

16 May 2016

Hon Ivan Dean MLC  
Chair of Public Accounts Committee  
Parliament House  
HOBART TAS 7000

Dear Mr Dean

#### **INQUIRY INTO GOVERNMENT-OWNED ENERGY ENTITIES**

Thank you for your letter dated 19 April 2016 regarding the establishment of a Parliamentary Standing Committee of Public Accounts inquiry into Government-owned energy entities.

Hydro Tasmania's enclosed submission provides:

- an overview of the business and recent history; and
- our specific responses to the Committee's Terms of Reference for the inquiry.

The submission is accompanied by internal source documents relevant to the Committee's Terms of Reference.

Some of the material contained in this submission and the related documents is commercially sensitive to our business, our customers or our suppliers. This material is provided to the Committee on a confidential basis.

Also provided is a version of this submission for publication by the Committee.

Please note the overall submission represents an initial response to the Committee's Terms of Reference, as Hydro Tasmania understands them. With particular regard to term of reference 2, Hydro Tasmania seeks from the Committee an extension of time to make a supplementary submission.

The financial performance of the business continues to be impacted by factors that stem from the period of low rainfall that began in September 2015 and the subsequent Basslink outage (and delays in Basslink's return to service), as well as the high inflows into hydro storages of recent weeks. An improved understanding of the impact of these events will be provided to the Committee in the coming weeks.

Should the Committee determine that our interpretation of the Terms of Reference has overlooked a matter of interest, please advise us of any additional material required. Hydro Tasmania will provide supplementary materials that may be beneficial as the inquiry progresses.

Yours sincerely

A handwritten signature in black ink, appearing to read 'G.V. Every-Burns', with a long horizontal flourish extending to the right.

G.V. Every-Burns  
Chairman  
16 May 2016

## Corporate Profile

Hydro Tasmania is a trading name (along with Entura) of Hydro-Electric Corporation, an integrated energy business owned by the State of Tasmania.

Hydro Tasmania operates under the *Government Business Enterprises (GBE) Act 1995* and the *Hydro-Electric Corporation Act 1995*. The Minister for Energy has portfolio responsibility for Hydro Tasmania.

### Our business

Hydro Tasmania's principal purpose is to 'efficiently generate, trade and sell electricity in the National Electricity Market'. Our principal objectives are to perform our functions and exercise our powers to:

- be a successful business by operating in accordance with sound commercial practice and as efficiently as possible
- achieve a sustainable rate of return that maximises value for the State of Tasmania in accordance with the Corporate Plan and having regard to the economic and social objectives of the state.

Building on 100 years of experience in the electricity industry, the Hydro Tasmania group operates as one business focused on delivering value to our customers: Hydro Tasmania (electricity generation and trading), Momentum Energy (our mainland retail subsidiary) and Entura (professional services). Each operates as part of the integrated group to deliver the business strategy, enhance value and mitigate strategic risks so that Hydro Tasmania can deliver sustainable financial returns to the State of Tasmania.

### Ministerial Charter

Hydro Tasmania operates in line with its Ministerial Charter. The Charter sets out the Tasmanian Government's broad policy expectations of the Hydro-Electric Corporation and requirements of the business. The current Charter is dated November 2012 and can be found at [Ministerial Charter](#).

### Treasurer's Instructions

These lay out the requirements of the Government in relation to the financial management and reporting of GBEs. They are issued under section 23 of the [Financial Management and Audit Act 1990](#) and section 114 of the [Government Business Enterprises \(GBE\) Act 1995](#).

They can be found at [Treasurer's Instructions](#).

### Other useful links

Hydro Tasmania's annual reports - [annual reports](#)  
Tasmania's Energy Supply Plan - [Energy Supply Plan](#)

## **Submission – public version**

**Hydro Tasmania’s submission to the Public Accounts Committee of the Tasmanian Parliament contains the following sections:**

### **Part A: Background and overview**

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<b>Part B: Specific Response to the Inquiry’s Terms of Reference .....</b>	<b>25</b>

### **Explanatory note:**

This document is the public version of the submission provided to the Public Accounts Committee on 16 May 2016. The full submission contains material and related documents that are commercially sensitive to our business, our customers or our suppliers and have been provided to the Committee on a confidential basis.

