proposed Capex included labour costs of operational staff that should be allocated to Opex and that the duplication of the Network Operations Centre (NOC) at a third party disaster recovery site would be made redundant by the construction of a new NOC later in the period.

The AER applied a reduction of $10.1m to the network control project to remove the allocation of operating staff costs as capex and correct for inefficiencies resulting from the temporary need for an interim NOC location.

2.3.1 Revised proposal and new information

ETSA Utilities has proposed that $8.2m be reinstated on the basis that the operating costs included in the capex estimate are limited to those associated with Network Controllers and Network Dispatchers.

In support of its revised proposal, ETSA Utilities has provided a letter from KEMA clarifying the cost associated with Network Controllers and Network Dispatchers. ETSA has also identified that four of the IT systems included in the temporary NOC IT project will not be made redundant by the replacement of the SCADA system.

2.3.2 PB findings and recommendation

PB has reviewed the additional supporting material and accepts ETSA Utilities proposed adjustment for the operating costs that were included in its original capex estimate for the Network Control project on the basis of KEMA's specific identification of opex costs.

51 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (AssetReplGeneralAdjustment sheet).

We also accept ETSA Utilities statement that that the applications included in the duplicated disaster recovery NOC will not be made redundant by the upgrade of the SCADA system. However, we note that the original KEMA report includes the telecommunications, IT and other infrastructure (UPS, generator, voice communications equipment) for the new NOC in the scope of work and specifically identifies the UPS, generator and voice communications equipment as being included in the NOC relocation budget[52] along with "computer hardware, software and outside service providers services"[53] for the main control centre and disaster recovery control centre. Given that the communications, IT hardware, supporting equipment (including UPS, generator, and voice communications equipment) and replication of the NOC IT systems comprises the majority of the scope in the proposed IT project[54], PB remains of the view that the duplication of these systems at the third party disaster recovery site in 2010 is repeated for the new NOC site in 2013 and on this basis does not represent efficient expenditure.

Therefore PB does not accept ETSA Utilities revised network control project expenditure related to the NOC relocation, as shown in Table 2.7.

Table 2.8 PB recommendation - revised network control project ($m 2008 incl. corporate overheads)[55]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	2.1	9.5	12.1	7.8	4.4	35.9
EU revised proposal	5.9	10.8	13.1	8.9	5.4	44.1
PB adjustment	(2.4)	-	-	-	-	(2.4)
PB recommendation	3.5	10.8	13.1	8.9	5.4	41.7

Source: PB analysis.

2.4 Safety related capex – security and fencing

PB is required to review at a high level, and provide advice on the prudence and efficiency of the revised substation fencing and security program proposed in section 6.5.7 of ETSA Utilities' revised proposal.

In its original proposal ETSA Utilities proposed an expenditure of $18.2m (real 2008) for the period associated with replacing the existing security fences with high security fencing at 57% of its 319 outdoor substations over an 11 year period.

The AER did not consider that the proposed expenditure was efficient on the basis that the ETSA Utilities' existing fencing meets or exceeds the relevant Australian Standard and is consistent with the practices adopted by other distribution businesses in Australia and overseas[56]. Furthermore, the AER noted that the scope proposed by ETSA Utilities resulted in a high risk being assessed based on fences at otherwise low and medium risk sites.

52 KEMA Report (Attachment E.14 to the original proposal) p.10.
53 ibid, p.9.
54 KPMG Report Appendix D, F and G (Attachment IT036 to the original proposal) pp. 20 & 23-25.
55 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (MetwrokControl sheet).
56 AER, *South Australia Draft Distribution Determination 2010-11 to 2014-15*, 25 November 2009, p.157.

The AER recommended a reduction of $12.2m (real 2008) to the substation security and fencing program to reflect a targeted condition based approach to managing the risks associated with substation fencing.

2.4.1 Revised proposal and new information

In the revised proposal ETSA Utilities has proposed an expenditure of $12.3m (real 2008)[57] for an extension of the substation security and fencing program to cover the replacement of poor condition fences at medium risk sites and the inclusion of fencing upgrades at substation sites shared with ElectraNet. This represents a $6.3m (real 2008) increase over the amount included in the AER's draft decision.

To support the revised expenditure, ETSA Utilities has provided a letter from their legal advisors, Johnson Winter & Slattery (JWS) discussing the duty of care owed by ETSA Utilities to trespassers at their substation sites[58]. In its revised proposal ETSA Utilities highlights JWS's agreement with PB's conclusion that priority should be given to the highest risk sites however JWS also noted that:

- the present assessment of the site as low risk does not negate the fact that a person may be injured there in the future
- the upgrading of fences at high risk sites may result in thieves and vandals to select 'easier' targets in the form of low and medium risk sites
- the upgrading of sites at high risk sites makes harder for ETSA Utilities to justify the reasonableness of retaining less secure fencing at other sites.

As a result of these findings JWS considered that it is reasonable and prudent for ETSA Utilities to ensure that its substation fencing complies with the ENA Guidelines.

2.4.2 PB findings and recommendation

PB has reviewed ETSA Utilities revised proposal and the supporting material provided for the revised substation security and fencing program.

Regarding shared ElectraNet sites, the specific need to upgrade these sites is not identified in the AMP and, other than the assertion that ElectraNet has elected to upgrade its fences, no analysis has been provided to demonstrate that the need for, or efficiency, of the expenditure. Furthermore, no site or fence risk assessments have been provided for eight of the shared sites which were not included in ETSA Utilities original proposal. The remaining shared sites have been assessed by ETSA Utilities as being of medium site risk and in the case of the highest cost shared site, (at $410k) the fence risk has also been assessed as low.

Noting the higher inherent risks associated with transmission voltages and ElectraNet's statement that:

57 ETSA Utilities Attachment F.4 Capital Expenditure Costing.xls.
58 ETSA Utilities Revised Regulatory Proposal 2010-2015, p.86.

> "fencing typically consists of wire mesh topped with barbed wire to serve as a deterrent to unauthorised access (high security 'palisade' fencing has been installed at three substations and will be installed at other sites on a case–by–case basis)"[59]

PB considers that the adoption of high security fencing at ETSA Utilities shared substation sites should also be demonstrated on a case by case basis as reflected in the site specific risk assessments provided. It is clear that this has not been undertaken in eight cases and that the need for high security fencing, as opposed to a low risk chain mesh fence, is not well supported for the remaining sites. For the purpose of estimating the prudent and efficient level of expenditure, PB has applied the same site and fence risk criterion to shared sites as we have recommended for ETSA Utilities only substation sites.

