RAISE CONTINGENCY FCAS – PRICE CONTROL MECHANISM

28 July 2010

FINAL REPORT

IES
Intelligent Energy Systems

Executive Summary

Introduction

The Regulator has commenced, in accordance with the requirements of the Electricity Supply Industry (Price Control) Regulations 2003, the process for making a determination that regulates the prices that may be charged by, and specifies the price control mechanisms imposed on, Hydro Tasmania for raise contingency frequency control ancillary services (FCAS) to meet the Tasmanian local requirement. The Regulator has engaged Intelligent Energy Systems (IES) to give advice on an appropriate price control mechanism to be imposed on Hydro Tasmania.

Scope

Under its Terms of Reference, IES has been asked to analyse and advise on the reasonable options for price control mechanisms to regulate the prices that may be charged by Hydro Tasmania for raise contingency frequency control ancillary services to meet the Tasmanian local requirement and advise on the most appropriate option.

Potential Price Control Mechanisms

While IES observes that the price control mechanisms available to the Regulator under Regulation 18 of the Price Control Regulations are very broad, it maintains the view that the most prospective approaches for effective price control are those aimed at regulating Hydro Tasmania's FCAS offer prices or the terms and prices of FCAS hedge contracts provided by Hydro Tasmania. In our view, approaches which aim at directly regulating the spot price of raise contingency services in Tasmania when there is a local requirement are really not viable because they would interfere with the workings of the NEM and hence could have unintended consequences.

IES notes that the energy and FCAS markets are strongly related and that this has important implications for the regulation of FCAS offer prices. IES accepts that there are conditions under which Hydro Tasmania would be disadvantaged if its FCAS offer pricing were to be regulated. However, apart from this, IES concludes that this form of regulation would not be effective because FCAS spot price outcomes would still be strongly influenced by Hydro Tasmania through its dispatch offer pricing in the energy market. IES considers that regulation of Hydro Tasmania's provision and pricing of FCAS contracts should be the preferred price control mechanism.

Aspects of the Preferred Price Control Mechanism

In its April 2010 submission to the Regulator, Hydro Tasmania also considers that this is the preferred approach to regulation. While our Terms of Reference fall short of asking us to recommend a particular design for the preferred price control mechanism and associated pricing methodology, our recommended

approach to the regulation of FCAS contracts and contract price differs from that advocated by Hydro Tasmania in a number of important respects.

While IES broadly concurs with many aspects of, and a number of the justifications of Hydro Tasmania's proposal, we observe that one of the difficulties with a negotiated approach using pricing principles approved by the Regulator is that counterparties to these negotiations would be at a strong informational disadvantage to Hydro Tasmania. Accordingly, while IES agrees broadly with the Hydro Tasmania proposal, we believe it would be in the public interest that the pricing methodology and parameters be determined upfront and disclosed generally rather than remaining confidential to Hydro Tasmania and subject to regulatory review only in the event of complaint. Making this information publicly available also fits with Hydro Tasmania's stated desire for others to step in if they can provide the services more efficiently than Hydro Tasmania.

Furthermore we do not agree with Hydro Tasmania's subsequent proposal to base foregone generation revenue on Long Run Average Cost (LRAC) on the grounds that the opportunity cost based on wholesale electricity price (spot or contract) already includes a capacity component as the NEM regional spot price is intended to cover a generator's fixed costs (operations, maintenance and return of and on capital) as well as variable generation costs.

In its draft report, IES expressed the view that three years would be an appropriate time for the price control mechanism to be in place and that it would be appropriate to review the application of the mechanism at least six months prior to the expiration of this initial period. Upon further consideration, IES is now of the view that the regulatory period should be extended to five years with regulated contracts applying only up to the end of this period.

IES considers that during this regulatory period, Hydro Tasmania be required to advise updates to pricing inputs on a six monthly basis.

Submissions on the Draft Report

IES submitted its draft report to the Regulator on 18 June 2010. During the subsequent consultation period, three submissions were received including comments from Mark B. Lively of Utility Economic Engineers, and responses from Hydro Tasmania and AETV. The first of these submissions presented an alternative pricing mechanism for regulation FCAS, while submissions from Hydro Tasmania and AETV expressed broad agreement with the recommended form of price control, while, particularly in the case of Hydro Tasmania's submission, disagreeing with some of our characterisations and comments. In our view, the submissions did not present any new material issues and apart from changing our view on the duration of the regulatory period, we have made no other changes to our draft recommendations.

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Glossary

Term	Definition
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AETV	Aurora Energy Tamar Valley
AGC	Automatic Generation Control
FCAS	Frequency Control Ancillary Services
IES	Intelligent Energy Systems
LRAC	Long Run Average Cost
LRMC	Long Run Marginal Cost
NCAS	Network Control Ancillary Services
NEM	National Electricity Market
NEMDE	National Electricity Market Dispatch Engine
NER	National Electricity Rules
OTTER	Office of the Tasmanian Economic Regulator
REC	Renewable Energy Certificate
SRMC	Short Run Marginal Cost
WACC	Weighted Average Cost of Capital

1 Introduction and Scope

1.1 Reason for Review

On 24 July 2009, the Tasmanian Energy Regulator (Regulator) gave written notice of intention to declare the supply of raise contingency frequency ancillary services (fast raise, slow raise and delayed raise) by Hydro Tasmania to meet the Tasmanian local requirement as declared electrical services. This was followed in December 2009 with the publication of its "Statement of Reasons". The Regulator considers that Hydro Tasmania has substantial market power in the supply of the defined services and the promotion of competition, efficiency and the public interest warrants the declaration of the defined services.

The Regulator has commenced, in accordance with the requirements of the Electricity Supply Industry (Price Control) Regulations 2003, the process for making a determination that regulates the prices that may be charged by, and specifies the price control mechanisms imposed on, Hydro Tasmania for raise contingency frequency control ancillary services (FCAS) to meet the Tasmanian local requirement. The Regulator has engaged Intelligent Energy Systems (IES) to give advice on an appropriate price control mechanism to be imposed on Hydro Tasmania.

1.2 Terms of Reference

Under its terms of reference, IES has been asked to analyse and advise on the reasonable options for price control mechanisms to regulate the prices that may be charged by Hydro Tasmania for raise contingency frequency control ancillary services to meet the Tasmanian local requirement and advise on the most appropriate option.

Specifically, IES has been instructed to devise a number of potential price control mechanisms that could reasonably be applied to regulate the prices of the declared electrical services, each of which must be permissible under Regulation 18 of the Price Control Regulations. IES was informed that potential options might include, but are not limited to:

- limiting the offer prices that may be submitted by Hydro Tasmania in respect of the declared electrical services;
- an obligation to offer a specified minimum volume of each service;
- limiting the revenue that Hydro Tasmania can procure from the declared electrical services over a period of time; and
- financial contracting obligations that will protect the interests of consumers and promote competition in the downstream and upstream markets.

IES is required to consider each candidate price control mechanism to ensure that the matters and principles set out in Regulation 33(2) can be appropriately

addressed within the scope of the declaration and assess each candidate price control mechanism against:

- the links between supply of the various declared electrical services and the supply of energy and other ancillary services;
- the importance of these links to the long-term efficient supply of energy and the maintenance of frequency standards in Tasmania;
- the links between the various declared electrical services and energy or other ancillary services through dispatch co-optimisation in the NEM, and the potential impacts from each particular form of price control on overall outcomes given that price control will only apply to some of the services; and
- any potential consequential impacts on the price and efficiency and adequacy of supply of energy and other ancillary services by third parties resulting from regulation of some services provided by Hydro Tasmania.

IES is required to

- consolidate the consideration of the various candidate options and make a recommendation for the most appropriate mechanism;
- detail all key assumptions affecting the advice and the sensitivity of the recommendation to changes in these assumptions;
- provide advice on an appropriate duration for the application of the recommended price control mechanism; and
- provide advice on any adjustments to the recommended price control mechanism that may be necessary over the recommended duration of its application and the principles to be applied in making the adjustment.

1.3 Submissions on the Draft Report

IES submitted its draft report to the Regulator on 18 June 2010. During the subsequent consultation period, three submissions were received including comments from Mark B. Lively of Utility Economic Engineers, and responses from Hydro Tasmania and AETV.

