APPLICATION NOTICE

PROPOSED AUGMENTATION OF BENDIGO TERMINAL STATION

June 2009

Contents

Executive Summary

Background and Purpose

This document ("Application Notice") sets out Powercor's application to augment capacity at Bendigo Terminal Station (BETS). This Application Notice has been prepared in accordance with, and meets the requirements of clause 5.6.6 of the National Electricity Rules (NER). It explains the rationale for the proposed augmentation at BETS with reference to the requirements of the regulatory test.

Given that the proposed augmentation at BETS is a transmission connection investment, the regulatory test and the provisions in clause 5.6.6 of the NER are not strictly applicable to the proposed investment. Nevertheless, this Application Notice is intended to provide a further opportunity for interested parties to comment on the proposed investment, the need for which has been foreshadowed in the Victorian distributors' annual Transmission Connection Planning Report since 2003.

BETS currently consists of three 230/66/22 kV transformers; two are rated 70/57/51 MVA and one rated 125/125/40 MVA. These are the main source of supply for over 77,000 customers in Bendigo and the surrounding area. The station supply area includes Bendigo CBD, Eaglehawk, Charlton, St. Arnaud, Maryborough and Castlemaine. Growth in summer peak demand at BETS has averaged around 7.5% per annum over the last 5 years. The peak load on the station reached 256 MVA (66 kV and 22 kV networks) in January 2009 during a period of very high summer temperatures.

The need for investment at BETS

The sustained increase in summer peak demand at BETS exposes customers to reliability risks. It is these reliability risks that give rise to the need for investment in additional capacity at BETS.

The bar chart in Figure 1 below depicts the energy that would not be supplied ("energy at risk") with one transformer out of service at BETS, for a demand forecast that has a 50% probability of being exceeded (the "50th percentile" demand forecast). It also shows the hours per year that the 50th percentile demand forecast is expected to exceed the N-1 capability rating. The line graph shows the value to customers of the expected (probability-weighted) unserved energy in each year, for the 50th percentile demand forecast.

Figure 1: Annual energy at risk and customer value of expected unserved energy at BETS

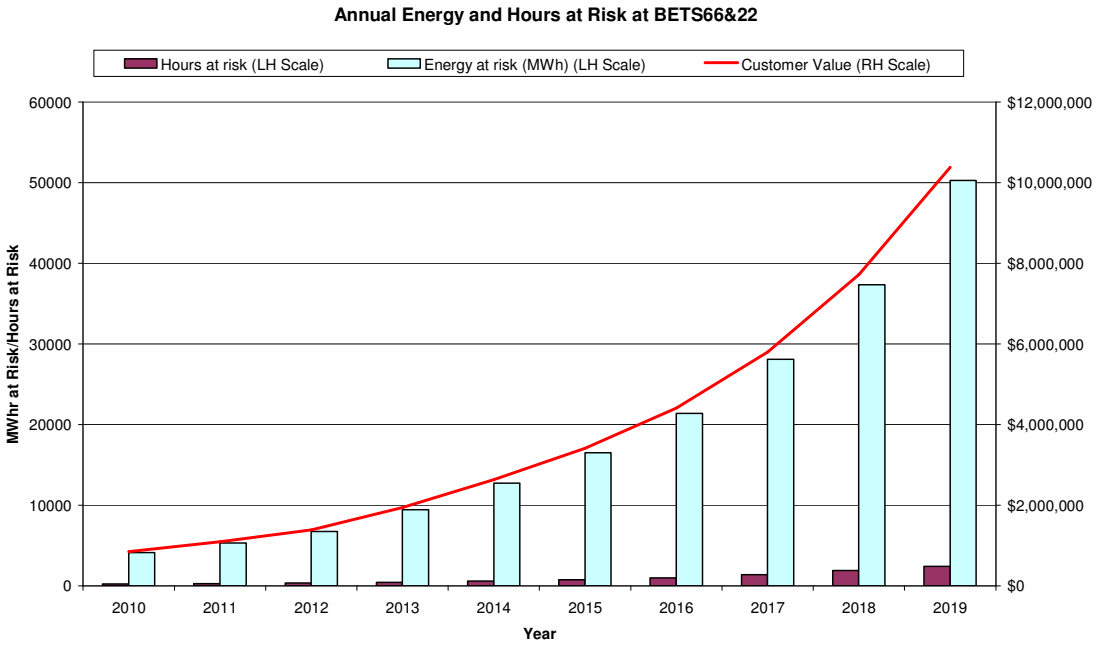


Figure 1 depicts energy at risk if there is a major outage[1] of one of the three transformers at the station. Based on the historical performance of these assets, the risk of a major outage occurring is small (at approximately 1% per annum per transformer) and the expected annual unavailability of each transformer is 0.217%. Given the very low level of expected unavailability of each transformer, the expected value of unserved energy is substantially lower than the energy at risk shown in the bar chart in Figure 1. Nevertheless, using central (median) demand forecasts and weather estimates, the expected value of unserved energy will be approximately $1.4 million per annum by 2012, which is self-evidently a substantial exposure.

In light of the growing demand at BETS and the load at risk, Powercor has identified a number of options to provide additional capacity at BETS.

Options for increasing capacity at BETS

The options to address the reliability issues at BETS are summarised in Table 1 below.

[1] For the purpose of this analysis, a "major outage" is defined as one that has a mean duration of 2.6 months

Table 1: Description of options

Option	Description
Do nothing	Replace the existing single phase transformer groups with three-winding transformers, and replace 22 kV cable during SPI PowerNet's next regulatory period (commencing 1 April 2014).
Option 1	Replace both existing 70 MVA single phase transformer groups with two new 150 MVA 220/66/22 kV transformers.
Option 2	Replace both existing 70 MVA single phase transformer groups with: • two new 150 MVA 220/66 kV transformers; and • two new 60 MVA 66/22 kV transformers (in series with the 220/66 kV units).
Option 3	Leave all existing BETS transformers in service and: • install two new 75 MVA 220/22 kV transformers in parallel with the existing transformers; then • replace the existing single phase transformer groups with a single 150 MVA 220/66 kV transformer during SPI PowerNet's next regulatory period (commencing on 1 April 2014).
Option 4	Installation of an additional 150 MVA 220/66 kV transformer with modification to the 66 kV and 22 kV yards and existing transformer low voltage arrangements.
Option 5	Replace all 220/66/22 kV transformers with: • two new 225 MVA 220/66 kV transformers; and • two new 60 MVA 66/22 kV transformers (in series with the 220/66 kV units).
Option 6	Installation of an additional 150 MVA 220/66 kV transformer and two 66 kV line CB's for new KGF Zone Substation. Powercor to construct 3 x 25/33 MVA 66/22 kV zone substation with eight 22 kV feeders. Retire the existing BETS 22 kV switchyard. Replace the existing single phase transformer groups with a single 150 MVA 220/66 kV transformer in 2017.

SP AusNet has advised that Option 4 is not feasible from an operational perspective. Option 4 is therefore not considered further.

In addition to the above options, Powercor has considered whether demand reduction and embedded generation could provide non-network solutions to the reliability issues at BETS. No proposals from proponents of non-network alternatives have been received, even though Powercor first foreshadowed the need for investment at BETS in the 2003 Transmission Connection Planning Report. Non-network solutions are therefore not considered to be feasible and are not examined further in this Application Notice.

Net market benefits of proposed augmentation

The results of the analysis of the base case (which assumes the commissioning of augmentation works in 2012), and sensitivities to variations in individual variables are set out in Table 2 below. The net market benefit of each option under the base case scenario is shown in the first row of the table, and then results are presented reflecting the base case changed for one variable only (in turn: capital cost, network operating costs, discount rate and demand growth rate). The shaded cell in each row indicates the option that maximises net market benefit for that particular set of assumptions.

Table 2: Summary of results- Sensitivity testing of individual variables
(Net market benefits in present value terms in $ million)

	Do nothing	Option 1	Option 2	Option 3	Option 5	Option 6
Base Case	**0**	**10.96**	**9.55**	**12.03**	**11.10**	**6.24**
Capital cost sensitivity						
Upper Bound (Base + 30%)	0	7.94	6.11	9.35	8.12	1.80
Lower Bound (Base - 30%)	0	13.98	12.99	14.72	14.07	10.67
Operating cost sensitivity						
Upper Bound (Base + 50%)	0	10.41	8.92	11.55	10.56	5.43
Lower Bound (Base - 50%)	0	11.51	10.17	12.52	11.64	7.04
Discount rate sensitivity						
Upper Bound (10% real)	0	7.25	5.77	8.66	7.39	2.57
Lower Bound (6.6% real)	0	14.01	12.68	14.84	14.14	9.34
Demand forecast sensitivity						
Upper bound (10^{th} percentile)	0	63.62	62.21	64.54	63.67	58.90
Lower bound (base annual growth rate reduced by 15%)	0	4.74	3.33	5.81	4.88	0.01

Examination of the sensitivity of net market benefits to changes in individual variables (shown in Table 2 above) is a precursor to full sensitivity testing involving different combinations of assumptions on all key variables. Table 2 shows that Option 3 is consistently the superior option when changes to individual variables are introduced.

Table 3 below sets out a comparison of the present value of net market benefits of each option when different combinations of assumptions are applied under different scenarios. Seven scenarios are presented: the "base case" or most likely scenario, and six other scenarios, which represent plausible combinations of upper and lower bound assumptions on the key variables of capital cost, operating cost, discount rate and demand growth. The shaded cell in each row indicates the option that maximises net market benefit for that particular scenario.

Table 3: Results- Economic evaluation of options under various scenarios (Net present value in $ million)

Scenario	Do nothing	Option 1	Option 2	Option 3	Option 5	Option 6
Base Case	0	10.96	9.55	12.03	11.10	6.24
Scenario A • Upper bound capital cost • Upper bound operating cost • Lower bound discount rate • Central demand growth	0	10.45	8.60	11.61	10.63	3.99
Scenario B • Upper bound capital cost • Upper bound operating cost • Lower bound discount rate • Lower bound demand growth	0	3.52	1.67	4.68	3.71	-2.93
Scenario C • Upper bound capital cost • Upper bound operating cost • Upper bound discount rate • Lower bound demand growth	0	-2.02	-4.03	-0.09	-1.82	-8.38
Scenario D • Lower bound capital cost • Lower bound operating cost • Lower bound discount rate • Central demand growth	0	17.22	16.35	17.75	17.31	14.16
Scenario E • Lower bound capital cost • Lower bound operating cost • Lower bound discount rate • Lower bound demand growth	0	10.29	9.42	10.82	10.38	7.23
Scenario F • Lower bound capital cost • Lower bound operating cost • Upper bound discount rate • Lower bound demand growth	0	5.51	4.52	6.45	5.61	2.39

The results of this analysis demonstrate that:

- Option 3 maximises net market benefit under the base case set of assumptions; and
- Option 3 maximises net market benefits in all sensitivity tests involving the variation of assumptions within plausible limits, apart from scenario C where the 'do nothing' option would be marginally preferred.

The impact on net market benefits of deferring the proposed augmentation was examined. This examination confirmed that:

- deferral of Option 3 beyond the proposed commissioning date of 2012 would reduce net market benefits; and

- commissioning of Option 3 in 2012 will maximise net market benefits.

A qualitative assessment of options against a number of considerations also suggests that Option 3 is the superior option.

Description of the proposed project

The project (Option 3) which is the subject of this Application Notice involves the following works:

- All existing BETS transformers (including the ageing single phase transformer groups) will remain service.

- Two new 75 MVA 220/22 kV transformers will be installed in 2012, in parallel with the existing transformers, to provide additional capacity at the station. There will be modifications made in the 22 kV yard to enable the full cyclic rating of the transformers to be utilised, and two additional feeders will be installed.

- During SPI PowerNet's forthcoming regulatory period (which commences on 1 April 2014) the ageing single phase transformer groups will be replaced with a single 220/66 kV, 150 transformer.

The proposed project utilises the existing infrastructure at BETS efficiently, whilst providing a cost-effective addition to capacity at the station in 2012. The project also integrates efficiently with SPI PowerNet's asset replacement program, under which the ageing 70/57/51 MVA, 230/66/22 kV single phase transformers will be replaced with a modern single 220/66 kV transformer.

The proposed works have no material inter-network impact, so an augmentation technical report (pursuant to clause 5.6.5(c)(5) of the National Electricity Rules) is not required to be included with this Application Notice.

Detailed design and construction of the project is planned to commence in the second half of 2009. The augmentation is expected to be placed into service in late 2012.

1 Background and purpose

This document ("Application Notice") sets out Powercor's application to augment capacity at Bendigo Terminal Station (BETS). This Application Notice has been prepared in accordance with, and meets the requirements of clause 5.6.6 of the NER. It explains the rationale for the proposed investment at BETS with reference to the requirements of the regulatory test.

Under the present Victorian regulatory arrangements governing the planning and development of transmission connection facilities, Powercor is not strictly required to apply the regulatory test to the proposed investment at BETS. In addition, given that the proposed investment at BETS is a transmission connection asset, the regulatory test and the provisions in clause 5.6.6 of the NER are not strictly applicable to the proposed augmentation. Nevertheless, this Application Notice is intended to provide a further opportunity for interested parties to comment on the proposed investment.

In Victoria the five Distribution Businesses ("the DBs") are responsible for planning and directing the augmentation of the transmission facilities that connect their distribution systems to the shared transmission network. Accordingly, clause 3.4 of the Victorian Electricity Distribution Code requires the Victorian DBs to publish an annual Transmission Connection Planning Report setting out, amongst other things:

- details of how the distributors plan to meet the predicted demand for electricity supplied into their distribution networks from transmission connections (terminal stations) over a ten year planning horizon; and

- an assessment of the magnitude, probability and impact of loss of load at each terminal station over that planning horizon.

In the 2003 Transmission Connection Planning Report, Powercor noted the need to address emerging constraints at BETS. That report (and subsequent Transmission Connection Planning Reports) identified the need for installation of additional capacity at BETS as Powercor's preferred network-based solution, and noted that the additional capacity from that augmentation would not be required until around 2011 or 2012. In the 2008 report, Powercor:

- invited proponents of non-network solutions to submit, by no later than 30 March 2009, proposals to alleviate the emerging constraints at BETS;

- provided a period of approximately four months to enable proponents to research and prepare their proposals; and

- provided an indication of the maximum financial contribution from Powercor which may be available to embedded generators and/or customers to reduce forecast demand and defer or avoid the transmission connection component of the proposed BETS augmentation.

The 2008 Transmission Connection Planning Report sought proposed solutions from non-network service providers in practically the same manner as specified in the provisions relating to requests for information on alternative options (set out in clause 5.6.5A(c)(4) of the NER and clauses 24 to 29 of version 3 of the regulatory test). No offers from proponents of non-network alternatives were received. This Application Notice therefore does not consider that there are any feasible non-network solutions that should be examined further.

Accordingly, this paper sets out Powercor's assessment of the network investment options at BETS, prepared in accordance with the principles underpinning the regulatory test. In accordance with the consultation process set out in clause 5.6.6 of the NER, Powercor will consider all submissions made in response to this paper before publishing a final report detailing its plans for addressing the emerging constraint at BETS.

It is widely known in the electricity industry that the regulatory test is a form of cost-benefit analysis for assessing alternative investment options. The current version of the test comprises two limbs:

- the 'reliability limb', which is intended for use in assessing network investments to be undertaken to meet minimum network performance requirements, and which is set out in clause (1)(a) of the test; and
- the 'market benefits limb', for use in assessing other network investments, set out in clause (1)(b).

The investment options at BETS will be assessed in this Application Notice in accordance with the market benefits limb of the regulatory test (clause (1)(b)), which states that an option satisfies the regulatory test if:[2]

> "in all other cases - the option maximises the expected *net economic benefit* to all those who produce, consume and transport electricity in the national electricity market compared to the likely *alternative option/s* in a majority of *reasonable scenarios*. *Net economic benefit* equals the *market benefit* less *costs."*

The italicised terms are defined in the regulatory test.

The proposed investment at BETS is relatively small in scale, and involves transmission connection assets only. Therefore the application of the regulatory test is reasonably straightforward when compared with major augmentations of the shared transmission network.

---

[2] Clause 1 of Version 3 of the regulatory test as published by the Australian Energy Regulator in its *Final Decision: Regulatory Test version 3* and in the accompanying *Application Guidelines*, in November 2007.