## Part A

### Executive summary

#### Overview

The Public Accounts Committee of the Tasmanian Parliament is conducting an inquiry into the financial position and performance of government-owned energy businesses.

In its submission to this inquiry, Hydro Tasmania seeks to:

- Provide a range of information and supporting documents in response to the Inquiry's specific terms of reference.
- Outline its response to the unprecedented set of circumstances that have impacted on the State over the last nine months and resulted in the Inquiry being initiated.
- Provide details of the Corporation's response to the emerging climatic situation and the Basslink outage.
- Outline the components of the Energy Supply Plan put in place by Hydro Tasmania and the State Government to ensure the energy needs of the State are met.
- Inform the Committee of the Corporation's response to a number of related government policy initiatives and changes in recent years, both at a federal and state level, that have required the business to make specific strategic decisions and adjust its operations.

As a result of 10 months of below average rainfall in Tasmania, combined with the extended Basslink outage, and the understandable increased level of community concern, some of the Corporation's actions and decisions have been questioned and criticised. The Corporation's submission also seeks to inform the Committee of the facts and to dispel some of the myths that have arisen as a result of increased public commentary and media coverage.

The key points of the submission are:

#### Financial position

- Hydro Tasmania is in a sound financial position. Its net debt balance of \$826 million as at 31 March 2016 is less than the balance at the end of each of the previous five financial years.
- It has enough liquidity and debt facilities in place to fund the implementation of the Energy Supply Plan without needing to extend its existing borrowing arrangements.
- While the reduction in generation to rebuild storages will, in isolation, have a downwards influence on the valuation of the assets, the business has a strong net asset position.

## **Weather projections**

- The Bureau of Meteorology's (BoM) seasonal outlook issued in late August 2015, at the start of the low inflow sequence into hydro storages, predicted average rainfall for September 2015. As late as 24 September 2015, the BoM was forecasting only slightly below average rainfall for October.
- Two weeks later BoM reassessed the rainfall outlook for October as extremely dry. Hydro Tasmania had already responded to lower than expected rainfall by increasing Basslink imports from late September.
- Spring 2015 inflows into storages were the worst on record for that period.

## **Basslink outage**

- On 22 December 2015, Basslink Pty Ltd informed the national market of a 60-day outage. Through a series of public statements over the next three months, the date for a return to service was extended to mid-June 2016.
- An extended outage of Basslink was part of Hydro Tasmania's contingency planning and, along with low rainfall, was identified as a risk. These risks, which have never been experienced previously, required Hydro Tasmania to employ an escalating array of response mitigations, which have been incorporated into the Energy Supply Plan to meet Tasmanian energy demand through to the winter rains.

## **Carbon price – business strategy**

- A price on carbon emissions from 1 July 2012 enabled Tasmania to secure a price premium for its clean electricity generation sold into the National Electricity Market (NEM).
- During the lead-up to the carbon period the business imported more heavily across Basslink to build up storages. This enabled Hydro Tasmania to exit the carbon priced period with a system storage level in excess of our long-run sustainable position.
- If there had been no carbon price, storages would have been held to a very similar level to where they were prior to the pre-carbon price build up (27.7 per cent at 30 June 2009) and at the end of the carbon price period (28.1% at 30 June 2014), meaning the net effect of the carbon price on storages was close to zero.

## **Tamar Valley Power Station (TVPS)**

- Responsibility for the TVPS was transferred to Hydro Tasmania on 1 June 2013. This included a range of other assets and liabilities, including associated debt of \$205 million.
- The Combined Cycle Gas Turbine (CCGT) was placed in dry lay-up from 8 July 2013, apart for a period from 10 December 2013 until 3 June 2014, to preserve it in good condition while it was not required to run within the generation portfolio.
- Based on a rigorous assessment of a range of issues such as projected inflows, approval was sought in January 2015 from the Tasmanian Government to sell the station's CCGT. In August 2015, the Government granted this approval subject to a range of conditions.
- Given the record low rain in October and the emerging challenge of responding to low storage levels, a commercial decision was taken in November 2015 to re-activate the CCGT. The unit was returned to service on 20 January 2016.