Mark Lively

Mark Lively's submission "A Pricing Mechanism to Facilitate Entry into the FCAS Market" is concerned with presenting an alternative pricing mechanism for the regulation service rather than the contingency service which is the object of the present determination. In summary, if the alternative pricing mechanism described were implemented, there could be benefits in ensuring the effective delivery of FCAS services when a contingency occurs but this would not replace the need for AEMO to be assured that there was sufficient capacity enabled to respond to all critical contingencies. This is particularly the case when local FCAS contingency services are required in Tasmania.

Aurora Energy Tamar Valley (AETV)

Aurora Energy Tamar Valley (AETV) broadly agrees with IES's findings. In particular AETV supports:

- The use of an FCAS hedge with the price and terms and conditions regulated;
- The proposal that the pricing methodology and parameters be determined up front;
- The duration of the price control mechanism being at least three years with a review occurring 6 to 12 months prior to the expiry of the price control mechanism;
- Hydro Tasmania being required to provide updates to pricing inputs on at least a six monthly basis;
- The aim that the regulation of FCAS contingency services should deliver outcomes that approximate outcomes of a competitive market and this can be achieved by relating the regulated price to Hydro Tasmania's opportunity costs; and
- The regulator approving a general contract design and associated terms and conditions along with approving the pricing parameters in advance on a periodic basis.

Hydro Tasmania

Hydro Tasmania supports IES's draft finding that the regulation of Hydro Tasmania's provision and pricing of FCAS hedge contracts should be the preferred price control mechanism.

Hydro Tasmania agrees with IES regarding the difficulties involved in separating FCAS and energy outcomes. Hydro Tasmania considers that the regulation of hedge contracts is the best option for achieving a practicable and workable regulatory outcome. However, Hydro Tasmania states that it does not agree with some elements of IES's economic characterisation of costs and a number of IES's comments concerning spot market dispatch.

Fundamentally, the Hydro Tasmania submission does not raise any new issues. However in response to this submission, we consider it useful to reiterate two principal points.

1) Opportunity Cost Due to Inefficient Generation

IES agrees that the opportunity cost of forgone generation needs to be considered as part of the cost of providing FCAS raise services and hence be incorporated into the price of a hedge contract. The foregone generation can be valued as the sum of the foregone electricity value, based on an appropriate water value or proxy, and the expected foregone REC value.

2) System Inertia:

Hydro Tasmania has noted elsewhere that while inertia is a key input in establishing the required level of certain ancillary services, it is not currently paid for as a service[1]. It has stated in its submission that the costs of providing inertia via synchronous condenser operation should be treated as raise FCAS costs for the purpose of determining a contract price for a regulated FCAS hedge.

IES understands that from time to time, Hydro Tasmania opts to run certain generator units in synchronous condenser mode as a means of increasing flow limits on Basslink and thereby maximising the value of its physical energy trading opportunities. In our view, the costs of operating in this mode are incurred primarily in relation to Hydro Tasmania pursuing its own commercial objectives and not for the purpose of providing benefits generally to the power system.

To the extent to which Hydro Tasmania views this operation as a contribution to the provision of, or a lessening of the requirement for an ancillary service, Hydro Tasmania could pursue compensation by offering the service explicitly by participating in the appropriate market arrangement as a provider of the service. To the extent to which Hydro Tasmania believes the appropriate market arrangement does not presently exist, Hydro Tasmania could actively advocate its establishment. In relation to this issue we note that in the Regulator has recommended the Tasmanian Jurisdiction consider initiating amendments to the National Electricity Rules (NER) if system inertia issues in Tasmania are not adequately addressed[2].

1.4 Structure of Report

This report commences with a brief overview of the issues (Chapter 2). In this overview we consider the opportunity costs entailed by generators in providing FCAS services and introduce possible regulatory approaches. Next, in Chapter 3, we provide an overview and discussion of ancillary services in the NEM. This is preliminary to discussing the dispatch of FCAS and the FCAS trapezium and examining some key issues specific to Tasmania. In Chapter 4 we set out and provide an evaluation of the alternative regulatory approaches. Finally in Chapter 5 we provide our recommendations and conclusions.

[1] Hydro Tasmania's Comments on OTTER's 2009 Reliability Review.
[2] Office of the Tasmanian Economic Regulator, 2009 Reliability Review, p.89.

2 Overview of Issues

2.1 Introduction

Ideally, the regulation of raise FCAS contingency services should deliver outcomes that would approximate what a market with effective competition would deliver. In a fully competitive and mature market with freely available information, the offered prices for the various FCAS raise contingency services should be related to each generating unit's opportunity cost of being enabled for the relevant service. Determining a generator's costs of providing various FCAS raise contingency services is not as clear cut as it might seem. The FCAS services and energy are joint products from the same generator and hence the provision of one service affects the provision of the others. Thus to estimate the cost of providing a raise service requires an understanding of how providing this service affects the provision of energy and other FCAS and what are the associated opportunity costs.

2.2 FCAS Opportunity Costs

Determining the opportunity cost of being enabled to provide raise FCAS services is not always straight forward. There are two distinct situations which could result in different opportunity costs.

The first situation is when the unit's energy output is not altered by the amount of FCAS raise services for which it is enabled. In this case the unit's energy dispatched is not changed from what it would have been had no FCAS raise service been enabled. Thus the generator's energy output is not changed. In the case of a hydro-electric generation unit, its water use and any other variable costs have not changed. Consequently, in this case the opportunity cost of being enabled is zero. On the rare occasions that the contingency service is required, the generator may have an increased output but this should be largely compensated through the energy spot market.

The second situation is when the unit's energy output is altered by the amount of FCAS raise services for which it is enabled. In this case the unit's energy dispatched is changed from what it would have been had no FCAS raise service been enabled. Because the generator's energy output is changed, its water use and any other variable costs will have changed as well. Additionally, the unit may have its energy market dispatch reduced to provide raise FCAS. This lost energy market opportunity must be considered.

2.3 Who Pays for FCAS Contingency Raise Services?

When considering any regulatory approach it is important to consider who pays for the service that is being regulated and their ability to manage these costs or to avoid or reduce their usage of the service.

In the case of FCAS raise contingency services, generators pay for these services. These costs are allocated based on the five minute dispatch and the spot prices resulting from this. If there are no specific regional requirements for raise contingency services then the total cost is allocated across all generators in the NEM in proportion to their dispatched energy quantities. If there are regional requirements then the regional costs are allocated on a regional basis. Thus, in the situations when there is a Tasmanian regional requirement, the costs of the raise contingency services would be apportioned between Hydro Tasmania and the other market generators in Tasmania. When there are Tasmanian regional requirements, Hydro Tasmania only benefits from high raise contingency prices when it provides a greater proportion of the services than it is liable to pay for.

2.4 Possible Approaches to Regulation

The price control mechanisms available to the Regulator under Regulation 18 of the Price Control Regulations are very broad. Apart from a number of enumerated measures including reference to average and maximum prices and revenues, the Price Control Regulations provide for the Regulator to express the price control mechanism in "any other terms the Regulator considers appropriate".

Particular approaches which could be used for price control mechanisms that could be imposed on Hydro Tasmania for raise contingency services include:

- Approaches which regulate Hydro Tasmania's offered prices and quantities for raise contingency services;
- Approaches which oblige Hydro Tasmania to offer FCAS hedging contracts for raise contingency services to other generators in Tasmania at some regulated price - such contracts might take multiple forms and within each form a range of approaches could be used to determine a fair price; and
- Limiting the revenue that Hydro Tasmania is entitled to obtain from providing the raise contingency FCAS over a period of time.

In our view, approaches which try to directly regulate the spot price of raise contingency services in Tasmania when there is a local requirement are really not viable because they would interfere with the workings of the NEM and hence could have unintended consequences.

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3 Ancillary Services in the NEM

3.1 Ancillary Services

Ancillary services are those services used by the Australian Energy Market Operator (AEMO) to manage the power system safely, securely and reliably. These services maintain key technical characteristics of the system, including standards for frequency, voltage, network loading and system restart processes. There are three broad groups of ancillary services purchased by AEMO:

- System restart ancillary services which are used to restart the system or an island in the system which has blacked out;
- Network control ancillary services (NCAS) which are used to manage voltages, network loading and stability; and
- Frequency control ancillary services (FCAS) which are used to manage system frequency.