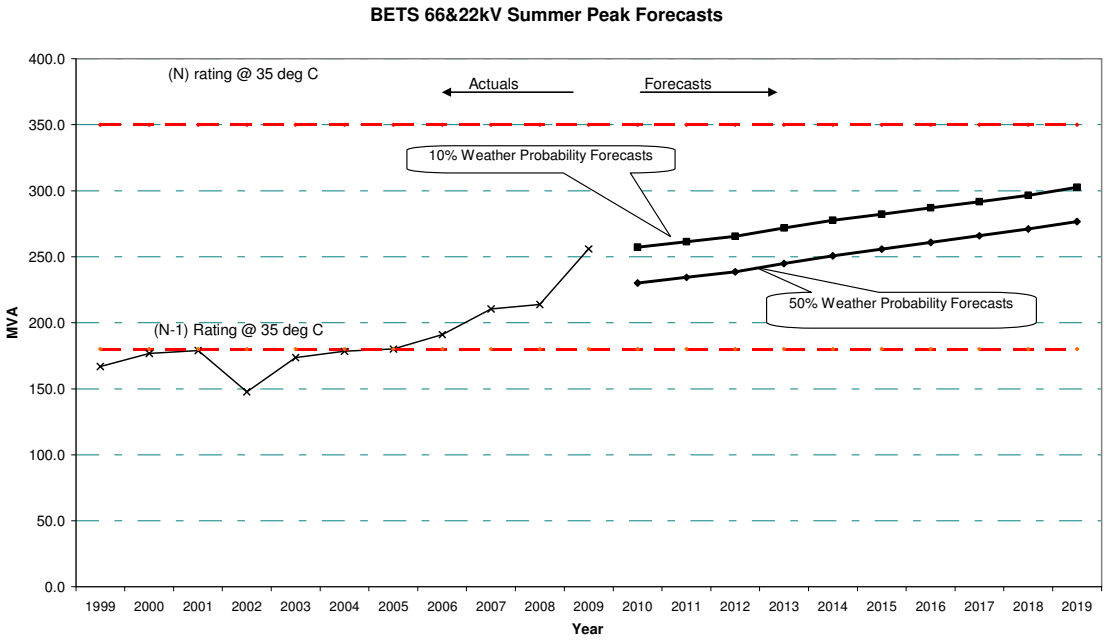
2 Overview of BETS and rationale for the network investment

BETS is a transmission connection asset owned by SPI PowerNet. The station consists of three 230/66/22 kV transformers; two are rated at 70/57/51 MVA and one is rated at 125/125/40 MVA. These transformers are the main source of supply for over 77,000 customers in Bendigo and the surrounding area. The geographic area supplied by BETS includes the Bendigo central business district, Eaglehawk, Charlton, St. Arnaud, Maryborough and Castlemaine.

Growth in summer peak demand at BETS has averaged around 7.5% per annum over the last 5 years. The peak load on the station reached 256 MVA (66 kV and 22 kV networks) in January 2009 during a period of very high summer temperatures.

BETS 66 kV and 22 kV demand is summer peaking. Figure 2 below depicts the 10th and 50th percentile[3] summer maximum demand forecast together with the station's operational "N" rating (all transformers in service) and the "N-1" rating at 35°C ambient temperatures.

Figure 2: BETS summer peak demand forecasts and installed capacity



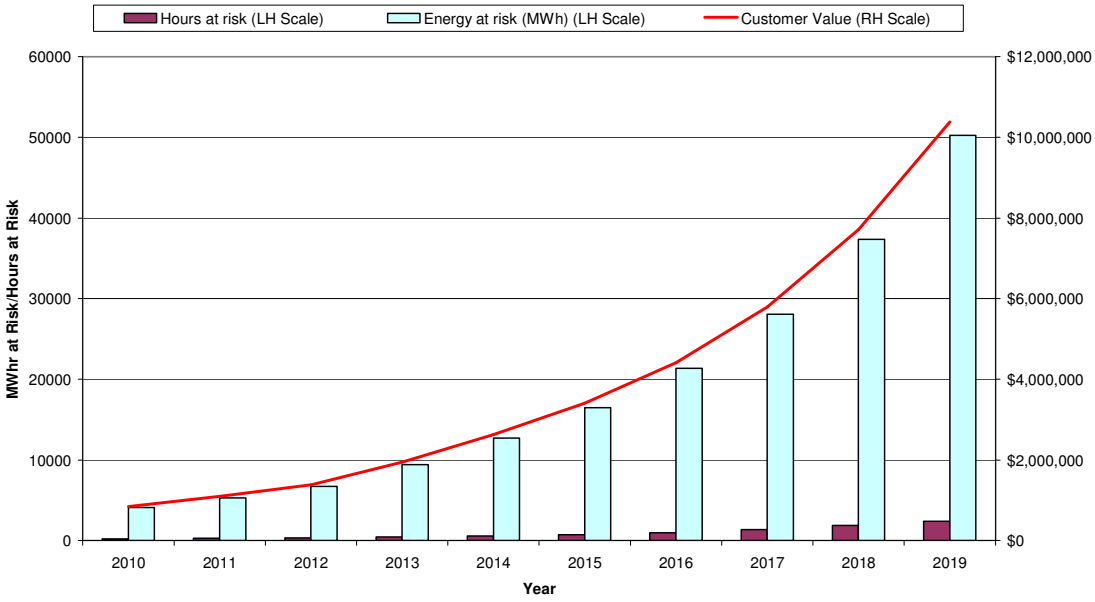
The (N) rating on the chart indicates the maximum load that can be supplied from BETS with all transformers in service.

[3] The 50th percentile forecast represents the demand forecast at a temperature that has a 50% chance of being exceeded in any one year. The 10th percentile forecast represents the demand forecast at a temperature that has a 10% chance of being exceeded in any one year. This represents the estimated maximum demand that would occur under more extreme (that is, one in ten-year) Summer temperatures.

The sustained increase in summer peak demand at BETS exposes customers to supply reliability risk, particularly if a major transformer outage[4] occurs over the summer period. It is this reliability risk that creates the need for investment in additional capacity at BETS.

Figure 3 below depicts the energy at risk[5] with one transformer out of service at BETS for the 50th percentile demand forecast, and the hours per year that the 50th percentile demand forecast is expected to exceed the N-1 capability rating. The line graph shows the value to customers of the expected unserved energy in each year, for the 50th percentile demand forecast.

Figure 3: Annual energy at risk and customer value of expected unserved energy at BETS



For a major outage of one transformer at BETS during the summer period, there will be insufficient capacity at the station to supply all demand at the 50th percentile temperature for about 320 hours in 2012. The energy at risk at the 50th percentile temperature under N-1 conditions is estimated to be approximately 6,700 MWh in 2012.

An estimate of the value that customers ascribe to unserved energy is required in order to assess the potential costs to customers from the energy at risk[6]. In this regard it is noted

---

4 For the purpose of this analysis, it is estimated that on average, 2.6 months is required to repair a transformer and to return it to service following a major failure, during which time, the transformer would not available for service. On this basis, a "major outage" is defined as one that has a mean duration of 2.6 months.

5 "Energy at risk" is, for a given forecast of demand, the total energy that would not be supplied from the terminal station if: a major outage of a transformer occurs at that station in a specified year; the outage has a mean duration of 2.6 months; and no other mitigation action is taken. This statistic provides an indication of the magnitude of loss of energy that would arise in the unlikely event of a major outage of a transformer.

6 It is noted that clause 4(c) of the regulatory test states that: "In determining the market benefit, the analysis may include the present value of … changes in involuntary load shedding using a reasonable forecast of the value of electricity to consumers".

that in September 2008 VENCorp published a consultation paper, titled *The Value of Customer Reliability Used by VENCorp for Electricity Transmission Planning*[7], which stated:

> "The VCR [Value of Customer Reliability] for electricity is a measure of the cost of unserved energy and is used in regulatory test assessments for planned augmentations for the Victorian electricity transmission system. The VCR is determined through a customer survey approach that estimates direct end-user customer costs incurred from power interruptions at the sector and state levels."

In September 2008, VENCorp also published a report prepared by Charles River Associates (CRA) and titled *Assessment of the Value of Customer Reliability*[8]. The CRA report provides an updated estimate of the composite or average value of customer reliability in Victoria for all electricity consumers, being approximately $47,600 per MWh. This estimate of VCR is a weighted average of estimated sector-specific VCRs for residential, commercial, agricultural and industrial customers. For a particular terminal station such as BETS, it is appropriate to apply a specific VCR estimates based on the known composition of customers served by that terminal station. In the case of BETS, the composition of load supplied is similar to that across the State as a whole, so this approach produces a VCR estimate of $47,667/MWh. This value is a reasonable forecast of the value of electricity to consumers, estimated in accordance with the requirements of clause 4(c) of the regulatory test.

Using the estimated VCR at BETS, the estimated value to consumers of the 6,700 MWh of energy at risk in 2012 is approximately $320 million. In other words, at the 50th percentile demand level, and in the absence of any other operational response that might be taken to mitigate the impact of a forced outage, a major outage of one transformer at BETS over the summer period in 2012 would be anticipated to lead to involuntary supply interruptions that would cost consumers $320 million.

It is emphasised however, that the probability of a major outage of one of the three transformers occurring over the year is very low, at about 1% per transformer per annum, whilst the expected unavailability per transformer per annum is 0.217%. When the energy at risk (6,700 MWh) is weighted by this low unavailability, the expected unsupplied energy in 2012 is estimated to be around 29 MWh. This expected unserved energy is estimated to have a value to consumers of around $1.4 million (based on a value of customer reliability of $47,667/MWh).

It should also be noted that the above estimates of energy at risk and expected unserved energy are based on an assumption of moderate summer temperatures occurring in each year, and central estimates of demand growth. Under more extreme summer temperature conditions (that is, at the 10th percentile level), the energy at risk in 2012 is estimated to be approximately 27,000 MWh. The estimated value to consumers of this energy at risk in 2012 is approximately $1,280 million. The corresponding value of the expected unserved energy (of 118 MWh) is around $5.6 million.

These key statistics for the year 2012 under N-1 outage conditions are summarised in Table 4 below.

---

[7] A copy of the consultation paper is available from VENCorp's website at: http://www.vencorp.com.au/index.php?action=filemanager&folder_id=1047&pageID=7742&sectionID=7720

[8] A copy of the CRA report is available from VENCorp's website at the address shown immediately above.

Table 4: Energy at risk and expected unserved energy under N-1 conditions at BETS in 2012

	MWh	Valued at consumer interruption cost
Energy at risk, at 50th percentile demand forecast	6,700	$320 million
Expected unserved energy at 50th percentile demand	29	$1.4 million
Energy at risk, at 10th percentile demand forecast	27,000	$1,280 million
Expected unserved energy at 10th percentile demand	118	$5.6 million

Appendix 1 provides more detailed data on the station rating, demand forecasts, energy at risk and expected unserved energy at BETS for each year to 2019.

If one of the transformers at BETS is taken off line during peak loading times and the N-1 station rating is exceeded, the "OSSCA"[9] automatic load shedding scheme which is operated by SPI PowerNet's Transmission Operation Centre will automatically reduce load in blocks to within safe loading limits.

In light of the growing demand at BETS and the existing load at risk, Powercor has examined a number of different options to increase capacity at the station. These options are outlined in the next section.

[9] Overload Shedding Scheme of Connection Asset.

3 Investment Options

The market benefits limb of the regulatory test requires the assessment of a proposed investment option relative to a number of alternative options, where the term "alternative option" is defined as:[10]

(a) a genuine alternative to the option being assessed, in that it:

(i) delivers similar outcomes to those delivered by the option being assessed; and

(ii) would become operational in a similar timeframe to the option being assessed;

(b) a practicable alternative to the option being assessed in that it is technically feasible.

In determining whether an alternative option is likely, a network service provider must consider a range of matters, including whether the alternative option has a genuine proponent and whether it is commercially feasible.[11] However, the absence of a proponent will not in itself exclude a project from being a likely alternative option for the purpose of the regulatory test.[12]

Clause 11 of the regulatory test requires consideration of whether any option provides prescribed network services as well as other services, and where this is the case, the costs and benefits associated with the other services should be disregarded, and the allocation of costs between prescribed and other services must be consistent with the cost allocation principles in clause 6A.19.2 of the NER, or the relevant jurisdictional guideline, as applicable. For the purpose of clause 11, it is noted that the transmission investment options described below provide only prescribed transmission services.

In view of these requirements, Table 5 below outlines the alternative options for addressing the reliability issues at BETS.

In relation to the options, it is noted that:

- In defining the "do nothing" option, an appropriate allowance has been made for the costs of replacing the ageing single phase transformers (and associated assets) in order to maintain the existing capability of the assets presently in service.

- The costs of replacing the functional capability of the aging single phase transformers are also provided for in the definitions of Options 1 to 6.

- Under each of the augmentation options (except Option 6), the planned distribution augmentation path will be the same. The definition of Option 6 takes into account the incremental cost of additional distribution works necessitated by that particular option.

- The options do not provide equivalent levels of capacity. It is expected that Option 3 will deliver a slightly lower level of effective operational capacity than Option 5, and both Options 3 and 5 will deliver less capacity than Options 1, 2 and 6. These differences are

---

[10] Clause 16 of the Regulatory Test.

[11] Clause (17)(b) and (17)(c) of the Regulatory Test. The extent to which an alternative option is commercially feasible is to be demonstrated by determining whether an objective operator, acting rationally according to the economic criteria prescribed by this test, would be prepared to construct or provide the alternative option.

[12] Clause (17)(b) of the Regulatory Test.

accounted for in the estimates of expected unserved energy costs for each option. Further details are set out in section 5.1.

- As already noted, Powercor is not currently aware of any proponents of embedded generation or demand side management that would be capable of providing services to alleviate the reliability issues at BETS. Details of the emerging constraint at BETS have been published in the Transmission Connection Planning Report since 2003, and no proposals for non-network solutions have been forthcoming in response. As a consequence, non-network solutions such as embedded generation or demand side management are not considered to be viable alternative options, and are not considered further.

- SP AusNet has advised that one of the options devised by Powercor (shown as Option 4 in the table below) is not feasible from an operational perspective. Option 4 is therefore also not considered further.

Table 5: Options for increasing capacity at BETS

	Description	Approximate Effective N-1 capacity (MVA)	Indicative capital cost (and timing)	Date & source of cost estimate
Do nothing	Replace the existing single phase transformer groups with three-winding transformers, and replace 22 kV cable during SPI PowerNet's next regulatory period (commencing 1 April 2014).	125	$12.5 M ± 30% (in 2017)	Powercor estimate based on SP AusNet's Nov 2008 price for similar work at GTS.
Option 1	Replace both existing 70 MVA single phase transformer groups with: • two new 150 MVA 220/66/22 kV transformers.	275	$29.1 M ± 30% (in 2012)	SP AusNet planning estimate, December 2008
Option 2	Replace both existing 70 MVA single phase transformer groups with: • two new 150 MVA 220/66 kV transformers; and • two new 60 MVA 66/22 kV transformers (in series with the 220/66 kV units).	275	$32.0 M ± 30% (in 2012)	SP AusNet planning estimate, December 2008
Option 3	Leave all existing BETS transformers in service and: • install two new 75 MVA 220/22 kV transformers in parallel with the existing transformers; then • replace the existing single phase transformer groups with a single 150 MVA 220/66 kV transformer during SPI PowerNet's next regulatory period (commencing on 1 April 2014).	225	$20.1 M ± 30% (in 2012); then $10.0 M ± 30% in 2017	SP AusNet planning estimate, December 2008
Option 4	Installation of an additional 150 MVA 220/66 kV transformer with modification to the 66 kV and 22 kV yards and existing transformer low voltage arrangements.	n/a	Not costed	SP AusNet has advised that this option is not feasible from an operational perspective
Option 5	Replace all 220/66/22 kV transformers with: • two new 225 MVA 220/66 kV transformers; and • two new 60 MVA 66/22 kV transformers (in series with the 220/66 kV units).	225	$28.8 M ± 30% (in 2012)	SP AusNet planning estimate, December 2008
Option 6	Installation of an additional 150 MVA 220/66 kV transformer and two 66 kV line CB's for new KGF Zone Substation. Powercor to construct 3 x 25/33 MVA 66/22 kV zone substation with eight 22 kV feeders. Retire the existing BETS 22 kV switchyard. Replace the existing single phase transformer groups with a single 150 MVA 220/66 kV transformer in 2017.	275	$17.1 M ± 30% plus $15.0 M ± 30% for KGF ZSS (in 2012); then $10.0 M ± 30% in 2017	December 2008, SP AusNet planning estimate, plus Powercor estimate (for costs of zone substation works).

4 Range of Reasonable Scenarios

Under the market benefits limb of the regulatory test, an investment option will satisfy the test if it maximises the net present value of the market benefit, compared with a number of alternative options in a majority of reasonable scenarios. For the purpose of the test, reasonable scenarios are defined as scenarios incorporating reasonable and mutually consistent:[13]

(a) forecasts of:

  (i) electricity demand (modified where appropriate to take into account demand-side options, economic growth, weather patterns and price elasticity);

  (ii) the efficient operating costs of supplying energy to meet forecast demand from existing, *committed, anticipated* and *modelled proje*cts including demand side and generation projects;

  (iii) the avoidable costs of *committed, anticipated* and *modelled projects* including demand side and generation projects and whether all avoidable costs are completely or partially avoided or deferred;

  (iv) the cost of providing sufficient ancillary services to meet the forecast demand to support the relevant option or *alternative option*; and

  (v) the capital and operating costs of other regulated network and market network service projects that are augmentations consistent with the forecast demand and generation scenarios;

(b) *market development scenarios*, which must include, for each relevant option or *alternative option* :

  (i) all *committed projects*;

  (ii) *anticipated projects*, to the extent they are likely to be commissioned within the modelling period;

  (iii) *modelled projects*; and

  (iv) any other technically feasible projects identified during the consultation process; and

(c) sensitivity testing.