There is no doubt the energy supply challenges of the last nine months have had an impact on both our business and the state as a whole. The implementation of the Energy Supply Plan to maintain the state's energy supply is working but comes at a considerable cost which will be borne by Hydro Tasmania. As a result the Government has announced it does not expect the Corporation to provide dividends for the next three years.

While recent rains have been welcome and our position is significantly improved, the challenge is not over and Hydro Tasmania will continue to make operational decisions which are prudent and responsible as we focus on rebuilding dam levels and adjusting our planning assumptions to take stock of what has occurred.

## Background

Hydro Tasmania generates electricity from 30 hydropower stations and one gas-powered station (Tamar Valley Power Station) and has entered into offtake agreements for Woolnorth (Studland Bay and Bluff point) and Musselroe wind farms as part of a single, complex statewide operating system built up over 100 years to meet the energy needs of the Tasmanian community.

For a century, the business has helped shape Tasmania's industries, economy, landscape and community. Its legacy is not only its engineering and construction feats, but also its lasting impact on the State's population and culture, and it will have an integral role in the state's economic development for many years to come.

As Australia's largest water manager, the business is responsible for many significant lakes, rivers and smaller water bodies in six large catchments covering 35 per cent of Tasmania's land area.

### **Managing water storages**

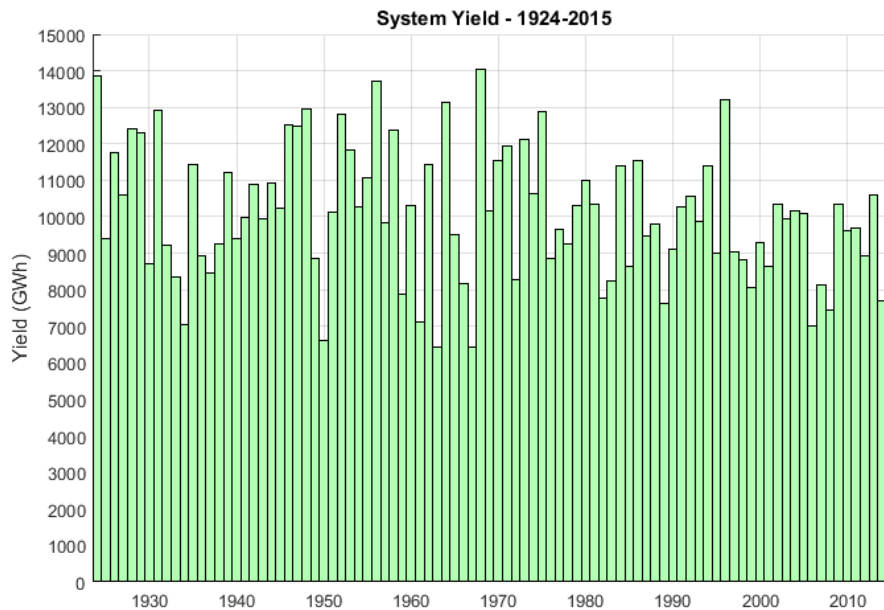
Water flowing from the rains over our catchments and into our storage lakes around the state is the key energy resource that generates much of the electricity required to meet the needs of households and businesses. Energy generated from wind turbines and gas has added to that mix in recent years. The Basslink interconnector has connected Tasmania to the mainland since 2006 to provide a physical link to join the NEM.

Water inflows are highly variable from year to year. Hydro Tasmania expresses water inflows in energy output terms (GWh). From the period 1924-1996, modelled inflows for Hydro Tasmania's current system averaged approximately 10,000 GWh per year. Actual inflows for that period are not available as the current statewide system was only completed in 1993.

Long-term average inflows into our system have reduced over the past 40 years. This phenomenon has been generally observed across southern Australia since the 1970s. Hydro Tasmania considers there to be a risk that system inflows will continue to be adversely affected by climate change and has been working with a number of organisations to better understand this risk. As part of this work, Hydro Tasmania has supported the Climate Futures for Tasmania project.

