FINAL REPORT

5 June 2009

>> *Maintaining a reliable electricity supply to Southern (South West and South East) Queensland*

DOCUMENT PURPOSE

For the benefit of those not familiar with the National Electricity Rules (Rules) and the National Electricity Market (NEM), Powerlink offers the following clarifications on the purpose and intent of this document:

1. The Rules require Powerlink to carry out forward planning to identify future reliability of supply requirements and to issue this type of document for "proposed new large network assets".

2. The Rules require Powerlink to identify, evaluate and compare both network and non-network options (including generation and demand side management) to determine which can address the future supply requirements at the lowest cost to the market and hence to electricity consumers.

3. This document contains the results of this evaluation, responses to any issues raised during the consultation on the draft recommendation included in the Application Notice and a final recommended solution to address future supply requirements.

What the document does NOT mean:

A. It does NOT mean that the lights are about to go out. The identified supply requirements are expected to arise some years into the future, assuming that demand for electricity continues to grow. There is enough time between now and then to implement a solution.

B. It does NOT mean that Powerlink has been surprised, or that anything is "out of the ordinary". It is part of the normal, routine planning processes in the NEM.

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EXECUTIVE SUMMARY

Introduction

Electricity use in Southern Queensland has exhibited very strong growth during the past ten years and growth is expected to continue over the next ten years, due to inter alia population growth and the on going uptake of domestic air-conditioning.

This forecast growth in electricity demand will increase loadings on the electricity transmission network supplying South West and South East Queensland. This is expected to result in the need for action from summer 2011/12 to ensure customers continue to receive a reliable electricity supply.

Powerlink recognises the importance of maintaining a reliable electricity supply to its customers. Routine planning investigations have been carried out to identify the most appropriate course of action to meet future supply requirements in Southern Queensland.

This Final Report has been prepared as part of the prescribed National Electricity Rules (NER) process for the approval of proposed new large network assets. It contains the results of the planning investigation and economic assessment of feasible supply options. In accordance with the Australian Energy Regulator (AER) Regulatory Test, the supply solution that meets the reliability requirements at the lowest present value cost is recommended for implementation.

Options Considered

Powerlink issued a Request for Information (RFI) document to Registered Participants and interested parties in October 2008, which invited submissions from potential non-network solution providers to address future supply requirements in Southern Queensland from summer 2011/12. Four submissions were received. Two of the submissions advised of proposed generation developments in Southern Queensland. At this stage and under the AER's Regulatory Test, these generation developments do not satisfy the "committed project" criteria and consequently could not be considered as genuine non-network alternatives. There were no proposed demand side options from either individual providers, or aggregators.

Given the summer 2011/12 timeline and the lead times required for transmission development, Powerlink published an Application Notice on 6 March 2009 that detailed six feasible network options to augment the transmission network supplying South West and South East Queensland.

The six network augmentation options were evaluated in detail to compare the present value of the costs to Registered Participants, in accordance with the Regulatory Test. The six options all address limitations arising from summer 2011/12, but each involves a different combination and sequence of augmentation. Common to all options is the proposal to rearrange the Braemar Substation as a measure to address fault levels. This involves splitting the 275kV bus to create two switchyard sections (western and eastern), coincident with establishing additional transmission circuits within the Bulli to South West grid section.

The options published in the Application Notice released on 6 March 2009 are summarised in Table 1.

Table 1: Summary of Network Augmentation Options

Option 1 Capacitor Banks followed by Braemar-Halys	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of a 275kV substation at Halys and construction of a 275kV double circuit line between Braemar and Halys substations. Also, installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 2 Western Downs-Halys	• Establishment of 275kV substations at Western Downs and Halys, and construction of 275kV double circuit lines between Western Downs and Halys substations, as well as between Western Downs and Braemar substations, by summer 2011/12; • Installation of two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation, as well as a 275kV 120MVAr shunt capacitor bank at Belmont Substation and a 110kV 50MVAr shunt capacitor bank at South Pine Substation by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 3 Capacitor Banks followed by Western Downs-Halys 275kV	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of 275kV substations at Western Downs and Halys, and construction of 275kV double circuit lines between Western Downs and Halys substations, as well as between Western Downs and Braemar substations. Also, installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of 275kV substations at Western Downs and Halys, and construction of 275kV double circuit lines between Western Downs and Halys substations, as well as between Western Downs and Braemar substations. Also, installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; • Establishment of five 275kV Series Capacitors on circuits between Tarong Substation and South East Queensland by summer 2013/14 ;and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2015/16.

Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; and • Establishment of 275kV substations at Western Downs and Halys, and construction of a 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV. Also construct a 275kV double circuit line between Western Downs and Braemar substations. In addition, install a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 6 Capacitor Banks followed by Western Downs-Halys 500kV	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of a 500/275kV Substation at Western Downs, a 500kV substation at Halys, and construction of a 500kV double circuit line between Western Downs and Halys substations, as well as a 275kV double circuit line between Western Downs and Braemar substations. In addition, upgrade the Blackwall Substation to 500kV and construct a 500kV double circuit line between Halys and Blackwall substations. Also installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13.

Options 2 to 6 involve constructing a new 275kV double circuit line between Western Downs and Braemar substations which would potentially duplicate a large proportion of the existing transmission line that currently provides non-regulated connection services to Kogan Creek Power Station.

The Application Notice released on 6 March 2009 advised that Powerlink had commenced discussions with CS Energy as the owner of Kogan Creek Power Station on utilising a large section of the existing 275kV double circuit line, as a lower cost alternative to duplicating that section and that the outcome of the discussion would be published in the Final Report.

Powerlink and CS Energy have agreed on utilising the existing 275kV double circuit line (presently providing non-regulated connection services) instead of constructing an additional 275kV transmission line, to the extent that this delivers an overall lower cost solution to consumers. The appropriate asset value would be included in Powerlink's regulated asset base. Powerlink is currently finalising discussions with the AER on the mechanics of the arrangements.

The cost estimates for the network options in this Final Report now reflect utilisation of the relevant sections of the existing Kogan Creek to Braemar 275kV transmission line to connect Western Downs Substation, as well as any other arrangements or costs required now or in the future.

Evaluation and Conclusion

The AER's Regulatory Test requires that, for reliability augmentations, the recommended option minimises the present value of costs in a majority of credible scenarios.

In the Application Notice released on 6 March 2009, Powerlink made a draft recommendation to implement Option 3 Capacitor Banks followed by Western Downs-Halys 275kV.

Subsequent to the economic analysis published in the Application Notice and in accordance with the AER's Regulatory Test, an updated economic analysis has been carried out that takes into account the revised cost estimates of the network options associated with utilising the existing Kogan Creek to Braemar 275kV transmission line to connect Western Downs Substation, as well as additional future costs for fault level management measures at Kogan Creek Power Station to accommodate anticipated future fault level increases that would result from changing the network configuration.

The outcomes of the economic analysis contained in this Final Report are consistent with those published in the Application Notice. Option 3, Capacitor Banks followed by Western Downs-Halys 275kV, remains as the least cost solution for the majority of credible scenarios (4 out of 6 scenarios) considered over the 25-year analysis timeframe.

The economic analysis in this Final Report also identifies that, under some circumstances there are other options which have Net Present Cost of the same order of magnitude as Option 3. This is a similar outcome to that detailed in the Application Notice which led Powerlink to also consider the broader strategic advantages that Option 3, Capacitor Banks followed by Western Downs-Halys 275kV, provides to the long term development of the power system. The comparative strategic advantages that Option 3 provides remain unchanged in this Final Report.

The sensitivity analysis carried out as part of the new economic analysis shows Option 3 Capacitor Banks followed by Western Downs-Halys 275kV to be the preferred solution under a range of assumptions. This outcome is consistent with the Application Notice, together with a sensitivity analysis of the possible impact of the CPRS, which revealed no change to the ranking of the options under the scenarios considered.

Six submissions were received in response to the Application Notice published on 6 March 2009. The respondents include ERM Power, Origin Energy, AGL, Stanwell Corporation, Hill-Michael and Xstrata Coal Queensland. Powerlink has reviewed these submissions and considers that the information provided does not change the recommendations contained within the Application Notice. The submissions supported the concept of developing a reliable high capacity transmission corridor to supply South East Queensland and did not propose any genuine non-network solutions or demand side options as an alternative to Option 3 as the recommended network solution.

Consequently, this Final Report contains a final recommendation to implement Option 3, Capacitor Banks followed by Western Downs-Halys 275kV. The series of works that comprise Option 3 in this Final Report are consistent with the works detailed in the Application Notice, with the exception that the recommendation in this Final Report includes utilising a large section of the existing Kogan Creek to Braemar 275kV double circuit line to connect the Western Downs Substation as a lower cost alternative to constructing a new (duplicate) 275kV double circuit line. The associated timing for the works remains unchanged.

The series of works that make up Option 3 include:

- Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12;
- Construction of new 275kV substations at Western Downs and Halys and a 275kV double circuit line between Western Downs and Halys substations by summer 2012/13;
- Rearrangement of the existing 275kV double circuit line between Kogan Creek Power Station and Braemar Substation, to connect Western Downs Substation by summer 2012/13;
- Rearrangement of Braemar Substation by splitting the 275kV bus by summer 2012/13;
- Installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and a 110kV 50MVAr shunt capacitor bank at South Pine Substation by summer 2012/13; and
- Construction of a new 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.

The estimated cost of these works is $651.24 million in 2008/09 prices. Powerlink will now proceed with the necessary processes to implement this recommendation.

1. INTRODUCTION

Electricity demand in Southern Queensland continues to increase due to, inter alia, population growth and the ongoing uptake of domestic air-conditioning. To ensure an ongoing reliable electricity supply to customers in this area, Powerlink has undertaken routine planning studies to identify future supply requirements. Based on the forecast growth for Southern Queensland, Powerlink has identified that action will be required from summer 2011/12 to ensure a continued reliable electricity supply, consistent with Powerlink's reliability of supply obligations.

Where a Transmission Network Service Provider (TNSP), such as Powerlink, proposes to establish new large network assets to address such requirements, it is required to issue an "Application Notice" under clause 5.6.6 of the National Electricity Rules (Rules). The Rules require consideration of any submissions received in response to the Application Notice, and preparation of a "Final Report", which must contain information regarding:

- The reasons the augmentation is required, including, if relevant, why it is considered a 'reliability augmentation', as defined in the Rules;
- Feasible options available to address the future supply requirements, including non-network alternatives;
- The recommended solution, including the timetable for implementation;
- Why the solution satisfies the Regulatory Test prescribed by the Australian Energy Regulator (AER); and
- A summary of submissions received from interested parties and the applicant's response to each submission.

This document contains a final recommendation for works to be undertaken to meet the reliability of electricity supply obligations for the summer peak loads over the period 2011/12 to 2013/14. This final recommendation is based on:

- The assessment that a decision is now required to efficiently increase supply capability to ensure a reliable power supply in Southern Queensland for the summer peak loads from 2011/12 to 2013/14;
- Analysis of feasible options in accordance with the AER Regulatory Test; and
- The publication of an Application Notice containing a draft recommendation to address the future supply requirements to allow comment by interested parties.

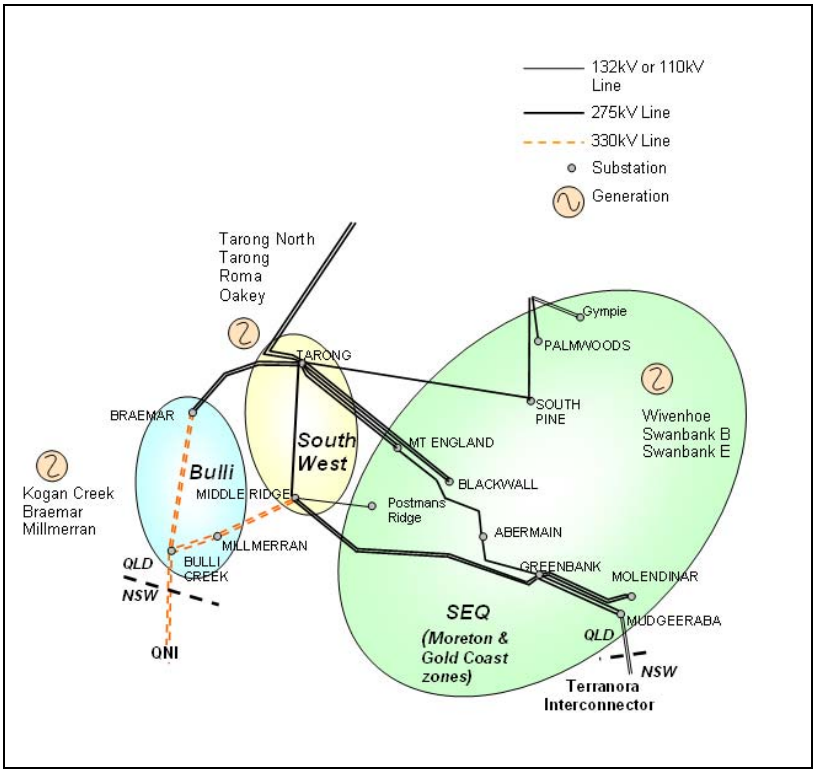
The recommended option minimises the present value of the costs to Registered Participants in the National Electricity Market while meeting the reliability standards under the Rules and Powerlink's transmission licence. It will allow Powerlink to ensure a reliable supply during single contingencies at the least cost to the market and therefore to end-use customers. It comprises works to ensure the existing network capability in Southern Queensland is maintained to meet the summer peak loads over the 2011/12 to 2013/14 period and works to increase capability to meet reliability of supply obligations.

2. BACKGROUND: EXISTING SUPPLY SYSTEM

2.1 Geographical Area

Southern Queensland and the transmission network supplying it is shown in the diagram below. Southern Queensland comprises the Bulli, South West, Moreton and Gold Coast zones as outlined in Powerlink's 2008 *Annual Planning Report*. The Moreton and Gold Coast zones are combined below and depicted as South East Queensland (SEQ) within this Application Notice.

Figure 1: Electricity transmission network and local generators supplying Southern Queensland (network shown as at summer 2008/09)



2.2 Existing Supply Arrangements

Within Southern Queensland, most of the load is consumed in the growing south eastern corner, that is, Brisbane, Ipswich and the Gold and Sunshine Coasts. The amount of electricity consumed in this area considerably exceeds the amount produced by power stations in the area. Accordingly, large amounts of electricity must be transferred into South East Queensland from power stations in Central Queensland, Bulli and South West zones via Powerlink's 275kV transmission network in order to meet peak demand requirements.

The existing transfer capability of Powerlink's 275kV network between Central Queensland and Southern Queensland, as well as between Bulli, South West, and South East Queensland, is described by limit equations which dynamically maximise the transmission capability available to electricity market participants at any time. Power transfers are not allowed to exceed these limits, otherwise the power system maybe affected by transient and voltage instability following critical single network contingencies.

Power may also be transferred into Southern Queensland via the Queensland-New South Wales interconnector (QNI) and Terranora Interconnector under some electricity market conditions. Capacity into Southern Queensland via QNI, which is greater than the capacity of the Terranora Interconnector, is transferred in addition to generated power between Bulli, South West to South East Queensland.

2.3 Committed Network Developments

Powerlink, ENERGEX and Ergon Energy have significant programs of committed capital works to address load growth within Southern Queensland. These have been considered in the planning analysis described in this document.

Committed works are detailed in Powerlink's 2008 *Annual Planning Report*, and the ENERGEX and Ergon Energy *Network Management Plans*. The most significant of these works are:

- Installation of Static VAr Compensators (SVCs) at Woolooga, South Pine and Greenbank substations (all recently completed);
- Construction of a new 275kV substation at Abermain to meet future Ipswich area needs (recently completed);
- Transformer augmentation at Palmwoods (132/110kV), and Murarrie and South Pine (275/110kV) substations;
- Construction of a new double circuit 275kV line between South Pine and Sandgate substations;
- Works to address localised supply needs in Oakey, Browns Plains and Bundamba and associated distribution works;
- Ongoing program of capacitor bank installations by Powerlink in South East Queensland; and
- ENERGEX and Ergon Energy programs of new transformer installations and capacitor banks installations throughout their distribution networks to meet growing demand.

2.4 Existing and Committed Generation Facilities

Existing power stations connected to the transmission network in Southern Queensland are detailed in Table 2.

Most of these power stations are located in Bulli and South West zones, with significant amounts of power being transferred to South East Queensland via the five 275kV circuits between Tarong and the Brisbane area, and the two 275kV circuits between Middle Ridge and Greenbank, as depicted in Figure 1.

In addition, there are also a number of generation facilities within the South East Queensland network that reduce power flow between Bulli, South West and South East Queensland when they are generating.

Table 2: Generation Facilities in Southern Queensland

Zone	Location	Type	Maximum Summer Capacity (MW generated)
Bulli and South West Queensland:			
Bulli	Braemar	Combustion turbine	450
	Kogan Creek	Coal fired	724
	Millmerran	Coal fired	852
South West	Tarong North	Coal fired	443
	Tarong	Coal fired	1400
	Roma	Combustion turbine	54
	Oakey	Combustion turbine	275
Total Bulli and South West Queensland Generation			*4198*
South East Queensland:			
Moreton	Wivenhoe	Hydro electric	500
	Swanbank B	Coal fired	480
	Swanbank E	Combustion turbine	350
Total South East Queensland Generation			*1330*
Total Southern Queensland Generation			**5528**

In addition, and as stated in its 2008 *Annual Planning Report*, Powerlink has been advised of the commitment of Braemar 2, Darling Downs and Condamine Power Stations. The Condamine Power Station will connect within the South West zone, whereas the Braemar 2 and Darling Downs Power Stations are connecting to Braemar Substation within the Bulli zone. Following the commissioning of the new power stations, the fault level at the Braemar Substation will be just within the rating of the equipment installed. No additional generation will be able to connect at this location until measures are undertaken to reduce fault levels.

Powerlink is also aware of a number of other generation proposals for Southern Queensland. Based on the information received, it is likely that new generation will emerge near the major gas and coal fuel sources located around the Kogan Creek and Braemar areas of the Bulli zone. In addition, possible large scale renewable generation such as solar thermal technology may locate further west, where there is suitable land area for the technology used.