From our review of the information provided by JWS, PB considers that the following points are pertinent:

- JWS state that ETSA Utilities are not legally compelled to comply with the ENA Guideline however the guideline may be relevant in assessing the standard of ETSA Utilities duty of care[60].
- JWS note that whether a fence upgrade is considered reasonable will depend on the individual circumstances of that site and consequently what is reasonable at that site, taking into account the cost involved[61].
- JWS note that a Court would not consider it reasonable for ETSA Utilities to immediately replace all of its substation fences but that a staged program to upgrade its fences should be put in place. This program should prioritise the sites where the foreseeability and severity of injury is highest[62].
- JWS note that their disagreement with the PB approach is related mainly to the treatment of fence condition (which JWS identify is of second importance)[63].

The first three points are consistent with PB's previous recommendations as adopted by the AER. With regard to cost, the expenditure associated with adopting a high security fencing standard at all of ETSA Utilities 319 outdoor substation sites would range from $64m to $128m[64] in total and represents $41m to $122m in additional cost over ensuring that fences meet ETSA Utilities existing 'low fence risk' chain mesh design. Therefore the cost associated with the JWS recommendation to retrospectively apply the ETSA Utilities' interpretation of the ENA Guideline requirements to all substation sites is likely to be considered material in the assessment of a prudent and reasonable response.

Furthermore JWS identifies that their recommendations regarding 'condition' relate to fences displaying physical damage or deterioration requiring repair[65]. PB agrees with JWS's view that fences that are seriously degraded or damaged should be replaced and that it may be appropriate (subject to supporting site specific economic and risk assessments) to upgrade the fences at this time to high security fencing.

59 ElectraNet, *Sustainability Report 2006-07*, p.18.
60 JWS Letter, *AER 2010-2015 Price Reset : Substation Fencing*, p.5. (Attachment F.7 to the Revised Proposal).
61 Ibid, p.7.
62 Ibid, p.8.
63 Ibid, p.9.
64 ETSA Utilities, AMP.5.1.03 Substation Fences and Security 2009 to 2020, p.15.
65 JWS Letter, *AER 2010-2015 Price Reset : Substation Fencing*, p. 8&9. (Attachment F.7 to the Revised Proposal).

However this interpretation is inconsistent with the definition of 'condition' used by ETSA Utilities in undertaking their fence risk assessment which identifies that the 'condition' assessment relates to the presence or absence of specific design features and not the degree of physical deterioration [66]. It is clear that JWS has misinterpreted the 'condition' risk assessment presented by ETSA Utilities as pertaining to the physical integrity, when making their recommendations regarding the prudence of upgrading security fences at all substation sites.

PB also notes that ETSA Utilities has accepted the risk associated with design deficiencies at over 200 sites since becoming aware of them in 2003 and having received legal advice of a similar nature to that provided by JWS dating from 2002. The timing of this program has been supported by the recent increase in copper theft following rapid escalation in copper prices during 2007 resulting in the financial cost of repairs following substation security incidents to increase to approximately $1m over the three years to March 2008[67]. To address this need, the program should focus on improving security at the high risk sites evaluated by ETSA Utilities. In PB's view it is also prudent to address the known fence design deficiencies at all medium and low risk sites by ensuring that the fence risk is low. Based on ETSA Utilities costs, it is clear that rectification of the design deficiencies in existing fences at $15k-$70K per site to achieve a 'low fence risk' score is more efficient than the replacement of all fences to a high security fence standard at $200k-$400k per site.

Furthermore, any future increase in unauthorised entry at medium or low risk sites due to the intentional selection of 'easier' targets is likely to be associated with malicious intent. In this case a lesser duty of care is noted by JWS and a limited effectiveness of security measures is acknowledged in the ENA Guideline. To address changes in the risk level over time, the site risk should be reassessed periodically as part of the inspection cycle to identify any changes in site activity, land use or socioeconomic indicators that may alter the site risk assessment.

PB also recognises that ETSA has made a $690k allowance in its opex for the continuing use of security patrols over the period and that this represents a prudent and efficient means of mitigating the risk at sites that have not previously been subject to security breaches.

Therefore PB remains of the view that the scope of the revised program is not efficient and recommends that the findings of the AER's draft decision are retained, as shown in Table 2.8.

Table 2.9 PB recommendation - security and fencing program ($m 2008 incl. corporate overheads)[68]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
AER draft decision	1.3	1.5	1.4	0.9	1.0	6.0
EU revised proposal	3.6	4.0	2.3	1.5	0.9	12.3
PB adjustment	(2.3)	(2.5)	(0.9)	(0.6)	0.1	(6.3)
PB recommendation	1.3	1.5	1.4	0.9	1.0	6.0

Source: PB analysis.

66 ETSA Utilities, AMP.5.1.03 Substation Fences and Security 2009 to 2020, p.13.
67 Ibid p. 7.
68 ETSA Utilities, Attachment F.4 Capital Expenditure Costing.xls, (SubstationFences sheet).

2.5 Adjustment Summary

This section summarises the adjustments to ETSA Utilities revised capex proposal that have been recommended by PB. The expenditure and adjustments have been converted from the 2008 basis of ETSA Utilities estimating processes to the 2009-10 basis of the revenue proposal by applying the adjustments in ETSA Utilities capital accumulation spreadsheets[69].

Table 2.10 PB recommend adjustments ($m 2009/10)[70]

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	Total
Capacity						
ETSA Utilities Revised Proposal	131.9	176.1	127.5	120.7	115.0	671.3
PB Adjustment (Section 2.1.2)	(7.6)	(7.7)	(7.7)	(7.6)	(7.6)	(38.3)
PB Recommendation	124.3	168.4	119.8	113.1	107.4	633.0
Asset Replacement						
ETSA Utilities Revised Proposal	57.6	65.2	63.2	64.7	63.9	314.6
PB Adjustment (Section 2.2)	(15.9)	(20.5)	(19.0)	(19.1)	(18.6)	(93.0)
PB Recommendation	41.8	44.6	44.2	45.6	45.3	221.6
Security of Supply						
ETSA Utilities Revised Proposal	13.8	16.3	16.8	13.9	8.7	69.6
PB Adjustment (Section 2.3.2)	(2.4)	0.0	0.0	0.0	0.0	(2.4)
PB Recommendation	11.3	16.3	16.8	13.9	8.7	67.1
Safety						
ETSA Utilities Revised Proposal	14.6	23.0	24.5	24.6	23.8	110.5
PB Adjustment (Section 2.4.2)	(2.3)	(2.6)	(1.0)	(0.6)	0.1	(6.4)
PB Recommendation	12.3	20.4	23.6	24.0	23.9	104.2
Total Gross System Capex						
ETSA Utilities Revised Proposal	395.9	460.9	397.5	395.0	385.2	2,034.5
PB Total Adjustment	(28.3)	(30.8)	(27.6)	(27.3)	(26.1)	(140.1)
PB Recommendation	367.7	430.1	369.8	367.7	359.1	1,894.4

Source: PB analysis.