As a consequence of inflow reductions, Hydro Tasmania has progressively lowered its expected long-term inflows from 10,000 GWh prior to 2007 to 9,000 GWh in 2014. The addition of Woolnorth (2002-2007) and Musselroe (2013-2014) wind farms, as well as on-island generation from small system enhancements, has maintained supply in Tasmania at around 10,000 GWh per annum without any contribution from gas-fired generation. Figure 1 illustrates system yield across the hydro system between 1924 and 2015 (Calendar Years).





**Figure 1. System Yield 1924-2015**

Water storage is similarly defined in energy output terms. Storage 'levels' are expressed as a 'per cent full' in energy terms. This applies to the system as a whole, but we also refer to the level of particular lakes. The figure is relative to, but is not the same as, the actual level of water in the storage. Hydro Tasmania publishes water storage data on its website under 'energy data' and 'lake levels', which are reported as metres below full.

Hydro Tasmania has developed water management guidelines for managing the system as a whole. These guidelines include establishing preferred operating zones and storage operating rules, managing storage risks and recording protocols for communication with stakeholders. These guidelines and operational parameters have been informed by a long history of observations and experience in operating the hydropower system.

### **Modelling**

The Tasmanian hydro system is complex given the number of relatively small and inter-dependent storages. System modelling makes use of current and historical water level and flow data. Hydro Tasmania uses this modelling to assist decision-making around generation from various storages. There are individual generation and portfolio considerations that influence decisions, balancing existing and future value from generation, including the risk of spilling water. Inflow data from 1997 to the present is utilised in current modelling because this period is considered representative of the current and near future climate.

These assumptions are consistent with the results of the Climate Futures for Tasmania modelling, which showed no strong trends in net inflows over the next couple of decades.

## Storage operating rules

Storage operating rules describe how water levels and releases from the storages are to be managed. In developing the rules, Hydro Tasmania considers the attributes of the particular lake – physical, climatic, multiple-use, social, environmental and operational requirements. Adjustments to rules are made when conditions surrounding these attributes change significantly. Consultation with relevant stakeholders is undertaken where appropriate to do so.

Due to the prevalence of winter rains and dry summers, Hydro Tasmania's storage levels will vary considerably over the course of a year. Therefore Hydro Tasmania's preferred operating zone varies throughout the year. Hydro Tasmania's preferred operating zone is a band, the lower end of which leaves a reserve that can be used to generate electricity when inflows are low, both due to seasonal variations in rainfall and in the case of below average rainfall. The low point of the band varies across the year, with a lowest point of 25 per cent in June, at the start of winter, and a highest point of 33 per cent in November and December, at the end of spring. The preferred operating zone extends up to 45 per cent to provide flexibility in operations.

Low storage levels result in a greater risk that Hydro Tasmania may not be able to generate electricity as and when required. High storage levels require significant investment in the form of foregone generation and revenue, which has to be funded by increased debt.

Around two-thirds of Hydro Tasmania's expected yield in a year occurs in catchments that have minimal storage capability. These storages fill over the course of a full winter/spring season (in some cases many times). Around one-third of yield occurs in catchments from the major storages of Great Lake and Lake Gordon, which rise and fall over years and present no current spill risk.

In managing its storages Hydro Tasmania must constantly balance the risks arising from: uncertain inflows against the risk of spilling excess water without power generation; the current and potential future value of generation; and the risk of asset outages (including assets not owned or operated by Hydro Tasmania, such as Basslink and the NEM transmission networks) against the cost of alternative generation or supply sources.

Hydro Tasmania's storage optimisation is achieved by integrating water modelling outputs within its total generation portfolio of hydro and gas generation. This is in turn optimised based upon forecasts of Tasmanian demand, wind generation and wholesale electricity market price with imports or exports across Basslink. This process also considers contingencies such as plant and Basslink outages.

In general, as water storages fall, the energy value of stored water increases, which flows through into higher bid prices into the NEM. This in turn triggers decisions on non-hydro generation - Basslink imports and gas generation - to preserve hydro storages.

Through the interaction of these factors and optimisation, Hydro Tasmania meets its GBE obligation to maximise the value of the business for Tasmania.