The rationale for assessing the costs of alternative options across a number of reasonable scenarios is to test the robustness of the results. Where the analysis relies on forecasts or uncertain assumptions, the outcome should be tested against plausible variations in these forecasts or assumptions.

Given that the regulatory test considers only direct costs and benefits, market development scenarios are relevant only to the extent that they affect the nature, timing and level of such costs and benefits. In light of this consideration, this Application Notice considers a range of scenarios for particular variables where they have the potential to affect the ranking of the options.

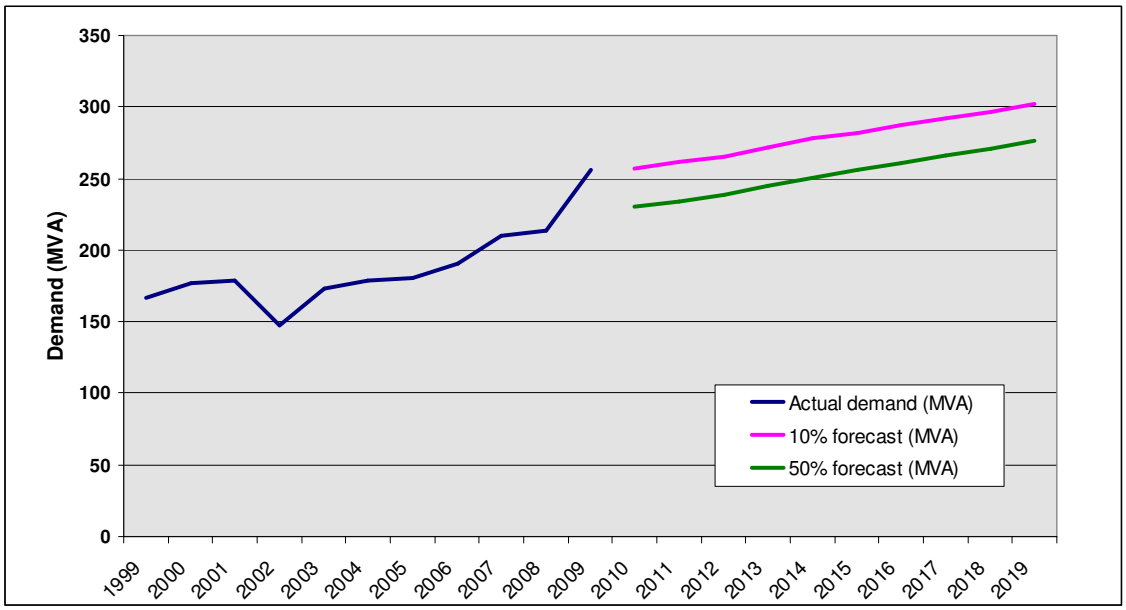
[13] See Clause 19 of the Regulatory Test. Italicised terms are defined in the regulatory test.

4.1 Demand forecasts

Under Clause 19(a)(i) of the regulatory test, the analysis must consider reasonable forecasts of electricity demand (modified where appropriate to take into account demand-side options, variations in economic growth, variations in weather patterns and price elasticity).

Forecasts of the 50th and 10th percentile summer maximum demand for BETS are presented in Figure 4 below, based on Powercor's central estimate of annual demand growth.

Figure 4: 10th & 50th percentile Summer maximum demand forecasts- BETS



4.2 Capital and operating costs of options

Under clause 19(a) of the regulatory test, reasonable forecasts of costs of each option under each scenario must be included in the analysis. Capital and operating cost assumptions for each of the options considered in this analysis are summarised in

Table 6 below.

Table 6: Capital and operating cost assumptions

Option	Capital cost (and basis of estimate)	Operating cost (and basis of estimate)
Do nothing	$12.5 M ± 30% in 2017. (Powercor estimate based on SP AusNet's Nov 2008 price for similar work at GTS.)	Unserved energy valued at $47,667 per MWh in accordance with the findings of the CRA report on VCR published by VENCorp[14]. 1% per annum in real terms of the capital cost (Powercor estimate)
Option 1	$29.1 M ± 30% in 2012. (SP AusNet planning estimate, December 2008.)	As above
Option 2	$32.0 M ± 30% in 2012. (SP AusNet planning estimate, December 2008.)	As above
Option 3	$20.1 M ± 30% in 2012 then $10.0 M ± 30% in 2017. (SP AusNet planning estimate, December 2008.)	As above
Option 4	Not costed. SP AusNet has advised that this option is not feasible from an operational perspective.	N/A
Option 5	$28.8 M ± 30% in 2012. (SP AusNet planning estimate, December 2008.)	As above
Option 6	$17.1 M ± 30% plus $15.0 M ± 30% for KGF zone substation in 2012 then $10.0 M ± 30% in 2017. (December 2008 SP AusNet planning estimate for transmission works. Powercor estimate for costs of zone substation works)	As above

4.3 Market development scenarios

Under clause 19(b) of the regulatory test, reasonable market development scenarios must be considered.

In the case of this particular analysis, different assumptions regarding generation and other transmission developments are not expected to have any impact on the assessment of the alternative options to address the emerging constraint at BETS.

[14] Charles River Associates, *Assessment of the Value of Customer Reliability*, August 2008. A copy of the report is available from VENCorp's website at: http://www.vencorp.com.au/

4.4 Sensitivity Testing

In relation to sensitivity testing, clause 23 of the regulatory test states:

> *Reasonable scenarios* under this test must encompass sensitivity testing on key input variables. Sensitivity testing may be carried out on the following, and should be appropriate to the size and type of project:
>
> (a) testing reasonable forecasts of the value of electricity to consumers.
>
> (b) price elasticity of demand.
>
> (c) capital and operating costs of *alternative options*.
>
> (d) discount rate (the lower boundary should be the regulated cost of capital).
>
> (e) market demand.
>
> (f) generation bidding behaviour using:
>
> (i) short run marginal cost; and
>
> (ii) approximates of realistic bidding.
>
> (g) commissioning dates of:
>
> (i) the option being assessed;
>
> (ii) *alternative options*;
>
> (iii) *committed projects*; and
>
> (iv) *anticipated projects*
>
> (h) inclusion or exclusion of particular *anticipated projects* based on their degree of likelihood of being commissioned within the modelling period;
>
> (i) *modelled projects* based on a market-driven market development modelling approach
>
> (j) market based regulatory instruments that may be used to address greenhouse and environmental issues and
>
> (k) other sensitivity testing determined to be relevant and material to the case concerned.

For the purpose of this analysis, it is appropriate to apply sensitivity testing to the following variables:

- demand forecasts;
- capital costs;
- operating costs; and
- discount rate.

Sections 4.4.1 to 4.4.4 below provide details of the sensitivity testing undertaken in respect of these key variables.

4.4.1 Demand forecasts

For the purpose of sensitivity testing, the 10th percentile demand forecast was adopted as the upper estimate of future demand, while a lower bound forecast was derived by reducing the annual growth rate in the central demand forecast by 15%.

To manage the number of scenarios presented in this Application Notice, the analysis focused on scenarios involving the central and lower bound demand forecasts. This is because the results of sensitivity testing of individual assumptions (set out in section 5.2 below) confirmed that the adoption of a high demand forecast does not affect the relative ranking of the options (and has the effect of increasing the net benefit for each network option).

4.4.2 Capital costs

As noted in section 4.2 above, SPI PowerNet has provided budget estimates for the transmission connection augmentation works associated with each option. Those budget estimates are subject to a range of ±30%. Powercor has developed budget estimates for the capital costs of transmission connection replacement works and any distribution works associated with particular options. These estimates are also subject to a range of ±30%.

Accordingly, for the purpose of sensitivity testing, a range of ±30% around the budget estimate is assumed to define the upper and lower bounds of the capital costs of all options Option 3.

4.4.3 Operating costs

For the purpose of this analysis it has been assumed that the operating and maintenance costs associated with all network investments will be 1 per cent per annum (in real terms) of the capital cost. This is a generic estimate, so sensitivity analysis has been undertaken with operating costs at ±50 per cent of this estimate.

4.4.4 Discount Rate

To compare cash flows of options with different time profiles, it is necessary to use a discount rate to express future cash payments and receipts in present value terms. The choice of discount rate will impact on the estimated present value of costs and may affect the ranking of alternative options.

Clause 13 of the regulatory test states:

> The present value calculations must use a commercial discount rate appropriate for the analysis of a private enterprise investment in the electricity sector. The discount rate used should be consistent with the cash flows being discounted.

A real pre-tax discount rate of 8 per cent has been applied for the purpose of this analysis. This is consistent with the discount rate applied by VENCorp in three recent assessments of new transmission investments.[15]

The regulatory test requires that sensitivity analysis using alternative discount rates be carried out, and that the lower boundary should be the regulated cost of capital.[16] The

---

[15] VENCorp, *New Large Transmission Network Asset: Additional 500/220 kV Transformation to Support West Metropolitan Melbourne and Geelong Area Load Growth*, September 2005, p27; VENCorp, *New Large Network Asset: Additional 500/220 kV Transformation to Support Melbourne Metropolitan Load Growth*, July 2005, p48; and VENCorp, *Consultation Notice Small Network Augmentation Rowville to Richmond Transfer Capacity Upgrade*, March 2005, p13.

[16] Clause 23(c) of the regulatory test.

Essential Services Commission's estimate of the real pre-tax regulatory weighted average cost of capital in the pricing determination in force at present is 6.6 per cent.[17]

Accordingly, for the purpose of sensitivity testing, real discount rates of 6.6 per cent and 10 per cent are applied.

4.4.5 Alternative timing of options

All capital projects face some risk of delay, with larger or more complex projects typically being subject to a greater risk of extensive delays. The ranking of options may be affected if there is a greater risk of delay in the delivery of one project compared to the other. In light of this consideration, sensitivity analysis may examine the impact on net market benefits of options where some options are subject to materially greater risks of delay or protracted delays than other options.

In the case of BETS options, all options are of a similar scale and complexity so it is unlikely that there would be any material differences between options in terms of the risk of delay. For the purposes of the analysis presented in this Application Notice, therefore, it is assumed that all options involve an equal risk of delay. On this basis, no specific sensitivity analysis has been undertaken in relation to the impact of project delays on the net market benefits of the options.

A further issue arises in relation to the optimal timing of the project that is identified as maximising the net present value under the majority of scenarios examined. In particular, it is reasonable to assess whether the proposed timing is optimal or, alternatively, whether further net benefits could be obtained by deferring the proposed investment.

Under the base case assumptions adopted in this evaluation, the augmentation of capacity at BETS is assumed to be commissioned in 2012. This timing represents the earliest practicable service date for the types of augmentations envisaged under the various options. This question of the impact on net market benefits of deferring the augmentation is addressed in section 5.2 below.

4.5 Summary of Reasonable Scenarios

In light of the approach to sensitivity testing explained in section 4.4, Table 7 below lists the variables and ranges of values for those variables adopted for the purpose of defining scenarios.

[17] This is the "Officer" real pre-tax WACC derived using the WACC parameter values contained in the ESC October 2005 Final Decision in the Electricity Distribution Price Review for 2006-10.

Table 7: Variables and ranges adopted for the purpose of defining scenarios

Variable for sensitivity testing	Lower Bound	Base Case	Upper Bound
Capital cost	Budget estimates minus 30%	SPI PowerNet and Powercor budget estimates, as appropriate	Budget estimates plus 30%
Network operating costs	0.5% per annum of capital cost	1% per annum in real terms of capita cost (Powercor estimate)	1.5% per annum of capital cost
Discount Rate (real pre-tax)	6.6%	8%	10%
Annual growth rate of forecast demand	15% reduction from base	Powercor Estimate	Tenth percentile demand forecast

Clause 19 of the regulatory test requires the application of reasonable scenarios incorporating reasonable and mutually consistent forecasts of demand, costs and market development paths. In light of this requirement, the analysis presented in section 5:

- assesses the sensitivity of the base case net market benefit of the proposed option to upper and lower bound variations in each individual variable (as shown in Table 7 above); and also

- evaluates the net market benefit of the proposed option under six scenarios that represent plausible combinations of assumptions. These scenarios are described in Table 8 below.

Table 8: Scenarios considered in the economic evaluation

	Capital cost	Operating cost	Discount rate	Demand growth
Scenario A	Upper bound	Upper bound	Lower bound	Central estimate
Scenario B	Upper bound	Upper bound	Lower bound	Lower bound
Scenario C	Upper bound	Upper bound	Upper bound	Lower bound
Scenario D	Lower bound	Lower bound	Lower bound	Central estimate
Scenario E	Lower bound	Lower bound	Lower bound	Lower bound
Scenario F	Lower bound	Lower bound	Upper bound	Lower bound

5 Methodology and results of analysis

5.1 Methodology and approach

In order to evaluate the net market benefits of each option, Powercor has constructed a discounted cash flow model that takes account of the following considerations:

- Tenth and fiftieth percentile demand forecasts and associated estimates of expected unserved energy are available for the period out to 2019, which is Powercor's planning horizon for transmission connection facilities[18].

- By 2019, the effective annual cost of expected unserved energy under the "do nothing" option is extremely high and growing on an annual basis. This observation indicates that any network option which delivers net market benefits prior to 2019 would continue to deliver net market benefits beyond 2019.

- Some options involve capital expenditure in 2017. In addition, all options involve capital expenditure that will provide services (benefits) over a period that extends well beyond 2019.

- As noted in section 3 above, Option 3 is expected to deliver a slightly lower level of effective operational capacity than Option 5, and both Options 3 and 5 will deliver less capacity than Options 1, 2 and 6.

In view of these considerations, the asset-related costs of all options have been assessed over a 50 year horizon. Under this approach, the costs attributable to the network augmentation options are included in the discounted cash flow analysis as a real annuity (or an 'equivalent annual cost'). The annuity of the network capital cost is calculated by amortising the capital cost at the discount rate over an assumed asset life of 50 years[19]. The annual operating costs for the network assets are then added to the equivalent annual capital cost to derive an estimate of the total effective annual cost for each option for each year. The net market benefit of each option is then calculated over a 10 year horizon (from 2009 to 2019). Under this approach:

- The capital-related costs of the network options are apportioned uniformly across all years of the relevant asset's life, and the evaluation of net market benefits therefore need not be extended to include the whole of each asset's 50 year life.

- The total present value cost (and net market benefit) of each option over a 10-year horizon can be calculated in a manner that takes into account the fact that under all options, the transmission assets will have substantial service potential remaining at the end of that 10-year horizon in 2019.

- As noted above, Option 3 is expected to deliver a slightly lower level of effective operational capacity than Option 5, and both Options 3 and 5 will deliver less capacity than Options 1, 2 and 6. These differences are expected to result in some additional exposure to unserved energy risk under Options 3 and 5 over the period from 2019 to 2027 (when the capacity under those two options begins to become constrained due to

---

[18] A 10 year horizon is consistent with the planning horizon for transmission networks required under Clause 5.6.2(d) of the National Electricity Rules.

[19] This represents a best estimated of the service life of new transformers.

load growth). Consequently, Powercor prepared supplementary demand forecasts to evaluate the additional costs of expected unserved energy over the period from 2019 to 2027 under Options 3 and 5 (relative to the other options)[20]. The additional expected costs have been reflected in the calculation of net market benefits for Options 3 and 5. In this way, the evaluation takes account of the differing levels of capacity provided by the options.

The approach adopted in this Application Notice provides a robust means of ensuring that the costs and net market benefits of all options will be compared on a like-for-like basis. Accordingly, this approach provides a valid investment decision signal.

5.2 Results of the analysis

The results of the analysis of the base case (which assumes the commissioning of augmentation works in 2012), and sensitivities to variations in individual variables are set out in Table 9 below. The net market benefit of each option under the base case scenario is shown in the first row of the table, and then results are presented reflecting the base case changed for one variable only (in turn: capital cost, network operating costs, discount rate and demand growth rate). The shaded cell in each row indicates the option that maximises net market benefit for that particular set of assumptions.

[20] For the purpose of this analysis, it has been assumed that under all options the total energy at risk is likely to trigger a requirement for some further augmentation around 2027.