AEMO operates eight separate markets for the delivery of frequency control ancillary services (FCAS) and purchases network control ancillary services (NCAS) under agreements with service providers. FCAS providers submit offers in a similar way to generators bidding into the energy market. Payment is made for enablement of the services.

3.2 Frequency Control Ancillary Services

The frequency control ancillary services (FCAS) are the services required by AEMO to manage the power system so that it remains secure and can operate within the frequency operating standards. The FCAS services are split into two broad areas: regulation services and contingency services. These two groups are in turn split into two categories: services that raise system frequency (raise services) and services that lower system frequency (lower services). There are eight FCAS and they are as follows:

Regulation

- Regulation raise
- Regulation lower

Contingency

- 6 second raise (fast raise)
- 6 second lower (fast lower)
- 60 second raise (slow raise)
- 60 second lower (slow lower)
- 5 minute raise (delayed raise)
- 5 minute lower (delayed lower)

The regulation services are used to correct frequency back to 50Hz in response to minor deviations of load from forecast trajectory or generation from dispatch trajectory. The regulation frequency control services are provided by generators on Automatic Generation Control (AGC). The regulation services are controlled centrally by AEMO's AGC (automatic generation control). The AGC system allows AEMO to continually monitor the system frequency and to send control signals to generators providing regulation in such a manner that maintains the frequency within the normal operating band of 49.9Hz to 50.1Hz. In Tasmania the normal operating band is 49.75 to 50.25 Hz, and frequency is required to be within the range 49.85 to 50.15 Hz 99% of the time.

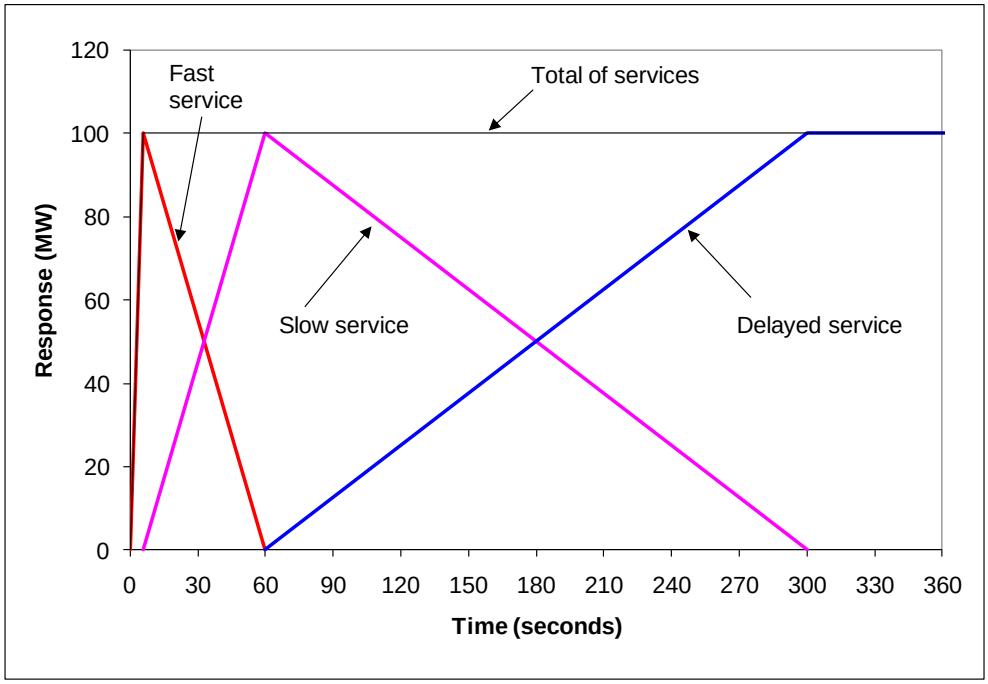
Contingency services are used to correct frequency following a major event such as the loss of a generating unit or transmission line. Contingency services are controlled locally and are triggered by a frequency deviation that follows a contingent event. Under the NEM frequency standards AEMO must ensure that, following a single contingency event, the frequency deviation remains within the single contingency band and is returned to the normal operating band within five minutes.

Contingency services are provided by technologies that can locally detect the frequency deviation and respond in a manner that corrects the frequency. Some examples of these technologies include:

- Generator Governor Response: where the generator governor reacts to the frequency deviation by opening or closing the turbine steam valve or guide vanes and consequently altering the MW output of the generating unit accordingly.
- Load shedding: where a load can be quickly disconnected from the electrical system (can act to correct a low frequency only).
- Rapid Generation: where a frequency relay will detect a low frequency and correspondingly start a fast generator (can act to correct a low frequency only).
- Rapid Unit Unloading: where a frequency relay will detect a high frequency and correspondingly reduce a generator output (can act to correct a high frequency only).

The fast, slow and delayed contingency services are designed to complement each other in a way that provides a service which rapidly ramps in the first six seconds following a contingency and continues to maintain this output for at least five minutes and up to 15 minutes. The relationship between the services is presented in Figure 1 which shows the desired profiles for the 6s (fast), 60s (slow) and 5 min (delayed) services for a desired contingency response of 100MW.

Figure 1 Contingency Service Responses



3.3 Dispatch of FCAS

AEMO co-optimises the dispatch of energy and frequency control ancillary services. That is, AEMO uses the NEM dispatch engine, NEMDE, to find the least cost way of meeting the demand for energy in all of the regions and the global and regional requirements for FCAS. This optimisation explicitly takes into account the ability of generating units to provide the joint products of energy and FCAS. That is NEMDE finds a physically feasible dispatch of energy and FCAS for each unit. For instance if a unit's capacity was 100MW then if the unit were to supply 20MW of raise 6s contingency service then the unit would not be able to be dispatched for more than 80MW for energy. The physically feasible domain in which a unit can provide energy and a particular FCAS is defined by what is known as the FCAS trapezium.

3.3.1 FCAS Trapezium

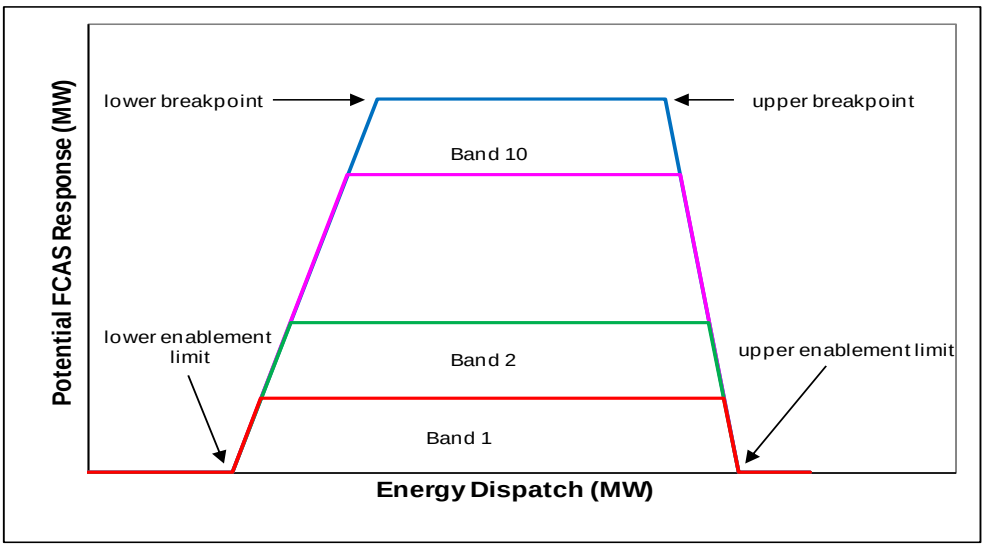
The trapezium describes the way in which the potential to provide FCAS changes with a generator's or load's energy dispatch. The trapezium for a particular FCAS is defined by five items of data:

- Maximum available - the maximum response,
- Lower enablement limit - the MW output below which no response can be provided,
- Lower break point - the lowest MW output at which the maximum response can be achieved,

- Upper break point - the highest MW output at which the maximum response can be achieved, and
- Upper enablement limit - the MW output above which no response can be achieved.