## **Basslink and the National Electricity Market (NEM)**

The drivers and history of Tasmania's connection to the NEM and the Basslink project were extensively covered by the Electricity Supply Industry Expert Panel in its March 2012 report. For current purposes, however, it is important that the Committee is aware that:

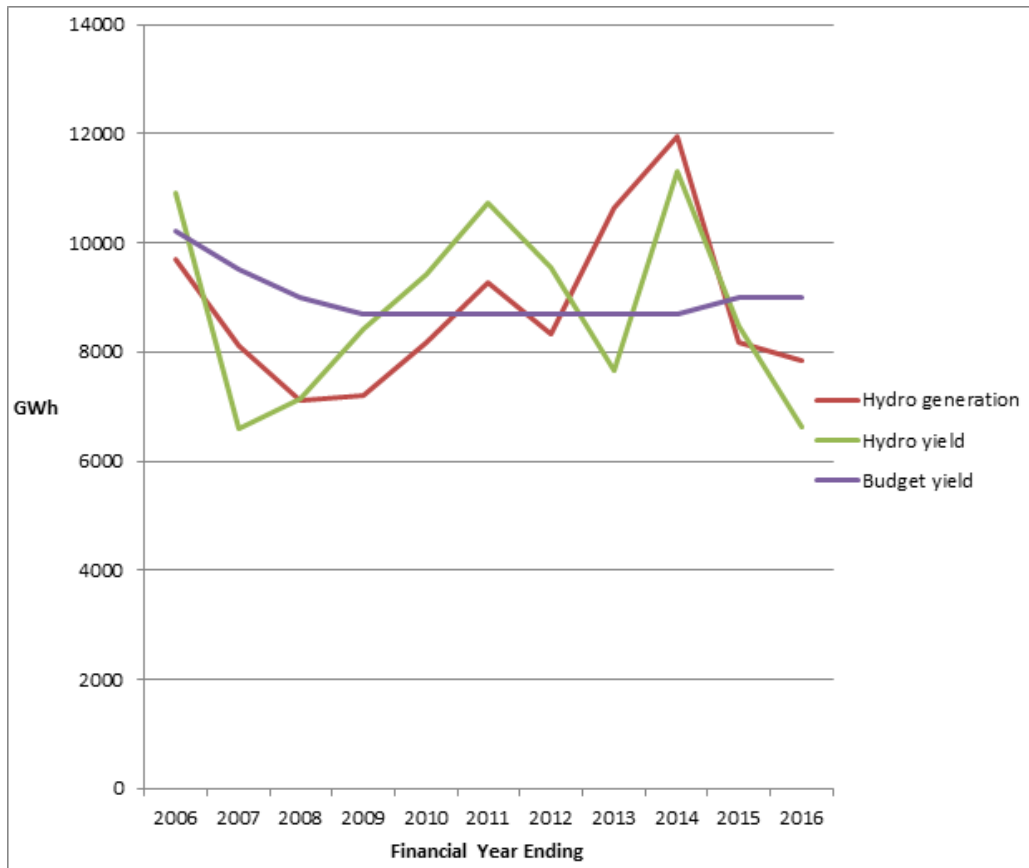
- The interconnector is owned by Basslink Pty Ltd (BPL), a special purpose company owned by the Singapore-listed Keppel Infrastructure Trust. Hydro Tasmania is a customer.
- Hydro Tasmania has a financial contract with BPL called the Basslink Services Agreement, which provides a partially firm revenue stream for BPL, and which underpinned BPL's original decision to build Basslink. This Agreement, and the associated Basslink Operations Agreement between BPL and the State of Tasmania, also set some basic performance requirements and provide Hydro Tasmania and the state with some rights to information and consultation in respect of Basslink operations.
- A key performance requirement under the Basslink Operations Agreement is a maximum repair time for cable failure of two months. BPL's ability to meet this requirement was reviewed by an independent expert and certified as part of the Basslink commissioning process.
- Hydro Tasmania does not, and is not able to, control the operation of Basslink. This is done by BPL, in accordance with the National Electricity Rules managed by the Australian Energy Market Operator (AEMO).
- The flow of electricity over Basslink is a function of Basslink's available capacity (which is affected by system constraints and asset design limits) and Victorian and Tasmanian electricity price offers. Hydro Tasmania is able to influence Basslink flows only through the structure of its Tasmanian price offers.<sup>1</sup>

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<sup>1</sup> Hydro Tasmania can also make transport bids on the link. These are rarely used and their use is controlled by Tasmanian legislation.