Table 9: Summary of results- Sensitivity testing of individual variables (Net market benefits in present value terms in $ million)

	Do nothing	Option 1	Option 2	Option 3	Option 5	Option 6
Base Case	**0**	**10.96**	**9.55**	**12.03**	**11.10**	**6.24**
Capital cost sensitivity						
Upper Bound (Base + 30%)	0	7.94	6.11	9.35	8.12	1.80
Lower Bound (Base - 30%)	0	13.98	12.99	14.72	14.07	10.67
Operating cost sensitivity						
Upper Bound (Base + 50%)	0	10.41	8.92	11.55	10.56	5.43
Lower Bound (Base - 50%)	0	11.51	10.17	12.52	11.64	7.04
Discount rate sensitivity						
Upper Bound (10% real)	0	7.25	5.77	8.66	7.39	2.57
Lower Bound (6.6% real)	0	14.01	12.68	14.84	14.14	9.34
Demand forecast sensitivity						
Upper bound (10^{th} percentile)	0	63.62	62.21	64.54	63.67	58.90
Lower bound (base annual growth rate reduced by 15%)	0	4.74	3.33	5.81	4.88	0.01

Examination of the sensitivity of net market benefits to changes in individual variables (shown in Table 9 above) is a precursor to full sensitivity testing involving different combinations of assumptions on all key variables. Table 9 shows that Option 3 is consistently the superior option when changes to individual variables are introduced. Copies of the output of the model used to calculate the results shown above are provided in Appendix 2.

Table 10 below sets out a comparison of the present value of net market benefits of each option when different combinations of assumptions are applied under the different scenarios listed in Table 8. The shaded cell in each row indicates the option that maximises net market benefit for that particular scenario.

Table 10: Results- Economic evaluation of options under various scenarios (Net present value in $ million)

Scenario	Do nothing	Option 1	Option 2	Option 3	Option 5	Option 6
Base Case	0	10.96	9.55	12.03	11.10	6.24
Scenario A • Upper bound capital cost • Upper bound operating cost • Lower bound discount rate • Central demand growth	0	10.45	8.60	11.61	10.63	3.99
Scenario B • Upper bound capital cost • Upper bound operating cost • Lower bound discount rate • Lower bound demand growth	0	3.52	1.67	4.68	3.71	-2.93
Scenario C • Upper bound capital cost • Upper bound operating cost • Upper bound discount rate • Lower bound demand growth	0	-2.02	-4.03	-0.09	-1.82	-8.38
Scenario D • Lower bound capital cost • Lower bound operating cost • Lower bound discount rate • Central demand growth	0	17.22	16.35	17.75	17.31	14.16
Scenario E • Lower bound capital cost • Lower bound operating cost • Lower bound discount rate • Lower bound demand growth	0	10.29	9.42	10.82	10.38	7.23
Scenario F • Lower bound capital cost • Lower bound operating cost • Upper bound discount rate • Lower bound demand growth	0	5.51	4.52	6.45	5.61	2.39

Copies of the output of the model used to calculate the results shown above are provided in Appendix 3.

The results set out in Table 9 and Table 10 show that:

- Option 3 maximises net market benefit under the base case set of assumptions; and

- Option 3 maximises net market benefits in all sensitivity tests involving the variation of assumptions within plausible limits, with the exception of scenario C in which the "do nothing" option is marginally preferred.

It is noted that clause 23(g) of the regulatory test states that sensitivity testing should be carried out in relation to the commissioning dates of the proposed options and alternative options, while clause 4(d)(iv) states:

> In determining the *market benefit*, the analysis may include the present value of benefits [including] changes in costs caused through differences in the timing of transmission investments.

Accordingly, as noted in section 4.4.5 above, this analysis has examined the economics of deferring the proposed augmentation of capacity at BETS. It is evident that under base case assumptions, deferring the proposed project would lead to a reduction in the net benefit of the preferred option (Option 3) because:

- deferring the augmentation for one year (from 2012 to 2013) would lead to savings of approximately $2.3 million[21]; however

- the cost of deferring the project (in terms of expected unserved energy at the 50th percentile estimate of demand, plus the annuity of the replacement capital expenditure under the "do nothing" option) is approximately $2.6 million in 2013[22].

This simple analysis suggests that the commissioning of Option 3 in 2012 will maximise net market benefits. This hypothesis was tested by evaluating the net market benefits of all options under four alternative commissioning dates, being 2011 to 2014 inclusive. The results of this analysis are shown in Table 11 below.

Table 11: Summary of results- Impact of deferral of augmentation (Net market benefits in present value terms in $ million)

	Do nothing	Option 1	Option 2	Option 3	Option 5	Option 6
Augmentation in **2011**	0	10.40	8.87	11.83	10.55	5.56
Augmentation in **2012**	0	10.96	9.55	12.03	11.10	6.24
Augmentation in **2013**	0	11.25	9.95	11.99	11.38	6.64
Augmentation in **2014**	0	11.27	10.06	11.70	11.38	6.76

[21] This is the sum of: the annuity (for one year) of the total capital cost of the proposed option (calculated over 50 years at a discount rate of 8% real) and the annual operating and maintenance costs (of 1% per annum in real terms of the initial capital cost). See the base case model outputs (on page 2, under the heading "Simple annuity analysis excluding unserved energy costs for augmentation options") in Appendix 2 for further details.

[22] See the base case model outputs in Appendix 2 for further details.

The results shown in Table 11 confirm that under base case assumptions:

- Option 3 has the highest net market benefit of all options, for any commissioning date in the period from 2011 to 2014 inclusive; and

- commissioning Option 3 in 2012 will maximise net market benefits.

As noted in section 4.4.1, the scenario analysis presented in this Application Notice only considered two demand forecasts – a central case and a lower bound case in which the annual growth in demand is 15% lower than the central case. Whilst a higher forecast was not adopted in the scenario analysis presented in this paper it is noted that:

- sensitivity testing of individual assumptions demonstrated that Option 3 maximises net market benefits under a high (10^{th} percentile) demand forecast;

- adoption of higher demand forecasts would increase the net market benefits of all augmentation options, but it would not affect the relative ranking of the options, as the capital and operating costs of each augmentation option are not materially affected by a change in the demand forecast.

5.3 Qualitative analysis of relevant considerations

In addition to undertaking an economic evaluation of net market benefits, Powercor has also undertaken a qualitative examination of the options, with reference to a number of relevant considerations. Table 12 below provides a summary of the qualitative analysis.

Table 12: Summary of qualitative assessment of options

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Is adequate N-1 capacity provided?	Yes	Yes	Yes	No increase in 22 kV capacity	Yes	Yes
Is voltage control of both 66 kV and 22 kV provided?	22 kV voltage control only	Yes	Yes	Complex voltage control scheme	Yes	Yes
Are fault level considerations adequately addressed?	Yes	Yes	Yes	Fault level reduction switching required	Yes	Yes
Are reliability considerations adequately addressed?	Yes	Yes	Yes	Normally open CBs resulting in reduced reliability	Yes	Yes
Negative implications for future development of the station	None	Restricts the number of future 66 kV lines due to use of two 66 kV line CB to supply 66/22 kV transformers	None	There will issues due to space restrictions when 2A 2B transformer group is replaced	None	Restricts the number of future 66 kV lines due to use of two 66 kV line CB to supply 66/22 kV transformers
Operational feasibility	Load is not shared equally between the transformer supplying the 66 kV bus only and the other two transformers	No operational issues	No operational issues	Significant operational issues render this option infeasible	No operational issues	No operational issues
Implications of this option for augmentation requirements and losses in the distribution network	Circulating currents between the transformers due to unequal load sharing	Nil	Nil	No clear future development plan for replacement of the 2A 2B transformer group	Nil	Nil
Any other relevant considerations	Non-standard transformers are installed so there is no spare in event of a transformer failure	Nil	Nil	Non-standard transformers are installed so there is no spare in event of a transformer failure	Nil	Nil

The qualitative assessment confirms that all options, with the exception of Option 4 would provide workable solutions to the need to provide additional capacity at BETS.

6 Conclusion

During 2012, Powercor proposes to install two new 75 MVA 220/22 kV transformers at BETS in parallel with the existing transformers, followed by replacement of the existing single phase transformer groups with a single 150 MVA 220/66 kV transformer during SPI PowerNet's next regulatory period. This network project is described in this Application Notice as Option 3.

The results of the analysis presented in this Application Notice demonstrate that Option 3 is the preferred project because it is maximises net market benefits under a range of reasonable scenarios.

The impact on net market benefits of deferring the proposed augmentation was examined. This examination confirmed that:

- deferral of Option 3 beyond the proposed commissioning date of 2012 would reduce net market benefits; and

- commissioning of Option 3 in 2012 will maximise net market benefits.

The proposed works have no material inter-network impact, so an augmentation technical report (pursuant to clause 5.6.5(c)(5) of the National Electricity Rules) is not required to be included with this Application Notice.

Detailed design and construction of the project is planned to commence in the second half of 2009. The augmentation in expected to be placed into service in late 2012.

Appendix 1: Station rating data and expected unserved energy calculations

Bendigo Terminal Station
Detailed data: Magnitude and probability of loss of load

Distribution Businesses supplied by this station: Powercor (100%)

	MW	MVA	
Normal cyclic rating with all plant in service		350	via 2 transformers (Summer peaking)
Summer N-1 Station Rating:	155	180	[See Note 1 below for interpretation of N-1]
Winter N-1 Station Rating:	182	188	

Station: BETS Sum 66&22kV	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
50th percentile Summer Maximum Demand (MVA)	230.2	234.4	238.6	244.9	250.7	255.8	260.8	265.9	271.1	276.6
Summer % Overload [See Note 2 below]	27.87	30.20	32.53	36.06	39.29	42.11	44.89	47.72	50.61	53.67
50th percentile Winter Maximum Demand (MVA)	179.0	182.4	185.5	189.3	194.6	198.5	202.4	206.5	210.7	215.0
Winter % Overload [See Note 2 below]	Nil	Nil	Nil	0.70	3.49	5.59	7.66	9.84	12.07	14.36
Annual energy at risk (MWh) [See Note 3 below]	4099.4	5294.9	6710.0	9408.7	12726.9	16510.7	21368.8	28067.1	37361.6	50267.8
Annual hours at risk [See Note 4 below]	229.0	272.8	320.0	430.5	572.8	740.8	994.5	1353.8	1870.5	2392.3
Expected Annual Unserved Energy (MWh) [See Note 5 below]	17.76	22.94	29.08	40.77	55.15	71.55	92.60	121.62	161.90	217.83
Expected Annual Unserved Energy valued at in accordance with the value of customer reliability as estimated in the September 2008 study commissioned by VENCorp. [See Note 6 below]	$846,766	$1,093,711	$1,386,015	$1,943,436	$2,628,841	$3,410,422	$4,413,908	$5,797,489	$7,717,349	$10,383,224

Notes:
1. "N-1" means cyclic station output capability rating with outage of one transformer. The rating is at an ambient temperature of 35 degrees Centigrade.
2. This is the percentage by which the 50th percentile forecast maximum demand exceeds the N-1 capability rating.
3. "Annual energy at risk" is the amount of energy that would not be supplied in a year during which the 50th percentile demand forecast exceeds the N-1 capability rating, there is a major outage of a transformer (see Note 5 below), and no other mitigation action is taken.
4. "Annual hours per year at risk" is the number of hours in a year during which the 50th percentile demand forecast exceeds the N-1 capability rating.
5. "Expected annual unserved energy" means "Annual Eenergy at risk" multiplied by the probability of a major outage affecting one transformer. "Major outage" means an outage with a duration of 2.6 months. The outage probability is derived from the base reliability data given in Section 4.3.
6. The value of unserved energy is derived from the sector values given in Table 1, weighted in accordance with the composition of the load at this terminal station.

Appendix 2: Model output - Sensitivity testing of individual variables

BETS Regulatory Test evaluation: 50th percentile demand - Base case

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY - Base case (augment in 2012)		
50% demand	NPV	Net benefit
Do nothing	-$26.6	$0.00
Option 1	-$15.7	$10.96
Option 2	-$17.1	$9.55
Option 3	-$14.6	$12.03
Option 5	-$15.5	$11.10
Option 6	-$20.4	$6.24

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-1.0	-1.0
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.1	-1.1
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.5
NPV asset costs over 50 years=	**-7.4**											
Check NPV (over 50 years)	-$7.4											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$7.4											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.5**	**-1.7**	**-2.0**	**-2.6**	**-3.2**	**-4.0**	**-5.0**	**-6.4**	**-8.3**	**-11.0**
PV cash flow (over 10 years)		0.0	-1.3	-1.5	-1.6	-1.9	-2.2	-2.5	-2.9	-3.5	-4.2	-5.1
NPV (over 10 years) =	**-26.6**											
Check NPV (over 10 years) =	**-$26.6**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.0	-1.8	-1.7	-1.6	-1.4	-1.3	-1.2
NPV (over 50 years) =	-28.6											
Check NPV (over 50 years) =	-$28.6											
Annuity @ t=0 of 50-year NPV	-$2.34											
Total EAC of this option		0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Check NPV (over 50 years)	-$28.6											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$15.7**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.2	-2.0	-1.9	-1.7	-1.6	-1.5	-1.4
NPV (over 50 years) =	-31.2											
Check NPV (over 50 years) =	-$31.2											
Annuity @ t=0 of 50-year NPV	-$2.55											
Total EAC of this option		0	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5
Check NPV (over 50 years)	-$31.2											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$17.1**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-1.6	-1.6	-1.6	-1.6	-1.6	-2.5	-2.5
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-2.8**	**-2.8**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.4	-1.3	-1.2	-1.1	-1.0	-1.4	-1.3
NPV (over 50 years) =	-26.6											
Check NPV (over 50 years) =	-$26.6											
Annuity @ t=0 of 50-year NPV	-$2.18											
Total EAC of this option		0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Check NPV (over 50 years)	-$26.6											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$14.6**											

BETS Regulatory Test evaluation: 50th percentile demand - Base case (page 2 of 2)

Option 5												
Capital cost including FDC					**28.8**							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.9	-1.8	-1.7	-1.5	-1.4	-1.3	-1.2
NPV (over 50 years) =	-28.3											
Check NPV (over 50 years) =	-$28.3											
Annuity @ t=0 of 50-year NPV	-$2.32											
Total EAC of this option		0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Check NPV (over 50 years)	-$28.3											
Error =	0											
NPV (over 10 years) =	**-$15.5**											
Option 6												
Capital cost including FDC					**32.1**					**10**		
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-3.4	-3.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-3.9**	**-3.9**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$37.2											
Annuity @ t=0 of 50-year NPV	-$3.04											
Total EAC of this option		0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Check NPV (over 50 years)	-$37.2											
Error =	0											
NPV (over 10 years) =	**-$20.4**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.5**	**-1.7**	**-1.99**	**-2.55**	**-3.24**	**-4.02**	**-5.0**	**-6.4**	**-8.3**	**-11.0**
Option 1		0.0	-2.7	-2.7	-2.67	-2.67	-2.67	-2.67	-2.7	-2.67	-2.7	-2.7
Option 2		0.0	-2.9	-2.9	-2.94	-2.94	-2.94	-2.94	-2.9	-2.94	-2.9	-2.9
Option 3		0.0	-2.3	-2.3	-2.33	-2.33	-2.33	-2.33	-2.3	-2.33	-2.3	-2.3
Option 5		0.0	-2.6	-2.6	-2.64	-2.64	-2.64	-2.64	-2.6	-2.64	-2.6	-2.6
Option 6		0.0	-3.4	-3.4	-3.43	-3.43	-3.43	-3.43	-3.4	-3.4	-3.4	-3.4

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 50th percentile demand - High capex

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY		
50% demand	NPV	Net benefit
Do nothing	-$27.9	$0.00
Option 1	-$19.9	$7.94
Option 2	-$21.8	$6.11
Option 3	-$18.5	$9.35
Option 5	-$19.7	$8.12
Option 6	-$26.1	$1.80

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**16.3**		
Annuity of capex											-1.3	-1.3
Opex											-0.2	-0.2
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.5	-1.5
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.7	-0.7
NPV asset costs over 50 years=	**-9.7**											
Check NPV (over 50 years)	-$9.7											
Annuity of capex			**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**
Check PV annuity of capex	-$9.7											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.6**	**-1.9**	**-2.2**	**-2.7**	**-3.4**	**-4.2**	**-5.2**	**-6.6**	**-8.5**	**-11.2**
PV cash flow (over 10 years)		0.0	-1.5	-1.6	-1.7	-2.0	-2.3	-2.6	-3.0	-3.6	-4.3	-5.2
NPV (over 10 years) =	**-27.9**											
Check NPV (over 10 years) =	**-$27.9**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**37.83**							
Annuity of capex						-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.6	-2.4	-2.2	-2.0	-1.9	-1.7	-1.6
NPV (over 50 years) =	-36.3											
Check NPV (over 50 years) =	-$36.3											
Annuity @ t=0 of 50-year NPV	-$2.97											
Total EAC of this option		0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Check NPV (over 50 years)	-$36.3											
Error =	0											
NPV (over 10 years) =	**-$19.9**											