3. BACKGROUND: ELECTRICITY DEMAND

3.1 Overview

Powerlink coordinates a state-wide electricity demand forecast on an annual basis. Electricity demand forecasts for a ten-year period are obtained from Distribution Network Service Providers (DNSP's), that is ENERGEX, Ergon Energy and Country Energy, and customers at each connection point in Powerlink's transmission system. The forecasts take account of demand management programs in place or foreseen by DNSP's, and also the presence of embedded generation, which may reduce the forecast of demand which needs to be supplied via each transmission connection point.

Finalisation of the annual demand forecast includes comparing the local DNSP forecasts with an independent assessment of energy and demand forecasts for the Queensland region carried out by the National Institute of Economic and Industrial Research (NIEIR). This independent assessment includes a review of the impact of new embedded generation.

3.2 Load Forecast

Electricity usage in Queensland has exhibited very strong growth during the past ten years, and growth is expected to continue over the next ten years. As stated in Section 2.2, the majority of the electricity is consumed in the south eastern corner.

Electricity demand is currently expected to increase by approximately 3.6% per annum across the state, and 4.2% per annum in South East Queensland, over the next ten years. This increased demand is due to, inter alia, population growth and the ongoing uptake of domestic air-conditioning. The summer peak demand forecast based on hot weather conditions (10% Probability of Exceedence [PoE]) is shown in Table 3 below.

Table 3: State and South East Queensland (SEQ) Peak Demand Forecast (Medium Economic Growth)

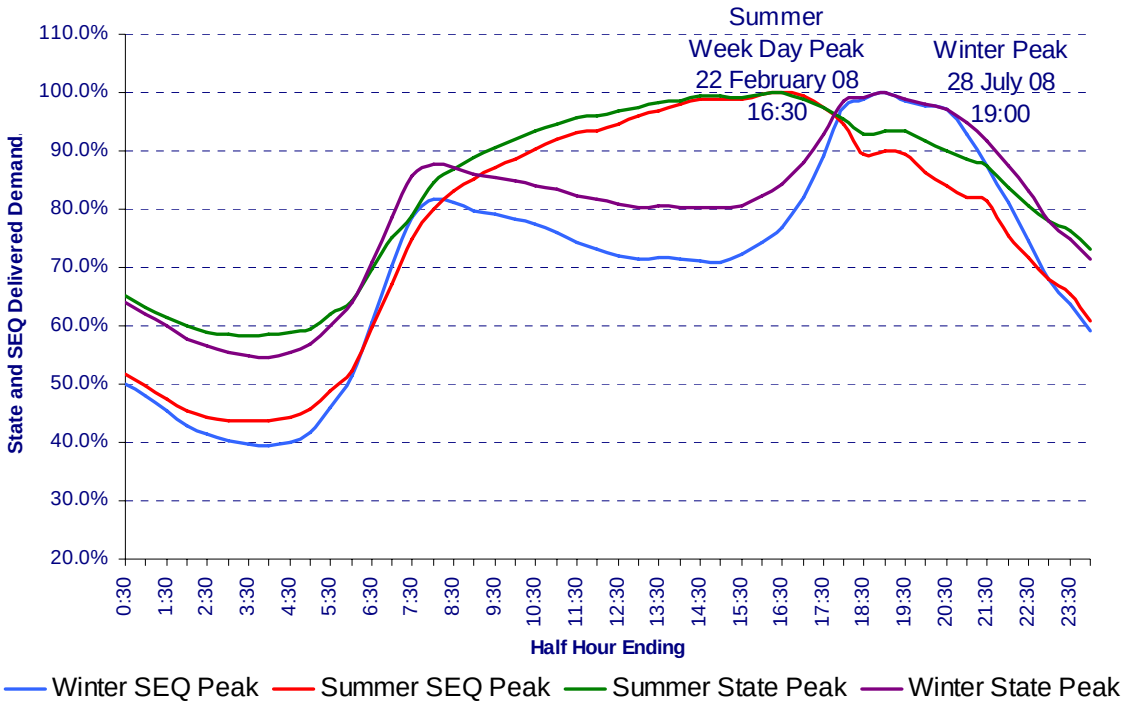
YEAR	STATE DEMAND 10% PoE (MW)	SEQ DEMAND 10%PoE (MW)
2008/09	9,233	5,383
2009/10	9,660	5,678
2010/11	10,076	5,949
2011/12	10,503	6,222
2012/13	10,885	6,454
2013/14	11,232	6,668
2014/15	11,595	6,915
2015/16	12,001	7,196
2016/17	12,400	7,472
2017/18	12,815	7,758

3.3 Pattern of Use

Peak electricity demand in Queensland is experienced in summer, driven by high temperatures, and industrial and air conditioning load. As a result, the area also has a high reactive power demand with a consequent requirement for reactive power supply.

Figure 2 below shows the load profiles for the most recent summer and winter peak demand days for both the state and South East Queensland. Typically, summer weekday electricity demand in Queensland remains relatively high throughout the day.

Figure 2: State and South East Queensland Peak Daily Load Curves - Summer 2007/08 and Winter 2008



Sensitivity of electricity demand to ambient temperature is much higher in summer compared to winter. Peak demand in Queensland occurs on hot humid days and is driven mostly by the use of air conditioning during these conditions.

4. FORECAST RELIABILITY OF SUPPLY REQUIREMENTS

4.1 Planning Criteria for Network Development

Powerlink has reliability and quality of supply obligations under the National Electricity Rules, the Electricity Act, and its Transmission Authority and connection agreements with customers. In particular, Powerlink must plan and develop its transmission system in accordance with good electricity industry practice, such that its network must be able to meet forecast electricity demand during an outage of the most critical single network element (known as the N-1 criterion), unless otherwise agreed with affected parties.

Powerlink assesses the future capability of its network and takes action to ensure it continues to meet these performance requirements. Consequently, Powerlink has identified that action is required to ensure that the network supplying Southern Queensland will be able to meet these obligations for forecast peak demands from summer 2011/12. Solutions to address the forecast requirements are therefore classified as reliability augmentations[1].

4.2 Supply and Demand Assumptions

In its assessment of future network capability, Powerlink has made the following assumptions regarding supply and demand.

Generation
It is assumed that all Bulli, South West and South East Queensland generation will operate at maximum summer sent out capacity, except Wivenhoe, which is energy-limited and assumed to operate at 150MW. The reliability study is based on supplying the peak demand in Southern Queensland with a single generating unit out of service at one of Tarong North, Callide, or Swanbank E Power Stations, depending on the emerging limit.

Interconnectors
It is assumed that, at times of peak demand, Queensland New South Wales Interconnector and Terranora Interconnector will have northerly flows of 200MW and 0MW respectively.

Demand
The demand forecast is based on medium economic growth and hot weather conditions (10% PoE).

4.3 Network Capability and Future Supply Requirements

The forecast growth in electricity demand outlined in Section 3.2 will increase loadings on the high voltage network between Bulli and South West zones, and between South West and South East Queensland. Without action to augment supply, the capability of both these grid sections will be insufficient to reliably meet forecast demand following critical contingencies.

4.3.1 Bulli to South West

Maximum power transfer across the Bulli to South West grid section may be limited by transmission plant thermal capacity, the ability to maintain stable voltage levels or to maintain transient stability following critical contingencies.

[1] A transmission network augmentation that is necessitated principally by inability to meet the minimum network performance requirements set out in schedule 5.1 of the NER or in relevant legislation, regulations or any statutory instrument of a participating jurisdiction.

The two circuits between Millmerran and Middle Ridge are transformer-ended feeders. Thermal limitations are forecast to occur on a 330/275kV transformer at Middle Ridge, for an outage of the parallel circuit and transformer, from summer 2010/11. The short-term maximum and emergency cyclic rating of this transformer is 1300MVA. Powerlink has developed operational measures to avoid overloads and alleviate the need for a network augmentation or non-network solution to address this limitation until summer 2012/13, when other limitations that cannot be addressed via operational measures are forecast to occur.

For voltage stability, the critical contingency is the outage of one of the 275kV or 330kV circuits that make up this grid section. The voltage instability results from exhaustion of reactive power reserves in Southern Queensland.

Following a credible contingency, there may also be insufficient generation beyond the Bulli zone to allow NEMMCO to return the power system within the Queensland region to a secure state while maintaining a reliable supply to all customers. Under these conditions, the maximum power transfer between the Bulli and South West zones is limited by the occurrence of unstable voltage levels or transient instability. These limitations may mean that a portion of the available generation capacity within the Bulli zone cannot be dispatched, resulting in a supply deficit. This would mean that Powerlink could not meet its mandated reliability of supply obligations. Based on current generation commitments as described in Section 2.4, this limitation is forecast to occur from summer 2011/12.

Beyond the forecast initial limitations, thermal limitations are forecast to occur on the 330kV circuits between Millmerran and Middle Ridge, or the 275kV circuits between Braemar and Tarong, for an outage of the parallel circuit, from summer 2012/13. These 330kV and 275kV circuits have emergency ratings of 1464MVA and 1234MVA respectively.

These thermal limitations are sensitive to the distribution of generation dispatched within the Bulli and South West zones. Generation at the southern end of the Bulli zone (Millmerran and northerly flow on QNI) increases the loading on the southern corridor between Millmerran and Middle Ridge, whereas generation at the northern end (Braemar) leads to higher flows on the Braemar to Tarong circuits within the northern corridor.

4.3.2 South West to South East Queensland

Maximum power transfer across the South West to South East Queensland grid section may be limited thermally or by the occurrence of unstable voltages, following critical contingencies.

Thermal limitations are forecast to occur on a 275kV circuit between Middle Ridge and Greenbank following an outage of the parallel circuit. These 275kV circuits have an emergency rating of 1234MVA. Based on current generation commitments as outlined in Section 2.4, this limitation is forecast to occur from summer 2013/14.

Prior to the thermal limitation from summer 2013/14, voltage stability is forecast to limit the maximum power transfer across the South West to South East Queensland grid section. The voltage instability will result from exhaustion of reactive power reserves in Southern Queensland. The critical contingency is the loss of a 275kV circuit between Central and Southern Queensland or one of the seven 275kV circuits between South West and South East Queensland.

Voltage stability into South East Queensland has been a limitation Powerlink has progressively addressed for many years. Over time, this voltage stability limit has been increased through the commissioning of new 275kV circuits into South East Queensland and a program of static and dynamic reactive power compensation. Transmission line augmentations have included double circuit 275kV lines between Tarong and Blackwall

substations commissioned summer 2000/01, and between Middle Ridge and Greenbank substations commissioned summer 2007/08.

With respect to static and dynamic reactive power compensation, Powerlink recently commissioned Static VAr Compensators at Greenbank, South Pine and Woolooga substations, together with several static capacitor banks in South East Queensland as detailed in Powerlink's *Annual Planning Report* 2008 and Regulatory Test consultation documents.

Beyond summer 2011/12, additional supply capacity is required to meet forecast demand and ensure that customers in South East Queensland continue to receive a reliable electricity supply during single network outages. Unless action is undertaken to augment supply, voltage stability limitations are forecast to recur from summer 2012/13, and thermal limitations from summer 2013/14.

4.3.3 Fault Level Limitations

As outlined in Section 2.4, Powerlink has been advised of the commitment of Braemar 2, Darling Downs and Condamine Power Stations. Condamine Power Station is connecting to Ergon Energy's 132kV network within the South West zone, while Braemar 2 and Darling Downs Power Stations are connecting to Powerlink's 275kV Braemar Substation within the Bulli zone.

This new generation, together with existing plant, is expected to increase the fault level at the Braemar Substation to be just within the plant rating.

Solutions to meet the forecast supply reliability needs must ensure fault levels do not exceed the capacity of substation plant. This includes the ability to connect future generating plant to meet forecast increases in demand.

5. RESPONSES TO THE CONSULTATION PROCESS

Powerlink issued an Application Notice on 6 March 2009 which contained a draft recommendation to address future supply requirements into South West and South East Queensland. The recommended scope of works was as follows:

- Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12;
- Construction of new 275kV substations at Western Downs and Halys, and a new 275kV double circuit line between Western Downs and Halys substations by summer 2012/13;
- Construction of a 275kV double circuit line between Western Downs and Braemar substations by summer 2012/13;
- Rearrangement of Braemar Substation by splitting the 275kV bus by summer 2012/13;
- Installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and a 110kV 50MVAr shunt capacitor bank at South Pine Substation by summer 2012/13; and
- Construction of a new 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.

Six submissions were received in response to the Application Notice. The respondents include ERM Power, Origin Energy, AGL, Stanwell Corporation, Hill-Michael and Xstrata Coal Queensland.

Powerlink has reviewed the submissions and has considered that they do not change the recommendations contained within the Application Notice published during March this year. The submissions supported the concept of developing a reliable high capacity transmission corridor to supply South East Queensland and did not propose any genuine non-network solutions or demand side options as an alternative to Option 3 as the recommended network solution. Five of the submissions also proposed that Powerlink consider a range of suggestions which have been summarised as follows:

Relocate Western Downs Substation

Three submissions suggested locating the new 275kV Western Downs Substation further west to the Columboola or Chinchilla area, so as to provide a connection point for future generation and coal mining developments locating in the Surat Basin and Wandoan areas respectively.

Powerlink has considered the suggestion of locating Western Downs Substation further west (approximately 50km) and concluded that this alternative would not be economically efficient due to the associated increase in construction costs. This does not preclude future network developments that may connect to Western Downs Substation.

Upgrade of QNI

One of the submissions identified that the Bulli / South West Queensland area is expected to become a significant hub in the future for low carbon generation sources. In light of this potential future development, it was suggested that Powerlink review the impact of this

scenario on Queensland New South Wales Interconnector (QNI) and the southern transmission corridor from Bulli Creek to Middle Ridge and incorporate associated findings in this Final Report.

Powerlink has considered this suggestion. In the joint final report on the potential to upgrade QNI that was released in October 2008[2], Powerlink and TransGrid committed to continue to monitor load growth across all regions in the National Electricity Market (NEM) and new generation entry which could materially impact on the potential upgrade to QNI. The report advised that triggers for conducting further analysis may include a consistent "above medium" load growth totalling 2,000MW across all regions in the NEM over several years that would indicate a high economic growth scenario is emerging, or where the optimal timing for upgrading QNI may be advanced due to the entry of as-yet uncommitted new generation scheduled for commissioning from 2012 onwards which was not included in the market modelling.

Where one of these triggers arises in the future, Powerlink will as part of its routine planning studies assess the impact on QNI together with intra-regional transmission capability and associated reinforcement requirements that may be needed to increase QNI transfer capability. This will include assessing the transmission capability of the southern transmission corridor from Bulli Creek to Middle Ridge.

Implement the recommended works earlier

One of the submissions suggested advancing the works comprising the construction of the new 275kV power path to Halys Substation earlier than summer 2012/13, to enable an earlier connection of as-yet uncommitted new generation.

Powerlink has considered this suggestion and will address the suggested early connection requirements under Clause 5.3 of the National Electricity Rules at the time a connection application is received.

[2] Powerlink and TransGrid published the final report "Potential Upgrade of Queensland/New South Wales Interconnector (QNI) – Assessment of Optimal Timing and Net Market Benefits" on 13 October 2008.

6. OPTIONS CONSIDERED

Powerlink identified in its *Annual Planning Reports* published in 2006, 2007 and 2008 an expectation that action would be required to address future reliability of supply requirements in Southern Queensland. Relevant industry participants and interested parties were consulted in October 2008[3] regarding these future supply requirements and information was requested on potential non-network options that could address these requirements as an alternative to network augmentation.

6.1 Non-Network Options

Four submissions were received in response to the Request For Information (RFI) consultation. In summary, these submissions did not offer any genuine and practicable non-network options to address the future supply requirements in Southern Queensland from summer 2011/12.

More specifically, three of the parties indicated support for the ongoing development of transmission network between South West and South East Queensland. Two of the parties also advised of proposed new generation in Southern Queensland. This included the:

- A potential wind farm at Coopers Gap; and
- Braemar 3 Power Station (expected from late 2011) and a possible scenario of establishing additional units in the Braemar area.

At this stage, these proposed generation developments do not satisfy the "committed project" criteria defined by the AER's Regulatory Test.

In order for a potential non-network solution to be considered as a genuine alternative to network augmentation, the solution must deliver reliability outcomes consistent with Powerlink's mandated reliability obligations and accept, on a commensurate basis, levels of liability similar to those accepted by transmission network service providers.

Powerlink has considered whether the potential generation projects referred to in the responses to the RFI could address the future supply requirements within the identified timeframes.

The voltage limitation that is forecast to occur from summer 2011/12 relates to the ability to transfer power across the Bulli to South West grid section following credible contingencies. A generation or DSM solution would need to be connected east of the Bulli zone to address this forecast limitation. As the Braemar 3 Power Station is proposing to locate in the Bulli zone, it cannot be considered as a non-network alternative suitable for addressing the forecast voltage limitation. It is also an uncommitted project under the Australian Energy Regulator's (AER) Regulatory Test.

Powerlink has determined that the submissions received in response to the RFI do not offer any genuine and practicable non-network solutions that address the forecast supply requirements.

[3] Request for Information document *Maintaining a reliable electricity supply to Southern (South West and South East) Queensland* was published on 28 October 2008.

However, potential future generation developments in the Bulli area have been included in the market development scenarios used to evaluate feasible network options to address the forecast limitations beyond summer 2011/12.

6.2 Network Options

Powerlink has carried out detailed planning studies to consider feasible network options. These studies included load flow analysis, fault level studies and other technical assessment to determine the capability of various options to supply future customer electricity needs in Southern Queensland.

From the planning studies, six feasible network options to augment the transmission network were identified and published in an Application Notice on 6 March 2009.

The six network augmentation options were evaluated in detail to compare the present value of the costs to Registered Participants, in accordance with the Regulatory Test. The six options that address limitations arising from summer 2011/12 involve different combinations and sequences of augmentation, and are summarised in the Table 4 below.

Table 4: Summary of Network Augmentation Options

Option 1 Capacitor Banks followed by Braemar-Halys	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of a 275kV substation at Halys and construction of a 275kV double circuit line between Braemar and Halys substations. Also, installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 2 Western Downs-Halys	• Establishment of 275kV substations at Western Downs and Halys, and construction of 275kV double circuit lines between Western Downs and Halys substations, as well as between Western Downs and Braemar substations, by summer 2011/12; • Installation of two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation, as well as a 275kV 120MVAr shunt capacitor bank at Belmont Substation and a 110kV 50MVAr shunt capacitor bank at South Pine Substation by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 3 Capacitor Banks followed by Western Downs-Halys 275kV	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of 275kV substations at Western Downs and Halys, and construction of 275kV double circuit lines between Western Downs and Halys substations, as well as between Western Downs and Braemar substations. Also, installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.

Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of 275kV substations at Western Downs and Halys, and construction of 275kV double circuit lines between Western Downs and Halys substations, as well as between Western Downs and Braemar substations. Also, installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; • Establishment of five 275kV Series Capacitors on circuits between Tarong Substation and South East Queensland by summer 2013/14 ;and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2015/16.
Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; and • Establishment of 275kV substations at Western Downs and Halys, and construction of a 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV. Also construct a 275kV double circuit line between Western Downs and Braemar substations. In addition, install a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13; and • Construction of a 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14.
Option 6 Capacitor Banks followed by Western Downs-Halys 500kV	• Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12; • Establishment of a 500/275kV Substation at Western Downs, a 500kV substation at Halys, and construction of a 500kV double circuit line between Western Downs and Halys substations, as well as a 275kV double circuit line between Western Downs and Braemar substations. In addition, upgrade the Blackwall Substation to 500kV and construct a 500kV double circuit line between Halys and Blackwall substations. Also installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and an 110kV 50MVAr shunt capacitor bank at South Pine Substation. All works are to be completed by summer 2012/13

Other works common to the six options above include rearranging the Braemar Substation in order to address fault levels. This involves splitting the 275kV[4] bus to create two switchyard sections (western and eastern), coincident with establishing additional transmission circuits within the Bulli to South West grid section.

Options 2 to 6 in the above table include constructing a new 275kV double circuit line between Western Downs and Braemar substations. These works would potentially duplicate a large section of the existing 275kV double circuit transmission line between Kogan Creek Power Station and Braemar Substation, which provides non-regulated connection services to the Kogan Creek Power Station.

The Application Notice released on 6 March 2009 advised that Powerlink had commenced discussions with CS Energy as the owner of Kogan Creek Power Station, to investigate whether the existing 275kV transmission line could be utilised to connect Western Downs Substation as a lower cost alternative to duplicating the line. The Application Notice also advised that the outcome of the discussions would be published in the Final Report.

[4] Operational switching will be used to split the 330kV bus at Braemar substation.

Powerlink and CS Energy have agreed on utilising the existing 275kV double circuit line (presently providing non-regulated connection services) instead of constructing an additional 275kV transmission line, to the extent that this delivers an overall lower cost solution to consumers. The appropriate asset value would be included in Powerlink's regulated asset base. Powerlink is currently finalising discussions with the AER on the mechanics of the arrangements.

The cost estimates for the network options in this Final Report now reflect utilisation of the relevant sections of the existing 275kV transmission line between Kogan Creek and Braemar Substation to connect Western Downs Substation[5] and also include additional future costs for fault level management measures at Kogan Creek Power Station to accommodate anticipated future fault level increases that would result from changing the network configuration.

All of the network augmentation options also involve the construction of 500kV double circuit lines between Halys and Blackwall substations. Easements have been strategically acquired since the 1980's and reserved for this purpose, in recognition of diminishing land availability and increasing land development in the South East Queensland corner.

It should be noted that the six feasible options described deliver different increments in supply capacity to Southern Queensland. Some options provide a larger increment in network capability, and therefore provide for forecast load growth further into the future before additional action would be required. These differences are taken into account in the economic comparison by including for each option, the additional "anticipated" and "modelled" projects that are expected to be required to continue to meet reliability obligations during the 25-year planning horizon.

These anticipated and modelled projects are not recommended for development at this stage in this Application Notice but are included in the economic analysis to ensure that all feasible options are compared on an equivalent basis in accordance with the AER's Regulatory Test. The sensitivity of the analysis to these assumptions is tested through the use of market development scenarios. However, it should be noted that projects which are common (in both scope and timing) to all feasible options are excluded from the economic analysis as they have no impact on the ranking of results.

Each of the six feasible options is described below, together with the relevant anticipated/modelled projects[6]. The description of the works and cost estimates of the options have been slightly changed to reflect Powerlink and CS Energy agreeing on Powerlink utilising the existing 275kV double circuit line from Kogan Creek Power Station to Braemar Substation, to connect the Western Downs Substation as the lower cost alternative to constructing a new 275kV double circuit line. This is shown as "rearrangement" works[7] in this Final Report. Also included are additional future costs to upgrade certain equipment at Kogan Creek Power Station to accommodate expected fault level increases at that location, resulting from changing the network configuration.

All other information on the six options described in this section remains unchanged and consistent with that published in the Application Notice. This includes the timing for

[5] For the purpose of the economic analysis, the lines component of the works associated with the rearrangement of the existing Braemar-Kogan Creek 275kV transmission line is modelled to occur in the year preceding the rearrangement, to reflect expected cash flow.

[6] The AER Regulatory Test defines 'anticipated projects' as "projects … which have expected commissioning dates within five years" and 'modelled projects' as "other investments which are likely to be commissioned in response to growing demand…".

[7] The description used in Tables 5 to 16 that reflect the use of the existing Braemar-Kogan Creek 275kV line is "Rearrangement of existing 275kV double circuit line between Kogan Creek and Braemar substation, to connect Western Downs". This description replaces "Construction of 275kV double circuit line between Western Downs and Braemar substations" published in the Application Notice on 6 March 2009.

rearranging the existing 275kV line from Kogan Creek to Braemar Substation, to connect Western Downs Substation.

Full details of the economic analysis are contained in Appendix 2.

6.2.1 Option 1 Capacitor Banks followed by Braemar-Halys

The proposed scope of works for Option 1 is outlined in Table 5.

Table 5: Option 1 Proposed Augmentations

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2011/12	Installation of: • 330kV 200MVAr shunt capacitor bank at Millmerran Substation; and • Two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation.	$10.30
Summer 2012/13	Construction of: • 275kV substation at Halys; • 275kV double circuit line between Braemar and Halys substations; • 275kV 120MVAr shunt capacitor bank at Belmont Substation; and • 110kV 50MVAr shunt capacitor bank at South Pine Substation. Rearrangement of: • Braemar Substation by splitting the 275kV bus.	$206.07
Summer 2013/14	Construction of: • 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV.	$387.26
	Total	**$603.63**

Option 1 meets future supply requirements in Southern Queensland, with the cost of the proposed works under this option estimated at $603.63 million in $08/09.

The capacitor banks address the voltage stability limits that are forecast to arise across the Bulli to South West and South West to South East Queensland grid sections from 2011/12, by reducing reactive power losses in the 275kV and 330kV transmission circuits supplying South East Queensland. The capacitor banks will also increase the reactive power reserves in the region. This collectively meets the voltage stability requirements to 2012/13 at which time thermal limits within the Bulli to South West grid section are forecast to arise following a critical contingency.

Installing a 275kV double circuit line between Braemar and Halys substations and a 500kV double circuit line (initially operated at 275kV) between Halys and Blackwall substations will create an additional transmission power path in the northern corridor between Bulli-South West grid section. This will increase power flow across the northern corridor into South East Queensland and address the thermal limits that are forecast to arise from summers 2012/13 and 2013/14 within the Bulli to South West and South West to South East Queensland grid sections respectively.

Splitting the Braemar Substation's 275kV bus is a measure that reduces fault levels and increases the capacity for additional connections to be made, including future generation required to meet growing demand for electricity in Southern Queensland.

Further works will then be required to meet the forecast power transfer limitations across the Bulli to South West and South West to South East Queensland grid sections. As these works progress and additional generation connects to the transmission network, fault levels at the Braemar Substation are again expected to be reached. Establishing the Western Downs Substation, as well as upgrading plant fault level ratings at the Braemar Substation are measures to address the fault level limitation. These works are detailed as anticipated/modelled projects and are listed in Table 6.

Table 6: Option 1 Anticipated/Modelled Projects

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2016/17	Construction of: • 275kV substation at Western Downs; and • 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV. Upgrade of: • Fault level ratings of Braemar Substation plant (western yard section). Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 1). Rearrangement of: • Existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation.	$382.15
Summer 2018/19	Upgrade of : • Western Downs and Halys substations to 500kV and operation of the Western Downs-Halys 500kV double circuit line at 500kV; and • Blackwall Substation to 500kV and operation of the Halys-Blackwall double circuit line at 500kV. Construction of: • 500kV double circuit line between Halys and Greenbank substations, initially operated at 275kV.	$568.67
Summer 2020/21	Upgrade of : • Greenbank Substation to 500kV and operation of the Halys-Greenbank double circuit line at 500kV. Construction of: • Second 500kV double circuit line between Western Downs and Halys substations, to operate at 500kV. Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 2).	$405.05
	Total	**$1,355.87**

6.2.2 Option 2 Western Downs-Halys

The proposed scope of works for Option 2 is outlined in Table 7.

Table 7: Option 2 Proposed Augmentations

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2011/12	Construction of: • 275kV substations at Western Downs and Halys; and • 275kV double circuit line between Western Downs and Halys substations; Rearrangement of: • Existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation; and • Braemar Substation by splitting the 275kV bus.	$248.78
Summer 2012/13	Installation of: • Two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation; • 275kV 120MVAr shunt capacitor bank at Belmont Substation; and • 110kV 50MVAr shunt capacitor bank at South Pine Substation.	$11.60
Summer 2013/14	Construction of: • 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV.	$387.26
	Total	**$647.64**

Option 2 meets future supply requirements in Southern Queensland, with the cost of the proposed works under this option estimated at $647.64 million in $08/09.

Establishing the Western Downs and Halys substations combined with rearranging the existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation, together with constructing a new 275kV double circuit line from Western Downs to Halys Substation will create an additional transmission power path in the northern corridor. This will increase power flow across the northern corridor into South East Queensland and address the voltage limits that are forecast to arise from summer 2011/12 within the Bulli to South West grid section, and also the thermal limits that arise from summer 2012/13. Installation of capacitor banks is then required to address the forecast voltage stability limits arising from reactive power losses in the 275kV and 330kV transmission circuits supplying South East Queensland.

Constructing a 500kV double circuit line (initially operated at 275kV) between Halys and Blackwall substations in turn addresses the voltage stability limit and the forecast thermal limitations that are forecast to arise within the South West to South East Queensland grid section by summer 2013/14.

As with Option 1, splitting the 275kV bus addresses the fault level at Braemar Substation. Establishing the Western Downs Substation allows fault levels at the Braemar Substation to remain within plant ratings as it provides an alternative generation connection hub for future generation required to meet growing demand for electricity in Southern Queensland.

Further works will then be required to meet the forecast power transfer limitations across the Bulli to South West and South West to South East Queensland grid sections. These works are detailed as anticipated/modelled projects in Table 8.

Table 8: Option 2 Anticipated/Modelled Projects

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2015/16	Implementation of: • Fault level management measures at Kogan Creek (Stage 1).	$12.00
Summer 2016/17	Construction of: • 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV.	$266.55
Summer 2018/19	Construction of: • 500kV double circuit line between Halys and Greenbank substations, initially operated at 275kV; Upgrade of: • Western Downs and Halys substations to 500kV and operation of Western Downs-Halys double circuit line at 500kV; and • Blackwall Substation to 500kV and operation of Halys-Blackwall double circuit line at 500kV.	$568.67
Summer 2020/21	Construction of: • Second 500kV double circuit line between Western Downs and Halys substations. Upgrade of: • Greenbank Substation to 500kV and operation of Halys-Greenbank double circuit line at 500kV. Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 2).	$405.05
	Total	**$1,252.28**

6.2.3 Option 3 Capacitor Banks followed by Western Downs-Halys 275kV

The proposed scope of works for Option 3 is outlined in Table 9.

Table 9: Option 3 Proposed Augmentations

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2011/12	Installation of: • Shunt capacitor banks at Millmerran and Middle Ridge substations per Option 1.	$10.30
Summer 2012/13	Construction of: • Substation works at Braemar and Western Downs substations to connect the rearranged Kogan Creek 275kV double circuit line; • 275kV substations at Western Downs and Halys; • 275kV double circuit line between Western Downs and Halys substations; and • Shunt capacitor banks at Belmont and South Pine substations per Option 1. Rearrangement of: • Existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation; and • Braemar Substation by splitting the 275kV bus.	$253.68
Summer 2013/14	Construction of: • 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV.	$387.26
	Total	**$651.24**

Option 3 meets future supply requirements in Southern Queensland, with the cost of the proposed works under this option estimated at $651.24 million in $08/09

As described in Option 1, installation of the capacitor banks address voltage stability limitations that are forecast to arise across the Bulli to South West and South West to South East Queensland grid sections through to summer 2012/13 at which time thermal limits within the Bulli to South West grid section are also forecast to arise following a critical contingency.

In a similar fashion to Option 2, creating an additional power path via the northern corridor into South East Queensland comprising 275kV double circuit lines between Braemar, Western Downs and Halys substations, together with a 500kV double circuit line (initially operated at 275kV) between Halys and Blackwall substations addresses the thermal limits that are forecast to arise by summers 2012/13 and 2013/14 within the Bulli to South West and South West to South East Queensland grid sections respectively and also defers voltage limitations.

As with Option 1, splitting the 275kV bus addresses the fault level at Braemar Substation. Establishing the Western Downs Substation allows fault levels at the Braemar Substation to remain within plant ratings and also provides an alternative generation connection hub for future generation required to meet growing demand for electricity in Southern Queensland.

Further works will then be required to meet the forecast power transfer limitations across the Bulli to South West and South West to South East Queensland grid sections. These works are detailed as anticipated/modelled projects in Table 10.

Table 10: Option 3 Anticipated/Modelled Projects

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2015/16	Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 1).	$12.00
Summer 2016/17	Construction of: • 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV.	$266.55
Summer 2018/19	Construction of: • 500kV double circuit line between Halys and Greenbank substations, initially operated at 275kV. Upgrade of: • Western Downs and Halys substations to 500kV and operation of Western Downs-Halys double circuit line at 500kV; and • Blackwall Substation to 500kV and operation of Halys-Blackwall double circuit line at 500kV.	$568.67
Summer 2020/21	Upgrade of: • Greenbank Substation to 500kV and operation of Halys-Greenbank double circuit line at 500kV. Construction of: • Second 500kV double circuit line between Western Downs and Halys substations. Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 2).	$405.05
	Total	**$1,252.28**

6.2.4 Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors

The proposed scope of works for Option 4 is outlined in Table 11.

Table 11: Option 4 Proposed Augmentations

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2011/12	Installation of: • Shunt capacitor banks at Millmerran and Middle Ridge substations per Option 1.	$10.30
Summer 2012/13	Construction of: • 275kV substations at Western Downs and Halys; • 275kV double circuit line between Western Downs and Halys substations; and • Shunt capacitor banks at Belmont and South Pine substations per Option 1. Rearrangement of: • Existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation; and • Braemar Substation by splitting the 275kV bus.	$253.68
Summer 2013/14	Installation of: • 5 x 275kV Series capacitors on circuits between Tarong and South East Queensland[8].	$125.00
Summer 2015/16	Construction of: • 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV.	$387.26
	Total	**$776.24**

Option 4 meets future supply requirements in Southern Queensland, with the cost of the proposed works under this option estimated at $776.24 million in $08/09.

As described in Option 1, installation of the capacitor banks addresses voltage stability limitations that are forecast to arise across the Bulli to South West and South West to South East Queensland grid sections through to summer 2012/13, at which time thermal limits within the Bulli to South West grid section are also forecast to arise following a critical contingency.

In a similar fashion to Option 2, creating an additional power path via the northern corridor into South East Queensland comprising 275kV double circuit lines between Braemar, Western Downs and Halys substations addresses the thermal and voltage limits that are forecast to arise by summer 2012/13.

As with Option 1, splitting the 275kV bus addresses the fault level at Braemar Substation. Establishing the Western Downs Substation allows fault levels at the Braemar substation to remain within plant ratings, and also provides an alternative generation connection hub for future generation required to meet growing demand for electricity in Southern Queensland.

Installation of the Series Capacitors on circuits between Tarong Substation and South East Queensland reduces the effective reactance across the northern corridor transmission lines. This causes more power to flow across the northern transmission corridor transmission lines,

[8] Fixed capacitors have been used to establish augmentation cost estimates. A detailed analysis would be required to confirm suitability of the cost estimates, should mitigating sub synchronous resonance be required. This would involve use of thyristor controlled series capacitors as a higher cost option.

and defers the time at which the thermal limit of the Middle Ridge to Greenbank 275kV circuits is reached. The series capacitors also address the continuing voltage stability limitations into South East Queensland until the thermal limit is reached. Construction of the 500kV double circuit line (initially operated at 275kV) between Halys and Blackwall substations by summer 2015/16 is required to address the forecast thermal and voltage limitations across the Bulli to South West and South West to South East Queensland grid sections.

Further works will then be required to meet the forecast power transfer limitations across the Bulli to South West and South West to South East Queensland grid sections. These works are detailed as anticipated/modelled projects in Table 12.

Table 12: Option 4 Anticipated/Modelled Projects

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2015/16	Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 1).	$12.00
Summer 2016/17	Construction of: • 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV.	$266.55
Summer 2018/19	Upgrade of: • Western Downs and Halys substations to 500kV and operation of Western Downs-Halys double circuit line at 500kV; and • Blackwall Substation to 500kV and operation of Halys-Blackwall double circuit line at 500kV.	$184.40
Summer 2019/20	Construction of: • 500kV double circuit line between Halys and Greenbank substations, initially operated at 275kV.	$384.27
Summer 2020/21	Upgrade of: • Greenbank Substation to 500kV and operation of Halys-Greenbank double circuit line at 500kV. Construction of: • Second 500kV double circuit line between Western Downs and Halys. Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 2).	$405.05
	Total	**$1,252.28**

6.2.5 Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)

The proposed scope of works for Option 5 is outlined in Table 13.

Table 13: Option 5 Proposed Augmentations

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2011/12	Installation of: • Shunt capacitor banks at Millmerran and Middle Ridge substations per Option 1.	$10.30
Summer 2012/13	Construction of: • 275kV substations at Western Downs and Halys; • 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV; and • Shunt capacitor banks at Belmont and South Pine substations per Option 1. Rearrangement of: • Existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation; and • Braemar Substation by splitting the 275kV bus.	$370.31
Summer 2013/14	Construction of: • 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV.	$387.26
	Total	**$767.87**

Option 5 meets future supply requirements in Southern Queensland, with the cost of the proposed works under this option estimated at $767.87 million in $08/09.