69 Attachment F.4 Capital Expenditure Costing Spreadsheet, Attachment F.1 SEM-Capex Model Spreadsheet, Attachment F.12 CX001 Spreadsheet & RIN999 Revised ETSA Utilities Pro Formas.xls.

70 Attachment F.4 Capital Expenditure Costing.xls.

3. Forecast opex

In this section PB reviews the following matters in relation to ETSA Utilities' revised forecast opex proposal:

- emergency response – defect ratios
- age based replacement
- capex/opex trade-off
- feed-in tariff – forecasting methodology
- network growth escalation.

3.1 Emergency response – defect ratios

PB is required to review in detail, and provide advice on the prudence and efficiency of the emergency response costs in section 7.5.2 of ETSA Utilities' revised proposal, having regard to the new assets that will be installed during the next regulatory control period and the impact on the economies of scale factor for the network growth escalator.

As part of its draft decision, the AER reduced ETSA Utilities' forecast emergency response expenditure by $9.5m on the basis that it considered the application of the network growth scale escalation overstated the increase in unplanned opex activities.

The principle underpinning the adjustment was recommended by PB. It was the observation that emergency response opex not only included responses to outages due to a variety of issues such as storms, animals contacting live assets and vegetation contacting mains, etc but also from asset failures. Given that new assets are not likely to fail with a comparable rate to the existing assets, PB recommended increasing the economies of scale factor that was used to desensitise the application of the network growth scale factor based on historical emergency response expenditure classified by causes.

3.1.1 Revised proposal and new information

In its revised proposal, ETSA Utilities argued that the statements and justification described by PB to recommend the adjustment to emergency response opex did not provide a reasonable basis on which to adopt a more conservative economy of scale factor. Further it states that the approach it adopted of applying a constant defect ratio to the enlarged network is already conservative given its inclusion of 5% economy of scale factor to recognise advances in production processes and operating methods that may have a marginally favourable impact on failure rates during the 2010-2015 regulatory control period.

ETSA Utilities has referred to the conclusions drawn by the Australian Competition Tribunal when TransGrid applied for a review of this aspect of the AER's Final Decision[71]. In relation to the merits review brought by TransGrid, the Tribunal found that the AER was wrong to:

71 Application by EnergyAustralia and Others (includes corrigendum dated 1 December 2009) [2009] ACompT 8 (12 November 2009).

- exclude defect maintenance in respect of new growth assets
- proceed on a basis that TransGrid would incur zero defect expenditure in respect of new growth assets
- assume that the existing pool of ageing assets, that is, assets other than the new growth assets, would have the same level of defects as in the base period

ETSA Utilities has argued that the statements made by PB are for all intents and purposes identical to those used in its review of Powerlink and TransGrid and that given the findings of the Tribunal, the AER should revert to the use of ETSA Utilities original economy of scale factor or potentially make the same error as it did in respect of the defect maintenance for TransGrid.

3.1.2 PB findings and recommendation

In consideration of ETSA Utilities revised proposal, PB makes the following observations concerning ETSA Utilities approach to forecasting emergency maintenance opex and our original recommendations in the context of the three key errors identified by the Tribunal as part of TransGrid's merits review:

- *'it is wrong to exclude defect maintenance in respect of new growth assets'*

  PB has not recommended excluding defect maintenance in respect of new growth assets from ETSA Utilities' opex forecasts. It has, however, recommended reducing the increases proposed in proportion to ETSA Utilities historical records of causes for unplanned outages[72]. PB has reduced (not eliminated) the emergency response opex forecasts for new growth assets because they are not expected to fail consistently and repeatedly in an unplanned manner due to poor condition, which is related to the age of the asset[73]. PB has quantified the reduction based on the proportion of historical expenditure attributed to equipment failure.

- *'it is wrong to proceed on a basis that (ETSA Utilities) would incur zero defect expenditure in respect of new growth assets'*

  PB has not recommended excluding defect maintenance in respect of new growth assets from ETSA Utilities' opex forecasts. Some increased allowance for new growth assets has been recommended and quantified by PB because the assets are exposed to third party, external and environmental effects in the same way as the existing assets.

- *'it is wrong to assume that the existing pool of ageing assets, that is, assets other than the new growth assets, would have the same level of defects as in the base period'*

  The forecasting methodology adopted by ETSA Utilities is stated as 'taking the defect ratio that applies to its electricity distribution network assets today, and applying this same ratio to an enlarged network in the future'[74]. PB accepts the basis for ETSA

72 The data set of historical unplanned outage expenditure was supplied by ETSA Utilities and explicitly shows the proportion of expenditure associated with equipment failure and third party, external and environmental effects.

73 Any equipment failures of new plant installed over the next regulatory period (i.e. run-in failures) are expected to be covered by manufacturer's warranty.

74 ETSA Utilities Revised Proposal, p.120.

Utilities assuming that the existing pool of ageing assets, that is, assets other than the new growth assets, would have the same level of defects as in the base period because of the mix of new and aged assets which exhibit certain 'infant mortality' failure rates, and other age, condition and environmental failure rates.

PB notes that ETSA Utilities has applied an additional variation to its emergency response opex associated with an increase in average asset age, which is aimed to account for an increase in defect rates since the weighted average age of the network increases over the next regulatory period. The associated opex escalation factor has been calculated by SKM and is discussed further in the following section 3.2. PB highlights that it is through this mechanism that ETSA Utilities has endeavoured to establish the relationship between asset age, defects and associated opex. PB highlights that it is not clear to what extent the metric of the weighted average age of the asset base (or any specific asset class within it) as presented by ETSA Utilities is directly relevant to the emergency response opex base line as it has not presented any detailed description or discussion of the nature and basis of the current period defect ratios that impact on levels of unplanned emergency response activities. In PB's view, given the significant variation in weighted average ages (both increasing and decreasing) across various asset categories, PB considers such a discussion is warranted to substantiate any impacts on emergency response opex at an asset category level. In PB's view the impact of the aging asset base is suitably captured in discussions related to the SKM modelling and its application in section 3.2.

PB also wishes to highlight some specific differences in the opex modelling approaches adopted by ETSA Utilities and TransGrid:

- TransGrid's approach involved defining defect ratios as the historical average of routine inspection and maintenance costs relative to the costs incurred in undertaking non-routine defect repairs and emergency repairs. It did this across five key asset classes (i.e lines, substations, etc). As part of its advice to the AER, PB advised that both the defect repair and the emergency repair (i.e. non-routine) opex for all new growth assets be excluded.