Option 2												
Capital cost including FDC					**41.6**							
Annuity of capex						-3.4	-3.4	-3.4	-3.4	-3.4	-3.4	-3.4
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.8**	**-3.8**	**-3.8**	**-3.8**	**-3.8**	**-3.8**	**-3.8**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.8	-2.6	-2.4	-2.2	-2.1	-1.9	-1.8
NPV (over 50 years) =	-39.7											
Check NPV (over 50 years) =	-$39.7											
Annuity @ t=0 of 50-year NPV	-$3.24											
Total EAC of this option		0	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Check NPV (over 50 years)	-$39.7											
Error =	0											
NPV (over 10 years) =	**-$21.8**											

Option 3												
Capital cost including FDC					**26.13**					**13**		
Annuity of capex						-2.1	-2.1	-2.1	-2.1	-2.1	-3.2	-3.2
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-3.6**	**-3.6**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.8	-1.6	-1.5	-1.4	-1.3	-1.8	-1.7
NPV (over 50 years) =	-33.8											
Check NPV (over 50 years) =	-$33.8											
Annuity @ t=0 of 50-year NPV	-$2.76											
Total EAC of this option		0	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Check NPV (over 50 years)	-$33.8											
Error =	0											
NPV (over 10 years) =	**-$18.5**											

BETS Regulatory Test evaluation: 50th percentile demand - High capex (page 2 of 2)

Option 5												
Capital cost including FDC					**37.44**							
Annuity of capex						-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.4**	**-3.4**	**-3.4**	**-3.4**	**-3.4**	**-3.4**	**-3.4**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.5	-2.3	-2.2	-2.0	-1.9	-1.7	-1.6
NPV (over 50 years) =	-36.0											
Check NPV (over 50 years) =	-$36.0											
Annuity @ t=0 of 50-year NPV	-$2.94											
Total EAC of this option		0	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Check NPV (over 50 years)	-$36.0											
Error =	0											
NPV (over 10 years) =	**-$19.7**											
Option 6												
Capital cost including FDC					**41.73**					**13**		
Annuity of capex						-3.4	-3.4	-3.4	-3.4	-3.4	-4.5	-4.5
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.5	-0.5
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.8**	**-3.8**	**-3.8**	**-3.8**	**-3.8**	**-5.0**	**-5.0**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$47.5											
Annuity @ t=0 of 50-year NPV	-$3.89											
Total EAC of this option		0	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Check NPV (over 50 years)	-$47.5											
Error =	7.1054E-14											
NPV (over 10 years) =	**-$26.1**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.6**	**-1.9**	**-2.18**	**-2.73**	**-3.42**	**-4.20**	**-5.2**	**-6.6**	**-8.5**	**-11.2**
Option 1		0.0	-3.5	-3.5	-3.47	-3.47	-3.47	-3.47	-3.5	-3.47	-3.5	-3.5
Option 2		0.0	-3.8	-3.8	-3.82	-3.82	-3.82	-3.82	-3.8	-3.82	-3.8	-3.8
Option 3		0.0	-3.0	-3.0	-3.03	-3.03	-3.03	-3.03	-3.0	-3.03	-3.0	-3.0
Option 5		0.0	-3.4	-3.4	-3.43	-3.43	-3.43	-3.43	-3.4	-3.43	-3.4	-3.4
Option 6		0.0	-4.5	-4.5	-4.46	-4.46	-4.46	-4.46	-4.5	-4.5	-4.5	-4.5

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 50th percentile demand - Low capex

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY		
50% demand	NPV	Net benefit
Do nothing	-$25.4	$0.00
Option 1	-$11.4	$13.98
Option 2	-$12.4	$12.99
Option 3	-$10.7	$14.72
Option 5	-$11.4	$14.07
Option 6	-$14.8	$10.67

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										8.8		
Annuity of capex											-0.7	-0.7
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	-0.8
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	-0.4
NPV asset costs over 50 years=	**-5.2**											
Check NPV (over 50 years)	-$5.2											
Annuity of capex			**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**
Check PV annuity of capex	-$5.2											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.3**	**-1.5**	**-1.8**	**-2.4**	**-3.1**	**-3.8**	**-4.8**	**-6.2**	**-8.1**	**-10.8**
PV cash flow (over 10 years)		0.0	-1.2	-1.3	-1.4	-1.7	-2.1	-2.4	-2.8	-3.4	-4.1	-5.0
NPV (over 10 years) =	**-25.4**											
Check NPV (over 10 years) =	**-$25.4**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					20.37							
Annuity of capex						-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.9**	**-1.9**	**-1.9**	**-1.9**	**-1.9**	**-1.9**	**-1.9**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.4	-1.3	-1.2	-1.1	-1.0	-0.9	-0.9
NPV (over 50 years) =	-20.9											
Check NPV (over 50 years) =	-$20.9											
Annuity @ t=0 of 50-year NPV	-$1.71											
Total EAC of this option		0	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7
Check NPV (over 50 years)	-$20.9											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$11.4**											

Option 2												
Capital cost including FDC					22.4							
Annuity of capex						-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.5	-1.4	-1.3	-1.2	-1.1	-1.0	-1.0
NPV (over 50 years) =	-22.7											
Check NPV (over 50 years) =	-$22.7											
Annuity @ t=0 of 50-year NPV	-$1.85											
Total EAC of this option		0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
Check NPV (over 50 years)	-$22.7											
Error =	0											
NPV (over 10 years) =	**-$12.4**											

Option 3												
Capital cost including FDC					14.07					7		
Annuity of capex						-1.2	-1.2	-1.2	-1.2	-1.2	-1.7	-1.7
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.9**	**-1.9**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-0.9	-0.9	-0.8	-0.8	-0.7	-1.0	-0.9
NPV (over 50 years) =	-19.5											
Check NPV (over 50 years) =	-$19.5											
Annuity @ t=0 of 50-year NPV	-$1.60											
Total EAC of this option		0	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
Check NPV (over 50 years)	-$19.5											
Error =	0											
NPV (over 10 years) =	**-$10.7**											

BETS Regulatory Test evaluation: 50th percentile demand - Low capex (page 2 of 2)

Option 5												
Capital cost including FDC					**20.16**							
Annuity of capex						-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-1.8**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.4	-1.3	-1.2	-1.1	-1.0	-0.9	-0.9
NPV (over 50 years) =	-20.7											
Check NPV (over 50 years) =	-$20.7											
Annuity @ t=0 of 50-year NPV	-$1.69											
Total EAC of this option		0	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7
Check NPV (over 50 years)	-$20.7											
Error =	0											
NPV (over 10 years) =	**-$11.4**											
Option 6												
Capital cost including FDC					**22.47**					**7**		
Annuity of capex						-1.8	-1.8	-1.8	-1.8	-1.8	-2.4	-2.4
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.7**	**-2.7**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$26.9											
Annuity @ t=0 of 50-year NPV	-$2.20											
Total EAC of this option		0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Check NPV (over 50 years)	-$26.9											
Error =	0											
NPV (over 10 years) =	**-$14.8**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.3**	**-1.5**	**-1.81**	**-2.37**	**-3.05**	**-3.84**	**-4.8**	**-6.2**	**-8.1**	**-10.8**
Option 1		0.0	-1.9	-1.9	-1.87	-1.87	-1.87	-1.87	-1.9	-1.87	-1.9	-1.9
Option 2		0.0	-2.1	-2.1	-2.06	-2.06	-2.06	-2.06	-2.1	-2.06	-2.1	-2.1
Option 3		0.0	-1.6	-1.6	-1.63	-1.63	-1.63	-1.63	-1.6	-1.63	-1.6	-1.6
Option 5		0.0	-1.8	-1.8	-1.85	-1.85	-1.85	-1.85	-1.8	-1.85	-1.8	-1.8
Option 6		0.0	-2.4	-2.4	-2.40	-2.40	-2.40	-2.40	-2.4	-2.4	-2.4	-2.4

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 50th percentile demand - High Opex

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**1.5%**	per annum
Transmission asset life	**50**	years

SUMMARY		
50% demand	NPV	Net benefit
Do nothing	-$26.9	$0.00
Option 1	-$16.5	$10.41
Option 2	-$17.9	$8.92
Option 3	-$15.3	$11.55
Option 5	-$16.3	$10.56
Option 6	-$21.4	$5.43

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-1.0	-1.0
Opex											-0.2	-0.2
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-1.2
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.6
NPV asset costs over 50 years=	**-7.8**											
Check NPV (over 50 years)	-$7.8											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$7.8											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.5**	**-1.7**	**-2.0**	**-2.6**	**-3.3**	**-4.1**	**-5.1**	**-6.4**	**-8.4**	**-11.0**
PV cash flow (over 10 years)		0.0	-1.4	-1.5	-1.6	-1.9	-2.2	-2.6	-2.9	-3.5	-4.2	-5.1
NPV (over 10 years) =	**-26.9**											
Check NPV (over 10 years) =	**-$26.9**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.1	-1.9	-1.8	-1.6	-1.5	-1.4	-1.3
NPV (over 50 years) =	-30.0											
Check NPV (over 50 years) =	-$30.0											
Annuity @ t=0 of 50-year NPV	-$2.45											
Total EAC of this option		0	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5
Check NPV (over 50 years)	-$30.0											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$16.5**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.3	-2.1	-2.0	-1.8	-1.7	-1.5	-1.4
NPV (over 50 years) =	-32.7											
Check NPV (over 50 years) =	-$32.7											
Annuity @ t=0 of 50-year NPV	-$2.67											
Total EAC of this option		0	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7
Check NPV (over 50 years)	-$32.7											
Error =	0											
NPV (over 10 years) =	**-$17.9**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-1.6	-1.6	-1.6	-1.6	-1.6	-2.5	-2.5
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.5	-0.5
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.9**	**-1.9**	**-1.9**	**-1.9**	**-1.9**	**-2.9**	**-2.9**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.4	-1.3	-1.2	-1.1	-1.1	-1.5	-1.3
NPV (over 50 years) =	-27.9											
Check NPV (over 50 years) =	-$27.9											
Annuity @ t=0 of 50-year NPV	-$2.28											
Total EAC of this option		0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Check NPV (over 50 years)	-$27.9											
Error =	0											
NPV (over 10 years) =	**-$15.3**											

BETS Regulatory Test evaluation: 50th percentile demand - High Opex (page 2 of 2)

Option 5											
Capital cost including FDC					**28.8**						
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.0	-1.9	-1.8	-1.6	-1.5	-1.4	-1.3
NPV (over 50 years) =	-29.7											
Check NPV (over 50 years) =	-$29.7											
Annuity @ t=0 of 50-year NPV	-$2.43											
Total EAC of this option		0	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Check NPV (over 50 years)	-$29.7											
Error =	3.1974E-14											
NPV (over 10 years) =	**-$16.3**											
Option 6											
Capital cost including FDC					**32.1**					**10**		
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-3.4	-3.4
Opex						-0.5	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-4.1**	**-4.1**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$39.1											
Annuity @ t=0 of 50-year NPV	-$3.19											
Total EAC of this option		0	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Check NPV (over 50 years)	-$39.1											
Error =	0											
NPV (over 10 years) =	**-$21.4**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.5**	**-1.7**	**-2.03**	**-2.58**	**-3.27**	**-4.05**	**-5.1**	**-6.4**	**-8.4**	**-11.0**
Option 1		0.0	-2.8	-2.8	-2.82	-2.82	-2.82	-2.82	-2.8	-2.82	-2.8	-2.8
Option 2		0.0	-3.1	-3.1	-3.10	-3.10	-3.10	-3.10	-3.1	-3.10	-3.1	-3.1
Option 3		0.0	-2.4	-2.4	-2.40	-2.40	-2.40	-2.40	-2.4	-2.40	-2.4	-2.4
Option 5		0.0	-2.8	-2.8	-2.79	-2.79	-2.79	-2.79	-2.8	-2.79	-2.8	-2.8
Option 6		0.0	-3.6	-3.6	-3.56	-3.56	-3.56	-3.56	-3.6	-3.6	-3.6	-3.6

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 50th percentile demand - Low Opex

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**0.5%**	per annum
Transmission asset life	**50**	years

SUMMARY		
50% demand	NPV	Net benefit
Do nothing	-$26.4	$0.00
Option 1	-$14.9	$11.51
Option 2	-$16.2	$10.17
Option 3	-$13.9	$12.52
Option 5	-$14.8	$11.64
Option 6	-$19.4	$7.04

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-1.0	-1.0
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.1	-1.1
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.5	-0.5
NPV asset costs over 50 years=	**-7.0**											
Check NPV (over 50 years)	-$7.0											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$7.0											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.4**	**-1.7**	**-2.0**	**-2.5**	**-3.2**	**-4.0**	**-5.0**	**-6.4**	**-8.3**	**-11.0**
PV cash flow (over 10 years)		0.0	-1.3	-1.4	-1.6	-1.9	-2.2	-2.5	-2.9	-3.4	-4.1	-5.1
NPV (over 10 years) =	**-26.4**											
Check NPV (over 10 years) =	**-$26.4**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.9	-1.7	-1.6	-1.5	-1.4	-1.3	-1.2
NPV (over 50 years) =	-27.2											
Check NPV (over 50 years) =	-$27.2											
Annuity @ t=0 of 50-year NPV	-$2.22											
Total EAC of this option		0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Check NPV (over 50 years)	-$27.2											
Error =	0											
NPV (over 10 years) =	**-$14.9**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-2.0	-1.9	-1.7	-1.6	-1.5	-1.4	-1.3
NPV (over 50 years) =	-29.6											
Check NPV (over 50 years) =	-$29.6											
Annuity @ t=0 of 50-year NPV	-$2.42											
Total EAC of this option		0	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Check NPV (over 50 years)	-$29.6											
Error =	0											
NPV (over 10 years) =	**-$16.2**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-1.6	-1.6	-1.6	-1.6	-1.6	-2.5	-2.5
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-2.6**	**-2.6**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.3	-1.2	-1.1	-1.0	-0.9	-1.3	-1.2
NPV (over 50 years) =	-25.3											
Check NPV (over 50 years) =	-$25.3											
Annuity @ t=0 of 50-year NPV	-$2.07											
Total EAC of this option		0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Check NPV (over 50 years)	-$25.3											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$13.9**											

BETS Regulatory Test evaluation: 50th percentile demand - Low Opex (page 2 of 2)

Option 5											
Capital cost including FDC					**28.8**						
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.1	-1.8	-1.7	-1.6	-1.5	-1.3	-1.2	-1.2
NPV (over 50 years) =	-27.0											
Check NPV (over 50 years) =	-$27.0											
Annuity @ t=0 of 50-year NPV	-$2.20											
Total EAC of this option		0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Check NPV (over 50 years)	-$27.0											
Error =	0											
NPV (over 10 years) =	**-$14.8**											
Option 6											
Capital cost including FDC					**32.1**					**10**		
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-3.4	-3.4
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-2.8**	**-3.7**	**-3.7**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$35.3											
Annuity @ t=0 of 50-year NPV	-$2.89											
Total EAC of this option		0	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Check NPV (over 50 years)	-$35.3											
Error =	0											
NPV (over 10 years) =	**-$19.4**											
Determining the optimal timing of investment:											
Simple annuity analysis excluding unserved energy costs for augmentation options											
Do Nothing Option		**0.0**	**-1.4**	**-1.7**	**-1.96**	**-2.52**	**-3.20**	**-3.99**	**-5.0**	**-6.4**	**-8.3**	**-11.0**
Option 1		0.0	-2.5	-2.5	-2.52	-2.52	-2.52	-2.52	-2.5	-2.52	-2.5	-2.5
Option 2		0.0	-2.8	-2.8	-2.78	-2.78	-2.78	-2.78	-2.8	-2.78	-2.8	-2.8
Option 3		0.0	-2.3	-2.3	-2.27	-2.27	-2.27	-2.27	-2.3	-2.27	-2.3	-2.3
Option 5		0.0	-2.5	-2.5	-2.50	-2.50	-2.50	-2.50	-2.5	-2.50	-2.5	-2.5
Option 6		0.0	-3.3	-3.3	-3.31	-3.31	-3.31	-3.31	-3.3	-3.3	-3.3	-3.3

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 50th percentile demand - High discount rate

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**10.0%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY		
50% demand	NPV	Net benefit
Do nothing	-$23.8	$0.00
Option 1	-$16.5	$7.25
Option 2	-$18.0	$5.77
Option 3	-$15.1	$8.66
Option 5	-$16.4	$7.39
Option 6	-$21.2	$2.57