As described in Option 1, installation of the capacitor banks address voltage stability limitations that are forecast to arise across the Bulli to South West and South West to South East Queensland grid sections through to summer 2012/13 at which time thermal limits within the Bulli to South West grid section are also forecast to arise following a critical contingency.

In a similar fashion to Option 2, creating an additional power path via the northern corridor into South East Queensland comprising rearrangement of the existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation, together with new 500kV double circuit lines (initially operated at 275kV) between Western Downs, Halys, and Blackwall substations addresses the thermal and voltage limits that are forecast to arise from summers 2012/13 and 2013/14 within the Bulli to South West and South West to South East Queensland grid sections respectively.

As with Option 1, splitting the 275kV bus addresses the fault level at Braemar Substation. Establishing the Western Downs Substation allows fault levels at the Braemar Substation to remain within plant ratings and also provides an alternative generation connection hub for future generation required to meet growing demand for electricity in Southern Queensland.

Further works will then be required to meet the forecast power transfer limitations across the Bulli to South West and South West to South East Queensland grid sections. These works are detailed as anticipated/modelled projects in Table 14.

Table 14: Option 5 Anticipated/Modelled Projects

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2015/16	Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 1).	$12.00
Summer 2016/17	Construction of: • Second 500kV double circuit line between Western Downs and Halys substations, initially operated at 275kV.	$256.55
Summer 2018/19	Construction of : • 500kV double circuit line between Halys and Greenbank substations, initially operated at 275kV. Upgrade of: • Halys and Blackwall substations to 500kV and operation of Halys-Blackwall double circuit line at 500kV; and • Western Downs Substation to 500kV and operation of Western Downs-Halys double circuit line at 500kV.	$568.67
Summer 2020/21	Upgrade of: • Greenbank Substation to 500kV and operation of Halys-Greenbank double circuit line at 500kV; and • Operation of the second Western Downs-Halys 500kV double circuit line at 500kV. Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 2).	$148.50
	Total	**$985.72**

6.2.6 Option 6 Capacitor Banks followed by Western Downs-Halys 500kV

The proposed scope of works for Option 6 is outlined in Table 15.

Table 15: Option 6 Proposed Augmentations

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2011/12	Installation of: Shunt capacitor banks at Millmerran and Middle Ridge substations per Option 1.	$10.30
Summer 2012/13	Upgrade of: • Blackwall substation to 500kV operation. Construction of: • 500kV substation at Halys; • 500/275kV substation at Western Downs; • 500kV double circuit line between Western Downs and Halys substations; and • 500kV double circuit line between Halys and Blackwall substations. Installation of: • Shunt capacitor banks at Belmont and South Pine substations per Option 1. Rearrangement of: • Existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation; and • Braemar Substation by splitting the 275kV bus.	$886.74
	Total	**$897.04**

Option 6 meets future supply requirements in Southern Queensland, with the cost of the proposed works under this option estimated at $897.04 million in $08/09.

As described in Option 1, installation of the capacitor banks addresses voltage stability limitations that are forecast to arise across the Bulli to South West and South West to South East Queensland grid sections through to summer 2012/13 at which time thermal limits within the Bulli to South West grid section is also forecast to arise following a critical contingency.

In a similar fashion to Option 2, creating an additional power path via the northern corridor into South East Queensland comprising rearrangement of the existing 275kV double circuit line between Kogan Creek and Braemar Substation, to connect Western Downs Substation, together with new 500kV double circuit lines between Western Downs, Halys, and Blackwall substations and new 275kV double circuit line between Braemar and Western Downs addresses the thermal and voltage limits that are forecast to arise from summers 2012/13 and 2013/14 within the Bulli to South West and South West to South East Queensland grid sections respectively.

As with Option 1, splitting the 275kV bus addresses the fault level at Braemar Substation. Establishing the Western Downs Substation allows fault levels at the Braemar Substation to remain within plant ratings and also provides an alternative generation connection hub for future generation required to meet growing demand for electricity in Southern Queensland.

Further works will then be required to meet the forecast power transfer limitations across the Bulli to South West and South West to South East Queensland grid sections, together with

forecast fault levels at the Braemar Substation. These works are detailed as anticipated/modelled projects below in Table 16.

Table 16: Option 6 Anticipated/Modelled Projects

Date Required	Proposed Augmentations	Cost ($m, 08/09)
Summer 2015/16	Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 1).	$12.00
Summer 2016/17	Upgrade of: • Greenbank Substation to 500kV. Construction of: • 500kV double circuit line between Halys and Greenbank substations; and • Second 500kV double circuit line between Western Downs and Halys substations. Implementation of: • Fault level management measures at Kogan Creek Power Station (Stage 2).	$757.54
	Total	**$769.54**

7. SCENARIOS CONSIDERED

7.1 Context for Evaluation of Options

All feasible options to the identified supply requirements must be viewed in the context of wider developments in the National Electricity Market:

- Queensland legislation has been in effect since 1 January 2005 requiring Queensland energy retailers to source 13% of their energy from gas-fired generation. The 13% Gas Scheme is designed to deliver on the government policy objectives of diversifying the State's energy mix towards a greater use of gas and encouraging new gas infrastructure in Queensland, while reducing the growth in greenhouse gas emissions. The Queensland government announced in 2007 a policy to increase the requirement for gas fired generation from 13% to 18% by 2020. This policy announcement also includes an increase in generation from renewable energy sources to 10% of generation by 2020;
- Commonwealth legislation has been in effect since 1 January 2001 to encourage increased generation from renewable energy sources. Policy now increases this to 20% by 2020. Powerlink has incorporated independent forecasts of additional renewable energy generation into the forecasts of demand and energy used in assessing future supply requirements;
- NEMMCO's *Statement of Opportunities (SOO)* issued in October 2008 contained information on existing and committed generation developments in Queensland. There is currently a considerable margin between supply capacity and demand, with several large new generating units having been commissioned in Queensland in the past few years. Other committed plant is currently under construction. It is expected that increasing electricity demand in Queensland may lead to the commissioning of new, as-yet uncommitted generation from summer 2011/12 and beyond; and
- The implementation details of the Commonwealth Government's proposed Carbon Pollution Reduction Scheme are still being developed. However, it is anticipated that, over a period of time following implementation of the scheme (mooted for 2010), changes to generator operation and new generation investment is likely to occur and impact the National Electricity Market. A likely indirect impact is that the cost of transmission losses would increase, reflecting the cost of emissions certificates for power stations.

7.2 Assumed Market Development Scenarios

The AER's Regulatory Test requires that options to address network requirements be assessed against a number of plausible scenarios. These scenarios need to consider:

- The existing system;
- Future network developments;
- Variations in load growth;
- Committed generation and demand side developments; and
- Potential generation and demand side developments.

The purpose of this approach is to test the present value costs of the solutions being evaluated under a range of plausible scenarios.

7.2.1 Existing Network and Future Transmission Developments

No market development scenarios have been developed related to new network developments proposed by Powerlink outside Southern Queensland. These are independent of the future supply requirements that are the subject of this report and are considered to be common to all options analysed. Future network developments that are relevant to Southern Queensland have been included as anticipated/modelled projects in the analysis.

7.2.2 Variations in Demand Growth

Four different levels of demand growth were examined to consider sensitivity to variations in forecast customer electricity demand:

Forecast Electricity Demand Level
Medium (medium economic growth and hot weather conditions)
High (higher economic growth and hot weather conditions)
Low (lower economic growth and hot weather conditions)
Economic downturn outlook (a period of low economic growth trending back to medium economic growth rate and hot weather conditions)

These demand levels are based on hot weather conditions (10% Probability of Exceedence [PoE]) forecasts for electricity usage with varying levels of economic growth. The "Economic downturn outlook" scenario is a hybrid of the Low and Medium economic growth levels. It reflects the expected impacts of the current downturn being experienced across Australia and Queensland, and the expectation of a return to medium growth levels thereafter. The scenario is based on low economic growth for the first three years followed by a transition to medium economic growth rate for the remainder of the 25-year study period.

The forecasts include all known information about existing and planned demand side initiatives, and include independent forecasts of existing and planned local embedded generation.

7.2.3 Existing and Committed Generators and Demand Side Developments

A list of power stations currently operating in Southern Queensland and committed generation developments currently under construction was provided in Section 2.4.

Information gained through the RFI process (refer Section 6.1), as well as from NEMMCO's publications on existing and committed generation, does not advise of any proposals of future increases in generation output from existing generators.

For this reason, no scenarios have been developed in which the output of existing and/or committed generators is increased.

Similarly, there are no committed demand side management initiatives, either from individual providers or aggregators, relevant to meeting Southern Queensland reliability of supply requirements. Demand forecasts reflect existing embedded generation and existing demand side management in Southern Queensland.

7.2.4 Potential New Generation

The public consultation undertaken as part of the RFI process (refer Section 6.1) advised of two proposed generation projects, including the Braemar 3 Power Station and Coopers Gap wind farm. NEMMCO also provides information on future generation proposals. This

information advises that Swanbank F Power Station is proposed for commissioning in 2012. None of these proposed projects meet the criteria of "committed" projects under the AER's Regulatory Test.

As electricity demand continues to grow, it is forecast that additional generation will be required within the Queensland region. It has been assumed for the purposes of the planning studies on the future supply requirements to Southern Queensland, that entry of new generators will occur from summer 2011/12 to meet the increasing electricity demand in Queensland.

There is no certainty regarding the location of this potential new entry plant. Current new generation enquiries to Powerlink suggest there is a relatively high probability that the majority of future non-renewable new generation will locate near the Braemar / Kogan Creek area within Bulli zone, rather than in South West or South East Queensland. This reflects, inter alia, the significant coal seam methane resources in that area. In addition, possible large scale renewable generation such as solar thermal technology may locate west of the Braemar / Kogan Creek area, where there is a suitable land area for the technology used.

Three different scenarios for new generation entry were examined in the studies:

New Entry Generation Locations
All new generation located in Bulli
Majority of new generation located in Bulli, remainder in South East Queensland
Majority of new generation located in Bulli, remainder in Central Queensland

7.2.5 Scenarios considered in Economic Analysis

To take into account combinations of possible load growth and new generation entry, Powerlink considered the following six scenarios in its economic evaluation of solutions to address future supply requirements for Southern Queensland:

Scenario	Forecast Demand Growth and New Generation Location
Scenario A	Medium growth and all new generation located in Bulli
Scenario B	High growth and all new generation located in Bulli
Scenario C	Low growth and all new generation located in Bulli
Scenario D	Medium growth and most new generation location in Bulli, remainder in South East Queensland
Scenario E	Medium growth and most new generation location in Bulli, remainder in Central Queensland
Scenario F	Economic downturn outlook and all new generation located in Bulli

8. FORMAT AND INPUTS TO ANALYSIS

8.1 Regulatory Test Requirements

The requirements for the comparison of options to address future supply requirements are contained in the AER's Regulatory Test[9].

The Regulatory Test requires that, for reliability augmentations to the shared network[10], the recommended option be the option that "minimises the present value of costs, compared with a number of alternative options in a majority of reasonable scenarios".

The Regulatory Test contains guidelines for the methodology to be used to identify the lowest cost option. For example, information to be considered includes construction, operating and maintenance costs, the cost of complying with existing and anticipated laws and regulations, and reasonable forecasts of the "efficient operating costs of competitively supplying energy to meet forecast demand". However, the Regulatory Test specifically excludes indirect costs, and costs that cannot be measured as a cost in terms of financial transactions in the electricity market.

8.2 Inputs to Analysis

A solution to meet future supply requirements in Southern Queensland as outlined in this document is required to satisfy reliability requirements linked to Schedule 5.1 of the NER, the requirements of the Queensland Electricity Act and Powerlink's Transmission Authority[11].

According to the AER's Regulatory Test, this means that the costs of all options must be compared, and the least cost solution is considered to satisfy the Regulatory Test. The results of this evaluation, carried out using a discounted cash flow model to determine the present value (PV) cost of the various options, are shown in Section 9.

Cost inputs to the economic analysis are described below.

8.3 Cost of Network Augmentations

The financial analysis considers all foreseeable cost impacts of the proposed network augmentations to market participants as defined by regulatory processes.

The cost to implement each of the feasible options outlined in Section 6 has been estimated by Powerlink[12].

Sensitivity studies have been carried out using variations in the cost estimates of plus or minus 15%.

[9] Powerlink is required to evaluate solutions for new transmission developments under the Regulatory Test in accordance with clause 5.6 of the National Electricity Rules.
[10] Where an option is necessitated principally by the inability to meet the minimum network performance requirements set out in schedule 5.1 of the Rules or in relevant legislation, regulations or any statutory instrument of a participating jurisdiction.
[11] Refer Section 4.
[12] 2008/09 real dollars.

The estimated saving in the cost of network losses for each option has been included based on the assumption of a typical load factor and an average cost of losses of $25/MWh[13].

The economic analysis also considered the possible impact of the Commonwealth Government's proposed Carbon Pollution Reduction Scheme on the cost of losses and the sensitivity of the options to a possible cost increase. A comparative analysis based on an average cost of losses of $50/MWh revealed no change to the ranking of the options under the scenarios considered.

Sensitivity studies have also been carried out on the assumed cost of losses (refer Section 9.2).

8.4 Other Inputs to Analysis

While a solution is to be implemented from summer 2011/12 to address the identified future supply requirements, the economic analysis contains anticipated projects required to address long-term supply reliability requirements, excluding those future developments whose scope and timing is common to all options.

Timings for anticipated/modelled projects are based on meeting future electricity supply requirements for Southern Queensland based on the load forecasts published in Powerlink's 2008 *Annual Planning Report*. Load forecasts are reviewed annually. Actual timings of the anticipated/modelled projects may change as a result of the ongoing review of load forecasts for Southern Queensland and other market developments during the 25-year planning horizon.

The sensitivity of the timing of these anticipated projects to load growth and generation development scenarios, and therefore the incidence of capital expenditure, has been taken into account in the economic analysis.

Capital and operating costs for some items that are common to all options were not included in the analysis. These common costs include the capital and operating costs of other future works, where these costs are independent of the identified future supply requirements or where they are independent of the proposed augmentation. As such, they have no impact on the relative ranking of options resulting from the analysis. Where the timing of common works is affected by the proposed options, the cost of the other works proposed has been included in the financial analysis.

[13] Network losses are a function of the length and capacity of individual network elements, and the power being transferred through them. As electricity demand increases, network losses increase at a higher rate than the growth in demand. In heavily loaded systems, additional network elements reduce the amount of power that must be forced through the existing network, and therefore reduce total losses.

9. FINANCIAL ANALYSIS

The economic analysis undertaken considered the present value cost of alternative options over the 25-year period from 2009/10 to 2033/34. Full details of this analysis are contained in Appendix 2.

9.1 Present Value Analysis

Financial analysis was carried out to calculate and compare the present value of the costs to market participants of each option under the range of assumed scenarios.

A 25-year study period was selected as an appropriate period for financial analysis to ensure that required future network developments under each option are included in the analysis. A discount rate of 9% was selected as a relevant commercial discount rate and sensitivity analysis was conducted to test this assumption.

Under the Regulatory Test, it is the ranking of options that is important, rather than the actual present value results. The Regulatory Test requires the recommended option to have the lowest present value compared with alternative projects.

Table 17 below shows the present value cost of each alternative and identifies the 'winning' option (i.e. ranking of 1), for the range of scenarios considered.

Table 17: Summary of economic analysis of the six scenarios

Discount rate 9%	**Scenario A** *Medium growth, new generation Bulli*		**Scenario B** *High growth, new generation Bulli*		**Scenario C** *Low growth, new generation Bulli*		**Scenario D** *Medium growth, new generation Bulli & SEQ*		**Scenario E** *Medium growth, new generation Bulli & CQ*		**Scenario F** *Economic downturn, new generation Bulli*	
	PV ($M)	**Rank**	**PV ($M)**	**Rank**	**PV ($M)**	**Rank**	**PV ($M)**	**Rank**	**PV ($M)**	**Rank**	**PV ($M)**	**Rank**
Option 1 Capacitor Banks followed by Braemar-Halys 275kV	$1,107.57	4	$1,716.17	5	$471.68	2	$1,055.10	3	$1,057.01	3	$1,002.48	2
Option 2 Western Downs-Halys 275kV	$1,106.23	3	$1,699.25	4	$480.48	4	$1,057.30	4	$1,059.93	5	$1,006.62	4
Option 3 Capacitor Banks followed by Western Downs-Halys 275kV	$1,093.23	1	$1,688.48	3	$473.84	3	$1,045.50	1	$1,046.86	1	$993.51	1
Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors	$1,112.01	5	$1,727.52	6	$467.06	1	$1,046.48	2	$1,050.39	2	$1,010.48	5
Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)	$1,095.38	2	$1,647.36	1	$522.58	5	$1,058.03	5	$1,058.41	4	$1,004.03	3
Option 6 Capacitor Banks followed by Western Downs-Halys 500kV	$1,178.43	6	$1,687.33	2	$669.99	6	$1,141.58	6	$1,144.58	6	$1,053.09	6

From the above table, Option 3, Capacitor Banks followed by Western Downs-Halys 275kV is ranked as the 'winning' option under 4 out of the 6 scenarios considered, and therefore satisfies the AER Regulatory Test.

From the above table, it is also evident that, in some instances, the results of the economic analysis were very close, and within the order of accuracy of the capital cost estimates. For example, the maximum difference in the Present Value (PV) of cost estimates between the 'winning' and next highest ranked option varied from $40 million (2.4% of the total PV) under Scenario B, to as low as $1 million (0.1% of the total PV) under Scenario D.

Consequently, Powerlink has considered the broader strategic advantages in relation to the long term development of the power system.

Braemar Substation Fault Level

Establishing the Western Downs Substation under Option 3 provides a strategic advantage for addressing fault level issues at the Braemar Substation. The Western Downs Substation allows fault levels at the Braemar Substation to remain within the rating of the existing plant. This outcome compares more favourably than the alternative solution under Option 1 Capacitor Banks followed by Braemar-Halys 275kV, where further upgrades of substation plant fault ratings are required as new connections are made to the Braemar Substation.

Additional Generation Connection Capacity

By providing additional fault level 'headroom', establishing the Western Downs Substation early also provides greater total capacity to connect the additional generation required to meet growing demand for electricity in Southern Queensland. This provides a strategic advantage, as it is likely that new generation will locate near the large energy sources available in the Braemar / Kogan Creek area that are suitable for low carbon emission power plants. The location could also provide a connection point for large scale renewable generation technologies such as solar thermal, wind and geothermal generation.