- ETSA Utilities approach is different to TransGrid's in that it has separated out what TransGrid grouped together and defined as non-routine 'defect maintenance' into 'repairs' and ' emergency response' opex. The repairs component was included in activity DA-13 (maintenance) along with the routine inspections and maintenance, and the emergency response was included uniquely in activity DA-15. ETSA Utilities did not develop or apply any 'defect ratios' as such, based on historically averaged costs across asset classes. PB's advice to the AER accepted that non-routine defect repairs for new assets be included, as well as the emergency response opex associated with external influences. PB has proposed to the AER that the component of emergency response opex associated with plant condition and performance be removed as new growth assets are not likely to suffer such failures within the timeframes of the next regulatory control period.

Noting the above observations and in particular the specific differences identified between the approach adopted by ETSA Utilities and TransGrid, PB maintains its recommendation to the AER that a total reduction in forecast emergency response opex of $8.69m or 4.9% over the five year regulatory control period is appropriate, as shown in Table 3.1. Consistent with our original review, this has been informed by reducing the economies of scale factor by 43% from 0.95 to 0.54. PB remains of the view that this reduction is appropriate, given the lack of any further information from ETSA Utilities with regard to the suitability of the

methodology applied by PB in determining the proportion by which to reduce ETSA Utilities forecast increase of emergency response opex.

Table 3.1 Recommended reduction in maintenance opex associated with emergency response activities

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
AER draft decision						
ETSA Utilities proposal	29.8	32.4	35.1	37.9	41.0	176.20
PB adjustment	(0.75)	(1.26)	(1.75)	(2.23)	(2.70)	(8.69)
PB recommendation	29.05	31.14	33.35	35.67	38.3	167.51

Source: PB analysis.

3.2 Age based replacement

PB is required to review in detail, and provide advice on the prudence and efficiency of the maintenance and repair and emergency response costs in section 7.5.4 of ETSA Utilities' revised proposal, having regard to ETSA Utilities' review of PB's asset age escalators reservations and other supporting documentation.

As part of its draft determination, the AER applied a negative adjustment to ETSA Utilities forecast emergency response and maintenance opex totalling approximately $19.8m. The adjustment was made to remove the variations, attributed to the aging characteristics of the distribution network assets as modelled by SKM, which did not appear to be well substantiated or calibrated to ETSA Utilities network.

PB advised the AER that the modelling approach and framework applied by SKM to arrive at the expenditure age escalators was generally sound, however PB expressed a number of reservations regarding the data used in the model and its application to ETSA Utilities assets. Specifically, due to the lack of calibration of the SKM age versus opex characteristics to ETSA Utilities existing asset base and classes, PB formed the view that the proposed increases in opex due to increasing asset age were not substantiated and therefore were not prudent and efficient scope changes.

3.2.1 Revised proposal and new information

ETSA Utilities has considered in detail PB's review of the modelling undertaken by SKM and its application to ETSA Utilities' forecast operating expenditure and systematically responded to the eight reservations expressed by PB. As a result of its review, ETSA Utilities has made two adjustments to the asset age escalation model. These adjustments limit the application of SKM's age escalators to:

- 86% of its network maintenance and repair operating expenditure, thereby removing any age escalation that could be attributable to poles; and
- 43% of its emergency response operating expenditure, thereby eliminating any escalation that could be attributable to causes other than equipment failure.

In addition to these two adjustments, ETSA Utilities requested that SKM's model the impact on the asset's age profile of the AER's proposed (forecast capex) adjustments and the capex

proposed in ETSA Utilities' revised proposal. As a result of this revised modelling, errors were identified in the modelling referenced within ETSA Utilities' original proposal that had the effect of overstating the asset age-related escalators. The corrected (cumulative) age escalator in 2014-15 reduced from 10.89% to 7.9%.

The additional analysis undertaken by SKM was presented in a supplementary report[75], and ETSA Utilities applied these findings to propose a positive adjustment of approximately $6.7m to the total forecast opex proposed by the AER in its draft decision.

3.2.2 PB findings and recommendation

PB has reviewed in detail both the responses outlined by ETSA Utilities and the supplementary report prepared by SKM, and makes a number of further observations and recommendations.

Corrections to base-level escalators

PB's preliminary observation in regards to ETSA Utilities revised application of age-based escalators to its emergency response and maintenance opex has focussed on the adjustments to the base-level opex cost escalators as shown in Table 3.2, where the correct cumulative escalator in 2015 has decreased from 10.89% to 7.90%. PB notes SKM's explanation of this change is attributed to:

- using the final version of ETSA Utilities forecast capex program
- removal of capitalised overhead costs from the study
- correction of an error in the original modelling.

Table 3.2 SKM's original and corrected cumulative age escalators

Expenditure category	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Original escalators	1.87	3.62	5.07	6.82	8.75	10.89
Corrected escalators	1.31	2.70	6.50	4.80	6.30	7.90

Source: ETSA Utilities revised proposal, p. 127.

This correction indicates that the weighted average age of the total distribution network increases over the outlook period by 2 years from 36.1 years in 2009 to 38.1 years (+5.5%) in 2015[76]. This view is heavily informed by the 'overhead' asset class, which comprised 75% of the total replacement cost and itself increases by 3.8 years from 39.4 years to 43.2 years (+9.6%) over the same period.

PB notes that no further details of the changes and corrections to the base-level opex escalators have been provided or were requested. Notwithstanding that this correction has amounted to a significant increase of 38% in the 2014-15 cumulative escalator and therefore highlights the sensitivity of the model to input assumptions, PB has progressed its review on the basis that the corrections to the base-level opex escalators are accurate.

75 SKM, Distribution Network Asset Age Projections and Impact on Network Operating Costs—Supplementary Report, 8 January 2010.

76 The original change in the weighted average age of the total distribution network varied over the outlook period from 36.2 years in 2009 to 38.9 years (+7.5%) in 2015.

Use of implicit replacement capex/opex trade-off modelling

PB's secondary observation is in regards to ETSA Utilities application of the updated SKM model to determine two scenarios of the age-related escalators based on the following versions of the forecast replacement capex inputs, and as shown in Table 3.3:

- the AER's draft decision
- ETSA Utilities revised proposal.

Table 3.3 SKM's cumulative age-related escalators for three capex scenarios

Expenditure category	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Base-line escalators (original proposal)	1.31	2.70	6.50	4.80	6.30	7.90
AER draft decision	1.31	3.17	4.62	6.58	8.52	10.89
ETSA Utilities revised proposal	1.31	2.95	4.18	5.95	7.72	9.54

Source: ETSA Utilities revised proposal, p. 127

PB considers the principle of updating the escalators based on the various replacement capex outcomes is sound, provided the other key inputs are maintained constant. It therefore considers that this approach should provide an accurate reflection of the capex/opex trade-off sensitivity. PB's analysis has progressed on the basis these age-related escalators are an accurate reflection of the three different replacement capex scenarios.