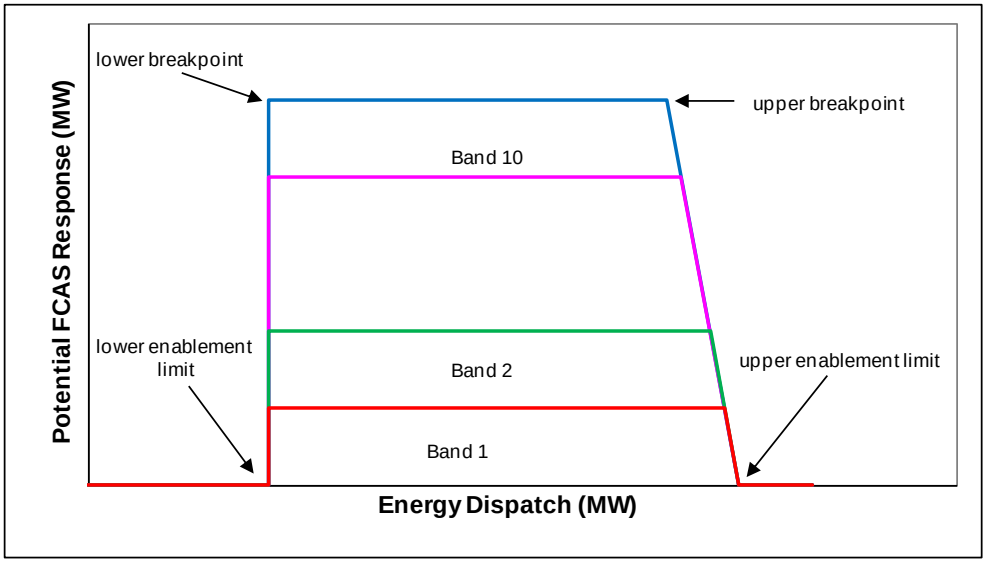
The FCAS trapezium is illustrated in Figure 2.

Figure 2 FCAS Trapezium



The trapezium can be used to represent the ability of generators and loads to deliver the various frequency control services. For example Figure 3 illustrates the trapezium for a raise contingency service being provided by a generator.

Figure 3 Example Trapezium for a 6s Raise Contingency Service



3.3.2 Co-optimisation

Co-optimisation is the simultaneous optimisation of the dispatch of energy and FCAS. When NEMDE performs this joint optimisation it may constrain plant in the energy market (alter the plant's energy dispatch) in order to be able to deliver more of a particular FCAS.

To illustrate how this might occur take the following example. The Tasmanian demand is 1,200 MW and the Victorian demand is 8,000 MW. Basslink can transfer up to 600 MW of energy + FCAS northward and there is a global requirement for 400 MW of 6s raise. There are two generators in each of Tasmania and Victoria. The energy and FCAS offers are presented in Table 1.

Table 1 Example Energy and FCAS Offers

Generator	Energy offer price	Offered capacity	FCAS offer price	Max offered FCAS
Tas Gen1	35	1,400	10	200
Tas Gen2	40	600	21	50
Vic Gen1	30	4,000	5	0
Vic Gen2	40	5,000	20	500

A co-optimised dispatch[3] which meets the requirements at least cost is presented in Table 2 below.

Table 2 Energy and FCAS Dispatch and Costs

Generator	Energy dispatch	FCAS dispatch	Energy cost	FCAS cost	Energy + FCAS cost
Tas Gen1	1,200	200	42,000	2,000	44,000
Tas Gen2	300	0	12,000	0	12,000
Vic Gen1	4,000	0	120,000	0	120,000
Vic Gen2	3,700	200	148,000	4,000	152,000
Total	9,200	400	322,000	6,000	328,000

For this example the spot price for energy is $40/MWh in Tasmania and $40/MWh in Victoria and the price for the FCAS global requirement is $20/MWh. Basslink is partially utilised by being dispatched for 300MW energy northwards plus an allowance for 200MW FCAS thus utilising 500MW of the 600MW northward capability. The Tasmanian energy price is being determined by Tas Gen2 which is marginal and the Victorian energy price is being determined by Vic Gen2. The 6s raise price is being determined by Vic Gen2 which is marginal.

Based on its energy offer of $35/MWh, which is less than the $40/MWh spot price, Tas Gen1 should be fully dispatched. However, it has been backed off to

[3] For this problem there are a number of solutions which produce the same minimum cost.

provide the 6s raise FCAS. In this case, the dispatch co-optimisation has found it cheaper to back this unit off from its energy market dispatch in order to get more 6s raise from the unit. The cost of doing so to the co-optimisation is $10/MWh for 1MW extra of 6s raise and the opportunity cost of backing the unit off by 1MW in the energy market. This opportunity cost corresponds to generating 1 extra MW from Tas Gen2 and 1 less MW from Tas Gen1. That is $40MW/h - $35/MWh = $5/MWh. Thus the total cost of backing off the Tas Gen1 to supply 1MW extra 6s raise service would be $15/MWh compared with a spot price of $20/MWh. Hence Tas Gen1 is dispatched to the maximum amount of 6s raise that it offered.

If we:

- increase Tas Gen1's FCAS price to $20/MWh,
- decrease Tas Gen2's energy and FCAS offer prices to $0/MWh each, and
- reduce Vic Gen2's maximum offered amount to 300MW,

then we get the offers in Table 3 and dispatches and costs in Table 4.

Table 3 Revised Energy and FCAS Offers

Generator	Energy offer price	Offered capacity	FCAS offer price	Max offered FCAS
Tas Gen1	35	1,400	20	200
Tas Gen2	0	600	0	50
Vic Gen1	30	4,000	5	0
Vic Gen2	40	5,000	20	300

Table 4 Energy and FCAS Dispatch and Costs for Revised Offers

Generator	Energy dispatch	FCAS dispatch	Energy cost	FCAS cost	Energy + FCAS cost
Tas Gen1	1,100	100	38,500	2,000	40,500
Tas Gen2	600	0	0	0	0
Vic Gen1	4,000	0	120,000	0	120,000
Vic Gen2	3,500	300	140,000	6,000	146,000
Total	9,200	400	298,500	8,000	306,500

Under this scenario, Vic Gen2's offer for FCAS is fully dispatched but even though Tas Gen2's offer for FCAS is $0/MWh it has not been dispatched for FCAS because it is better value to dispatch it fully for energy. Tas Gen1 becomes the marginal FCAS provider. The energy spot prices are $35/MWh in Tasmania and $40/MWh in Victoria but the FCAS spot price has risen to $25/MWh. Even though Tas Gen 1 is the marginal FCAS provider, the FCAS price is not equal to Tas Gen1's offer price of $20/MWh. The cost of using Tas Gen1 to the co-optimisation is $20/MWh for 1MW extra of 6s raise and the

opportunity cost of backing the unit off by 1MW in the energy market. This opportunity cost corresponds to generating 1 extra MW from Vic Gen2 to make up for the reduced power flow on Basslink and 1 less MW from Tas Gen1. That is $40MW/h - $35/MWh = $5/MWh. Thus the total cost of backing off Tas Gen1 to supply 1MW extra 6s raise service would be $25/MWh. Hence the FCAS spot price of $25/MWh.

In general, the NEM dispatch co-optimisation incorporates into the determination of FCAS spot prices the opportunity costs of generators being backed off from the energy market. As a consequence, any generator which is backed off from the energy market to provide FCAS is no worse off if it can be assumed that the generator's offers for energy and FCAS are its marginal costs.

Because the NEM dispatch and pricing process co-optimises energy and all the FCAS services the outcome of this process is that if a unit's energy market output is reduced to supply a particular FCAS raise service then the spot price for that FCAS raise service is always greater than or equal to the energy spot price plus the offered price for the dispatched FCAS less the offered energy price for the capacity which is backed off. Thus the FCAS spot price determined by the NEM's dispatch and pricing process will be at least the 'lost energy market opportunity', based on the offered energy and FCAS prices assuming that they reflect the unit's variable costs of supplying the energy and FCAS services. Consequently, in this case a unit could offer its FCAS raise services at a price of zero and the opportunity cost of being enabled is always fully compensated by the spot price provided the energy prices offered reflected the unit's variable or opportunity costs of generating. This is a theoretical property of the linear programming optimisation. However, in practice this is not always the case as all of the capacity of generating units is generally not offered at marginal costs.