Bulli to South West Grid Section Capacity

Planning studies have shown that in addressing future network limits across the Bulli-South West grid section, regardless of whether the summer 2012/13 network augmentation requirement is met with 275kV or 500kV transmission construction, there is no difference in the timing to address the next required augmentation (summer 2016/17). Consequently by not deferring this subsequent augmentation timing, a 500kV construction or operation does not provide an overall advantage. For this reason Powerlink considers it prudent to make a smaller initial investment across this grid section through construction of a 275kV double circuit line, as building "bigger earlier" provides no strategic advantage to the overall network development.

Thus, in addition to having the least PV cost, Option 3 also has some strategic advantages.

9.2 Sensitivity Analysis

In addition to examining the impact of a range of reasonable scenarios, the sensitivity of the option ranking to other critical parameters was also examined.

The effect of varying these parameters over their credible range was investigated using standard Monte Carlo techniques[14]. Table 18 shows the parameters that were investigated in the sensitivity analysis, the distribution that was assumed for each and the range of values.

[14] Using the @Risk add-in for Microsoft Excel.

Table 18: Parameters investigated in sensitivity analysis

Parameter	Distribution
Capital cost of transmission augmentations	The cost of the proposed augmentations and anticipated/modelled projects was tested for sensitivity to variations of plus or minus 15% from the expected value. The variation in each cost was modelled as a triangular distribution with the assumption that the costs are statistically independent. This means that the cost of each network component is allowed to vary within plus and minus 15% independently of the over or underspend of the other components.
Cost of losses	The sensitivity to the average cost of losses was tested by allowing this parameter to vary randomly between $20/MWh and $30/MWh using a triangular distribution with a mode of $25/MWh.

The Monte Carlo analysis assigns a value to each of the above parameters according to its distribution and then ranks the options. This simulation is done many times (in this case, 10,000 times) to cover a large number of combinations of parameters. The analysis identifies which option is the best-ranked option (the option that has the lowest cost on a present value basis for the largest number of samples) and gives the frequency for which this option 'wins'.

In addition to the above sensitivity testing, the sensitivity of the ranking of options to the discount rate assumption was also investigated by repeating the above analysis with a discount rate of 7%, 9% and 11%. Table 19 below shows the 'winning option' (i.e. Option 3) and the frequency for which it 'wins' for each scenario and discount rate across the range of parameters assessed.

Table 19: Results of sensitivity analysis for varying discount rates

	Discount Rate		
	7%	9%	11%
Scenario A Medium growth, new generation Bulli	5 (61%)	3 (50%)	3 (61%)
Scenario B High growth, new generation Bulli	5 (73%)	5 (78%)	5 (79%)
Scenario C Low growth, new generation Bulli	4 (51%)	4 (67%)	4 (75%)
Scenario D Medium growth, new generation Bulli & SEQ	3 (49%)	3 (35%)	4 (75%)
Scenario E Medium growth, new generation Bulli & CQ	3 (51%)	3 (44%)	4 (75%)
Scenario F Economic downturn, new generation Bulli	3 (45%)	3 (57%)	3 (60%)

As can be seen from the table, the results of the sensitivity analysis are consistent with the base case economic analysis. On a comparative basis, the frequency results also reflect the small relative differences in the PV of cost estimates between the winning and next highest ranked option.

On the basis of the financial analysis and the sensitivity testing, Option 3, Capacitor Banks followed by Western Downs-Halys 275kV, is the option that satisfies the AER's Regulatory Test. In addition, Option 3 also provides some strategic advantages to the development of the power system (refer Section 9.1).

Details of the scope of proposed works under Option 3 are provided in Appendix 1.

9.3 Inter-Network Impact

Powerlink is required under the National Electricity Rules to assess whether a proposed new large network asset is reasonably likely to have a material inter-network impact. Powerlink has conducted analysis in accordance with the guidelines published by the Inter-regional Planning Committee[15] and has determined that the proposed new large network asset will not impose power transfer constraints nor adversely impact on the quality of supply within adjacent networks.

[15] Under the National Electricity Rules, the Inter-regional Planning Committee has developed a set of guidelines for assessing whether transmission network augmentations have a material inter-network impact. The guidelines are developed in accordance with objectives and principles provided by the Australian Energy Market Commission.

10. CONCLUSIONS

The following conclusions have been drawn from the analysis presented in this report:

- There is no acceptable 'do nothing' option. Action is required now to ensure that reliability of supply obligations can be maintained from the 2011/12 summer. An increase in the transmission network capability is required by the summer of 2011/12 to maintain a reliable power supply to customers in Southern Queensland during critical network contingencies. 'Doing nothing' is not consistent with the reliability standards that Powerlink must comply with under its Transmission Authority, and as a TNSP in the NEM;
- Powerlink must plan new works to allow adequate lead time to ensure continued reliable electricity supply to Southern Queensland in the peak load periods from summer 2011/12;
- As the augmentation proposed in this document will prevent interruptions to supply during critical single contingencies in the transmission network supplying Southern Queensland, it is defined as a 'reliability augmentation' in the National Electricity Rules;
- Powerlink identified the requirement for additional supply capacity in its *Annual Planning Reports* published in 2006, 2007 and 2008. Submissions from potential non-network solution (including DSM) providers were also invited in response to the Request for Information document that Powerlink published in October 2008. From this, Powerlink concluded there were no non-network options that could meet the forecast supply requirements within the identified timeframe;
- Planning studies were undertaken to evaluate potential network options to address the future supply requirements in Southern Queensland. Six network augmentation options were evaluated in detail;
- The outcomes of the economic analysis carried out in accordance with the Regulatory Test and identified that proposed augmentation Option 3, Capacitor Banks followed by Western Downs-Halys 275kV is the least NPV cost solution over the 25-year period of the analysis in the majority of credible scenarios considered. The results of sensitivity testing involving variation in cost and other assumptions also demonstrate an outcome consistent with the base case economic analysis. Option 3, Capacitor Banks followed by Western Downs-Halys 275kV is therefore considered to satisfy the AER's Regulatory Test;
- While under some circumstances, there are other options which have Net Present Cost of the same order of magnitude as Option 3, there are also some comparative strategic advantages to this option in the context of the development of the power system;
- In satisfying the Regulatory Test and by providing several comparative strategic advantages for developing the power system, Option 3, Capacitor Banks followed by Western Downs-Halys 275kV was the draft recommended option for implementation in the Application Notice published on 6 March 2009;
- Six submissions were received in response to the Application Notice. The submissions supported the concept of developing a reliable high capacity transmission corridor to supply South East Queensland and did not propose any genuine non-network solutions or demand side options as an alternative to Option 3 as the recommended network solution;
- The Application Notice released during March 2009 advised that Powerlink was pursuing discussions with CS Energy as the owners of Kogan Creek Power Station, on utilising a large section of the existing 275kV double circuit line between Kogan Creek Power Station and Braemar Substation to connect Western Downs Substation, as a lower cost alternative to constructing a duplicate 275kV double circuit line;

- Powerlink and CS Energy have agreed on utilising a significant section of the existing 275kV double circuit line (presently providing non-regulated connection services), to the extent that this delivers an overall lower cost solution to consumers;
- The cost estimates for the network options in this Final Report now reflect utilisation of the relevant sections of the existing Kogan Creek to Braemar 275kV transmission line to connect Western Downs Substation, as well as future fault management measures at Kogan Creek Power Station and have been included in an updated economic analysis undertaken in accordance with the Regulatory Test;
- The outcome of the updated economic analysis contained in this Final Report is consistent with the outcome published in the Application Notice during March 2009. The updated economic analysis identifies Option 3, Capacitor Banks followed by Western Downs-Halys 275kV as satisfying the Regulatory Test and the several comparative strategic advantages that Option 3 provides for developing the power system remain unchanged;
- Powerlink will now proceed with the necessary processes to implement this recommendation. It is expected that the network augmentation works that make up Option 3 will commence in 2009 for progressive completion over summers 2011/12 to 2013/14 to ensure continued reliability of electricity supply to customers in Southern Queensland; and
- The appropriate asset value of the existing 275kV double circuit line between Kogan Creek and Braemar Substation to connect Western Downs Substation would be included in Powerlink's regulated asset base. Powerlink is currently finalising discussions with the AER on the mechanics of the arrangements.

11. FINAL RECOMMENDATION

Based on the conclusions drawn from the analysis and the Rules requirements relating to 'New Large Network Assets', it is recommended that the following action be taken to address the future supply requirements in Southern Queensland:

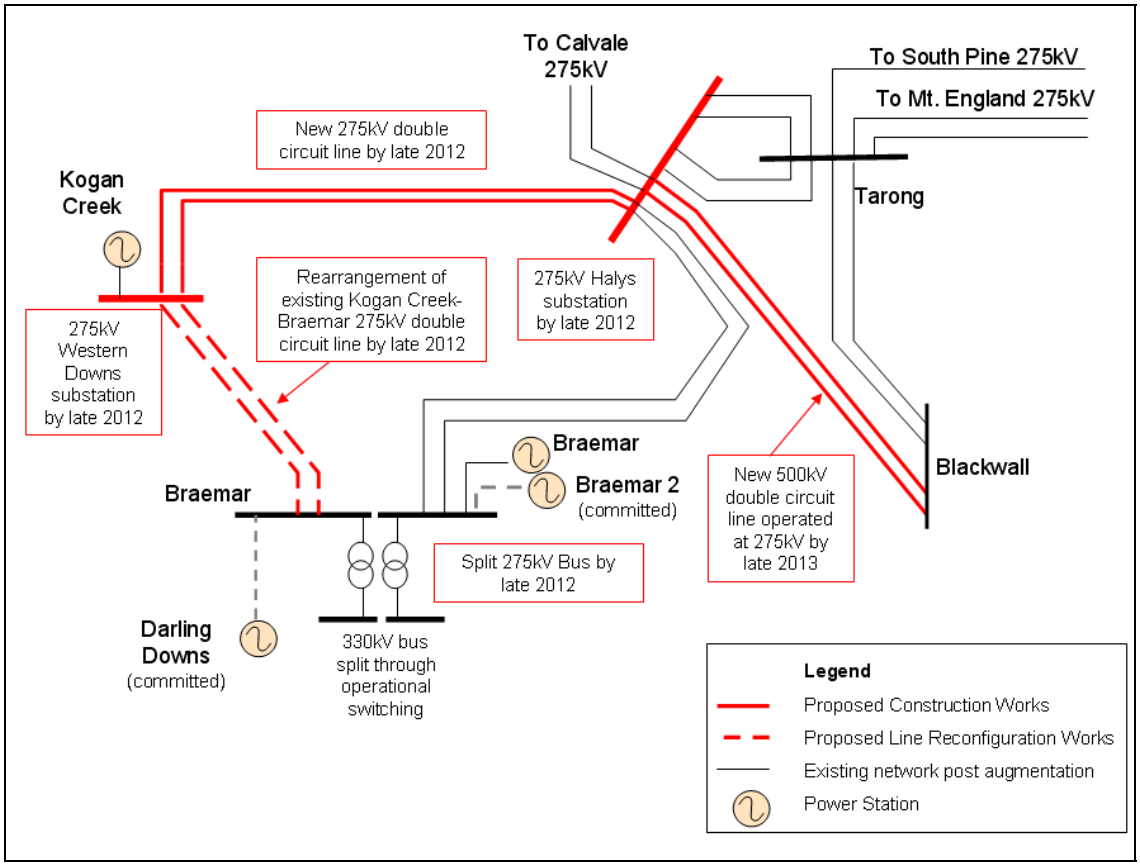
- Installation of a 330kV 200MVAr shunt capacitor bank at Millmerran Substation and two 330kV 120MVAr line connected shunt capacitor banks at Middle Ridge Substation by summer 2011/12;
- Construction of new 275kV substations at Western Downs and Halys, and a new 275kV double circuit line between Western Downs and Halys substations by summer 2012/13;
- Rearrangement of the existing 275kV double circuit line between Kogan Creek Power Station and Braemar Substation, to connect Western Downs Substation by summer 2012/13;
- Rearrangement of Braemar Substation by splitting the 275kV bus by summer 2012/13;
- Installation of a 275kV 120MVAr shunt capacitor bank at Belmont Substation and a 110kV 50MVAr shunt capacitor bank at South Pine Substation by summer 2012/13;
- Construction of a new 500kV double circuit line between Halys and Blackwall substations, initially operated at 275kV, by summer 2013/14; and

The estimated cost of these works is $651.24 million in 2008/09 prices.

Powerlink will now proceed with the necessary processes to implement this recommendation.

APPENDIX 1: TECHNICAL DETAILS OF OPTION 3 WESTERN DOWNS-HALYS 275KV

As set out in this Final Report, Powerlink examined six options to address its reliability of supply obligation for summer peak loads in Southern Queensland. The following diagram summarises the proposed scope of works under Option 3 (capacitor banks not shown) which satisfies the Regulatory Test.



Technical details relevant to the preferred option follow.

Middle Ridge Substation – by summer 2011/12

- Installation of two 120MVAr 330kV line connected shunt capacitor banks; and
- Associated substation works including line connected bays, modifications to secondary systems and telecommunications.

Millmerran Substation – by summer 2011/12

- Installation of a 200MVAr 330kV shunt capacitor bank; and
- Associated substation works including new bay, modifications to secondary systems and telecommunications.

Belmont Substation – by summer 2012/13

- Installation of a 120MVAr 275kV shunt capacitor bank; and
- Associated substation works including new bay, modifications to secondary systems and telecommunications.

South Pine Substation – by summer 2012/13

- Installation of a 50MVAr 110kV shunt capacitor bank; and
- Associated substation works including new bay, modifications to secondary systems and telecommunications.

Western Downs Substation – by summer 2012/13

- Establishment of new 275kV substation including two fully switched, complete diameters and one fully switched, partial diameter;
- Connect the rearranged Braemar-Kogan Creek 275kV double circuit line;
- Cutting in and terminating the new 275kV Halys double circuit line; and
- Installation of switchgear, secondary systems and telecommunications.

Halys Substation

By summer 2012/13:

- Establishment of new 275kV substation including six fully switched, complete diameters;
- Cutting in and terminating the 275kV Braemar double circuit line, 275kV Western Downs double circuit line, 275kV Calvale double circuit line and two 275kV Tarong double circuit lines; and
- Installation of switchgear, secondary systems and telecommunications.

By summer 2013/14:

- Cutting in and terminating the 500kV Blackwall double circuit line, initially operated at 275kV.

Braemar Substation – by summer 2012/13

- Establishment of a split bus that creates two substation yard sections - Eastern and Western. The Eastern bus will provide connections for the Braemar Power Station, the committed Braemar 2 Power Station and existing circuits to Tarong substation. The Western bus will provide connections for the Kogan Creek Power Station and committed Darling Downs Power Station, as well as a double circuit to the proposed Western Downs Substation;
- Connect the rearranged Braemar-Kogan Creek 275kV double circuit line to connect Western Downs Substation;
- Establishment of a fully switched, complete diameter on the Western bus and cut in the existing 275kV/330kV transformer – T2 (the other 275kV/330kV transformer is connected to the Eastern bus); and
- Installation and modification of switchgear, secondary systems and telecommunications.

Transmission Lines

- Rearrangement of the existing 275kV double circuit line between Kogan Creek Power Station and Braemar Substation to connect Western Downs Substation – *by summer 2012/13;*
- Construction of 275kV double circuit line from Western Downs Substation to Halys Substation – *by summer 2012/13*; and
- Construction of 500kV double circuit line from Halys Substation to Blackwall Substation initially operated at 275kV – *by summer 2013/14*.