PB notes, however, that the established opex/age curves used in this modelling remain unchanged from the original application. PB's concern about the application of these curves to ETSA Utilities' network is discussed below.

Implementation of revised proposal adjustments

PB finds ETSA Utilities approach to applying the revised proposal cumulative escalators to only 86% of its network maintenance (DA-13) and emergency response opex (DA-15) pragmatic and reasonable. This approach (based on post-processing the model outputs) effectively achieves the required outcome and removes any age related escalation due to poles using a simple method that is transparent and does not involve changes to the structure, inputs or contents of the model (i.e. it does not require the creation of new asset sub-classes, etc).

PB also finds ETSA Utilities approach to adjusting the revised proposal cumulative escalators to only 43% of its emergency response opex – effectively removing the age related escalation equipment failures – pragmatic and reasonable. It does, however, consider that this should be modelled as a compounding adjustment where both the 86% and the 43% are taken into account such that a factor of only 0.37 is applied to the age-related escalation factors for emergency response activity.

In regards to the detailed modelling presented by ETSA Utilities[77], PB has not been able to reconcile the impacts advised by ETSA Utilities of $6.7m[78] to the results in its spreadsheet model. When PB removed the impact of variation 7 and variation 3 from the model for maintenance and emergency response activities respectively, the impact on total forecast

77 Attachment G.1 SEM-Opex Model Ver RP1.4.xls.

78 ETSA Utilities revised proposal, p.127.

opex was calculated as $7.3m. In PB's view this was partly attributable to the observation that the age escalators for maintenance were not adjusted by a constant factor of 0.86 over the outlook period (rather the factor reduced to 0.81 in 2011-12 and then 0.78 in the remaining four years).

PB recommends correcting the application of ETSA Utilities modelling assumptions such that:

- the application of the age-related escalators for network maintenance (DA-13) opex is adjusted by the factor 0.86 over the entire outlook period, and
- the application of the age-related escalators for emergency response opex (DA-15) opex is adjusted by the factor of 0.86x0.43=0.37 over the entire outlook period.

These corrections imply the positive adjustment should amount to $7.0m, in accordance with the profile in Table 3.4, rather than $6.7m as proposed by ETSA Utilities.

PB also notes the sensitivity to this adjustment should the AER draft decision forecast capex allowance be maintained without any of increases sought by ETSA Utilities in its revised proposal is an increase of 11% to $7.8m - based on the implicit capex/opex trade-off within the model, and this is also shown in Table 3.4.

Table 3.4 Recommended increase in opex associated with the corrected application of age-related escalators

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
ETSA Utilities revised proposal[1]	0.6	0.9	1.3	1.7	2.2	6.7
PB recommendation	0.6	0.9	1.4	1.8	2.3	7.0
AER draft decision capex	0.7	1.0	1.5	2.0	2.7	7.8

Note 1, assuming the same profile calculated by PB forming its recommendation

Source: PB analysis.

Opex/age curves and relationships

The fundamental premise of ETSA Utilities application of the age-related escalators is the relationship between opex and age, expressed as a real % annual increase per year of change in the weighted average age across various asset categories.

The input assumptions used by ETSA Utilities as part of its original calculations are shown in Table 3.5, and ETSA Utilities has not proposed to amend these as part of its revised proposal assessment. (Noting, however it has chosen to desensitise the application of the resulting age-related exactors to recognise the difference between the use of its 'stobie' designed steel/concrete poles assets compared with that of the benchmark network, which was selected as that of Powercor, and in consideration of PB reservations numbered 3, 4 and 8).

Table 3.5 Mapping of ETSA Utilities asset categories to established SKM opex cost curves

Asset category	Opex % increase per year of age	% total replacement cost
Cables	6.4	6.5
Distribution transformers	3.2	8.3
LV services	3.2	0.1
Other	3.5	0.3
Overhead	3.2	75.7
Power transformers	3.2	1.3
Secondary	3.6	4.5
Switchgear	3.6	3.3
		100%

Source: SKM Supplementary report, p.3

As part of its original review, PB expressed concerns regarding the suitability of applying the Powercor relationships – in particular for the 'Overhead' asset category. In PB's view, a number of these concerns have still not been adequately addressed as part of ETSA Utilities revised proposal; in particular, reservations 1, 2 and 6.

Notwithstanding the narrow range of the calibrated results derived from SKM's previous studies, or the selection of escalators from the bottom 50th percentiles, PB maintains that the opex age curves adopted by ETSA Utilities appear unsubstantiated and relatively high when considered in the context of the performance of its assets, and their weighted average age compared with the expected lives described in ETSA Utilities asset management documentation. PB also highlights that the basis of the relationships within the SKM database remains unclear, in particular whether the 3.2% is reflective of growth in opex requirements in real terms excluding the effect of input costs escalators (which is managed as a separate aspect of the forecasting process), or other key matters such as asset management practices and strategies that inform the starting and mid-points of the exponential relationships adopted.

Specifically focussing on the most material asset subcategory of 'Overhead – fittings[79], PB acknowledges that the weighted average asset age in 2008 is 38.1 years and this increases by 3.9 years[80] based on the revised proposal replacement capex scenario (assuming historical expenditure ratios across asset categories are maintained constant). SKM goes on to indicate that as part of its updated assessment[81], the proportion of over-age overhead fittings increases from 18% to 35%. PB recognises that this outcome, coupled with the assumption of a 3.2% annual opex increase per 1-year of weighted average age increase is the primary driver behind the need for an overall net increase in the opex allowance[82].

79 The sub category of 'Overhead - fittings' accounts for 72% of the value of overhead category and 54% of the entire asset base replacement cost of $33.6b, and is comprised of cross-arms, insulators, conductor taps and other line hardware.

80 SKM Supplementary Report, p.12.

81 SKM Supplementary Report, p.13.

82 It is further noted that the reduction in weighted average age in the asset classes of power transformers, secondary and switchgear provides a positive opex/capex trade-off result countering the increases required in the five other categories.

In order to understand the 3.2% relationship further, PB sought clarification from ETSA Utilities on the specific activities that it is expected to undertake to support its assumption of an 'opex % increase per year of weighted average age increase' of 3.2% i.e. PB sought a more detailed understanding of the opex associated with new assets as compared with older versions in the overhead asset category.

ETSA Utilities response outlined that:

- as part of emergency response activities it was expecting increases in the number of trouble calls requiring crew attendance and increases in the amount of time spent fault finding and trouble-shooting transient and intermittent faults, and

- as part of maintenance and repair activities, it was expecting increases in the number of repairs due to vibration, moisture ingress, corrosion and brittleness; the complexity of switching operations and time spent preparing, reviewing and approving switching plans; and the number of reclosers requiring adjustments to protection settings.