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-1.3	-1.3
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-1.4
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.5
NPV asset costs over 50 years=	**-6.3**											
Check NPV (over 50 years)	-$6.3											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$6.3											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.5**	**-1.7**	**-2.0**	**-2.6**	**-3.3**	**-4.1**	**-5.1**	**-6.4**	**-8.4**	**-11.0**
PV cash flow (over 10 years)		0.0	-1.4	-1.4	-1.5	-1.8	-2.0	-2.3	-2.6	-3.0	-3.5	-4.2
NPV (over 10 years) =	**-23.8**											
Check NPV (over 10 years) =	**-$23.8**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.0	-2.2	-2.0	-1.8	-1.7	-1.5	-1.4	-1.2
NPV (over 50 years) =	-26.7											
Check NPV (over 50 years) =	-$26.7											
Annuity @ t=0 of 50-year NPV	-$2.69											
Total EAC of this option		0	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7
Check NPV (over 50 years)	-$26.7											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$16.5**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.0	-2.4	-2.2	-2.0	-1.8	-1.7	-1.5	-1.4
NPV (over 50 years) =	-29.1											
Check NPV (over 50 years) =	-$29.1											
Annuity @ t=0 of 50-year NPV	-$2.93											
Total EAC of this option		0	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Check NPV (over 50 years)	-$29.1											
Error =	0											
NPV (over 10 years) =	**-$18.0**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-2.0	-2.0	-2.0	-2.0	-2.0	-3.0	-3.0
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-3.3**	**-3.3**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.0	-1.5	-1.4	-1.3	-1.1	-1.0	-1.4	-1.3
NPV (over 50 years) =	-24.4											
Check NPV (over 50 years) =	-$24.4											
Annuity @ t=0 of 50-year NPV	-$2.46											
Total EAC of this option		0	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5
Check NPV (over 50 years)	-$24.4											
Error =	0											
NPV (over 10 years) =	**-$15.1**											

BETS Regulatory Test evaluation: 50th percentile demand - High discount rate (page 2 of 2)

Option 5											
Capital cost including FDC					**28.8**						
Annuity of capex						-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**
PV cash flow (over 50 years)		0	-0.8	-0.9	-1.0	-2.2	-2.0	-1.8	-1.6	-1.5	-1.4	-1.2
NPV (over 50 years) =	-26.4											
Check NPV (over 50 years) =	-$26.4											
Annuity @ t=0 of 50-year NPV	-$2.67											
Total EAC of this option		0	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7
Check NPV (over 50 years)	-$26.4											
Error =	3.908E-14											
NPV (over 10 years) =	**-$16.4**											
Option 6											
Capital cost including FDC					**32.1**					**10**		
Annuity of capex						-3.2	-3.2	-3.2	-3.2	-3.2	-4.2	-4.2
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.6**	**-3.6**	**-3.6**	**-3.6**	**-3.6**	**-4.7**	**-4.7**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$34.2											
Annuity @ t=0 of 50-year NPV	-$3.45											
Total EAC of this option		0	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Check NPV (over 50 years)	-$34.2											
Error =	0											
NPV (over 10 years) =	**-$21.2**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.5**	**-1.7**	**-2.03**	**-2.58**	**-3.27**	**-4.05**	**-5.1**	**-6.4**	**-8.4**	**-11.0**
Option 1		0.0	-3.2	-3.2	-3.23	-3.23	-3.23	-3.23	-3.2	-3.23	-3.2	-3.2
Option 2		0.0	-3.5	-3.5	-3.55	-3.55	-3.55	-3.55	-3.5	-3.55	-3.5	-3.5
Option 3		0.0	-2.8	-2.8	-2.79	-2.79	-2.79	-2.79	-2.8	-2.79	-2.8	-2.8
Option 5		0.0	-3.2	-3.2	-3.19	-3.19	-3.19	-3.19	-3.2	-3.19	-3.2	-3.2
Option 6		0.0	-4.1	-4.1	-4.12	-4.12	-4.12	-4.12	-4.1	-4.1	-4.1	-4.1

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 50th percentile demand - Low discount rate

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**6.6%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY		
50% demand	NPV	Net benefit
Do nothing	-$28.9	$0.00
Option 1	-$14.9	$14.01
Option 2	-$16.2	$12.68
Option 3	-$14.0	$14.84
Option 5	-$14.7	$14.14
Option 6	-$19.5	$9.34

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.938	0.880	0.826	0.774	0.726	0.681	0.639	0.600	0.563	0.528
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-0.9	-0.9
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	-1.0
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.5
NPV asset costs over 50 years=	**-8.3**											
Check NPV (over 50 years)	-$8.3											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$8.3											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.4**	**-1.7**	**-2.0**	**-2.5**	**-3.2**	**-4.0**	**-5.0**	**-6.4**	**-8.3**	**-11.0**
PV cash flow (over 10 years)		0.0	-1.3	-1.5	-1.6	-1.9	-2.3	-2.7	-3.2	-3.8	-4.7	-5.8
NPV (over 10 years) =	**-28.9**											
Check NPV (over 10 years) =	**-$28.9**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.3**	**-2.3**	**-2.3**	**-2.3**	**-2.3**	**-2.3**	**-2.3**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.8	-1.7	-1.6	-1.5	-1.4	-1.3	-1.2
NPV (over 50 years) =	-30.2											
Check NPV (over 50 years) =	-$30.2											
Annuity @ t=0 of 50-year NPV	-$2.08											
Total EAC of this option		0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Check NPV (over 50 years)	-$30.2											
Error =	3.1974E-14											
NPV (over 10 years) =	**-$14.9**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-2.0	-1.8	-1.7	-1.6	-1.5	-1.4	-1.3
NPV (over 50 years) =	-32.9											
Check NPV (over 50 years) =	-$32.9											
Annuity @ t=0 of 50-year NPV	-$2.26											
Total EAC of this option		0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Check NPV (over 50 years)	-$32.9											
Error =	0											
NPV (over 10 years) =	**-$16.2**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-1.4	-1.4	-1.4	-1.4	-1.4	-2.1	-2.1
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-1.6**	**-2.4**	**-2.4**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.2	-1.2	-1.1	-1.0	-1.0	-1.3	-1.3
NPV (over 50 years) =	-28.5											
Check NPV (over 50 years) =	-$28.5											
Annuity @ t=0 of 50-year NPV	-$1.96											
Total EAC of this option		0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Check NPV (over 50 years)	-$28.5											
Error =	0											
NPV (over 10 years) =	**-$14.0**											

BETS Regulatory Test evaluation: 50th percentile demand - Low discount rate (page 2 of 2)

Option 5											
Capital cost including FDC					28.8						
Annuity of capex						-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.3**	**-2.3**	**-2.3**	**-2.3**	**-2.3**	**-2.3**	**-2.3**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.8	-1.6	-1.5	-1.5	-1.4	-1.3	-1.2
NPV (over 50 years) =	-29.9											
Check NPV (over 50 years) =	-$29.9											
Annuity @ t=0 of 50-year NPV	-$2.06											
Total EAC of this option		0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Check NPV (over 50 years)	-$29.9											
Error =	0											
NPV (over 10 years) =	**-$14.7**											
Option 6											
Capital cost including FDC					32.1					10		
Annuity of capex						-2.2	-2.2	-2.2	-2.2	-2.2	-2.9	-2.9
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-2.5**	**-3.3**	**-3.3**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$39.6											
Annuity @ t=0 of 50-year NPV	-$2.73											
Total EAC of this option		0	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7
Check NPV (over 50 years)	-$39.6											
Error =	0											
NPV (over 10 years) =	**-$19.5**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.4**	**-1.7**	**-1.96**	**-2.52**	**-3.20**	**-3.98**	**-5.0**	**-6.4**	**-8.3**	**-11.0**
Option 1		0.0	-2.3	-2.3	-2.29	-2.29	-2.29	-2.29	-2.3	-2.29	-2.3	-2.3
Option 2		0.0	-2.5	-2.5	-2.52	-2.52	-2.52	-2.52	-2.5	-2.52	-2.5	-2.5
Option 3		0.0	-2.0	-2.0	-2.01	-2.01	-2.01	-2.01	-2.0	-2.01	-2.0	-2.0
Option 5		0.0	-2.3	-2.3	-2.27	-2.27	-2.27	-2.27	-2.3	-2.27	-2.3	-2.3
Option 6		0.0	-3.0	-3.0	-2.96	-2.96	-2.96	-2.96	-3.0	-3.0	-3.0	-3.0

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: 10th percentile demand - Base case

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY - Base case (augment in 2012)		
10% demand	NPV	Net benefit
Do nothing	-$84.2	$0.0
Option 1	-$20.6	$63.6
Option 2	-$22.0	$62.2
Option 3	-$19.7	$64.5
Option 5	-$20.5	$63.7
Option 6	-$25.3	$58.9
Net benefit of Option 3 exeeds do nothing by		$64.5

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-1.0	-1.0
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.1	-1.1
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.5
NPV asset costs over 50 years=	**-7.4**											
Check NPV (over 50 years)	-$7.4											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$7.4											
Expected USE value @ 50% demand forecast ($)			3653823	4523546	5628851	7867176	10584853	13248174	16463135	20281153	24645941	30557792
Expected Unserved energy value ($M)			3.7	4.5	5.6	7.9	10.6	13.2	16.5	20.3	24.6	30.6
Total cash flow			**-4.3**	**-5.1**	**-6.2**	**-8.5**	**-11.2**	**-13.9**	**-17.1**	**-20.9**	**-25.3**	**-31.2**
PV cash flow (over 10 years)		0.0	-3.9	-4.4	-5.0	-6.2	-7.6	-8.7	-10.0	-11.3	-12.6	-14.4
NPV (over 10 years) =	**-84.2**											
Check NPV (over 10 years) =	**-$84.2**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-3.7	-4.5	-5.6							
Total cash flow		**0**	**-3.7**	**-4.5**	**-5.6**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**
PV cash flow (over 50 years)		0	-3.4	-3.9	-4.5	-2.0	-1.8	-1.7	-1.6	-1.4	-1.3	-1.2
NPV (over 50 years) =	-37.5											
Check NPV (over 50 years) =	-$37.5											
Annuity @ t=0 of 50-year NPV	-$3.07											
Total EAC of this option		0	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1
Check NPV (over 50 years)	-$37.5											
Error =	0											
NPV (over 10 years) =	**-$20.6**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-3.7	-4.5	-5.6							
Total cash flow		**0**	**-3.7**	**-4.5**	**-5.6**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**
PV cash flow (over 50 years)		0	-3.4	-3.9	-4.5	-2.2	-2.0	-1.9	-1.7	-1.6	-1.5	-1.4
NPV (over 50 years) =	-40.1											
Check NPV (over 50 years) =	-$40.1											
Annuity @ t=0 of 50-year NPV	-$3.28											
Total EAC of this option		0	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3
Check NPV (over 50 years)	-$40.1											
Error =	0											
NPV (over 10 years) =	**-$22.0**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-1.6	-1.6	-1.6	-1.6	-1.6	-2.5	-2.5
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Expected unserved energy			-3.7	-4.5	-5.6					-0.0007	-0.002	-0.006
Total cash flow		**0**	**-3.7**	**-4.5**	**-5.6**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-2.8**	**-2.8**
PV cash flow (over 50 years)		0	-3.4	-3.9	-4.5	-1.4	-1.3	-1.2	-1.1	-1.0	-1.4	-1.3
NPV (over 50 years) =	-35.8											
Check NPV (over 50 years) =	-$35.8											
Annuity @ t=0 of 50-year NPV	-$2.93											
Total EAC of this option		0	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Check NPV (over 50 years)	-$35.8											
Error =	0											
NPV (over 10 years) =	**-$19.7**											

BETS Regulatory Test evaluation: 10th percentile demand - Base case (page 2 of 2)

Option 5											
Capital cost including FDC					28.8						
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-3.7	-4.5	-5.6							-0.0002
Total cash flow		**0**	**-3.7**	**-4.5**	**-5.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**
PV cash flow (over 50 years)		0	-3.4	-3.9	-4.5	-1.9	-1.8	-1.7	-1.5	-1.4	-1.3	-1.2
NPV (over 50 years) =	-37.4											
Check NPV (over 50 years) =	-$37.4											
Annuity @ t=0 of 50-year NPV	-$3.06											
Total EAC of this option		0	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1
Check NPV (over 50 years)	-$37.4											
Error =	0											
NPV (over 10 years) =	**-$20.5**											
Option 6												
Capital cost including FDC					32.1					10		
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-3.4	-3.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4
Expected unserved energy			-3.7	-4.5	-5.6							
Total cash flow		**0**	**-3.7**	**-4.5**	**-5.6**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-3.9**	**-3.9**
PV cash flow (over 50 years)		0	13.4	20.5	31.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	65.5											
Check NPV (over 50 years) =	-$46.1											
Annuity @ t=0 of 50-year NPV	-$3.77											
Total EAC of this option		0	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8
Check NPV (over 50 years)	-$46.1											
Error =	0											
NPV (over 10 years) =	**-$25.3**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-4.3**	**-5.1**	**-6.2**	**-8.5**	**-11.2**	**-13.9**	**-17.1**	**-20.9**	**-25.3**	**-31.2**
Option 1		0.0	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.67	-2.7	-2.7
Option 2		0.0	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.94	-2.9	-2.9
Option 3		0.0	-2.33	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.33	-2.3	-2.3
Option 5		0.0	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.64	-2.6	-2.6
Option 6		0.0	-3.4	-3.4	-3.4	-3.4	-3.4	-3.4	-3.4	-3.4	-3.4	-3.4

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: Low demand case (50th percentile)

All amounts expressed in real $ M at Dec 08 prices

Discount rate	**8.0%**	real, pre-tax
Opex rate	**1%**	per annum
Transmission asset life	**50**	years

SUMMARY - Low demand case (augment in 2012)		
50% demand	NPV	Net benefit
Do nothing	-$20.2	$0.00
Option 1	-$15.5	$4.74
Option 2	-$16.9	$3.33
Option 3	-$14.4	$5.81
Option 5	-$15.4	$4.88
Option 6	-$20.2	$0.01

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**12.5**		
Annuity of capex											-1.0	-1.0
Opex											-0.1	-0.1
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.1	-1.1
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.5
NPV asset costs over 50 years=	**-7.4**											
Check NPV (over 50 years)	-$7.4											
Annuity of capex			**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**	**-0.6**
Check PV annuity of capex	-$7.4											
Expected USE value @ 50% demand forecast ($)			779824	949267	1175215	1563812	2047532	2559683	3164482	3972793	5049900	6492370
Expected Unserved energy value ($M)			0.8	0.9	1.2	1.6	2.0	2.6	3.2	4.0	5.0	6.5
Total cash flow			**-1.4**	**-1.6**	**-1.8**	**-2.2**	**-2.7**	**-3.2**	**-3.8**	**-4.6**	**-5.7**	**-7.1**
PV cash flow (over 10 years)		0.0	-1.3	-1.3	-1.4	-1.6	-1.8	-2.0	-2.2	-2.5	-2.8	-3.3
NPV (over 10 years) =	**-20.2**											
Check NPV (over 10 years) =	**-$20.2**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**29.1**							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**	**-2.7**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-2.0	-1.8	-1.7	-1.6	-1.4	-1.3	-1.2
NPV (over 50 years) =	-28.2											
Check NPV (over 50 years) =	-$28.2											
Annuity @ t=0 of 50-year NPV	-$2.31											
Total EAC of this option		0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Check NPV (over 50 years)	-$28.2											
Error =	0											
NPV (over 10 years) =	**-$15.5**											

Option 2												
Capital cost including FDC					**32**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-2.2	-2.0	-1.9	-1.7	-1.6	-1.5	-1.4
NPV (over 50 years) =	-30.8											
Check NPV (over 50 years) =	-$30.8											
Annuity @ t=0 of 50-year NPV	-$2.52											
Total EAC of this option		0	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5
Check NPV (over 50 years)	-$30.8											
Error =	3.5527E-14											
NPV (over 10 years) =	**-$16.9**											

Option 3												
Capital cost including FDC					**20.1**					**10**		
Annuity of capex						-1.6	-1.6	-1.6	-1.6	-1.6	-2.5	-2.5
Opex						-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-1.8**	**-2.8**	**-2.8**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-1.4	-1.3	-1.2	-1.1	-1.0	-1.4	-1.3
NPV (over 50 years) =	-26.3											
Check NPV (over 50 years) =	-$26.3											
Annuity @ t=0 of 50-year NPV	-$2.15											
Total EAC of this option		0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Check NPV (over 50 years)	-$26.3											
Error =	0											
NPV (over 10 years) =	**-$14.4**											

BETS Regulatory Test evaluation: Low demand case (50th percentile) **(page 2 of 2)**

Option 5												
Capital cost including FDC					28.8							
Annuity of capex						-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**	**-2.6**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-1.9	-1.8	-1.7	-1.5	-1.4	-1.3	-1.2
NPV (over 50 years) =	-28.0											
Check NPV (over 50 years) =	-$28.0											
Annuity @ t=0 of 50-year NPV	-$2.29											
Total EAC of this option		0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Check NPV (over 50 years)	-$28.0											
Error =	0											
NPV (over 10 years) =	**-$15.4**											
Option 6												
Capital cost including FDC					32.1					10		
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-3.4	-3.4
Opex						-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.4
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-2.9**	**-3.9**	**-3.9**
PV cash flow (over 50 years)		0	0.6	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	2.9											
Check NPV (over 50 years) =	-$36.9											
Annuity @ t=0 of 50-year NPV	-$3.01											
Total EAC of this option		0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Check NPV (over 50 years)	-$36.9											
Error =	0											
NPV (over 10 years) =	**-$20.2**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.4**	**-1.6**	**-1.78**	**-2.17**	**-2.66**	**-3.17**	**-3.8**	**-4.6**	**-5.7**	**-7.1**
Option 1		0.0	-2.7	-2.7	-2.67	-2.67	-2.67	-2.67	-2.7	-2.67	-2.7	-2.7
Option 2		0.0	-2.9	-2.9	-2.94	-2.94	-2.94	-2.94	-2.9	-2.94	-2.9	-2.9
Option 3		0.0	-2.3	-2.3	-2.33	-2.33	-2.33	-2.33	-2.3	-2.33	-2.3	-2.3
Option 5		0.0	-2.6	-2.6	-2.64	-2.64	-2.64	-2.64	-2.6	-2.64	-2.6	-2.6
Option 6		0.0	-3.4	-3.4	-3.43	-3.43	-3.43	-3.43	-3.4	-3.4	-3.4	-3.4