3.4 Opportunity Costs and FCAS Spot Prices

As was discussed earlier, determining the opportunity cost of being enabled to provide FCAS services is not always straightforward. There are two quite distinct situations which could result in quite different opportunity costs.

The first situation is when the unit's energy output is not altered by the amount of FCAS raise services for which it is enabled. In this case the unit's energy dispatched is not changed from what it would have been had no FCAS raise service been enabled. Thus the generator's energy output is not changed, hence its water use and any other variable costs have not changed. Consequently, for this scenario the opportunity cost of being enabled is zero. On the rare occasions that the contingency service is required the generator may have an increased output but this should be approximately compensated for via the energy spot market.

The second situation is when the unit's energy output is altered by the amount of FCAS raise services for which it is enabled. In this case the unit's energy dispatched is changed from what it would have been had no FCAS raise service

been enabled. Because the generator's energy output is changed, its water use and any other variable costs will have changed as well. Also, it may have lost an opportunity in the energy market.

If the generating unit's capacity was offered into the energy market at its marginal cost which is largely determined by the marginal value of the water passing through the turbines, then the price that the generator should receive for being enabled for the FCAS raise contingency services and being backed off in the energy market is the lost energy market 'profit' plus the marginal cost of providing the FCAS service. The NEM co-optimised dispatch always guarantees this if the generator's offers for energy and FCAS services reflect the generator's marginal costs of providing these services. Consequently, if a unit's marginal cost of providing, say, the 5 minute raise contingency service was zero then the unit could offer this FCAS raise service at a price of zero and the opportunity cost of being enabled would always be fully compensated by the FCAS spot price provided the energy prices offered reflected the unit's marginal costs.

In conclusion, if a generator offers its capacity in the energy market at its marginal cost then the NEM co-optimisation approach to dispatch and pricing will automatically compensate a generator for any lost opportunity in the energy market due to being backed off to provide an FCAS raise service via the FCAS spot price.

3.5 FCAS Markets Settlements

In its "Guide to Ancillary Services in the National Electricity Market, 25 August 2009" AEMO state the following regarding FCAS payments and settlements.

For each five minute dispatch interval of the market, NEMDE determines a clearing price for each of the eight FCAS. This price is then used by settlements to determine payments to each of the FCAS providers. The payments for all the services are determined as follows:

Payment = MW enabled x 5 minute spot price / 12

Once the five minute payments have been determined, these are summed over a trading interval and expressed as half hourly payments for the purpose of cost recovery.

All payments to frequency control ancillary service providers are recovered from market participants as follows:

- Contingency raise payments are recovered from generators with the rationale that the requirements are set to manage the loss of the largest generator on the system;
- Contingency lower requirements are recovered from customers based on the rationale that requirements are set to manage the loss of the largest load / transmission element on the system;

- The recovery for contingency services is pro-rated over participants based on the energy generation or consumption in the trading interval;
- The recovery of payments for the regulation services is based upon the "Causer Pays" methodology. Under this methodology the response of measured generators and loads, to frequency deviations, is monitored and used to determine a series of causer pays factors.

3.6 Demand and Supply of Raise Contingency Services in Tasmania

Currently Hydro Tasmania is the only generator which supplies raise contingency services: 6s, 60s, 5 mins in Tasmania. AETV does not supply them, although we would expect it to be capable of providing some amount of raise contingency services. Given the variable and relatively uncontrolled nature of their outputs, the wind farms are not considered likely to be able to provide any raise contingency services. The interruptible loads that are part of the Basslink control scheme (system protection scheme - SPS) could well have the capability to provide some raise contingency services but cannot provide these services simultaneously if they are armed for SPS. There is no dispatch mechanism currently available to make this discrimination as the SPS is an off-market arrangement.

We understand that the supply of 6s raise contingency services is considered to be the main problem for ancillary services provision in Tasmania. The 6s services can only be supplied by units spinning or load tripping. Normally 6s services would be supplied by steam generators such as coal-fired plant which can use potential energy in boilers to provide a quick increase in power output for a short time.

The global demand for raise contingency services in the NEM is set by AEMO and determined by the size of the largest contingency less an estimate of load relief for a drop in frequency corresponding to the relevant frequency standard for frequency 6s, 60s, 5 min after the occurrence of a contingency. The largest contingency is generally a generator such as the 750MW Kogan Creek unit.

In addition to the global requirements, Tasmania may have a local requirement. This could be the related to the largest generating unit operating in Tasmania or to Basslink flows into Tasmania.

3.7 Provision of FCAS and Inertia by Hydro Tasmania

IES understands that the amount of system inertia in Tasmania is considered to have become a problem. Inertia is important because it determines the rate of change of frequency following a disturbance. The system inertia is largely determined by the inertia of spinning turbines.

When Tasmania joined the NEM, it had less stringent frequency standards than the other NEM regions. When these were subsequently tightened, the result was a greater requirement for spinning reserve in the form of FCAS contingency 6 sec

raise and/or inertia. The problem of too little inertia in Tasmania is exacerbated when Basslink is importing as there are fewer generator units online and generating in Tasmania.

The issue of inertia is related to the provision of 6s raise services because the amount of 6s raise required in Tasmania is affected by the inertia of the system. Further, the amount of inertia in the Tasmanian system can also affect the amounts of power that can be transferred on Basslink.

To address the relationship of inertia to the amount of 6s raise services required by AEMO and to the maximum possible power flows on Basslink, Hydro Tasmania has found it more efficient to run some units in synchronous condenser mode to increase the inertia in the Tasmanian system and consequently reduce AEMO's requirements for local 6s services and increase the potential flows on Basslink. In this case the additional inertia being provided by Hydro Tasmania is effectively providing a network support ancillary service and reducing the requirements for 6s raise FCAS. However, at the moment the NEM does not treat inertia as a separate ancillary service nor does it consider inertia as providing a 6s contingency FCAS.

IES notes that there has been discussion around the treatment of inertia as a separate ancillary service. For example, the Australian Energy Regulator (AER) has argued for a broad review of network control and support services (NCSC)[4]. IES considers that the issues around the supply of 6s raise could be ameliorated if AEMO were to separately contract for inertia.

3.8 Generating Capacity and FCAS

Historically, the development of the Tasmanian hydro-electric system has been driven by annual energy considerations. While a peak development program with consideration of spinning reserve requirements was included in the suite of analysis for development planning, the primary analysis was always the energy development program. The seasonality of hydro-electric inflow, resulted in the installed capacity of power schemes being sized to around twice the average power output giving rise to a relatively large reserve margin when compared to the Australian mainland's power systems based on coal-fired thermal generation. Generally this large reserve margin more than satisfied the requirements of the peak development program. Thus, from a historical perspective Hydro Tasmania's capital expenditure on generation plant has been generally unrelated to the provision of raise contingency FCAS services. Though, IES does note that some refurbishment of Gordon and other power stations has taken into account the provision of 6s raise FCAS.

3.9 Hydro Tasmania's Market Operations

Hydro Tasmania's market operations are largely concerned with attempting to control flows on Basslink. As the predominant generator in the Tasmania region,

[4] See AER submission "Review of network support and control services – Response to NEMMCO's draft determination report specifically citing a new form of ancillary service to ensure sufficient inertia.

Hydro Tasmania is largely able to influence the direction and quantum of flow on Basslink according to its internal assessment of the opportunity value of the water in its storages. When Victorian spot prices are judged by Hydro Tasmania to be relatively low, it will allow its own storage stations to be offloaded by energy flowing south on Basslink. When Victorian spot prices are judged to be relatively high, it will allow more of the energy from its storage stations to be dispatched and flow north on Basslink.

Hydro Tasmania's market operations are also influenced by the fact that under the Basslink Facility Agreement, it receives the inter-regional revenues associated with Basslink as a market interconnector.