In PB's view, whilst there is some basis to relate these increasing opex activities to ageing assets, there is limited supporting information to establish the robustness or strength of the annual 3.2% opex-age relationship proposed. Furthermore, ETSA Utilities has not attempted to validate the model by back-casting its assumptions, given that there appears to be some data on the historical aging across this key asset class and on increases in opex in these areas.

Given these matters, PB notes its original observations that ETSA Utilities has assigned asset lives for overhead line components of 56 years, and has made statements in the relevant AMP that it expects no systematic deterioration of porcelain and glass insulators until they are over 50 years of age given the mean life assigned to them of 100 years[83]. The AMP outlines that ETSA Utilities has adopted a normally distributed failure curve to represent its insulator failure rate and that, based on a nominal 2.5% population failure level, this suggests an age of 66 years before the 'wear out zone' is reached[84]. This underlines PB's original expectation that moving from a weighted average age for this asset category of 38 years to 42 years in a population of over 4 million should not present the significant six-year cumulative increase in aged-related opex of 12.0%, as implied by the SKM modelling.

Importantly, ETSA Utilities also indicates in its overhead line component asset management plan that:

- Details are provided of the types of insulator utilised by ETSA Utilities – pin, post and disc, and of the insulating materials used – porcelain, glass and composites. For the other types of overhead line components, little detail is given.

- The most significant causes of breakdown & maintenance defect for insulators is age (21%).

- The ceramic portions of the insulator could be expected to substantially outlast the metal components and the metal structure to which they are mounted.

PB has also identified that asset replacement capex is proposed to increase at a faster rate in the overhead line component category than in other areas – so the underlying assumption adopted by SKM that historical expenditure ratios will remain constant is likely to understate

83 CX105 Overhead Line Components AMP 3.1.06.pdf, p.23.

84 PB considers it is reasonable to assume that a nominal 2.5% population failure rate represents the start of a wear out zone for insulators within a normal distribution.

the impacts of the proposed capex replacement incorporated into the model in this key asset category[85].

Findings and recommendations

Given the sound framework of the SKM model and cognisant of the fact that the increasing weighted average age of key asset classes does represent a degree of risk to this business, PB recommends that the AER accept the application of the model.

In the above discussion, PB has recommended correcting the application of ETSA Utilities modelling assumptions such that:

- the application of the age-related escalators for network maintenance (DA-13) opex is adjusted by the factor 0.86 over the entire outlook period, and
- the application of the age-related escalators for emergency response opex (DA-15) opex is adjusted by the factor of 0.86x0.43=0.37 over the entire outlook period.

These corrections imply the positive adjustment should amount to $7.0m.

Given the new information presented in ETSA Utilities revised proposal, PB acknowledges that ETSA Utilities will be exposed to a reasonable increase in the weighted average age of the overhead fittings asset class of 3.9 years. This sub category of the overhead asset class represents over 54% of the value of the replacement cost of the entire asset base as of 2008, and strongly informs the age-related escalators used to increase the forecast opex allowance in the areas of maintenance and emergency response.

On the balance of evidence presented, however, PB is not satisfied that ETSA Utilities has substantiated the application of a 3.2% opex-age relationship given that many of the assets in this category (in particular insulators) are not expected to experience any wear out characteristics until they are at least 66 years of age and that the weighted average age will only be 42 years at the end of the regulatory control period. PB notes that the model was calibrated by reference to the Powercor network based on a predominance of wooden poles and crossarms. The effective removal of poles from this category and the use of predominately steel crossarms in SA mean that the relationship between age and opex is likely to be overstated.

Based on the relatively small increase in average age (3.9 years) compared to the difference between the average age and the expected age when wear out characteristics become evident (42 years and 66 years, a difference of 24 years or 57%), PB is of the view that little increase in opex will occur due to ageing of these assets over the next regulatory control period. Without substantiating data on which to base an alternative, we recommend that the model be desensitised to the opex-age relationship by applying a factor of 50%. This has the affect of decreasing the amount of opex required.

PB also notes that ETSA Utilities has presented insufficient details about the condition or performance of the other asset categories to substantiate the opex-age relationship contained in the model is appropriate for modelling ETSA Utilities assets. Given the lack of definitive information to form a view in the reasonableness of the entire suite of opex-age relationships, PB recommends the AER adopt a cautious approach and further[86] reduce the sensitivity of the model inputs such that all eight age-opex relationships are reduced by 50%,

85 Based on the expenditure profiles outlines within 'CX020 Asset Replacement Tradeoff Analysis.xls'

86 The term 'further' is adopted to reflect that ETSA Utilities has already accepted that the opex vs. age escalation for stobie poles should be excluded.

as shown in Table 3.6. It is noteworthy that in the asset classes that are shown to have a decreasing weighted average age (namely Power transformers, Secondary and Switchgear[87]), the adjustment proposed by PB has the effect of increasing the amount of opex required by ETSA Utilities. Notwithstanding this, the net impact across all asset categories is an overall decrease in opex forecasts because the weighted average age of the network increases.

The rationale adopted by PB to recommend the 50% reduction has been informed by our view that:

- 54% of the asset base (by value) is associated with overhead fittings, and there are significant differences between the weighted average age for insulators of 42 years compared with the age of onset of wear out of 66 years (i.e. 57% longer)
- there are some assets in the overhead category for which ETSA Utilities will experience an increase in weighted average age of 3.9 years and for which it does not have a detailed understanding of its condition or the potential onset of wear out (i.e cross-arms)
- the lack of supporting evidence for the original figures and our expectation that real annual growth in maintenance and emergency related opex at levels in excess of the resulting 1.5-3% range (as recommended by PB) should be able to be well supported by reference to actual experience, changes in asset management practices and actions that are very well understood

PB considers that applying a somewhat arbitrary but constant adjustment of 50% to all asset classes maintains the integrity of the weightings based application of the model, and effectively results in a direct reduction of 50% in the final opex-age escalators that are produced. PB also considers the somewhat arbitrary nature of our recommendation is reasonable given ETSA Utilities lack of supporting information to substantiate its original assumptions and in light of the recognition there will be some degree of age-related increase in risks faced by the business.

Table 3.6 Recommended mapping of ETSA Utilities asset categories to opex cost curves

Asset category	Proposed Opex % increase per year of weighted average age	PB recommended Opex % increase per year of weighted average age
Cables	6.4	3.2
Distribution transformers	3.2	1.6
LV services	3.2	1.6
Other	3.5	1.8
Overhead	3.2	1.6
Power transformers	3.2	1.6
Secondary	3.6	1.8
Switchgear	3.6	1.8

Source: PB analysis and SKM Supplementary report, p.3.