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

Appendix 3: Model output - Economic evaluation of options under different scenarios

BETS Regulatory Test evaluation: Scenario A

All amounts expressed in real $ M at Dec 08 prices

- Upper bound capital cost
- Upper bound operating cost
- Lower bound discount rate
- Central demand growth

SUMMARY - Scenario A	NPV	Net benefit
Do nothing	-$30.4	$0.00
Option 1	-$20.0	$10.45
Option 2	-$21.8	$8.60
Option 3	-$18.8	$11.61
Option 5	-$19.8	$10.63
Option 6	-$26.4	$3.99

Discount rate	**6.6%**	real, pre-tax
Opex rate	**1.5%**	per annum
Transmission asset life	**50**	years

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.938	0.880	0.826	0.774	0.726	0.681	0.639	0.600	0.563	0.528
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**16.3**		
Annuity of capex											-1.1	-1.1
Opex											-0.2	-0.2
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-1.4
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	-0.7
NPV asset costs over 50 years=	**-11.5**											
Check NPV (over 50 years)	-$11.5											
Annuity of capex			**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**
Check PV annuity of capex	-$11.5											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.6**	**-1.9**	**-2.2**	**-2.7**	**-3.4**	**-4.2**	**-5.2**	**-6.6**	**-8.5**	**-11.2**
PV cash flow (over 10 years)		0.0	-1.5	-1.7	-1.8	-2.1	-2.5	-2.9	-3.3	-4.0	-4.8	-5.9
NPV (over 10 years) =	**-30.4**											
Check NPV (over 10 years) =	**-$30.4**											
Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**37.83**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-2.5	-2.3	-2.2	-2.0	-1.9	-1.8	-1.7
NPV (over 50 years) =	-40.6											
Check NPV (over 50 years) =	-$40.6											
Annuity @ t=0 of 50-year NPV	-$2.79											
Total EAC of this option		0	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Check NPV (over 50 years)	-$40.6											
Error =	0											
NPV (over 10 years) =	**-$20.0**											
Option 2												
Capital cost including FDC					**41.6**							
Annuity of capex						-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-2.7	-2.5	-2.4	-2.2	-2.1	-2.0	-1.8
NPV (over 50 years) =	-44.4											
Check NPV (over 50 years) =	-$44.4											
Annuity @ t=0 of 50-year NPV	-$3.05											
Total EAC of this option		0	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1
Check NPV (over 50 years)	-$44.4											
Error =	5.6843E-14											
NPV (over 10 years) =	**-$21.8**											
Option 3												
Capital cost including FDC					**26.13**					**13**		
Annuity of capex						-1.8	-1.8	-1.8	-1.8	-1.8	-2.7	-2.7
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.6	-0.6
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-3.3**	**-3.3**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.7	-1.6	-1.5	-1.4	-1.3	-1.8	-1.7
NPV (over 50 years) =	-38.2											
Check NPV (over 50 years) =	-$38.2											
Annuity @ t=0 of 50-year NPV	-$2.63											
Total EAC of this option		0	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Check NPV (over 50 years)	-$38.2											
Error =	0											
NPV (over 10 years) =	**-$18.8**											

BETS Regulatory Test evaluation: Scenario A **(page 2 of 2)**

Option 5												
Capital cost including FDC					**37.44**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-2.4	-2.3	-2.1	-2.0	-1.9	-1.8	-1.7
NPV (over 50 years) =	-40.2											
Check NPV (over 50 years) =	-$40.2											
Annuity @ t=0 of 50-year NPV	-$2.77											
Total EAC of this option		0	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Check NPV (over 50 years)	-$40.2											
Error =	0											
NPV (over 10 years) =	**-$19.8**											
Option 6												
Capital cost including FDC					**41.73**					**13**		
Annuity of capex						-2.9	-2.9	-2.9	-2.9	-2.9	-3.8	-3.8
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.8	-0.8
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-4.6**	**-4.6**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$53.7											
Annuity @ t=0 of 50-year NPV	-$3.70											
Total EAC of this option		0	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7
Check NPV (over 50 years)	-$53.7											
Error =	0											
NPV (over 10 years) =	**-$26.4**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.6**	**-1.9**	**-2.18**	**-2.74**	**-3.42**	**-4.20**	**-5.2**	**-6.6**	**-8.5**	**-11.2**
Option 1		0.0	-3.2	-3.2	-3.17	-3.17	-3.17	-3.17	-3.2	-3.17	-3.2	-3.2
Option 2		0.0	-3.5	-3.5	-3.49	-3.49	-3.49	-3.49	-3.5	-3.49	-3.5	-3.5
Option 3		0.0	-2.7	-2.7	-2.70	-2.70	-2.70	-2.70	-2.7	-2.70	-2.7	-2.7
Option 5		0.0	-3.1	-3.1	-3.14	-3.14	-3.14	-3.14	-3.1	-3.14	-3.1	-3.1
Option 6		0.0	-4.0	-4.0	-4.01	-4.01	-4.01	-4.01	-4.0	-4.0	-4.0	-4.0

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: Scenario B

All amounts expressed in real $ M at Dec 08 prices

- Upper bound capital cost
- Upper bound operating cost
- Lower bound discount rate
- Lower bound demand growth

SUMMARY - Scenario B	NPV	Net benefit
Do nothing	-$23.3	$0.00
Option 1	-$19.8	$3.52
Option 2	-$21.7	$1.67
Option 3	-$18.7	$4.68
Option 5	-$19.6	$3.71
Option 6	-$26.3	-$2.93

Discount rate	**6.6%**	real, pre-tax
Opex rate	**1.5%**	per annum
Transmission asset life	**50**	years

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.938	0.880	0.826	0.774	0.726	0.681	0.639	0.600	0.563	0.528
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**16.3**		
Annuity of capex											-1.1	-1.1
Opex											-0.2	-0.2
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.4	-1.4
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	-0.7
NPV asset costs over 50 years=	**-11.5**											
Check NPV (over 50 years)	-$11.5											
Annuity of capex			**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**
Check PV annuity of capex	-$11.5											
Expected USE value @ 50% demand forecast ($)			779824	949267	1175215	1563812	2047532	2559683	3164482	3972793	5049900	6492370
Expected Unserved energy value ($M)			0.8	0.9	1.2	1.6	2.0	2.6	3.2	4.0	5.0	6.5
Total cash flow			**-1.6**	**-1.7**	**-2.0**	**-2.4**	**-2.8**	**-3.4**	**-4.0**	**-4.8**	**-5.8**	**-7.3**
PV cash flow (over 10 years)		0.0	-1.5	-1.5	-1.6	-1.8	-2.1	-2.3	-2.5	-2.9	-3.3	-3.8
NPV (over 10 years) =	**-23.3**											
Check NPV (over 10 years) =	**-$23.3**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**37.83**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**	**-3.2**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-2.5	-2.3	-2.2	-2.0	-1.9	-1.8	-1.7
NPV (over 50 years) =	-40.2											
Check NPV (over 50 years) =	-$40.2											
Annuity @ t=0 of 50-year NPV	-$2.77											
Total EAC of this option		0	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8	-2.8
Check NPV (over 50 years)	-$40.2											
Error =	0											
NPV (over 10 years) =	**-$19.8**											

Option 2												
Capital cost including FDC					**41.6**							
Annuity of capex						-2.9	-2.9	-2.9	-2.9	-2.9	-2.9	-2.9
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-2.7	-2.5	-2.4	-2.2	-2.1	-2.0	-1.8
NPV (over 50 years) =	-44.0											
Check NPV (over 50 years) =	-$44.0											
Annuity @ t=0 of 50-year NPV	-$3.03											
Total EAC of this option		0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Check NPV (over 50 years)	-$44.0											
Error =	0											
NPV (over 10 years) =	**-$21.7**											

Option 3												
Capital cost including FDC					**26.13**					**13**		
Annuity of capex						-1.8	-1.8	-1.8	-1.8	-1.8	-2.7	-2.7
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-3.3**	**-3.3**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-1.7	-1.6	-1.5	-1.4	-1.3	-1.8	-1.7
NPV (over 50 years) =	-37.9											
Check NPV (over 50 years) =	-$37.9											
Annuity @ t=0 of 50-year NPV	-$2.61											
Total EAC of this option		0	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Check NPV (over 50 years)	-$37.9											
Error =	0											
NPV (over 10 years) =	**-$18.7**											

BETS Regulatory Test evaluation: Scenario B **(page 2 of 2)**

Option 5												
Capital cost including FDC					**37.44**							
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**	**-3.1**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-2.4	-2.3	-2.1	-2.0	-1.9	-1.8	-1.7
NPV (over 50 years) =	-39.9											
Check NPV (over 50 years) =	-$39.9											
Annuity @ t=0 of 50-year NPV	-$2.74											
Total EAC of this option		0	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7	-2.7
Check NPV (over 50 years)	-$39.9											
Error =	0											
NPV (over 10 years) =	**-$19.6**											
Option 6												
Capital cost including FDC					**41.73**					**13**		
Annuity of capex						-2.9	-2.9	-2.9	-2.9	-2.9	-3.8	-3.8
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.8	-0.8
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-3.5**	**-4.6**	**-4.6**
PV cash flow (over 50 years)		0	0.6	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	2.9											
Check NPV (over 50 years) =	-$53.3											
Annuity @ t=0 of 50-year NPV	-$3.67											
Total EAC of this option		0	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7	-3.7
Check NPV (over 50 years)	-$53.3											
Error =	6.3949E-14											
NPV (over 10 years) =	**-$26.3**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.6**	**-1.7**	**-1.97**	**-2.36**	**-2.84**	**-3.35**	**-4.0**	**-4.8**	**-5.8**	**-7.3**
Option 1		0.0	-3.2	-3.2	-3.17	-3.17	-3.17	-3.17	-3.2	-3.17	-3.2	-3.2
Option 2		0.0	-3.5	-3.5	-3.49	-3.49	-3.49	-3.49	-3.5	-3.49	-3.5	-3.5
Option 3		0.0	-2.7	-2.7	-2.70	-2.70	-2.70	-2.70	-2.7	-2.70	-2.7	-2.7
Option 5		0.0	-3.1	-3.1	-3.14	-3.14	-3.14	-3.14	-3.1	-3.14	-3.1	-3.1
Option 6		0.0	-4.0	-4.0	-4.01	-4.01	-4.01	-4.01	-4.0	-4.0	-4.0	-4.0

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: Scenario C

All amounts expressed in real $ M at Dec 08 prices

- Upper bound capital cost
- Upper bound operating cost
- Upper bound discount rate
- Lower bound demand growth

SUMMARY - Scenario C	NPV	Net benefit
Do nothing	-$19.6	$0.00
Option 1	-$21.6	-$2.02
Option 2	-$23.7	-$4.03
Option 3	-$19.7	-$0.09
Option 5	-$21.4	-$1.82
Option 6	-$28.0	-$8.38

Discount rate	**10.0%**	real, pre-tax
Opex rate	**1.5%**	per annum
Transmission asset life	**50**	years

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**16.3**		
Annuity of capex											-1.6	-1.6
Opex											-0.2	-0.2
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.9	-1.9
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	-0.7
NPV asset costs over 50 years=	**-8.6**											
Check NPV (over 50 years)	-$8.6											
Annuity of capex			**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**	**-0.9**
Check PV annuity of capex	-$8.6											
Expected USE value @ 50% demand forecast ($)			779824	949267	1175215	1563812	2047532	2559683	3164482	3972793	5049900	6492370
Expected Unserved energy value ($M)			0.8	0.9	1.2	1.6	2.0	2.6	3.2	4.0	5.0	6.5
Total cash flow			**-1.6**	**-1.8**	**-2.0**	**-2.4**	**-2.9**	**-3.4**	**-4.0**	**-4.8**	**-5.9**	**-7.4**
PV cash flow (over 10 years)		0.0	-1.5	-1.5	-1.5	-1.7	-1.8	-1.9	-2.1	-2.3	-2.5	-2.8
NPV (over 10 years) =	**-19.6**											
Check NPV (over 10 years) =	**-$19.6**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**37.83**							
Annuity of capex						-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-4.4**	**-4.4**	**-4.4**	**-4.4**	**-4.4**	**-4.4**	**-4.4**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-3.0	-2.7	-2.5	-2.2	-2.0	-1.9	-1.7
NPV (over 50 years) =	-34.9											
Check NPV (over 50 years) =	-$34.9											
Annuity @ t=0 of 50-year NPV	-$3.52											
Total EAC of this option		0	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Check NPV (over 50 years)	-$34.9											
Error =	0											
NPV (over 10 years) =	**-$21.6**											

Option 2												
Capital cost including FDC					**41.6**							
Annuity of capex						-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-4.8**	**-4.8**	**-4.8**	**-4.8**	**-4.8**	**-4.8**	**-4.8**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-3.3	-3.0	-2.7	-2.5	-2.2	-2.0	-1.9
NPV (over 50 years) =	-38.2											
Check NPV (over 50 years) =	-$38.2											
Annuity @ t=0 of 50-year NPV	-$3.85											
Total EAC of this option		0	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Check NPV (over 50 years)	-$38.2											
Error =	0											
NPV (over 10 years) =	**-$23.7**											

Option 3												
Capital cost including FDC					**26.13**					**13**		
Annuity of capex						-2.6	-2.6	-2.6	-2.6	-2.6	-3.9	-3.9
Opex						-0.4	-0.4	-0.4	-0.4	-0.4	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-3.0**	**-3.0**	**-3.0**	**-3.0**	**-3.0**	**-4.5**	**-4.5**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-2.1	-1.9	-1.7	-1.6	-1.4	-1.9	-1.7
NPV (over 50 years) =	-31.8											
Check NPV (over 50 years) =	-$31.8											
Annuity @ t=0 of 50-year NPV	-$3.21											
Total EAC of this option		0	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2	-3.2
Check NPV (over 50 years)	-$31.8											
Error =	3.908E-14											
NPV (over 10 years) =	**-$19.7**											

BETS Regulatory Test evaluation: Scenario C **(page 2 of 2)**

Option 5												
Capital cost including FDC					**37.44**							
Annuity of capex						-3.8	-3.8	-3.8	-3.8	-3.8	-3.8	-3.8
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-4.3**	**-4.3**	**-4.3**	**-4.3**	**-4.3**	**-4.3**	**-4.3**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-3.0	-2.7	-2.4	-2.2	-2.0	-1.8	-1.7
NPV (over 50 years) =	-34.6											
Check NPV (over 50 years) =	-$34.6											
Annuity @ t=0 of 50-year NPV	-$3.49											
Total EAC of this option		0	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Check NPV (over 50 years)	-$34.6											
Error =	0											
NPV (over 10 years) =	**-$21.4**											
Option 6												
Capital cost including FDC					**41.73**					**13**		
Annuity of capex						-4.2	-4.2	-4.2	-4.2	-4.2	-5.5	-5.5
Opex						-0.6	-0.6	-0.6	-0.6	-0.6	-0.8	-0.8
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-4.8**	**-4.8**	**-4.8**	**-4.8**	**-4.8**	**-6.3**	**-6.3**
PV cash flow (over 50 years)		0	0.6	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	2.9											
Check NPV (over 50 years) =	-$45.2											
Annuity @ t=0 of 50-year NPV	-$4.56											
Total EAC of this option		0	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6	-4.6
Check NPV (over 50 years)	-$45.2											
Error =	0											
NPV (over 10 years) =	**-$28.0**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.6**	**-1.8**	**-2.04**	**-2.43**	**-2.92**	**-3.43**	**-4.0**	**-4.8**	**-5.9**	**-7.4**
Option 1		0.0	-4.4	-4.4	-4.38	-4.38	-4.38	-4.38	-4.4	-4.38	-4.4	-4.4
Option 2		0.0	-4.8	-4.8	-4.82	-4.82	-4.82	-4.82	-4.8	-4.82	-4.8	-4.8
Option 3		0.0	-3.7	-3.7	-3.72	-3.72	-3.72	-3.72	-3.7	-3.72	-3.7	-3.7
Option 5		0.0	-4.3	-4.3	-4.34	-4.34	-4.34	-4.34	-4.3	-4.34	-4.3	-4.3
Option 6		0.0	-5.5	-5.5	-5.53	-5.53	-5.53	-5.53	-5.5	-5.5	-5.5	-5.5