APPENDIX 2: ECONOMIC ANALYSIS

Development Options	FY	Capex $M	FY	Capex $M	FY	Capex $M	FY	Capex $M	FY	Capex $M	FY	Capex $M
	Scenario A		Scenario B		Scenario C		Scenario D		Scenario E		Scenario F	
Option 1 Capacitor Banks followed by Braemar-Halys 275kV												
Millmerran Cap. Bank	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60
Middle Ridge Cap. Banks	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70
South Pine and Belmont Cap. Banks	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90
Braemar-Halys 275kV	12/13	201.17	10/11	201.17	16/17	201.17	12/13	201.17	12/13	201.17	12/13	201.17
Halys-Blackwall 500kV (initially operated at 275kV)	13/14	387.26	11/12	387.26	18/19	387.26	13/14	387.26	13/14	387.26	14/15	387.26
Proposed and modelled projects												
Kogan fault level management measures		13.00		13.00		12.00		13.00		13.00		13.00
Kogan-Braemar line rearrangement (line)	15/16	18.38	11/12	18.38	23/24	18.38	16/17	18.38	16/17	18.38	16/17	18.38
Kogan-Braemar line rearrangement (substation)	16/17	1.22	12/13	1.22	24/25	1.22	17/18	1.22	17/18	1.22	17/18	1.22
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build	16/17	266.55	12/13	266.55	24/25	266.55	17/18	266.55	17/18	266.55	17/18	266.55
Western Down Sub Est & Braemar Western Bus Upgrade	16/17	84.00	12/13	84.00	24/25	84.00	17/18	84.00	17/18	84.00	17/18	84.00
500kV upgrade Western Downs-Halys 1st Nthn. build	18/19	109.20	14/15	109.20			19/20	109.20	19/20	109.20	19/20	109.20
500kV upgrade Halys-Blackwall	18/19	75.20	14/15	75.20			19/20	75.20	19/20	75.20	19/20	75.20
Halys-Greenbank 500kV (initially operated at 275kV)	18/19	384.27	14/15	384.27			19/20	384.27	19/20	384.27	19/20	384.27
500kV upgrade Halys-Greenbank	20/21	55.70	15/16	55.70			21/22	55.70	21/22	55.70	21/22	55.70
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build	20/21	256.55	15/16	256.55			21/22	256.55	21/22	256.55	21/22	256.55
500kV upgrade Western Downs-Halys 2nd Nthn. build	20/21	91.80	15/16	91.80			21/22	91.80	21/22	91.80	21/22	91.80
Option 2 Western Downs-Halys 275kV												
Middle Ridge Cap. Banks	12/13	6.70	10/11	6.70	16/17	6.70	12/13	6.70	12/13	6.70	12/13	6.70
South Pine and Belmont Cap. Banks	12/13	4.90	10/11	4.90	16/17	4.90	12/13	4.90	12/13	4.90	12/13	4.90
Western Downs-Halys 275kV	11/12	229.18	09/10	229.18	15/16	229.18	11/12	229.18	11/12	229.18	11/12	229.18
Kogan-Braemar line rearrangement (line)	10/11	18.38	08/09	18.38	14/15	18.38	10/11	18.38	10/11	18.38	10/11	18.38
Kogan-Braemar line rearrangement (substation)	11/12	1.22	09/10	1.22	15/16	1.22	11/12	1.22	11/12	1.22	11/12	1.22
Halys-Blackwall 500kV (initially operated at 275kV)	13/14	387.26	11/12	387.26	18/19	387.26	13/14	387.26	13/14	387.26	14/15	387.26
Proposed and modelled projects												
Kogan fault level management measures		13.00		13.00		12.00		13.00		13.00		13.00
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build	16/17	266.55	12/13	266.55	24/25	266.55	17/18	266.55	17/18	266.55	17/18	266.55
500kV upgrade Western Downs-Halys 1st Nthn. build	18/19	109.20	14/15	109.20			19/20	109.20	19/20	109.20	19/20	109.20
500kV upgrade Halys-Blackwall	18/19	75.20	14/15	75.20			19/20	75.20	19/20	75.20	19/20	75.20
Halys-Greenbank 500kV (initially operated at 275kV)	18/19	384.27	14/15	384.27			19/20	384.27	19/20	384.27	19/20	384.27
500kV upgrade Halys-Greenbank	20/21	55.70	15/16	55.70			21/22	55.70	21/22	55.70	21/22	55.70
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build	20/21	256.55	15/16	256.55			21/22	256.55	21/22	256.55	21/22	256.55
500kV upgrade Western Downs-Halys 2nd Nthn. build	20/21	91.80	15/16	91.80			21/22	91.80	21/22	91.80	21/22	91.80
Option 3 Capacitor Banks followed by Western Downs-Halys 275kV												
Millmerran Cap. Bank	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60
Middle Ridge Cap. Banks	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70
South Pine and Belmont Cap. Banks	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90
Western Downs-Halys 275kV	12/13	229.18	10/11	229.18	16/17	229.18	12/13	229.18	12/13	229.18	12/13	229.18
Kogan-Braemar line rearrangement (line)	11/12	18.38	09/10	18.38	15/16	18.38	11/12	18.38	11/12	18.38	11/12	18.38
Kogan-Braemar line rearrangement (substation)	12/13	1.22	10/11	1.22	16/17	1.22	12/13	1.22	12/13	1.22	12/13	1.22
Halys-Blackwall 500kV (initially operated at 275kV)	13/14	387.26	11/12	387.26	18/19	387.26	13/14	387.26	13/14	387.26	14/15	387.26
Proposed and modelled projects												
Kogan fault level management measures		13.00		13.00		12.00		13.00		13.00		13.00
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build	16/17	266.55	12/13	266.55	24/25	266.55	17/18	266.55	17/18	266.55	17/18	266.55
Halys-Greenbank 500kV (initially operated at 275kV)	18/19	384.27	14/15	384.27			19/20	384.27	19/20	384.27	19/20	384.27
500kV upgrade Western Downs-Halys 1st Nthn. build	18/19	109.20	14/15	109.20			19/20	109.20	19/20	109.20	19/20	109.20
500kV upgrade Halys-Blackwall	18/19	75.20	14/15	75.20			19/20	75.20	19/20	75.20	19/20	75.20
500kV upgrade Halys-Greenbank	20/21	55.70	15/16	55.70			21/22	55.70	21/22	55.70	21/22	55.70
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build	20/21	256.55	15/16	256.55			21/22	256.55	21/22	256.55	21/22	256.55
500kV upgrade Western Downs-Halys 2nd Nthn. build	20/21	91.80	15/16	91.80			21/22	91.80	21/22	91.80	21/22	91.80

Development Options	FY	Capex $M	FY	Capex $M	FY	Capex $M	FY	Capex $M	FY	Capex $M	FY	Capex $M
	Scenario A		Scenario B		Scenario C		Scenario D		Scenario E		Scenario F	
Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors												
Millmerran Cap. Bank	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60
Middle Ridge Cap. Banks	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70
South Pine and Belmont Cap. Banks	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90
Western Downs-Halys 275kV	12/13	229.18	10/11	229.18	16/17	229.18	12/13	229.18	12/13	229.18	12/13	229.18
Kogan-Braemar line rearrangement (line)	11/12	18.38	09/10	18.38	15/16	18.38	11/12	18.38	11/12	18.38	11/12	18.38
Kogan-Braemar line rearrangement (substation)	12/13	1.22	10/11	1.22	16/17	1.22	12/13	1.22	12/13	1.22	12/13	1.22
Series Capacitors	13/14	125.00	11/12	125.00	18/19	125.00	13/14	125.00	13/14	125.00	14/15	125.00
Halys-Blackwall 500kV (initially operated at 275kV)	15/16	387.26	12/13	387.26	22/23	387.26	16/17	387.26	16/17	387.26	16/17	387.26
Proposed and modelled projects												
Kogan fault level management measures		13.00		13.00		12.00		13.00		13.00		13.00
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build	16/17	266.55	12/13	266.55	24/25	266.55	17/18	266.55	17/18	266.55	17/18	266.55
500kV upgrade Western Downs-Halys 1st Nthn. build	18/19	109.20	14/15	109.20			19/20	109.20	19/20	109.20	19/20	109.20
500kV upgrade Halys-Blackwall	18/19	75.20	14/15	75.20			19/20	75.20	19/20	75.20	19/20	75.20
Halys-Greenbank 500kV (initially operated at 275kV)	19/20	384.27	15/16	384.27			20/21	384.27	20/21	384.27	20/21	384.27
500kV upgrade Halys-Greenbank	20/21	55.70	15/16	55.70			21/22	55.70	21/22	55.70	21/22	55.70
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build	20/21	256.55	15/16	256.55			21/22	256.55	21/22	256.55	21/22	256.55
500kV upgrade Western Downs-Halys 2nd Nthn. build	20/21	91.80	15/16	91.80			21/22	91.80	21/22	91.80	21/22	91.80
Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)												
Millmerran Cap. Bank	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60
Middle Ridge Cap. Banks	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70
South Pine and Belmont Cap. Banks	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90
Western Downs-Halys 500kV (initially operated at 275kV)	12/13	345.81	10/11	345.81	16/17	345.81	12/13	345.81	12/13	345.81	12/13	345.81
Kogan-Braemar line rearrangement (line)	11/12	18.38	09/10	18.38	15/16	18.38	11/12	18.38	11/12	18.38	11/12	18.38
Kogan-Braemar line rearrangement (substation)	12/13	1.22	10/11	1.22	16/17	1.22	12/13	1.22	12/13	1.22	12/13	1.22
Halys-Blackwall 500kV (initially operated at 275kV)	13/14	387.26	11/12	387.26	18/19	387.26	13/14	387.26	13/14	387.26	14/15	387.26
Proposed and modelled projects												
Kogan fault level management measures		13.00		13.00		12.00		13.00		13.00		13.00
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build	16/17	256.55	12/13	256.55	24/25	256.55	17/18	256.55	17/18	256.55	17/18	256.55
Halys-Greenbank 500kV (initially operated at 275kV)	18/19	384.27	14/15	384.27			19/20	384.27	19/20	384.27	19/20	384.27
500kV upgrade Halys-Blackwall	18/19	75.20	14/15	75.20			19/20	75.20	19/20	75.20	19/20	75.20
500kV upgrade Western Downs-Halys 1st Nthn. build	18/19	109.20	14/15	109.20			19/20	109.20	19/20	109.20	19/20	109.20
500kV upgrade Halys-Greenbank	20/21	55.70	15/16	55.70			21/22	55.70	21/22	55.70	21/22	55.70
500kV upgrade Western Downs-Halys 2nd Nthn. build	20/21	91.80	15/16	91.80			21/22	91.80	21/22	91.80	21/22	91.80
Option 6 Capacitor Banks followed by Western Downs-Halys 500kV												
Millmerran Cap. Bank	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60	11/12	3.60
Middle Ridge Cap. Banks	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70	11/12	6.70
South Pine and Belmont Cap. Banks	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90	12/13	4.90
Western Downs-Halys 500kV at 500kV #1	12/13	420.35	10/11	420.35	16/17	420.35	12/13	420.35	12/13	420.35	13/14	420.35
Kogan-Braemar line rearrangement (line)	11/12	18.38	09/10	18.38	15/16	18.38	11/12	18.38	11/12	18.38	12/13	18.38
Kogan-Braemar line rearrangement (substation)	12/13	1.22	10/11	1.22	16/17	1.22	12/13	1.22	12/13	1.22	13/14	1.22
Halys-Blackwall 500kV at 500kV	12/13	441.89	10/11	441.89	16/17	441.89	12/13	441.89	12/13	441.89	12/13	441.89
Proposed and modelled projects												
Kogan fault level management measures		13.00		13.00		12.00		13.00		13.00		13.00
Halys-Greenbank 500kV at 500kV	16/17	420.99	13/14	420.99	25/26	420.99	17/18	420.99	17/18	420.99	18/19	420.99
Western Downs-Halys 500kV at 500kV #2	16/17	335.55	13/14	335.55	25/26	335.55	17/18	335.55	17/18	335.55	18/19	335.55

Scenario A	*Medium growth, new generation Bulli*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 1	**Option 1 Capacitor Banks followed by Braemar-Halys**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Braemar-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	22.179	21.883	21.587	21.292	20.996	20.700	20.404	20.109	19.813	19.517	19.222	18.926	18.630	18.334	18.039	17.743	17.447	17.152	16.856	16.560	16.264
==> PV of TUOS $132.37																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.38																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492
==> PV of TUOS $8.47																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101
==> PV of TUOS $0.50																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118
==> PV of TUOS $115.92																									
Western Down Sub Est & Braemar Western Bus Upgrade																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.261	9.138	9.014	8.891	8.767	8.644	8.520	8.397	8.273	8.150	8.026	7.903	7.779	7.656	7.532	7.409	7.285
==> PV of TUOS $36.53																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792
==> PV of TUOS $38.02																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743
==> PV of TUOS $26.18																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457
==> PV of TUOS $133.80																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158
==> PV of TUOS $15.30																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759
==> PV of TUOS $70.45																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502
==> PV of TUOS $25.21																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.862	19.825	20.907	22.496	23.643	25.197	25.386	26.498	27.689	29.424	31.848	34.607	37.732	41.382	44.434	47.395	50.508	53.622	56.735	59.848	62.962	66.075
=> PV of Loss difference $257.27																									
Total for Option 1 $1,107.57																									

Scenario A		*Medium growth, new generation Bulli*																								
		1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 2		**Option 2 Western Downs-Halys**																								
Middle Ridge Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542
==> PV of TUOS	$4.41																									
South Pine and Belmont Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS	$3.22																									
Western Downs-Halys 275kV																										
=> TUOS		0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193
==> PV of TUOS	$166.49																									
Kogan-Braemar line rearrangement (line)																										
=> TUOS		0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364
==> PV of TUOS	$14.02																									
Kogan-Braemar line rearrangement (substation)																										
=> TUOS		0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092
==> PV of TUOS	$0.84																									
Halys-Blackwall 500kV (initially operated at 275kV)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS	$230.45																									
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS	$6.92																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118
==> PV of TUOS	$115.92																									
500kV upgrade Western Downs-Halys 1st Nthn. build																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792
==> PV of TUOS	$38.02																									
500kV upgrade Halys-Blackwall																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743
==> PV of TUOS	$26.18																									
Halys-Greenbank 500kV (initially operated at 275kV)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457
==> PV of TUOS	$133.80																									
500kV upgrade Halys-Greenbank																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158
==> PV of TUOS	$15.30																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759
==> PV of TUOS	$70.45																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502
==> PV of TUOS	$25.21																									
Relative Losses																										
* Losses $		9.764	15.670	17.323	18.862	19.642	20.511	21.777	23.164	24.761	25.139	26.288	27.666	29.492	31.866	34.547	37.571	41.082	44.037	46.908	49.920	52.932	55.944	58.957	61.969	64.981
=> PV of Loss difference	$254.98																									
Total for Option 2	**$1,106.23**																									

Scenario A	*Medium growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 3	**Option 3 Capacitor Banks followed by Western Downs-Halys 275kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.92																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118
==> PV of TUOS $115.92																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457
==> PV of TUOS $133.80																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792
==> PV of TUOS $38.02																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743
==> PV of TUOS $26.18																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158
==> PV of TUOS $15.30																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759
==> PV of TUOS $70.45																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502
==> PV of TUOS $25.21																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.803	19.642	20.511	21.777	23.164	24.761	25.139	26.288	27.666	29.492	31.866	34.547	37.571	41.082	44.289	47.411	50.613	53.814	57.015	60.216	63.417	66.618
=> PV of Loss difference $255.98																									
Total for Option 3 $1,093.23																									

Scenario A	*Medium growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 4	**Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Series Capacitors																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	14.438	14.208	13.978	13.748	13.519	13.289	13.059	12.830	12.600	12.370	12.141	11.911	11.681	11.452	11.222	10.992	10.763	10.533	10.303	10.073
==> PV of TUOS $76.43																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018
==> PV of TUOS $187.40																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.92																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118
==> PV of TUOS $115.92																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792
==> PV of TUOS $38.02																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743
==> PV of TUOS $26.18																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158
==> PV of TUOS $15.30																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759
==> PV of TUOS $70.45																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502
==> PV of TUOS $25.21																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.803	20.060	21.201	21.989	23.130	24.737	26.176	26.856	27.623	29.398	31.775	34.462	37.492	41.009	43.971	46.847	49.865	52.883	55.901	58.919	61.937	64.955
=> PV of Loss difference $256.08																									
Total for Option 4 $1,112.01																									

Scenario A	*Medium growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 5	**Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	38.126	37.618	37.109	36.601	36.093	35.584	35.076	34.568	34.059	33.551	33.043	32.534	32.026	31.517	31.009	30.501	29.992	29.484	28.976	28.467	27.959
==> PV of TUOS $227.55																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.92																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628	22.251
==> PV of TUOS $111.57																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457
==> PV of TUOS $133.80																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743
==> PV of TUOS $26.18																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792
==> PV of TUOS $38.02																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158
==> PV of TUOS $15.30																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502
==> PV of TUOS $25.21																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.758	19.551	20.381	21.598	23.023	24.634	25.029	26.170	27.503	29.331	31.748	34.500	37.619	41.264	44.583	47.809	51.121	54.432	57.744	61.055	64.367	67.679
=> PV of Loss difference $256.18																									
Total for Option 5 $1,095.38																									

Scenario A		*Medium growth, new generation Bulli*																								
		1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 6		**Option 6 Capacitor Banks followed by Western Downs-Halys 500kV**																								
Millmerran Cap. Bank																										
=> TUOS		0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS	$2.62																									
Middle Ridge Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS	$4.87																									
South Pine and Belmont Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS	$3.22																									
Western Downs-Halys 500kV at 500kV #1																										
=> TUOS		0.000	0.000	0.000	0.000	46.344	45.726	45.108	44.490	43.872	43.254	42.636	42.018	41.401	40.783	40.165	39.547	38.929	38.311	37.693	37.075	36.457	35.839	35.221	34.603	33.986
==> PV of TUOS	$276.60																									
Kogan-Braemar line rearrangement (line)																										
=> TUOS		0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS	$12.72																									
Kogan-Braemar line rearrangement (substation)																										
=> TUOS		0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS	$0.76																									
Halys-Blackwall 500kV at 500kV																										
=> TUOS		0.000	0.000	0.000	0.000	48.719	48.069	47.420	46.770	46.120	45.471	44.821	44.172	43.522	42.872	42.223	41.573	40.924	40.274	39.625	38.975	38.325	37.676	37.026	36.377	35.727
==> PV of TUOS	$290.77																									
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	12.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS	$7.07																									
Halys-Greenbank 500kV at 500kV																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	46.414	45.795	45.177	44.558	43.939	43.320	42.701	42.082	41.463	40.845	40.226	39.607	38.988	38.369	37.750	37.131	36.513
==> PV of TUOS	$183.09																									
Western Downs-Halys 500kV at 500kV #2																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	36.995	36.501	36.008	35.515	35.022	34.528	34.035	33.542	33.049	32.555	32.062	31.569	31.076	30.582	30.089	29.596	29.103
==> PV of TUOS	$145.93																									
Relative Losses																										
* Losses $		9.764	15.670	17.205	18.421	19.469	20.417	21.429	21.668	22.399	23.814	25.406	27.225	29.331	31.748	34.500	37.619	41.264	44.018	46.701	49.620	52.540	55.459	58.378	61.298	64.217
=> PV of Loss difference	$250.79																									
Total for Option 6	**$1,178.43**																									

Scenario B	*High growth, new generation Bulli*																								
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*
	09/10	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**
Option 1	**Option 1 Capacitor Banks followed by Braemar-Halys**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Braemar-Halys 275kV																									
=> TUOS	0.000	0.000	22.179	21.883	21.587	21.292	20.996	20.700	20.404	20.109	19.813	19.517	19.222	18.926	18.630	18.334	18.039	17.743	17.447	17.152	16.856	16.560	16.264	15.969	15.673
==> PV of TUOS $161.11																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879	31.310	30.741
==> PV of TUOS $281.32																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	12.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $9.05																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118	22.726	22.334	21.943	21.551
==> PV of TUOS $175.40																									
Western Down Sub Est & Braemar Western Bus Upgrade																									
=> TUOS	0.000	0.000	0.000	0.000	9.261	9.138	9.014	8.891	8.767	8.644	8.520	8.397	8.273	8.150	8.026	7.903	7.779	7.656	7.532	7.409	7.285	7.162	7.038	6.915	6.791
==> PV of TUOS $55.27																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792	9.631	9.471	9.310	9.150
==> PV of TUOS $58.66																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743	6.633	6.522	6.412	6.301
==> PV of TUOS $40.40																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457	33.893	33.328	32.763	32.198
==> PV of TUOS $206.43																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158	5.076	4.995	4.913	4.831	4.749
==> PV of TUOS $26.95																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628	22.251	21.874
==> PV of TUOS $124.15																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502	8.367	8.232	8.097	7.962	7.827
==> PV of TUOS $44.42																									
Relative Losses																									
* Losses $	11.144	17.969	20.009	22.660	25.905	27.382	28.837	33.279	38.226	43.380	49.444	56.815	65.288	73.379	82.412	93.119	106.633	118.486	129.829	141.619	153.408	165.198	176.988	188.777	200.567
=> PV of Loss difference $508.82																									
Total for Option 1 $1,716.17																									