## Developments and decisions 2006-15

Figure 2 shows Hydro’s Tasmania’s budgeted and actual yield and hydro generation for the financial years 2005/06 to 2014/15, along with the most recent forecast for the 2015/16 financial year. The impacts of inflows and drivers of hydro generation decisions are described below.



**Figure 2. Hydro Generation and Yield 2006-2016**

In describing the changes that have occurred in hydro storages over the last 10 years, it is instructive to use the financial year 1 July 2006 - 30 June 2007 (FY2007) as the starting point. The reason for this is that FY2007 saw Hydro Tasmania’s catchments receive 73 per cent of their long-term average inflows (or 6606 GWh of our estimated long-term average yield of 9000 GWh), and storages declined from 30.5 per cent to 19.3 per cent during the year, with a low in early May 2007 of 17.3 per cent.

Poor rainfall and continued drought conditions saw Hydro Tasmania experience more challenges during the following year. Inflows into hydro storages during FY2008 yielded only 7,158 GWh, or 79 per cent of what was expected. The period from the end of October 2007 to the end of May 2008 was the driest in the preceding 75 years, with storages dipping to 16.5 per cent in early June 2008, the lowest they had been in 40 years.

The significant energy security, environmental and water management challenges presented by this situation were managed, while balancing higher costs, by protecting declining storages with increased Basslink imports and gas generation at Bell Bay Power Station.

The drought also led to a reassessment of the impact of climate change on rainfall patterns in Tasmania, and therefore on inflows into hydro reservoirs. In particular, for planning purposes, annual average inflows were progressively lowered from 10,000 GWh to 8,700 GWh. The figure of 8,700GWh was seen as a conservative estimate of expected future inflows at that point in time.

FY2009 brought some improvement in rainfall, albeit still below budget, with storages at 30 June 2009 reaching 27.7 per cent. Two months later they were at 43 per cent. With the improvement in the hydrological situation, the business was able to focus on building storages for the impending carbon price period, renewing its assets, building its financial strength, improving cash flow and reducing borrowings to turn around its performance after three drought-affected years. Also in FY2009, the obsolete Bell Bay Power Station was decommissioned as the Tamar Valley Power Station (TVPS) was completed.

### **Rebuilding storages (2010 - 2012)**

The following three years (FY2010 through FY2012) saw an increase in storage levels resulting from stronger inflows, base load operation of the TVPS unit by Aurora Energy (Tamar Valley) Pty Ltd (AETV) and strategic use of Basslink flows to preserve water in storage ahead of a widely anticipated price on carbon emissions. These improved operating conditions allowed Hydro Tasmania to increase its returns to Tasmanian taxpayers.

The commencement of rebuilding storages from late 2009 resulted in total returns to government of:

<b>Year</b>	<b>Returns to Government<sup>2</sup></b>	<b>Dividends</b>
FY2011	\$51.7 million	\$25.5 million
FY2012	\$116.0 million	\$49.0 million
FY2013	\$115.7 million	\$50.7 million

**Table 1. Returns to Government 2011 to 2013**

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<sup>2</sup> Returns to government include: government guarantee fee, income tax equivalent, ordinary dividend and rates equivalent

A timeline of impending policy, legislated carbon price mechanism and subsequent repeal is shown in Table 2:

<b>A Carbon Timeline 2005-2014</b>	
March 2005	State and territory governments agree on design principles for a multi-state emissions trading scheme
June 2007	Coalition Government announces it will develop an emissions trading scheme beginning no later than 2012 – <i>PM Howard</i>
November 2007	<i>Labor wins the Federal election – PM Rudd</i> <b>Labor, the Coalition and the Greens take to the election climate policies which include emissions trading</b>
July 2008	Labor releases the Carbon Pollution Reduction Scheme (CPRS) green paper with the aim of launching a trading scheme in 2010.
September 2008	PM Kevin Rudd receives final Garnaut report
December 2008	CPRS white paper released
August 2009	The Senate votes down the CPRS
November 2009	Labor and the Turnbull-led Coalition reach agreement on final terms of the CPRS
December 2009	<i>Abbott elected Coalition leader December 1</i> The Senate votes down the CPRS for the second time December 2
August 2010	<i>The Federal election results in a hung Parliament – PM Gillard</i>
September 2010	Labor Government establishes a <b>climate committee to develop a carbon pricing scheme</b> with the Greens (and independents)
February 2011	Labor and the Greens reach agreement that culminates in clean energy bills
November 2011	<b>Carbon price scheme and associated measures pass the Senate</b>
July 2012	<b>Carbon pricing scheme begins</b>
September 2013	<i>Coalition wins the Federal election – PM Abbott</i>
November 2013	Coalition Government introduces bills to abolish the carbon price scheme
July 2014	<b>Carbon tax repeal</b> legislation received the Royal Assent. Repeal effective from <b>1 July 2014</b> .

**Table 2. Carbon pricing timeline**

The final introduction of a price on carbon emissions from 1 July 2012 was an event that was anticipated for some years. From the beginning of the carbon price policy debate, Hydro Tasmania recognised that, for the first time, Tasmania would be able to secure a price premium for its clean electricity generation sold in the NEM. As a result, Hydro Tasmania planned and executed a progressive build-up of hydro storages as mentioned above, and the business was in a strong position to maximise opportunities that were expected to be presented by any carbon price scheme.

In FY2010, FY2011 and FY2012, Hydro Tasmania’s hydro generation was less than inflows as a result, the difference being 1,254 GWh, 1,471 GWh and 1,217 GWh respectively (see Figure 2 on page 13). During the same period AETV produced 1,131 GWh, 1,503 GWh and 1,556 GWh respectively.

Storage levels at the end of June 2010, 2011 and 2012 were 36.3, 45.9 and 53.6 per cent respectively. If there had been no carbon price, storages would have been held to a very similar level to where they were prior to the pre-carbon price build up (27.7 per cent at 30 June 2009) and at the end of the carbon price period (28.1 per cent at 30 June 2014) and generation levels in those years would have been closer to inflows. This was a very public strategy. As a business we are charged under the GBE Act with acting commercially and continued to do so in this period with the considerable benefits returning to Tasmania while managing the hydro storages in a careful and prudent manner. The net effect of the carbon price on storages was close to zero.

### **The carbon pricing scheme (2012 - 2014)**

The Clean Energy Act 2011 (the carbon price) began on 1 July 2012 with a fixed price of \$23 per tonne CO<sub>2</sub>-e for FY12/13. The legislation stipulated a fixed price of \$24.15 per tonne in FY13/14 and \$25.40 in FY14/15. From 1 July 2015 the fixed price was to transition to a floating price emissions trading scheme. Hydro Tasmania's electricity generation strategy during FY2013 and FY2014 aimed to maximise the value of its hydro generation while ensuring hydro storages were managed within pre-set guidelines to ensure energy security was maintained. As a result of increased generation, water storages fell from 53.6 per cent on 1 July 2012 to 32.8 per cent at the end of FY2013 and 28.1 per cent at the end of FY2014 (when the carbon pricing scheme was terminated). This storage level was in the long-term desired operating zone.

The financial outcome of this strategy was a significant increase in returns to the Tasmanian Government as seen in the table below:

<b>Year</b>	<b>Returns to Government<sup>3</sup></b>	<b>Dividends</b>
2013-14	\$235.4 million	\$116.0 million
2014-15	\$211.5 million	\$118.6 million

**Table 3. Returns to Government 2013-14 to 2014-15**

### **Energy reform impact**

In May 2012, the Tasmanian Government announced it had adopted many of the recommendations of an Expert Panel that had reviewed the state's energy challenges and requirements over an 18-month period. These included the transfer of TVPS from Aurora Energy to Hydro Tasmania with effect from 1 June 2013, and a change in the wholesale pricing methodology used for regulated customers that would reduce this input cost component for customers.