As a market generator located in the Tasmanian region, Hydro Tasmania receives the Tasmanian regional reference price in respect of its generation – even when some of this generation is used to meet demand in other regions. This would ordinarily mean that given a high spot price in Victoria and Basslink flowing north, Hydro Tasmania would not necessarily achieve the Victorian price in respect of that component of its generation "directed north". Ordinarily to achieve this, Hydro Tasmania would need to "shadow" the Victorian price to set an equivalent order of price in Tasmania. As the holder of the inter-regional revenues for northward flow on Basslink, Hydro Tasmania is able to access the Victorian price and can therefore be indifferent to the spot price in Tasmania where is largely contracted. At times, the regional pricing model of the NEM, creates conditions when it suits Hydro Tasmania to offer energy for dispatch at large negative prices in order to maximise its total dispatch of energy into the NEM.

4 Regulation of Hydro Tasmania's Provision of FCAS

4.1 Overview of Options

In the Regulator's terms of reference a number of potential options for price control regulation were suggested but the range of options that IES could explore were not limited to these options. The potential options suggested were:

- limiting the offer prices that may be submitted by Hydro Tasmania in respect of the declared electrical services;
- an obligation to offer a specified minimum volume of each service;
- limiting the revenue that Hydro Tasmania is entitled to obtain from the declared electrical services over a period of time; and
- financial contracting obligations that will protect the interests of consumers and promote competition in the downstream and upstream markets;

In addition to the options above one could contemplate approaches which try to directly regulate the spot price of raise contingency services in Tasmania when there is a local requirement but in reality such approaches would not be viable because they would interfere with the workings of the NEM's dispatch and pricing processes and hence could have undesirable consequences. The second option of obliging Hydro Tasmania to offer specified minimum volumes of the services does not really achieve any desired outcome unless it is also linked with some sort of limitations on the prices offered for these minimum volumes. Consequently the options which could be used for price control mechanisms reduce to three broad approaches as follows:

- regulate Hydro Tasmania's offered prices and quantities for raise contingency services;
- oblige Hydro Tasmania to offer FCAS hedging contracts for raise contingency services to other generators in Tasmania at some regulated price; there could be many forms these contracts take and with each form a range of approaches that could be used to determine a fair price; or
- limit the revenue that Hydro Tasmania is entitled to obtain from the raise contingency FCAS over a period of time.

4.2 Assessment of Options

IES is required to consider each candidate price control mechanism to ensure that the matters and principles set out in Regulation 33(2) can be appropriately addressed within the scope of the declaration and assess each candidate price control mechanism against:

- the links between supply of the various declared electrical services and the supply of energy and other ancillary services;
- the importance of these links to the long-term efficient supply of energy and the maintenance of frequency standards in Tasmania;
- the links between the various declared electrical services and energy or other ancillary services through dispatch co-optimisation in the NEM, and the potential impacts from each particular form of price control on overall outcomes given that price control will only apply to some of the services; and
- any potential consequential impacts on the price and efficiency and adequacy of supply of energy and other ancillary services by third parties resulting from regulation of some services provided by Hydro Tasmania.

IES has attempted to address these points via an analysis of the options and discussions in the previous sections on the raise contingency services, co-optimisation of the dispatch and pricing of FCAS, opportunity costs and other general issues. IES has attempted to provide some general guidance on pricing mechanisms but we note that while the Terms of Reference require IES to advise on particular mechanisms for regulating the services, they fall short of requiring IES to advise on particular methodologies for pricing.

Matters to be considered

Regulation 33(2) sets out the various matters the Regulator is to consider in conducting investigations relating to and making a declared electrical service price determination. The Regulator is to consider the cost of providing the declared electrical service. We take the view that the opportunity cost of providing this service is the appropriate cost to consider and that interstate or international benchmarks for prices and costs are not particularly relevant.

We note that “consumers of the declared electrical services should be protected from the adverse effects of the exercise of substantial market power”. In the present context we interpret this to mean that the price mechanism adopted needs to be effective in this regard.

We do not think that “the principle that there is a need for a reasonable return on the assets of an electricity entity” and “the principle that the electricity entity must be financially viable” imply in this case a necessity for a mechanism which provides explicitly for recovery of capital and fixed operating costs. We are of the view that the generating units that provide these services are maintained primarily for the purpose of earning revenue in the energy market. For this reason we consider that the appropriate pricing mechanism should recognise the opportunity cost of this service provision in terms of foregone revenue in the primary markets. We do recognise however, that if there is inadequate provision of the service (due to a lack of equipment capable of providing it), there will be a need for investment in such equipment. However this is ultimately the responsibility of AEMO which has powers to contract with parties to provide such services if required. We consider “the principle that there is a need for efficiency

in the provision of the declared electrical service for the purpose of benefitting the public interest through a reduction in the cost of providing the declared electrical service" is satisfied if the price mechanism is based on the opportunity cost of providing the service.

4.3 FCAS Offer Price Regulation

4.3.1 Aim

The aim of this approach is to approximate what would happen in a competitive and efficient spot market. In particular the option aims to create FCAS offer prices that would reflect the variable costs of a generator providing these services.

4.3.2 Description of option

The option of regulating Hydro Tasmania's offered prices and quantities for raise contingency services would entail requiring Hydro Tasmania to offer amounts of the raise services that would satisfy any local requirements at regulated prices. The regulated prices would reflect any additional water use that would be incurred providing these services. The costs of units operating in synchronous condenser modes would not be included in these costs as these units are not directly providing any raise contingency services. It is suggested that the costs of providing inertia should be addressed by Hydro Tasmania through the pursuit of payment as a network support service or via a new category of ancillary services.

The option would operate broadly along the following lines. Based on an historical analysis of the amounts of raise services required in Tasmania when there is a local requirement, an amount for each raise contingency services would be determined such that the local Tasmanian requirements would generally be covered by these amounts. Hydro Tasmania would be required to offer at least these pre-defined amounts into the spot market. Given the argument outlined in section 3.4 that if a generator offers its capacity in the energy market at marginal cost then the FCAS spot prices compensate for any opportunity cost of being backed off, then the only costs that need to be considered in terms of FCAS offer prices are the variable costs of providing these services. As a consequence, the regulated offer prices for these FCAS could be determined as follows :

5 minute raise service

For the 5 minute raise services the offer prices for these services would be zero as the services can be provided by units not on line that can start quickly and units on line and operating around their optimal energy dispatch point. In either case there would be no additional water use or other costs for units being enabled. Thus a regulated offer price of zero would reflect the actual costs of providing this service.

60s raise service

For the 60s raise services these could generally be provided by units on line and operating at their optimal energy dispatch point because the most efficient output for most units is somewhere between 80% and 90% of the maximum output. In addition to this source of 60s raise, some units may need to be backed off a little, resulting in a slight drop in water use efficiency. A certain proportion, say X% of the 60s raise is generally supplied by units that are not moved from their optimal energy dispatches and the other proportion is supplied by units which have their dispatched quantity moved slightly from the optimal efficiency points to an output, say,10% lower. For these units their generation efficiency might move from around 90% to 89%, i.e. 1% lower. Thus if the value of water passing through the turbines was worth $50/MWh (at the 90% efficiency) then the cost of providing the additional FCAS service in terms of lost generation efficiency would be about $5/MW per hour. If the unit's most efficient operating point was assumed to be about 85% of the maximum output then the average cost of providing 60s raise for this unit would be about $2/MWh. Thus the variable cost of Hydro Tasmania providing the 60s service would be something like $2*(1-X)/MWh.

6s raise service

6s raise services are the most difficult for a hydro generator to supply. As noted previously in many power systems these services are generally provided by steam based thermal generation. Many of Hydro Tasmania's units can supply little or no 6s FCAS and many of the others can only supply any amount when they are significantly backed off and operating at significantly lower water use efficiencies. However IES understands that the Gordon and John Butters power station units can supply significant amounts relatively efficiently. If the units are backed off to their upper break points then the cost of supplying the 6s raise service in terms of loss of water utilisation efficiency would be about $8/MWh and $5/MWh respectively, assuming a $50/MWh water value. Gordon can provide 6s raise service at very low generation outputs but this comes at a cost. At the lower break point of 10MW Gordon could provide about 40MW of 6s raise at a cost of about $50/MWh. On the other hand John Butters does not have such a low break point and can provide about 35MW at an output of 35MW for a cost of about $9.50/MWh.