Scenario B	*High growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 2	**Option 2 Western Downs-Halys**																								
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532	0.522
==> PV of TUOS $5.37																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396	0.389	0.382
==> PV of TUOS $3.92																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193	17.856	17.519
==> PV of TUOS $202.09																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364	1.338
==> PV of TUOS $15.43																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092	0.090	0.089
==> PV of TUOS $1.02																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879	31.310	30.741
==> PV of TUOS $281.32																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $9.81																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118	22.726	22.334	21.943	21.551
==> PV of TUOS $175.40																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792	9.631	9.471	9.310	9.150
==> PV of TUOS $58.66																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743	6.633	6.522	6.412	6.301
==> PV of TUOS $40.40																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457	33.893	33.328	32.763	32.198
==> PV of TUOS $206.43																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158	5.076	4.995	4.913	4.831	4.749
==> PV of TUOS $26.95																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628	22.251	21.874
==> PV of TUOS $124.15																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502	8.367	8.232	8.097	7.962	7.827
==> PV of TUOS $44.42																									
Relative Losses																									
* Losses $	11.144	17.908	19.695	22.364	25.489	27.078	28.827	33.264	38.062	43.034	48.845	55.888	64.031	72.032	81.040	91.885	105.384	117.251	128.648	140.474	152.300	164.126	175.952	187.778	199.604
=> PV of Loss difference $503.86																									
Total for Option 2 $1,699.25																									

Scenario B	*High growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 3	**Option 3 Capacitor Banks followed by Western Downs-Halys 275kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193	17.856
==> PV of TUOS $183.54																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364	1.338
==> PV of TUOS $15.43																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092	0.090
==> PV of TUOS $0.93																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879	31.310	30.741
==> PV of TUOS $281.32																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $9.81																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118	22.726	22.334	21.943	21.551
==> PV of TUOS $175.40																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457	33.893	33.328	32.763	32.198
==> PV of TUOS $206.43																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792	9.631	9.471	9.310	9.150
==> PV of TUOS $58.66																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743	6.633	6.522	6.412	6.301
==> PV of TUOS $40.40																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158	5.076	4.995	4.913	4.831	4.749
==> PV of TUOS $26.95																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628	22.251	21.874
==> PV of TUOS $124.15																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502	8.367	8.232	8.097	7.962	7.827
==> PV of TUOS $44.42																									
Relative Losses																									
* Losses $	11.144	17.908	19.695	22.364	25.489	27.078	28.827	33.264	38.062	43.034	48.845	55.888	64.031	72.032	81.040	91.885	105.384	118.542	131.359	144.347	157.335	170.322	183.310	196.298	209.285
=> PV of Loss difference $510.32																									
Total for Option 3 $1,688.48																									

Scenario B	*High growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 4	**Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193	17.856
==> PV of TUOS $183.54																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364	1.338
==> PV of TUOS $15.43																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092	0.090
==> PV of TUOS $0.93																									
Series Capacitors																									
=> TUOS	0.000	0.000	0.000	14.438	14.208	13.978	13.748	13.519	13.289	13.059	12.830	12.600	12.370	12.141	11.911	11.681	11.452	11.222	10.992	10.763	10.533	10.303	10.073	9.844	9.614
==> PV of TUOS $93.17																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879	31.310
==> PV of TUOS $254.82																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	12.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $9.05																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	23.118	22.726	22.334	21.943	21.551
==> PV of TUOS $175.40																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792	9.631	9.471	9.310	9.150
==> PV of TUOS $58.66																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743	6.633	6.522	6.412	6.301
==> PV of TUOS $40.40																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457	33.893	33.328	32.763
==> PV of TUOS $185.96																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158	5.076	4.995	4.913	4.831	4.749
==> PV of TUOS $26.95																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628	22.251	21.874
==> PV of TUOS $124.15																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502	8.367	8.232	8.097	7.962	7.827
==> PV of TUOS $44.42																									
Relative Losses																									
* Losses $	11.144	17.908	20.165	22.581	25.468	28.143	29.304	33.204	38.020	42.998	48.816	55.867	64.001	71.953	80.890	91.621	105.008	116.772	128.064	139.784	151.503	163.223	174.943	186.663	198.382
=> PV of Loss difference $503.92																									
Total for Option 4 $1,727.52																									

Scenario B	*High growth, new generation Bulli*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 5	**Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	38.126	37.618	37.109	36.601	36.093	35.584	35.076	34.568	34.059	33.551	33.043	32.534	32.026	31.517	31.009	30.501	29.992	29.484	28.976	28.467	27.959	27.451	26.942
==> PV of TUOS $276.95																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364	1.338
==> PV of TUOS $15.43																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092	0.090
==> PV of TUOS $0.93																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879	31.310	30.741
==> PV of TUOS $281.32																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $9.81																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628	22.251	21.874	21.497	21.119	20.742
==> PV of TUOS $168.82																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022	34.457	33.893	33.328	32.763	32.198
==> PV of TUOS $206.43																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	6.743	6.633	6.522	6.412	6.301
==> PV of TUOS $40.40																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	9.792	9.631	9.471	9.310	9.150
==> PV of TUOS $58.66																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	5.158	5.076	4.995	4.913	4.831	4.749
==> PV of TUOS $26.95																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	8.502	8.367	8.232	8.097	7.962	7.827
==> PV of TUOS $44.42																									
Relative Losses																									
* Losses $	11.144	17.863	19.583	22.249	25.364	26.955	28.675	33.229	38.184	43.312	49.382	56.765	65.300	73.368	82.324	92.963	106.407	118.189	129.461	141.181	152.900	164.619	176.338	188.058	199.777
=> PV of Loss difference $506.53																									
Total for Option 5 $1,647.36																									

Scenario B	*High growth, new generation Bulli*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 6	**Option 6 Capacitor Banks followed by Western Downs-Halys 500kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV at 500kV #1																									
=> TUOS	0.000	0.000	46.344	45.726	45.108	44.490	43.872	43.254	42.636	42.018	41.401	40.783	40.165	39.547	38.929	38.311	37.693	37.075	36.457	35.839	35.221	34.603	33.986	33.368	32.750
==> PV of TUOS $336.64																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364	1.338
==> PV of TUOS $15.43																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092	0.090
==> PV of TUOS $0.93																									
Halys-Blackwall 500kV at 500kV																									
=> TUOS	0.000	0.000	48.719	48.069	47.420	46.770	46.120	45.471	44.821	44.172	43.522	42.872	42.223	41.573	40.924	40.274	39.625	38.975	38.325	37.676	37.026	36.377	35.727	35.077	34.428
==> PV of TUOS $353.89																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	12.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $9.15																									
Halys-Greenbank 500kV at 500kV																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	46.414	45.795	45.177	44.558	43.939	43.320	42.701	42.082	41.463	40.845	40.226	39.607	38.988	38.369	37.750	37.131	36.513	35.894	35.275	34.656
==> PV of TUOS $250.53																									
Western Downs-Halys 500kV at 500kV #2																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	36.995	36.501	36.008	35.515	35.022	34.528	34.035	33.542	33.049	32.555	32.062	31.569	31.076	30.582	30.089	29.596	29.103	28.609	28.116	27.623
==> PV of TUOS $199.68																									
Relative Losses																									
* Losses $	11.144	17.524	19.411	22.050	23.660	25.650	28.424	33.229	38.184	43.312	49.382	56.765	65.300	73.368	82.324	92.963	106.407	119.471	132.154	145.027	157.901	170.774	183.647	196.521	209.394
=> PV of Loss difference $510.36																									
Total for Option 6 $1,687.33																									

Scenario C	*Low growth, new generation Bulli*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 1	**Option 1 Capacitor Banks followed by Braemar-Halys**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Braemar-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	22.179	21.883	21.587	21.292	20.996	20.700	20.404	20.109	19.813	19.517	19.222	18.926	18.630	18.334	18.039	17.743	17.447
==> PV of TUOS $87.49																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726
==> PV of TUOS $134.84																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $3.02																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698
==> PV of TUOS $3.23																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114
==> PV of TUOS $0.18																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253
==> PV of TUOS $42.35																									
Western Down Sub Est & Braemar Western Bus Upgrade																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.261	9.138	9.014	8.891	8.767	8.644	8.520	8.397	8.273
==> PV of TUOS $13.34																									
Relative Losses																									
* Losses $	9.722	15.040	15.726	16.400	17.004	17.394	17.689	18.120	18.575	18.430	18.632	19.162	19.778	20.436	21.225	21.367	21.800	22.558	23.315	24.073	24.831	25.589	26.347	27.105	27.862
=> PV of Loss difference $176.53																									
Total for Option 1 $471.68																									

Scenario C		*Low growth, new generation Bulli*																								
		1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 2		**Option 2 Western Downs-Halys**																								
Middle Ridge Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581
==> PV of TUOS	$2.91																									
South Pine and Belmont Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425
==> PV of TUOS	$2.13																									
Western Downs-Halys 275kV																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540
==> PV of TUOS	$110.91																									
Kogan-Braemar line rearrangement (line)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467
==> PV of TUOS	$9.40																									
Kogan-Braemar line rearrangement (substation)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099
==> PV of TUOS	$0.56																									
Halys-Blackwall 500kV (initially operated at 275kV)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726
==> PV of TUOS	$134.84																									
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS	$3.29																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253
==> PV of TUOS	$42.35																									
Relative Losses																										
* Losses $		9.722	15.040	15.726	16.400	17.004	17.394	17.792	18.152	18.500	18.303	18.416	18.838	19.312	19.815	20.411	20.918	21.507	22.058	22.588	23.134	23.681	24.228	24.774	25.321	25.868
=> PV of Loss difference	$174.09																									
Total for Option 2	**$480.48**																									

Scenario C		*Low growth, new generation Bulli*																								
		1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 3		**Option 3 Capacitor Banks followed by Western Downs-Halys 275kV**																								
Millmerran Cap. Bank																										
=> TUOS		0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS	$2.62																									
Middle Ridge Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS	$4.87																									
South Pine and Belmont Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS	$3.22																									
Western Downs-Halys 275kV																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877
==> PV of TUOS	$99.67																									
Kogan-Braemar line rearrangement (line)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492
==> PV of TUOS	$8.47																									
Kogan-Braemar line rearrangement (substation)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101
==> PV of TUOS	$0.50																									
Halys-Blackwall 500kV (initially operated at 275kV)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726
==> PV of TUOS	$134.84																									
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS	$3.29																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253
==> PV of TUOS	$42.35																									
Relative Losses																										
* Losses $		9.722	15.040	15.726	16.400	17.004	17.394	17.689	18.101	18.500	18.303	18.416	18.838	19.312	19.815	20.411	20.918	21.507	22.058	22.588	23.134	23.681	24.228	24.774	25.321	25.868
=> PV of Loss difference	$174.01																									
Total for Option 3	**$473.84**																									

Scenario C	*Low growth, new generation Bulli*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 4	**Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877
==> PV of TUOS $99.67																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492
==> PV of TUOS $8.47																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101
==> PV of TUOS $0.50																									
Series Capacitors																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.438	14.208	13.978	13.748	13.519	13.289	13.059	12.830	12.600	12.370	12.141	11.911	11.681	11.452	11.222
==> PV of TUOS $44.91																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003
==> PV of TUOS $82.13																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $3.29																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253
==> PV of TUOS $42.35																									
Relative Losses																									
* Losses $	9.722	15.040	15.726	16.400	17.004	17.394	17.689	18.101	18.500	18.691	19.036	19.508	20.034	20.040	20.373	20.892	21.492	22.069	22.623	23.189	23.754	24.320	24.885	25.451	26.016
=> PV of Loss difference $175.02																									
Total for Option 4 $467.06																									

Scenario C	*Low growth, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 5	**Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	38.126	37.618	37.109	36.601	36.093	35.584	35.076	34.568	34.059	33.551	33.043	32.534	32.026	31.517	31.009	30.501	29.992
==> PV of TUOS $150.39																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492
==> PV of TUOS $8.47																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101
==> PV of TUOS $0.50																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726
==> PV of TUOS $134.84																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $3.29																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268
==> PV of TUOS $40.76																									
Relative Losses																									
* Losses $	9.722	15.040	15.726	16.400	17.004	17.394	17.689	18.066	18.436	18.222	18.315	18.718	19.169	19.649	20.216	20.780	21.394	21.965	22.523	23.095	23.667	24.239	24.811	25.383	25.955
=> PV of Loss difference $173.61																									
Total for Option 5 $522.58																									

Scenario C		*Low growth, new generation Bulli*																								
		1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 6		**Option 6 Capacitor Banks followed by Western Downs-Halys 500kV**																								
Millmerran Cap. Bank																										
=> TUOS		0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS	$2.62																									
Middle Ridge Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS	$4.87																									
South Pine and Belmont Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS	$3.22																									
Western Downs-Halys 500kV at 500kV #1																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	46.344	45.726	45.108	44.490	43.872	43.254	42.636	42.018	41.401	40.783	40.165	39.547	38.929	38.311	37.693	37.075	36.457
==> PV of TUOS	$182.81																									
Kogan-Braemar line rearrangement (line)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492
==> PV of TUOS	$8.47																									
Kogan-Braemar line rearrangement (substation)																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101
==> PV of TUOS	$0.50																									
Halys-Blackwall 500kV at 500kV																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	48.719	48.069	47.420	46.770	46.120	45.471	44.821	44.172	43.522	42.872	42.223	41.573	40.924	40.274	39.625	38.975	38.325
==> PV of TUOS	$192.18																									
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS	$3.02																									
Halys-Greenbank 500kV at 500kV																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	46.414	45.795	45.177	44.558	43.939	43.320	42.701	42.082
==> PV of TUOS	$56.95																									
Western Downs-Halys 500kV at 500kV #2																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	36.995	36.501	36.008	35.515	35.022	34.528	34.035	33.542
==> PV of TUOS	$45.39																									
Relative Losses																										
* Losses $		9.722	15.040	15.726	16.400	17.004	17.394	17.689	17.809	17.967	18.192	18.468	18.796	19.154	19.541	19.995	20.514	20.047	20.375	20.890	21.172	21.455	21.737	22.020	22.302	22.585
=> PV of Loss difference	$169.97																									
Total for Option 6	**$669.99**																									

Scenario D	*Medium growth, new generation Bulli & SEQ*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 1	**Option 1 Capacitor Banks followed by Braemar-Halys**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Braemar-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	22.179	21.883	21.587	21.292	20.996	20.700	20.404	20.109	19.813	19.517	19.222	18.926	18.630	18.334	18.039	17.743	17.447	17.152	16.856	16.560	16.264
==> PV of TUOS $132.37																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $5.85																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518
==> PV of TUOS $7.61																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102
==> PV of TUOS $0.45																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
Western Down Sub Est & Braemar Western Bus Upgrade																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.261	9.138	9.014	8.891	8.767	8.644	8.520	8.397	8.273	8.150	8.026	7.903	7.779	7.656	7.532	7.409
==> PV of TUOS $32.74																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.862	19.825	20.293	21.460	23.274	24.527	26.305	26.763	28.124	29.586	31.617	34.355	37.459	41.084	44.385	47.594	50.889	54.183	57.477	60.771	64.065	67.359
=> PV of Loss difference $256.98																									
Total for Option 1 **$1,055.10**																									

Scenario D	*Medium growth, new generation Bulli & SEQ*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 2	**Option 2 Western Downs-Halys**																								
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542
==> PV of TUOS $4.41																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193
==> PV of TUOS $166.49																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364
==> PV of TUOS $14.02																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092
==> PV of TUOS $0.84																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.323	18.862	19.642	20.070	21.055	22.529	24.023	25.841	26.487	27.882	29.543	31.666	34.339	37.354	40.854	43.801	46.663	49.666	52.669	55.672	58.675	61.678	64.681
=> PV of Loss difference $253.57																									
Total for Option 2 $1,057.30																									

Scenario D	*Medium growth, new generation Bulli & SEQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 3	**Option 3 Capacitor Banks followed by Western Downs-Halys 275kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.803	19.642	20.070	21.055	22.529	24.023	25.841	26.487	27.882	29.543	31.666	34.339	37.354	40.854	44.294	47.672	51.081	54.489	57.898	61.307	64.716	68.124
=> PV of Loss difference $255.77																									
Total for Option 3 $1,045.50																									

Scenario D	*Medium growth, new generation Bulli & SEQ*																								
	1 **09/10**	*2* **10/11**	*3* **11/12**	*4* **12/13**	*5* **13/14**	*6* **14/15**	*7* **15/16**	*8* **16/17**	*9* **17/18**	*10* **18/19**	*11* **19/20**	*12* **20/21**	*13* **21/22**	*14* **22/23**	*15* **23/24**	*16* **24/25**	*17* **25/26**	*18* **26/27**	*19* **27/28**	*20* **28/29**	*21* **29/30**	*22* **30/31**	*23* **31/32**	*24* **32/33**	*25* **33/34**
Option 4	**Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Series Capacitors																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	14.438	14.208	13.978	13.748	13.519	13.289	13.059	12.830	12.600	12.370	12.141	11.911	11.681	11.452	11.222	10.992	10.763	10.533	10.303	10.073
==> PV of TUOS $76.43																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587
==> PV of TUOS $168.42																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587
==> PV of TUOS $105.53																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.803	20.060	20.659	21.695	22.720	23.979	25.806	27.391	28.370	29.485	31.558	34.236	37.255	40.761	43.965	47.083	50.279	53.476	56.673	59.870	63.067	66.264
=> PV of Loss difference $255.90																									
Total for Option 4 $1,046.48																									

Scenario D	*Medium growth, new generation Bulli & SEQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 5	**Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	38.126	37.618	37.109	36.601	36.093	35.584	35.076	34.568	34.059	33.551	33.043	32.534	32.026	31.517	31.009	30.501	29.992	29.484	28.976	28.467	27.959
==> PV of TUOS $227.55																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628
==> PV of TUOS $99.99																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.758	19.551	19.968	20.923	22.345	23.879	25.712	26.372	27.757	29.407	31.564	34.297	37.395	41.020	44.844	48.667	52.491	56.314	60.138	63.961	67.785	71.608
=> PV of Loss difference $257.56																									
Total for Option 5 $1,058.03																									