87 SKM Supplementary Report, Table 3, p.4.

Based on PB's recommendation to correct the application of ETSA Utilities modelling assumptions such that the proposed adjustment is $7m, rather than $6.7 as indicated by ETSA Utilities, the subsequent application of age-related escalators that are 50% lower than those included with ETSA Utilities revised proposal results in a positive adjustment of approximately $3.5m in accordance with Table 3.7 as opposed to the $6.7m sought.

Table 3.7 Recommended reduction in maintenance and emergency response opex associated with proposed age related escalators

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
AER draft decision	(1.6)	(2.4)	(3.6)	(5.1)	(6.9)	(19.5)
ETSA Utilities revised proposal increase	0.6	0.9	1.3	1.7	2.2	6.7
PB adjustment	(0.3)	(0.4)	(0.6)	(0.8)	(1.0)	(3.2)
PB recommendation	0.3	0.5	0.7	0.9	1.2	3.5
PB recommendation - AER draft decision capex	0.3	0.5	0.7	1.0	1.3	3.9

Note, Totals may not add due to rounding.

Source: PB analysis.

PB notes that should the AER's draft decision on replacement capex allowance be upheld, the change in the age-related escalators will result in an associated scaling of opex from $3.5m to $3.9m based on the recommended model and inputs and the implicit capex/opex trade-off, as per the final row of Table 3.7.

3.3 Capex/opex trade-off

PB is required to review at a high level, and provide advice on the prudence and efficiency of the maintenance and repair costs in section 7.5.3 of ETSA Utilities' revised proposal, having regard to the impact of the asset replacement capex trade-off and other supporting documentation provided.

In its draft determination, the AER included a negative adjustment of $0.3m to ETSA Utilities opex allowance on the basis that PB recommended removal of the age-related escalation of maintenance and emergency response opex and that it be substituted with a top-down financial model that represented a replacement capex/opex trade-off.

3.3.1 Revised proposal and new information

ETSA Utilities has not incorporated the AER's decision to reduce the proposed maintenance and repair opex on the basis that the approach:

- fails to account for changes in the overall weighted average age of the network across asset classes
- leads to the incongruous conclusion that implies it should incur less operating costs whilst maintaining an older network
- includes a gross generalisation that necessitates inclusion of a unsubstantiated '20% factor'

- represents a double standard in so far as PB's prime criticism of the SKM age-opex relationship was a lack of calibration to the specific network characteristics
- represents an inconsistency insofar that PB has expressed a preference for more detailed bottom-up analysis compared to top-down financial analysis in other areas.

3.3.2 PB findings and recommendation

Given that PB has now recognised that a de-sensitised application of the SKM age-opex relationships and modelling is appropriate (as discussed in the previous section), PB recommends the AER not incorporate any additional top-down adjustment to account for a financial ratio based replacement capex/opex trade-off. The SKM modelling approach implicitly incorporates a suitable replacement capex/opex trade-off and reflects a preferred and more accurate approach compared with that originally substituted by PB. Specifically, this is because the model assumes that the oldest assets in each category are replaced first, based on the accepted replacement capex program.

PB is sufficiently satisfied that the reservations it expressed in regards to the application of the SKM model have been addressed through the adjustments incorporated by ETSA Utilities as part of its application, as well as the recommended de-sensitisation of the key age verses opex relationships proposed by PB.

PB recommends that the original adjustment of $0.3m to ETSA Utilities forecast opex allowance be removed on the basis that a capex/opex trade-off is implicitly incorporated into the age-related opex escalators accepted by PB in section 3.2 of this report.

Table 3.8 Recommended increase in forecast opex associated with removing the top-down capex/opex trade-off

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
AER draft decision	-	-	-	-	-	-
ETSA Utilities revised proposal	0.01	0.03	0.06	0.08	0.12	0.30
PB adjustment	-	-	-	-	-	-
PB recommendation	0.01	0.03	0.06	0.08	0.12	0.30

Source: PB analysis.

3.4 Feed-in tariff – forecasting methodology

PB is required to review at a high level, and provide advice on, the prudence and efficiency of the revised opex associated with feed-in tariff payments.

Notwithstanding that the difference between the forecast and actual feed-in tariff payments made in any year will be adjusted through a specific nominated pass through provision, ETSA Utilities originally calculated an opex allowance of $38.8m associated with its forecast feed-in tariff payments. The AER concluded the approach taken by ETSA Utilities to determine its forecast allowances for feed-in tariffs for the 2010–2015 regulatory control period was reasonable.

3.4.1 Revised proposal and new information

In preparing its revised proposal, ETSA Utilities has reviewed its sales and demand forecasts, together with its forecast of the uptake of photovoltaic systems that allow qualifying customers to feed electricity into the distribution network. As a result of its review, ETSA Utilities has determined that it is necessary to revise its forecast operating expenditure associated with feed-in tariff payments for the 2010–2015 regulatory control period up by $9.8m, to a total of $48.6m over the five years.

The forecasting methodology has involved:

- analysis of the existing PV installations in terms of capacity and annual generation
- independent forecasts of new installations by NIEIR accounting for REC prices, multipliers and costs
- analysis of the average amount of PV generation used in house and the net amount exported to the grid
- application of a tariff of 44c/kWh to the net energy exported to the grid.

The key assumptions applied by ETSA Utilities include the assumption that typical installations are 1.4kW and 55% of the annual energy production of 2.2MWh would offset 25% of in-house consumption, with the remainder exported to the grid.

3.4.2 PB findings and recommendation

PB's review has confirmed that ETSA Utilities has applied a reasonable and transparent forecasting methodology to its revised forecast opex allowance of feed-in tariff payments for residential PV installations, and that it is consistent with its original submission. They key difference in the forecast is due to an update in the anticipated number of PV installations increasing from 25,500 to 34,570 in 2014-15, as advised by NIEIR.

PB agrees with ETSA Utilities that the update will ensure consistency between the sales and demand forecasts set out in the revised proposal and its forecast of the payments that it expects to make for feed-in tariffs; and reduce the likelihood of a pass-through application being made by ETSA Utilities to account for differences between the forecast and actual feed-in tariff payments made in 2010-11.

PB considers the revised opex allowance to be prudent and efficient given the forecasting methodology applied.

Table 3.9 Recommended opex allowance associated with feed-in tariff payments

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
AER draft decision	5.7	6.9	7.8	8.7	9.7	38.8
EU revised proposal	7.0	8.7	10.1	11.1	11.7	48.6
PB adjustment	-	-	-	-	-	-
PB recommendation	7.0	8.7	10.1	11.1	11.7	48.6

Source: PB analysis.