Joint provision of raise services

A generating unit can often provide several contingency raise services simultaneously without any increase in costs. In this case the cost for providing all of these services would correspond to how much the unit is moved away from its most efficient operating point.

4.3.3 Analysis of option

The option to regulate the amount of contingency raise FCAS offered at regulated prices upon initial analysis appears to be quite attractive. Reasonable

estimates for the amounts of FCAS needed to be regulated could be determined. Similarly reasonable estimated costs in terms of lost efficiencies of water use could also be determined. Hydro Tasmania's potential lost opportunities in the energy market would be automatically compensated for via the NEM spot prices for the raise contingency services, provided Hydro Tasmania made energy market offers which were approximately equal to its marginal generation costs (marginal water values) for the units which were going to offer the regulated FCAS quantities and prices.

The problem with this approach is that it does not guarantee any reasonable outcomes in terms of FCAS spot prices and hence raise contingency costs for other Tasmanian generators because Hydro Tasmania can indirectly determine the spot prices for these services when there is a local requirement through its market power in the energy market in Tasmania. This is because the spot price for these services will very often be driven by the energy market spot price rather than the FCAS offer prices.

Additionally, because it is not always possible to determine when there is likely to be a local Tasmanian contingency raise requirement before the dispatch period there can be situations where Hydro Tasmania could be substantial financially disadvantaged due to it being enabled for raise contingency services and for these services to be using some of the Basslink export capability.

4.3.4 Conclusion

Even though this option looks attractive at first because (a) it mimics what a competitive market could deliver in terms of offer prices for the raise contingency services and (b) it has a built in mechanism to efficiently compensate Hydro Tasmania for lost opportunity costs, it does not guarantee reasonable raise contingency prices when there is a local requirement due to Hydro Tasmania's market power in the energy market. Thus this option should be rejected.

4.4 FCAS Hedge Price Regulation

4.4.1 Aim

The aim of this approach is to approximate what would be a competitive price for hedges for raise contingency services.

4.4.2 Description of option

This option would entail regulating the price and associated terms and conditions of hedges for raise contingency services. The hedges could be essentially a simple swap contract with defined quantity amounts and hedge prices for the duration of the regulated period. Or the hedges could be negotiated between Hydro Tasmania and the other generators based on principles specified by the Regulator, with the Regulator being the potential arbitrator if agreements could not be reached.

Theoretically the value of these hedges should be related to the expected difference payments and any adjustment for risk. Thus a simple FCAS swap

contract's price should be equal to the expected FCAS spot price plus some allowance for risk. However, the problem with this approach is that the reason for regulating the raise contingency services in Tasmania is due to Hydro Tasmania's market power in this market. Thus the computation of contract prices based on expected spot prices does not address or overcome the problem of Hydro Tasmania's market power. Thus an alternative approach to calculating contract prices needs to be pursued. This could be done by estimating the expected costs of providing these services along the lines outlined for the option of regulating the offer prices. In addition to the variable costs discussed in that section some allowance would also have to be made for expected lost opportunities in the energy market due to Hydro Tasmania not being able to generate as much as it would have liked to in the energy market due to the provision of raise contingency services. This additional cost should be relatively small as most of the time Hydro Tasmania should have enough capacity to generate as much as it would like in the energy market even when it is supplying raise contingency services to meet a local demand.

4.4.3 Analysis of option

The benefits of this option are that it avoids interfering with the physical dispatch process in the NEM and provides a means for market participants to manage their FCAS exposures. Further analysis of this option is undertaken with respect to Hydro Tasmania's proposal which is considered in section 4.5.

4.4.4 Conclusion

This is a good option as it can satisfy other generators requirements for reasonable FCAS costs and also allows Hydro Tasmania to optimise its combined energy and FCAS offers and to manage any risks associated with Basslink and Victorian spot prices.

4.5 Hydro Tasmania's Proposal

4.5.1 Aim

The aim of this approach is to have a negotiated FCAS hedge between Hydro Tasmania and other Tasmanian generators seeking to hedge their FCAS exposure.

4.5.2 Description of option

On 11 May 2010, Hydro Tasmania provided a presentation to the Regulator and IES to further elucidate matters raised in its submission of 30 April 2010. Hydro Tasmania proposed the following:

- Not regulating the physical raise contingency FCAS product.
- Approving pricing principles for raise contingency FCAS hedge products in Tasmania.
- Approving the contract terms for the regulated product.

- Providing a process of review for any participant which disagrees with a quoted price from Hydro Tasmania for raise contingency FCAS.
- Setting the period of the price determination for three years.

Hydro Tasmania contends that the regulation of hedges is more attractive than regulating the physical offers as this does not interfere with the efficiency of the dispatch process, minimises the burden on both the Regulator and Hydro Tasmania, delivers a product which is useful to participants in managing their FCAS risks, and provides participants with "medium term price signals".

Hydro Tasmania has provided examples of a methodology for pricing hedge contracts. The methodology is based on identifying the particular generating units that would be expected to provide the service, estimating the level of service each would be expected to provide and how long it would be provided for. The resultant inefficiency in the use of water is costed on the basis of foregone future electricity and REC revenue.

The hedge might be offered firm or non-firm. The non-firm product would contain exclusion of specified events outside of Hydro Tasmania's control – notably inoperability of Basslink. An issue is whether Hydro Tasmania should be required to offer a firm product and if so how specified exclusions are to be priced.

Hydro Tasmania argues that "the provision of FCAS deprives Hydro Tasmania of a (small) proportion of its generating opportunity and thus of its ability to recover its costs. These costs would ordinarily be recovered by Hydro Tasmania selling the relevant generation under contract."

Hydro Tasmania appears to be arguing that valuing generation at contract provides a premium to valuation at spot market. In the history of the NEM there has been evidence that contracts trade at a premium to average spot prices. While theoretical arguments can be advanced in favour of the existence of a positive premium and also the absence of a premium, the statistical evidence is inconclusive. Accepting that a premium is present, it would be necessary to obtain an estimate of this premium. This done, the methodology could be amended to include foregone contract premium revenue (i.e Hydro Tasmania would have contracted more capacity if not required to reserve this capacity for FCAS contingency services). However this could be avoided by using electricity forward contract prices in determining water values rather than projected electricity spot prices.

4.5.3 Analysis of option

In its submission of April 2010, Hydro Tasmania adduced three considerations that in its view would "need to be accommodated in the regulatory outcome for it to be successful". These were i) that the form of regulation should not impact the spot or physical offer and dispatch process; ii) that the form of regulation should encourage new entrant in markets where there is more efficient new entrant available; and iii) that Hydro Tasmania should not be restricted in recovering a reasonable return on its assets nor subjected to excessive costs or

unmanageable risks. Hydro Tasmania claims that its proposal will satisfy these requirements.

Recognising the strong interaction between the energy and ancillary services markets, IES agrees with Hydro Tasmania's first consideration. However the principal reason for our agreement is that regulation of the physical offer price is unlikely to be effective as Hydro Tasmania will still be able to achieve high FCAS prices by means of its dispatch offer pricing in the energy market. We recognise that Hydro Tasmania would be disadvantaged by regulation directed at the spot or physical offer and dispatch processes. However we note that the conditions under which this disadvantage would be liable to occur are the conditions under which Tasmanian generators competing with Hydro Tasmania are also likely to be disadvantaged as a result of Hydro Tasmania's ability to influence Tasmanian electricity spot price outcomes to suit its use of Basslink to access high Victorian spot prices. In our view such outcomes occur with sufficient frequency to act as a strong deterrent to intending new-entrant generators in Tasmania.

With respect to the second consideration, we agree that a form of regulation which prices the service below Hydro Tasmania's opportunity cost of providing the service will be inefficient and act as an impediment to potential efficient new entry. However we note that in practice it is difficult to conceive of parties other than Hydro Tasmania investing in the provision of these services while spot prices outcomes are regarded as uncertain and there is a lack of transparency around their drivers. In general it can be expected that new entrant generators will be interested in opportunities to provide ancillary services if the revenue prospects associated with providing these services improve the business case for investment. In the case of the provision of network support services for example, we are aware that a number of new entrant generators have sought to obtain contracts to provide them. We consider it more likely that a new entrant generator will be attracted to providing such services if it can obtain a contract to do so.