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: Scenario D

All amounts expressed in real $ M at Dec 08 prices

- Lower bound capital cost
- Lower bound operating cost
- Lower bound discount rate
- Central demand growth

SUMMARY - Scenario D	NPV	Net benefit
Do nothing	-$27.5	$0.00
Option 1	-$10.2	$17.22
Option 2	-$11.1	$16.35
Option 3	-$9.7	$17.75
Option 5	-$10.1	$17.31
Option 6	-$13.3	$14.16

Discount rate	**6.6%**	real, pre-tax
Opex rate	**0.5%**	per annum
Transmission asset life	**50**	years

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.938	0.880	0.826	0.774	0.726	0.681	0.639	0.600	0.563	0.528
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**8.8**		
Annuity of capex											-0.6	-0.6
Opex											0.0	0.0
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.6
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	-0.3
NPV asset costs over 50 years=	**-5.5**											
Check NPV (over 50 years)	-$5.5											
Annuity of capex			**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**
Check PV annuity of capex	-$5.5											
Expected USE value @ 50% demand forecast ($)			846766	1093711	1386015	1943436	2628841	3410422	4413908	5797489	7717349	10383224
Expected Unserved energy value ($M)			0.8	1.1	1.4	1.9	2.6	3.4	4.4	5.8	7.7	10.4
Total cash flow			**-1.2**	**-1.5**	**-1.8**	**-2.3**	**-3.0**	**-3.8**	**-4.8**	**-6.2**	**-8.1**	**-10.8**
PV cash flow (over 10 years)		0.0	-1.1	-1.3	-1.5	-1.8	-2.2	-2.6	-3.1	-3.7	-4.6	-5.7
NPV (over 10 years) =	**-27.5**											
Check NPV (over 10 years) =	**-$27.5**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**20.37**							
Annuity of capex						-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.2	-1.1	-1.0	-1.0	-0.9	-0.8	-0.8
NPV (over 50 years) =	-20.8											
Check NPV (over 50 years) =	-$20.8											
Annuity @ t=0 of 50-year NPV	-$1.43											
Total EAC of this option		0	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Check NPV (over 50 years)	-$20.8											
Error =	3.1974E-14											
NPV (over 10 years) =	**-$10.2**											

Option 2												
Capital cost including FDC					**22.4**							
Annuity of capex						-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.3	-1.2	-1.1	-1.1	-1.0	-0.9	-0.9
NPV (over 50 years) =	-22.6											
Check NPV (over 50 years) =	-$22.6											
Annuity @ t=0 of 50-year NPV	-$1.55											
Total EAC of this option		0	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
Check NPV (over 50 years)	-$22.6											
Error =	3.1974E-14											
NPV (over 10 years) =	**-$11.1**											

Option 3												
Capital cost including FDC					**14.07**					**7**		
Annuity of capex						-1.0	-1.0	-1.0	-1.0	-1.0	-1.4	-1.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.6**	**-1.6**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-0.8	-0.8	-0.7	-0.7	-0.6	-0.9	-0.8
NPV (over 50 years) =	-19.7											
Check NPV (over 50 years) =	-$19.7											
Annuity @ t=0 of 50-year NPV	-$1.36											
Total EAC of this option		0	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Check NPV (over 50 years)	-$19.7											
Error =	0											
NPV (over 10 years) =	**-$9.7**											

BETS Regulatory Test evaluation: Scenario D **(page 2 of 2)**

Option 5												
Capital cost including FDC					**20.16**							
Annuity of capex						-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**
PV cash flow (over 50 years)		0	-0.8	-1.0	-1.1	-1.2	-1.1	-1.0	-1.0	-0.9	-0.8	-0.8
NPV (over 50 years) =	-20.6											
Check NPV (over 50 years) =	-$20.6											
Annuity @ t=0 of 50-year NPV	-$1.42											
Total EAC of this option		0	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Check NPV (over 50 years)	-$20.6											
Error =	0											
NPV (over 10 years) =	**-$10.1**											
Option 6												
Capital cost including FDC					**22.47**					**7**		
Annuity of capex						-1.5	-1.5	-1.5	-1.5	-1.5	-2.0	-2.0
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-1.1	-1.4							
Total cash flow		**0**	**-0.8**	**-1.1**	**-1.4**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-2.2**	**-2.2**
PV cash flow (over 50 years)		0	0.7	1.2	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	3.8											
Check NPV (over 50 years) =	-$27.0											
Annuity @ t=0 of 50-year NPV	-$1.86											
Total EAC of this option		0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
Check NPV (over 50 years)	-$27.0											
Error =	0											
NPV (over 10 years) =	**-$13.3**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.2**	**-1.5**	**-1.76**	**-2.32**	**-3.01**	**-3.79**	**-4.8**	**-6.2**	**-8.1**	**-10.8**
Option 1		0.0	-1.5	-1.5	-1.50	-1.50	-1.50	-1.50	-1.5	-1.50	-1.5	-1.5
Option 2		0.0	-1.7	-1.7	-1.65	-1.65	-1.65	-1.65	-1.7	-1.65	-1.7	-1.7
Option 3		0.0	-1.4	-1.4	-1.36	-1.36	-1.36	-1.36	-1.4	-1.36	-1.4	-1.4
Option 5		0.0	-1.5	-1.5	-1.49	-1.49	-1.49	-1.49	-1.5	-1.49	-1.5	-1.5
Option 6		0.0	-2.0	-2.0	-1.98	-1.98	-1.98	-1.98	-2.0	-2.0	-2.0	-2.0

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: Scenario E

All amounts expressed in real $ M at Dec 08 prices

- Lower bound capital cost
- Lower bound operating cost
- Lower bound discount rate
- Lower bound demand growth

SUMMARY - Scenario E	NPV	Net benefit
Do nothing	-$20.3	$0.00
Option 1	-$10.1	$10.29
Option 2	-$10.9	$9.42
Option 3	-$9.5	$10.82
Option 5	-$10.0	$10.38
Option 6	-$13.1	$7.23

Discount rate	**6.6%**	real, pre-tax
Opex rate	**0.5%**	per annum
Transmission asset life	**50**	years

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.938	0.880	0.826	0.774	0.726	0.681	0.639	0.600	0.563	0.528
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**8.8**		
Annuity of capex											-0.6	-0.6
Opex											0.0	0.0
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.6
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	-0.3
NPV asset costs over 50 years=	**-5.5**											
Check NPV (over 50 years)	-$5.5											
Annuity of capex			**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**
Check PV annuity of capex	-$5.5											
Expected USE value @ 50% demand forecast ($)			779824	949267	1175215	1563812	2047532	2559683	3164482	3972793	5049900	6492370
Expected Unserved energy value ($M)			0.8	0.9	1.2	1.6	2.0	2.6	3.2	4.0	5.0	6.5
Total cash flow			**-1.2**	**-1.3**	**-1.6**	**-1.9**	**-2.4**	**-2.9**	**-3.5**	**-4.3**	**-5.4**	**-6.9**
PV cash flow (over 10 years)		0.0	-1.1	-1.2	-1.3	-1.5	-1.8	-2.0	-2.3	-2.6	-3.1	-3.6
NPV (over 10 years) =	**-20.3**											
Check NPV (over 10 years) =	**-$20.3**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**20.37**							
Annuity of capex						-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-1.2	-1.1	-1.0	-1.0	-0.9	-0.8	-0.8
NPV (over 50 years) =	-20.4											
Check NPV (over 50 years) =	-$20.4											
Annuity @ t=0 of 50-year NPV	-$1.40											
Total EAC of this option		0	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Check NPV (over 50 years)	-$20.4											
Error =	0											
NPV (over 10 years) =	**-$10.1**											

Option 2												
Capital cost including FDC					**22.4**							
Annuity of capex						-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-1.3	-1.2	-1.1	-1.1	-1.0	-0.9	-0.9
NPV (over 50 years) =	-22.2											
Check NPV (over 50 years) =	-$22.2											
Annuity @ t=0 of 50-year NPV	-$1.53											
Total EAC of this option		0	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
Check NPV (over 50 years)	-$22.2											
Error =	0											
NPV (over 10 years) =	**-$10.9**											

Option 3												
Capital cost including FDC					**14.07**					**7**		
Annuity of capex						-1.0	-1.0	-1.0	-1.0	-1.0	-1.4	-1.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.6**	**-1.6**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-0.8	-0.8	-0.7	-0.7	-0.6	-0.9	-0.8
NPV (over 50 years) =	-19.3											
Check NPV (over 50 years) =	-$19.3											
Annuity @ t=0 of 50-year NPV	-$1.33											
Total EAC of this option		0	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3
Check NPV (over 50 years)	-$19.3											
Error =	0											
NPV (over 10 years) =	**-$9.5**											

BETS Regulatory Test evaluation: Scenario E **(page 2 of 2)**

Option 5												
Capital cost including FDC					**20.16**							
Annuity of capex						-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**
PV cash flow (over 50 years)		0	-0.7	-0.8	-1.0	-1.2	-1.1	-1.0	-1.0	-0.9	-0.8	-0.8
NPV (over 50 years) =	-20.2											
Check NPV (over 50 years) =	-$20.2											
Annuity @ t=0 of 50-year NPV	-$1.39											
Total EAC of this option		0	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
Check NPV (over 50 years)	-$20.2											
Error =	0											
NPV (over 10 years) =	**-$10.0**											
Option 6												
Capital cost including FDC					**22.47**					**7**		
Annuity of capex						-1.5	-1.5	-1.5	-1.5	-1.5	-2.0	-2.0
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-1.7**	**-2.2**	**-2.2**
PV cash flow (over 50 years)		0	0.6	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	2.9											
Check NPV (over 50 years) =	-$26.6											
Annuity @ t=0 of 50-year NPV	-$1.83											
Total EAC of this option		0	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8
Check NPV (over 50 years)	-$26.6											
Error =	3.1974E-14											
NPV (over 10 years) =	**-$13.1**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.2**	**-1.3**	**-1.55**	**-1.94**	**-2.42**	**-2.94**	**-3.5**	**-4.3**	**-5.4**	**-6.9**
Option 1		0.0	-1.5	-1.5	-1.50	-1.50	-1.50	-1.50	-1.5	-1.50	-1.5	-1.5
Option 2		0.0	-1.7	-1.7	-1.65	-1.65	-1.65	-1.65	-1.7	-1.65	-1.7	-1.7
Option 3		0.0	-1.4	-1.4	-1.36	-1.36	-1.36	-1.36	-1.4	-1.36	-1.4	-1.4
Option 5		0.0	-1.5	-1.5	-1.49	-1.49	-1.49	-1.49	-1.5	-1.49	-1.5	-1.5
Option 6		0.0	-2.0	-2.0	-1.98	-1.98	-1.98	-1.98	-2.0	-2.0	-2.0	-2.0

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.

BETS Regulatory Test evaluation: Scenario F

All amounts expressed in real $ M at Dec 08 prices

- Lower bound capital cost
- Lower bound operating cost
- Upper bound discount rate
- Lower bound demand growth

SUMMARY - Scenario F	NPV	Net benefit
Do nothing	-$16.9	$0.00
Option 1	-$11.4	$5.51
Option 2	-$12.4	$4.52
Option 3	-$10.5	$6.45
Option 5	-$11.3	$5.61
Option 6	-$14.5	$2.39

Discount rate	**10.0%**	real, pre-tax
Opex rate	**0.5%**	per annum
Transmission asset life	**50**	years

Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
t=		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Discount factor		1.000	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386
Do nothing Option (Central 50% demand f/c)												
Capital cost including FDC										**8.8**		
Annuity of capex											-0.9	-0.9
Opex											0.0	0.0
Total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.9	-0.9
PV of total asset-related annual cash flow			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	-0.4
NPV asset costs over 50 years=	**-4.2**											
Check NPV (over 50 years)	-$4.2											
Annuity of capex			**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**	**-0.4**
Check PV annuity of capex	-$4.2											
Expected USE value @ 50% demand forecast ($)			779824	949267	1175215	1563812	2047532	2559683	3164482	3972793	5049900	6492370
Expected Unserved energy value ($M)			0.8	0.9	1.2	1.6	2.0	2.6	3.2	4.0	5.0	6.5
Total cash flow			**-1.2**	**-1.4**	**-1.6**	**-2.0**	**-2.5**	**-3.0**	**-3.6**	**-4.4**	**-5.5**	**-6.9**
PV cash flow (over 10 years)		0.0	-1.1	-1.1	-1.2	-1.4	-1.5	-1.7	-1.8	-2.1	-2.3	-2.7
NPV (over 10 years) =	**-16.9**											
Check NPV (over 10 years) =	**-$16.9**											

Option 1												
Yr ending Dec =>		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Capital cost including FDC					**20.37**							
Annuity of capex						-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**	**-2.2**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-1.5	-1.3	-1.2	-1.1	-1.0	-0.9	-0.8
NPV (over 50 years) =	-18.4											
Check NPV (over 50 years) =	-$18.4											
Annuity @ t=0 of 50-year NPV	-$1.86											
Total EAC of this option		0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9
Check NPV (over 50 years)	-$18.4											
Error =	0											
NPV (over 10 years) =	**-$11.4**											

Option 2												
Capital cost including FDC					**22.4**							
Annuity of capex						-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-2.4**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-1.6	-1.5	-1.3	-1.2	-1.1	-1.0	-0.9
NPV (over 50 years) =	-20.0											
Check NPV (over 50 years) =	-$20.0											
Annuity @ t=0 of 50-year NPV	-$2.02											
Total EAC of this option		0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Check NPV (over 50 years)	-$20.0											
Error =	0											
NPV (over 10 years) =	**-$12.4**											

Option 3												
Capital cost including FDC					**14.07**					**7**		
Annuity of capex						-1.4	-1.4	-1.4	-1.4	-1.4	-2.1	-2.1
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-2.2**	**-2.2**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-1.0	-0.9	-0.8	-0.8	-0.7	-0.9	-0.9
NPV (over 50 years) =	-16.9											
Check NPV (over 50 years) =	-$16.9											
Annuity @ t=0 of 50-year NPV	-$1.70											
Total EAC of this option		0	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7
Check NPV (over 50 years)	-$16.9											
Error =	0											
NPV (over 10 years) =	**-$10.5**											

BETS Regulatory Test evaluation: Scenario F **(page 2 of 2)**

Option 5												
Capital cost including FDC					**20.16**							
Annuity of capex						-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**	**-2.1**
PV cash flow (over 50 years)		0	-0.7	-0.8	-0.9	-1.5	-1.3	-1.2	-1.1	-1.0	-0.9	-0.8
NPV (over 50 years) =	-18.2											
Check NPV (over 50 years) =	-$18.2											
Annuity @ t=0 of 50-year NPV	-$1.84											
Total EAC of this option		0	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8
Check NPV (over 50 years)	-$18.2											
Error =	0											
NPV (over 10 years) =	**-$11.3**											
Option 6												
Capital cost including FDC					**22.47**					**7**		
Annuity of capex						-2.3	-2.3	-2.3	-2.3	-2.3	-3.0	-3.0
Opex						-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Expected unserved energy			-0.8	-0.9	-1.2							
Total cash flow		**0**	**-0.8**	**-0.9**	**-1.2**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-2.4**	**-3.1**	**-3.1**
PV cash flow (over 50 years)		0	0.6	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NPV (over 50 years) =	2.9											
Check NPV (over 50 years) =	-$23.4											
Annuity @ t=0 of 50-year NPV	-$2.36											
Total EAC of this option		0	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4
Check NPV (over 50 years)	-$23.4											
Error =	2.8422E-14											
NPV (over 10 years) =	**-$14.5**											
Determining the optimal timing of investment:												
Simple annuity analysis excluding unserved energy costs for augmentation options												
Do Nothing Option		**0.0**	**-1.2**	**-1.4**	**-1.60**	**-1.99**	**-2.48**	**-2.99**	**-3.6**	**-4.4**	**-5.5**	**-6.9**
Option 1		0.0	-2.2	-2.2	-2.16	-2.16	-2.16	-2.16	-2.2	-2.16	-2.2	-2.2
Option 2		0.0	-2.4	-2.4	-2.37	-2.37	-2.37	-2.37	-2.4	-2.37	-2.4	-2.4
Option 3		0.0	-1.9	-1.9	-1.91	-1.91	-1.91	-1.91	-1.9	-1.91	-1.9	-1.9
Option 5		0.0	-2.1	-2.1	-2.13	-2.13	-2.13	-2.13	-2.1	-2.13	-2.1	-2.1
Option 6		0.0	-2.8	-2.8	-2.80	-2.80	-2.80	-2.80	-2.8	-2.8	-2.8	-2.8

Note: The annuity of the augmentation option commences at t=n+1 (one year after the capex is commissioned) so optimal timing is the year BEFORE the year in which the annuity of the Do Nothing option exceeds that of the augmentation option for the first time.