3.5 Network growth escalation

PB is required to review at a high level and provide advice on whether ETSA Utilities' has accurately determined and applied the network growth scale escalation for opex activities in section 7.5.1 of its revised proposal, having regard to ETSA Utilities' methodology to determine its revised network growth escalator.

As part of its draft decision, the AER substituted ETSA Utilities network growth scale escalation parameter developed using financial ratios for a simple average based on bottom-up forecasts of growth in specific types of assets. This resulted in a reduction of $9.8m to ETSA Utilities proposed opex for the 2010-2015 regulatory control period.

3.5.1 Revised proposal and new information

As part of its revised regulatory proposal, ETSA Utilities has proposed that the calculation of the network growth escalator based on the bottom-up forecasts be refined in order to recognise that the growth in the three key asset classes used is not even. It has calculated the weightings of each of the three asset categories (lines, distribution transformers, substation capacity) using the capital value across the classes in its Regulatory Financial Report for the year ended June 2008. This has the effect of increasing the 5-year average growth escalator from 2.72% to 2.79% and reducing the adjustment applied by the AER in its draft decision from $9.8m to $6.3m, or a net increase in its forecast opex allowance of $3.5m.

3.5.2 PB findings and recommendation

PB considers that the weighted growth escalator proposed by ETSA Utilities is a reasonable refinement to the calculation of a bottom-up growth escalator as it accurately recognises the proportion of assets (by capital value) within each of the identified classes, and therefore is a stronger reflection of the proportion of future opex requirements compared with assuming equal weighting across the three asset classes.

PB also considers the approach adopted by ETSA Utilities in determining the weightings in each class is suitable and appropriate, and that on the basis of the detailed and transparent calculations in Attachment G.2 the weighted average growth escalator has been applied correctly (noting that six-year averages have been applied to account for growth in 2009-10 also).

PB considers the resulting net increase of $3.5m proposed by ETSA Utilities in its forecast opex allowance to account for the weighted average of the three indicators is reasonable. Table 3.10 shows PB's recommendation.

Table 3.10 Recommended adjustment to the opex allowance associated with use of a weighted average growth escalator

Expenditure category	2010-11	2011-12	2012-13	2013-14	2014-15	TOTAL
AER draft decision	(0.8)	(1.6)	(2.1)	(2.5)	(2.8)	(9.9)
EU revised proposal	0.7	0.7	0.7	0.7	0.7	3.5
PB adjustment	-	-	-	-	-	-
PB recommendation	0.7	0.7	0.7	0.7	0.7	3.5

Source: PB analysis.

4. Service Target Performance Incentive Scheme

In this section PB reviews the following matters in relation to ETSA Utilities' revised STPIS proposal:

- Reliability of supply – performance targets 4 years vs. 5 years data
- Telephone answering parameter – MED's.

4.1 Reliability of supply – performance targets 4 years vs. 5 years data

PB is required to review ETSA Utilities' proposal to rely upon reliability data from 2009-10 in addition to the data from 2005-06 to 2008-09 and assess whether the additional data is robust and whether it is appropriate to rely upon a partial year's data to set performance targets.

As it changed its method of reporting reliability performance from 1 July 2005, ETSA Utilities originally proposed that targets be based on 4 years of data from 2005-06 to 2008-09. The AER accepted this approach in its draft decision. ETSA Utilities would now prefer to align its STPIS targets with those to be established by ESCOSA. Both ETSA Utilities and ESCOSA have indicated that they would prefer to establish targets based on the average of 5 years of data to 2009-10.

4.1.1 Revised proposal and new information

ETSA Utilities revised proposal indicates its preference for the STPIS targets to be based on the average performance of the 5-year period 2005-06 to 2009-10. As the data for the 2009-10 year would not be available until September 2010, ETSA Utilities proposes that the targets be established in September 2010 and applied retrospectively.

4.1.2 PB findings and recommendation

The setting of targets could be delayed to September 2010 without affecting the implementation of the scheme from 1 June 2010. The targets need only to be known prior to the calculation of the revenue increment or decrement in the following year. This approach would require the AER to accept an alternative methodology for setting the performance targets.

PB notes that where 5-years of data is unavailable, STPIS clause 3.2.1(c) allows that the AER may approve a performance target based on an alternative methodology. In this case, the alternative methodology would be targets based on the future calculation of average performance.

In PB's view, an acceptable alternative methodology would need to be consistent with all aspects of the STPIS. Setting targets based on future performance as proposed by ETSA Utilities appears to be inconsistent with the intent of clauses 3.1(e), 3.2.1(a)(1), 3.2.1(b) and

3.2.1(c). All of these clauses indicate that performance targets must be provided. In PB's view, an alternative methodology that does not provide targets that the AER can include in its distribution determination is inconsistent with the scheme and hence is not appropriate. PB notes that the AER has provided additional clarification in its November 2009 version of the STPIS, stating in a new clause 2.1(d)(4) that the AER will in its distribution determination stipulate the performance target to apply to each applicable parameter in each regulatory year of the regulatory control period.

The AER has asked whether targets could be established using data for a partial 2009-10 year. PB does not recommend this approach because seasonal variation in reliability performance does occur and would require significant modelling (and uncertainty) to transform a partial year result into a meaningful full year equivalent.

Considering the above discussion, PB recommends that the performance targets for the reliability of supply parameters be set at the average of the 4-years performance to 2008-09, as set out in the AER's draft decision.

4.2 Telephone answering parameter – MED's

PB is required to clarify the telephone answering parameter issue in relation to whether Major Event Days (MEDs) should be excluded.

Originally, ETSA Utilities did not exclude MEDs when calculating performance targets using historical information. It subsequently provided targets based on data that excluded MEDs. The AER draft decision is based on this historical performance excluding MEDs.

4.2.1 Revised proposal and new information

In its revised proposal, ETSA Utilities confirms that it had excluded MEDs when calculating performance targets for telephone answering.

4.2.2 PB findings and recommendation

PB has reviewed the calculation spreadsheet[88] and confirms that ETSA Utilities has removed MEDs from the calculation of average performance on which targets are based.

The MED's are the same as those determined for the reliability of supply parameter, which were reviewed by PB in its initial report.

In PB's view, the approach proposed by ETSA Utilities is consistent with STPIS clause 5.4, which allows that where the impact of an event is to be excluded from the calculation of a revenue increment or decrement under the 'reliability of supply' parameter (as provided for in clause 3.3), then the impact of the event may be excluded from the calculation of a revenue increment or decrement for the 'telephone answering' parameter as appropriate.

88 SI121 EU_to_AER_STPIS_Incentive_rate_Jul09_amended_25_09_09.xls.