We are of the view that the costs to Hydro Tasmania of units operating in synchronous condenser modes should not be considered as costs associated with raise contingency FCAS provision. We suggest that the costs of providing inertia should be addressed by Hydro Tasmania through the pursuit of payment as a network support service or via a new category of ancillary services. If AEMO were to contract inertia services directly then this could ameliorate the problems of 6s raise ancillary services provision in Tasmania.

Contrary to the points made by Hydro Tasmania in its April 2010 submission and reiterated and developed further in its subsequent letter to the Regulator of 27 May 2010 titled "Frequency Control Ancillary Services (FCAS) Investigation" regarding the recovery of capital costs and "broader operating costs", IES considers that the regulated price should be the opportunity cost of providing the service price in terms of foregone revenue in the energy and REC markets.

In our opinion, Hydro Tasmania confuses the concepts of water value and short run marginal cost. For a hydro-electric storage generator, water value is more

properly a shadow price or opportunity cost and is valued in terms of alternative future uses assessed over time and accounting for the stochastic nature of inflows. These "future uses" are typically earning revenue from generating electricity and from the production of RECs. We note that in the energy only design of the NEM, electricity spot prices are meant to provide for full fixed cost recovery for the efficient new entrant generator.

4.5.4 Conclusion

Hydro Tasmania claims in favour of its proposal that it "transparently identifies the cost of supplying FCAS so that OTTER can be satisfied the cost is efficient", that it "provides appropriate incentives for investment", that it is "easily implemented as a transitional measure of limited duration", that it imposes "a lower regulatory burden on Hydro Tasmania and OTTER than other options", and that it "does not directly interfere with the operation of physical dispatch of energy and FCAS in the NEM". Hydro Tasmania also claims that "this form of regulation would be an effective and efficient mechanism because there is no impact on the market dispatch outcome, it allows participants to know and manage their exposure in advance, and there are likely to be a small number of transactions keeping administrative overheads low."

IES broadly concurs with these claims. We observe however that one of the difficulties with a negotiated approach using pricing principles approved by the Regulator is that any counter parties to these negotiations would be at a strong informational disadvantage to Hydro Tasmania. Accordingly, while IES agrees broadly with the Hydro Tasmania proposal, we believe it would be in the public interest that the pricing methodology and parameters should be determined upfront and disclosed generally rather than remaining confidential to Hydro Tasmania and subject to regulatory review only in the event of complaint. Making this information publicly available also fits with Hydro Tasmania's stated desire for others to step in if they can provide the services more efficiently than Hydro Tasmania.

Duration of the application of the price control mechanism

In its draft report, IES expressed the view that three years would be an appropriate time for the price control mechanism to be in place and that it would be appropriate to review the application of the mechanism at least six months prior to the expiration of this initial period. Upon further consideration, including consideration of the likelihood that relevant circumstances might materially change during the regulatory period, IES is now of the view that the regulatory period should be extended to five years with regulated contracts applying only up to the end of this period. In making this consideration, IES notes that the Regulator can revoke a declaration at any time if circumstances change.

It would seem appropriate to review the application of the mechanism at least six months prior to the expiration of this initial period.

Adjusting the price control mechanism

IES considers that Hydro Tasmania should be required to advise updates to pricing inputs on a six monthly basis.

5 Recommendations and Conclusions

5.1 Options Considered

Options available to the Regulator for FCAS price regulation include

- imposing an obligation to offer a specified minimum volume of each service;
- limiting the revenue that Hydro Tasmania is entitled to obtain from the declared electrical services over a period of time;
- limiting the offer prices that may be submitted by Hydro Tasmania in respect of the declared electrical services; and
- financial contracting obligations that will protect the interests of consumers and promote competition in the downstream and upstream markets;

5.2 Analysis of Options

IES has considered these options and some variants and concluded that more substantial analysis of offer price regulation and financial contracting obligations was warranted.

The imposition of an obligation to offer a specified minimum volume of each service (at any price) would serve only to create certainty that at least that volume is offered. This is considered unnecessary as it is ultimately AEMO's responsibility to ensure that these services are available.

Limiting the revenue that Hydro Tasmania can procure from the declared services over a period of time is potentially a relatively simple remedy to apply however the revenue cap would need to be determined and once in place Hydro Tasmania would have an incentive to achieve it. Further it provides less certainty to generators exposed to FCAS spot prices as there will not necessarily be a close correspondence between the revenue cap and their FCAS exposure.

After considered analysis, IES does not recommend regulating the offer price of the service. While noting that under particular circumstances, such regulation would disadvantage Hydro Tasmania in the conduct of its market operations, the principal reason for not favouring this option is that the FCAS and energy markets are interrelated and so regulation of the FCAS offer price by itself will not necessarily succeed in preventing Hydro Tasmania from achieving high FCAS prices through the pricing of its energy market dispatch offers. IES does not support the direct regulation of the FCAS price through for example the application of a jurisdictional price cap as this interferes with market settlements and works against the objective of reducing jurisdictional differences in the application of the NEM Rules. Further IES considers that what the application of a price cap is designed to achieve is more effectively obtained by means of a financial contract referenced to the spot price of the service concerned. The recommended price control mechanism is therefore the imposition upon Hydro Tasmania of financial contracting obligations.

5.3 Price Control Mechanism

The recommended price control mechanism is the placing of an obligation on Hydro Tasmania to provide reasonably priced financial contracts. While our terms of reference fall short of asking us to consider or assess particular pricing methodologies, Hydro Tasmania has provided information with respect to a particular proposal and it is appropriate for us to make some observations. We understand however that the detailed design of the price control mechanism is intended by the Regulator to be the subject of a subsequent piece of work.

Hydro Tasmania has proposed that rather than regulating (the price of) the physical raise contingency FCAS product, OTTER approve the pricing principles for these products in Tasmania (presumably products offered by Hydro Tasmania), provide a process of review for disaffected participants and set the price determination period (or strictly the period over which this obligation will apply) for three years.

While broadly in agreement with this proposal, we note that as a consequence of Hydro Tasmania's dominant position in generation in Tasmania, the Regulator and other market participants are subject to an immense informational disadvantage. In the event that a participant elects to have the Regulator initiate a review of a Hydro Tasmania contract offer, it will be problematic for the Regulator to conclude the review without an extensive and intrusive investigation of Hydro Tasmania's pricing methodology and assumptions. There would be benefit therefore in the pricing methodology and its inputs being agreed upfront and made available to participants. This would obviate the need for the process of review.

We also agree with the broad elements of the pricing methodology illustrated by Hydro Tasmania as part of its presentation to the Regulator and IES on 11 May 2010 on the grounds that it attempts to represent Hydro Tasmania's opportunity costs in terms of the energy lost from the less efficient operation of generator turbines consequent on providing the services concerned valued according to foregone revenue (electricity and RECs). We do not agree with Hydro Tasmania's subsequent proposal to base foregone generation revenue on LRAC on the grounds that the opportunity cost based on wholesale electricity price (spot or contract) already includes a capacity component as the NEM regional spot price is intended to cover a generator's fixed costs (operations, maintenance and return of and on capital) as well as variable generation costs. Finally LRAC may be higher or lower than the efficient new-entrant cost which is arguably the more appropriate cost to employ. The main objection however is that Hydro Tasmania's opportunity cost varies over time according to evolving electricity forward prices and hydro–electric storage levels.

However as stated, our terms of reference do not require us to form a conclusion with respect to the design features of the contract or its pricing methodology.

To summarise, our recommendation is that the Regulator impose an obligation on Hydro Tasmania to provide a financial contract to allow Tasmanian NEM

generator participants to manage their local FCAS exposure. We recommend further that in consultation with Hydro Tasmania and other interested parties, the Regulator approve a general contract design and associated contract terms. We also recommend that the Regulator approve the value of pricing parameters in advance on a periodic basis. This is in contrast to Hydro Tasmania's suggestion that the Regulator need only be concerned with pricing in the event of a complaint. We consider that a five year period is appropriate for this arrangement with a review scheduled prior to the expiration of that period.