Scenario D		*Medium growth, new generation Bulli & SEQ*																								
		1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 6		**Option 6 Capacitor Banks followed by Western Downs-Halys 500kV**																								
Millmerran Cap. Bank																										
=> TUOS		0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS	$2.62																									
Middle Ridge Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS	$4.87																									
South Pine and Belmont Cap. Banks																										
=> TUOS		0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS	$3.22																									
Western Downs-Halys 500kV at 500kV #1																										
=> TUOS		0.000	0.000	0.000	0.000	46.344	45.726	45.108	44.490	43.872	43.254	42.636	42.018	41.401	40.783	40.165	39.547	38.929	38.311	37.693	37.075	36.457	35.839	35.221	34.603	33.986
==> PV of TUOS	$276.60																									
Kogan-Braemar line rearrangement (line)																										
=> TUOS		0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS	$12.72																									
Kogan-Braemar line rearrangement (substation)																										
=> TUOS		0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS	$0.76																									
Halys-Blackwall 500kV at 500kV																										
=> TUOS		0.000	0.000	0.000	0.000	48.719	48.069	47.420	46.770	46.120	45.471	44.821	44.172	43.522	42.872	42.223	41.573	40.924	40.274	39.625	38.975	38.325	37.676	37.026	36.377	35.727
==> PV of TUOS	$290.77																									
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS	$6.48																									
Halys-Greenbank 500kV at 500kV																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	46.414	45.795	45.177	44.558	43.939	43.320	42.701	42.082	41.463	40.845	40.226	39.607	38.988	38.369	37.750	37.131
==> PV of TUOS	$164.08																									
Western Downs-Halys 500kV at 500kV #2																										
=> TUOS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	36.995	36.501	36.008	35.515	35.022	34.528	34.035	33.542	33.049	32.555	32.062	31.569	31.076	30.582	30.089	29.596
==> PV of TUOS	$130.78																									
Relative Losses																										
* Losses $		9.764	15.670	17.205	18.421	19.469	20.113	20.935	22.151	22.643	23.682	25.261	27.067	29.158	31.564	34.297	37.395	41.020	43.449	45.845	48.573	51.301	54.029	56.757	59.485	62.213
=> PV of Loss difference	$248.67																									
Total for Option 6	**$1,141.58**																									

Scenario E	*Medium growth, new generation Bulli & CQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 1	**Option 1 Capacitor Banks followed by Braemar-Halys**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Braemar-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	22.179	21.883	21.587	21.292	20.996	20.700	20.404	20.109	19.813	19.517	19.222	18.926	18.630	18.334	18.039	17.743	17.447	17.152	16.856	16.560	16.264
==> PV of TUOS $132.37																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $5.85																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518
==> PV of TUOS $7.61																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102
==> PV of TUOS $0.45																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
Western Down Sub Est & Braemar Western Bus Upgrade																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.261	9.138	9.014	8.891	8.767	8.644	8.520	8.397	8.273	8.150	8.026	7.903	7.779	7.656	7.532	7.409
==> PV of TUOS $32.74																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.862	19.825	21.154	22.668	24.363	25.679	27.454	27.523	28.621	29.999	31.913	34.466	37.375	40.780	43.871	46.876	49.962	53.048	56.135	59.221	62.307	65.393
=> PV of Loss difference $258.88																									
Total for Option 1 $1,057.01																									

Scenario E	*Medium growth, new generation Bulli & CQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 2	**Option 2 Western Downs-Halys**																								
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542
==> PV of TUOS $4.41																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193
==> PV of TUOS $166.49																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364
==> PV of TUOS $14.02																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092
==> PV of TUOS $0.84																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.323	18.862	19.642	20.994	22.387	23.791	25.283	27.074	27.321	28.459	30.002	32.000	34.507	37.347	40.650	43.426	46.121	48.950	51.779	54.609	57.438	60.267	63.097
=> PV of Loss difference $256.21																									
Total for Option 2 $1,059.93																									

Scenario E	*Medium growth, new generation Bulli & CQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 3	**Option 3 Capacitor Banks followed by Western Downs-Halys 275kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.803	19.642	20.994	22.387	23.791	25.283	27.074	27.321	28.459	30.002	32.000	34.507	37.347	40.650	43.660	46.589	49.593	52.598	55.603	58.608	61.612	64.617
=> PV of Loss difference $257.12																									
Total for Option 3 $1,046.86																									

Scenario E	*Medium growth, new generation Bulli & CQ*																									
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 4	**Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors**																									
Millmerran Cap. Bank																										
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286	
==> PV of TUOS $2.62																										
Middle Ridge Cap. Banks																										
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532	
==> PV of TUOS $4.87																										
South Pine and Belmont Cap. Banks																										
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396	
==> PV of TUOS $3.22																										
Western Downs-Halys 275kV																										
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	
==> PV of TUOS $150.81																										
Kogan-Braemar line rearrangement (line)																										
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	
==> PV of TUOS $12.72																										
Kogan-Braemar line rearrangement (substation)																										
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	
==> PV of TUOS $0.76																										
Series Capacitors																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	14.438	14.208	13.978	13.748	13.519	13.289	13.059	12.830	12.600	12.370	12.141	11.911	11.681	11.452	11.222	10.992	10.763	10.533	10.303	10.073	
==> PV of TUOS $76.43																										
Halys-Blackwall 500kV (initially operated at 275kV)																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	
==> PV of TUOS $168.42																										
Proposed and modelled projects																										
Kogan fault level management measures																										
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
==> PV of TUOS $6.35																										
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510	
==> PV of TUOS $103.89																										
500kV upgrade Western Downs-Halys 1st Nthn. build																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952	
==> PV of TUOS $33.84																										
500kV upgrade Halys-Blackwall																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854	
==> PV of TUOS $23.30																										
Halys-Greenbank 500kV (initially operated at 275kV)																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	
==> PV of TUOS $105.53																										
500kV upgrade Halys-Greenbank																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240	
==> PV of TUOS $13.48																										
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	
==> PV of TUOS $62.11																										
500kV upgrade Western Downs-Halys 2nd Nthn. build																										
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637	
==> PV of TUOS $22.22																										
Relative Losses																										
* Losses $	9.764	15.670	17.205	18.803	20.060	21.654	23.153	24.003	25.202	26.999	28.498	29.090	29.918	31.858	34.372	37.216	40.525	43.777	46.973	50.197	53.421	56.645	59.869	63.093	66.317	
=> PV of Loss difference $259.81																										
Total for Option 4 $1,050.39																										

Scenario E	*Medium growth, new generation Bulli & CQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 5	**Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	38.126	37.618	37.109	36.601	36.093	35.584	35.076	34.568	34.059	33.551	33.043	32.534	32.026	31.517	31.009	30.501	29.992	29.484	28.976	28.467	27.959
==> PV of TUOS $227.55																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449	31.879
==> PV of TUOS $230.45																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628
==> PV of TUOS $99.99																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.758	19.551	20.905	22.278	23.636	25.154	26.952	27.222	28.358	29.807	31.762	34.303	37.201	40.590	43.918	47.186	50.484	53.782	57.080	60.378	63.677	66.975
=> PV of Loss difference $257.94																									
Total for Option 5 $1,058.41																									

Scenario E	*Medium growth, new generation Bulli & CQ*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 6	**Option 6 Capacitor Banks followed by Western Downs-Halys 500kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV at 500kV #1																									
=> TUOS	0.000	0.000	0.000	0.000	46.344	45.726	45.108	44.490	43.872	43.254	42.636	42.018	41.401	40.783	40.165	39.547	38.929	38.311	37.693	37.075	36.457	35.839	35.221	34.603	33.986
==> PV of TUOS $276.60																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV at 500kV																									
=> TUOS	0.000	0.000	0.000	0.000	48.719	48.069	47.420	46.770	46.120	45.471	44.821	44.172	43.522	42.872	42.223	41.573	40.924	40.274	39.625	38.975	38.325	37.676	37.026	36.377	35.727
==> PV of TUOS $290.77																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.48																									
Halys-Greenbank 500kV at 500kV																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	46.414	45.795	45.177	44.558	43.939	43.320	42.701	42.082	41.463	40.845	40.226	39.607	38.988	38.369	37.750	37.131
==> PV of TUOS $164.08																									
Western Downs-Halys 500kV at 500kV #2																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	36.995	36.501	36.008	35.515	35.022	34.528	34.035	33.542	33.049	32.555	32.062	31.569	31.076	30.582	30.089	29.596
==> PV of TUOS $130.78																									
Relative Losses																									
* Losses $	9.764	15.670	17.205	18.421	19.469	21.105	22.381	23.511	23.691	24.509	25.946	27.604	29.531	31.762	34.303	37.201	40.590	43.135	45.615	48.318	51.021	53.724	56.427	59.131	61.834
=> PV of Loss difference $251.67																									
Total for Option 6 $1,144.58																									

Scenario F	*Economic downturn, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 1	**Option 1 Capacitor Banks followed by Braemar-Halys**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Braemar-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	22.179	21.883	21.587	21.292	20.996	20.700	20.404	20.109	19.813	19.517	19.222	18.926	18.630	18.334	18.039	17.743	17.447	17.152	16.856	16.560	16.264
==> PV of TUOS $132.37																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449
==> PV of TUOS $208.03																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $5.85																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518
==> PV of TUOS $7.61																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102
==> PV of TUOS $0.45																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
Western Down Sub Est & Braemar Western Bus Upgrade																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.261	9.138	9.014	8.891	8.767	8.644	8.520	8.397	8.273	8.150	8.026	7.903	7.779	7.656	7.532	7.409
==> PV of TUOS $32.74																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.642	15.115	16.093	17.209	18.315	18.767	19.638	21.147	22.232	23.640	23.607	24.561	25.621	27.150	29.304	31.753	34.573	37.157	39.677	42.257	44.838	47.418	49.999	52.579	55.160
=> PV of Loss difference $226.78																									
Total for Option 1 $1,002.48																									

Scenario F	*Economic downturn, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 2	**Option 2 Western Downs-Halys**																								
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542
==> PV of TUOS $4.41																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529	18.193
==> PV of TUOS $166.49																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389	1.364
==> PV of TUOS $14.02																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094	0.092
==> PV of TUOS $0.84																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449
==> PV of TUOS $208.03																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.642	15.115	16.093	17.242	18.311	18.663	19.345	20.567	21.840	23.280	23.416	24.408	25.627	27.236	29.349	31.734	34.462	36.972	39.423	41.929	44.436	46.943	49.450	51.956	54.463
=> PV of Loss difference $225.31																									
Total for Option 2 $1,006.62																									

Scenario F	*Economic downturn, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 3	**Option 3 Capacitor Banks followed by Western Downs-Halys 275kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449
==> PV of TUOS $208.03																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.642	15.115	16.093	17.242	18.311	18.663	19.345	20.567	21.840	23.280	23.416	24.408	25.627	27.236	29.349	31.734	34.462	37.149	39.794	42.460	45.126	47.792	50.458	53.124	55.790
=> PV of Loss difference $226.20																									
Total for Option 3 $993.51																									

Scenario F	*Economic downturn, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 4	**Option 4 Capacitor Banks followed by Western Downs-Halys 275kV & Series Capacitors**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 275kV																									
=> TUOS	0.000	0.000	0.000	0.000	25.267	24.931	24.594	24.257	23.920	23.583	23.246	22.909	22.572	22.235	21.898	21.562	21.225	20.888	20.551	20.214	19.877	19.540	19.203	18.866	18.529
==> PV of TUOS $150.81																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Series Capacitors																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	14.438	14.208	13.978	13.748	13.519	13.289	13.059	12.830	12.600	12.370	12.141	11.911	11.681	11.452	11.222	10.992	10.763	10.533	10.303
==> PV of TUOS $69.05																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587
==> PV of TUOS $168.42																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	29.387	28.996	28.604	28.212	27.820	27.428	27.036	26.645	26.253	25.861	25.469	25.077	24.685	24.294	23.902	23.510
==> PV of TUOS $103.89																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587
==> PV of TUOS $105.53																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137
==> PV of TUOS $62.11																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.642	15.115	16.093	17.242	18.311	19.065	20.016	20.769	21.799	23.248	24.471	24.981	25.577	27.134	29.251	31.641	34.375	37.068	39.718	42.389	45.061	47.732	50.404	53.075	55.746
=> PV of Loss difference $227.29																									
Total for Option 4 $1,010.48																									

Scenario F	*Economic downturn, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 5	**Option 5 Capacitor Banks followed by Western Downs-Halys 500kV (initially operated at 275kV)**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	38.126	37.618	37.109	36.601	36.093	35.584	35.076	34.568	34.059	33.551	33.043	32.534	32.026	31.517	31.009	30.501	29.992	29.484	28.976	28.467	27.959
==> PV of TUOS $227.55																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415	1.389
==> PV of TUOS $12.72																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096	0.094
==> PV of TUOS $0.76																									
Halys-Blackwall 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	42.695	42.126	41.557	40.988	40.418	39.849	39.280	38.711	38.141	37.572	37.003	36.433	35.864	35.295	34.726	34.156	33.587	33.018	32.449
==> PV of TUOS $208.03																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $6.35																									
Western Downs-Halys 500kV (initially operated at 275kV) 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	28.285	27.908	27.531	27.154	26.776	26.399	26.022	25.645	25.268	24.891	24.514	24.137	23.759	23.382	23.005	22.628
==> PV of TUOS $99.99																									
Halys-Greenbank 500kV (initially operated at 275kV)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	42.366	41.801	41.236	40.671	40.106	39.541	38.976	38.412	37.847	37.282	36.717	36.152	35.587	35.022
==> PV of TUOS $119.09																									
500kV upgrade Halys-Blackwall																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.291	8.180	8.070	7.959	7.849	7.738	7.628	7.517	7.406	7.296	7.185	7.075	6.964	6.854
==> PV of TUOS $23.30																									
500kV upgrade Western Downs-Halys 1st Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.039	11.879	11.718	11.558	11.397	11.237	11.076	10.916	10.755	10.595	10.434	10.274	10.113	9.952
==> PV of TUOS $33.84																									
500kV upgrade Halys-Greenbank																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.141	6.059	5.977	5.895	5.813	5.732	5.650	5.568	5.486	5.404	5.322	5.240
==> PV of TUOS $13.48																									
500kV upgrade Western Downs-Halys 2nd Nthn. build																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.121	9.986	9.851	9.716	9.581	9.446	9.311	9.176	9.041	8.906	8.771	8.637
==> PV of TUOS $22.22																									
Relative Losses																									
* Losses $	9.642	15.115	16.093	17.224	18.267	18.588	19.232	20.408	21.711	23.161	23.317	24.304	25.457	27.050	29.194	31.632	34.443	37.208	39.928	42.670	45.413	48.155	50.898	53.640	56.383
=> PV of Loss difference $225.97																									
Total for Option 5 $1,004.03																									

Scenario F	*Economic downturn, new generation Bulli*																								
	1 09/10	*2* 10/11	*3* 11/12	*4* 12/13	*5* 13/14	*6* 14/15	*7* 15/16	*8* 16/17	*9* 17/18	*10* 18/19	*11* 19/20	*12* 20/21	*13* 21/22	*14* 22/23	*15* 23/24	*16* 24/25	*17* 25/26	*18* 26/27	*19* 27/28	*20* 28/29	*21* 29/30	*22* 30/31	*23* 31/32	*24* 32/33	*25* 33/34
Option 6	**Option 6 Capacitor Banks followed by Western Downs-Halys 500kV**																								
Millmerran Cap. Bank																									
=> TUOS	0.000	0.000	0.000	0.397	0.392	0.386	0.381	0.376	0.370	0.365	0.360	0.355	0.349	0.344	0.339	0.333	0.328	0.323	0.318	0.312	0.307	0.302	0.296	0.291	0.286
==> PV of TUOS $2.62																									
Middle Ridge Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.739	0.729	0.719	0.709	0.699	0.689	0.680	0.670	0.660	0.650	0.640	0.630	0.620	0.611	0.601	0.591	0.581	0.571	0.561	0.552	0.542	0.532
==> PV of TUOS $4.87																									
South Pine and Belmont Cap. Banks																									
=> TUOS	0.000	0.000	0.000	0.000	0.540	0.533	0.526	0.519	0.511	0.504	0.497	0.490	0.483	0.475	0.468	0.461	0.454	0.447	0.439	0.432	0.425	0.418	0.411	0.403	0.396
==> PV of TUOS $3.22																									
Western Downs-Halys 500kV at 500kV #1																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	46.344	45.726	45.108	44.490	43.872	43.254	42.636	42.018	41.401	40.783	40.165	39.547	38.929	38.311	37.693	37.075	36.457	35.839	35.221	34.603
==> PV of TUOS $250.15																									
Kogan-Braemar line rearrangement (line)																									
=> TUOS	0.000	0.000	0.000	0.000	1.930	1.904	1.878	1.853	1.827	1.801	1.775	1.750	1.724	1.698	1.672	1.647	1.621	1.595	1.570	1.544	1.518	1.492	1.467	1.441	1.415
==> PV of TUOS $11.52																									
Kogan-Braemar line rearrangement (substation)																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.128	0.126	0.125	0.123	0.121	0.119	0.118	0.116	0.114	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.101	0.099	0.097	0.096
==> PV of TUOS $0.69																									
Halys-Blackwall 500kV at 500kV																									
=> TUOS	0.000	0.000	0.000	0.000	48.719	48.069	47.420	46.770	46.120	45.471	44.821	44.172	43.522	42.872	42.223	41.573	40.924	40.274	39.625	38.975	38.325	37.676	37.026	36.377	35.727
==> PV of TUOS $290.77																									
Proposed and modelled projects																									
Kogan fault level management measures																									
* MWhrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
==> PV of TUOS $5.95																									
Halys-Greenbank 500kV at 500kV																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	46.414	45.795	45.177	44.558	43.939	43.320	42.701	42.082	41.463	40.845	40.226	39.607	38.988	38.369	37.750
==> PV of TUOS $146.59																									
Western Downs-Halys 500kV at 500kV #2																									
=> TUOS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	36.995	36.501	36.008	35.515	35.022	34.528	34.035	33.542	33.049	32.555	32.062	31.569	31.076	30.582	30.089
==> PV of TUOS $116.84																									
Relative Losses																									
* Losses $	9.642	15.115	16.093	16.709	17.731	18.587	19.324	20.312	21.437	21.537	22.184	23.609	25.204	27.050	29.194	31.632	34.443	36.326	38.192	40.315	42.438	44.561	46.684	48.807	50.930
=> PV of Loss difference $219.89																									
Total for Option 6 $1,053.09																									