<sup>3</sup> Returns to government include: government guarantee fee, income tax equivalent, ordinary dividend and rates equivalent

The rationale for the transfer of TVPS was that the value of the AETV assets could be optimised within Hydro Tasmania's larger energy portfolio as the reduced wholesale price made TVPS uneconomic on a stand-alone basis.

As part of the transfer, Hydro Tasmania took over the associated debt from Aurora Energy of \$205 million, as well as a range of other assets and liabilities such as gas transportation and commodity contracts and a tolling agreement for Bairnsdale power station in Victoria. As required by accounting standards, the fair value of these assets and liabilities was assessed and a \$335 million impairment was recorded in Hydro Tasmania's annual accounts for 2012/13. The resultant challenge for Hydro Tasmania was to maximise the efficient use of TVPS and associated gas contracts while achieving efficiencies through running the asset as part of the Corporation's broader hydro and wind portfolio.

For optimal use and to reduce the running cost of the TVPS, it was initially decided to operate the CCGT at the station during the summer months. This would reduce the need to draw from the major storages (retaining water for higher value periods) and to shut it down over the winter months where smaller storages 'must generate' during the higher inflow periods to avoid spilling. The smaller open-cycle gas generation units were to be maintained all year and used as needed for peaking load.

### **Emerging challenges**

Following the end of the carbon scheme at 30 June 2014, Hydro Tasmania's system storage initially remained in the preferred operating zone, but then tracked at the bottom of or below the preferred operating zone between December 2014 and April 2015. Inflows between 1 August 2014 and 31 Dec 2014 were over 1,500 GWh (equivalent to 10.5 per cent of system storage) below the long-term average for the period.

Substantial inflows in May 2015 and winter rains through to August 2015 took storage levels back into the preferred operating zone until September 2015.

The business reported in 2014 that the overall outlook for the Hydro Tasmania group over the following five years would be extremely challenging with profitability forecasts projected to decline dramatically from 1 July 2015. This was the result of a combination of external factors and events, including reduced demand nationally across the wholesale electricity market leading to lower wholesale prices, uncertainty around the future of the Renewable Energy Target (RET) and the removal of the price on carbon. Under the circumstances there was a heightened (and continued) focus on reducing costs, improving productivity and operational efficiency across the whole business.

The CCGT remained in dry lay-up (shut down) during FY2015 to reduce the running cost of the power station. As an initiative to reduce its recurring expenditure, Hydro Tasmania sought approval in January 2015 from the Tasmanian Government to sell the CCGT.

Hydro Tasmania estimated that closure and sale of the CCGT would reduce fixed costs by \$7.5 million per annum. At the time of seeking approval, extensive modelling was undertaken that demonstrated that the CCGT was not required for energy security for all credible scenarios, including where Basslink was unavailable for a period of two months. The modelling also concluded that Tasmanian demand can be met in extreme scenarios of a 12-month Basslink outage and a coincident drought.



On 11 August 2015, the Tasmanian Government granted this approval subject to endorsement of any sale price for the CCGT, and confirmation from Hydro Tasmania that it would be able to meet a formal responsibility for Tasmanian security of supply.

### **Impact of weather from Spring 2015**

Long-range forecasting of rainfall in Hydro Tasmania's catchments is extremely difficult. While the 2015-16 El Niño was predicted well in advance, the El Niño Southern Oscillation (ENSO) feature has a low correlation with rainfall in our western catchments. As well as observations about ENSO, meteorologists also measure other features that seem to be better correlated with our inflows.

Rainfall in Hydro Tasmania's catchments is observed to be more strongly related to conditions in the Southern and Indian Oceans. In the Southern Ocean, a natural oscillation feature known as the Southern Annular Mode (SAM), which affects the latitude at which westerly air flows prevail, is the single strongest driver of wet season (winter and spring) rainfall for the western half of Tasmania. Another feature known as the Indian Ocean Dipole (IOD) and a phenomenon referred to as "blocking", associated with high pressure systems and the Pacific South American pattern, may also influence the extent of wet season rainfall for Tasmania.

ENSO, which has well-recognised impacts across much of eastern Australia and elsewhere around the Pacific Ocean, is reasonably well understood and is able to be predicted with some degree of confidence. The same does not apply to SAM, IOD and blocking. To the best of Hydro Tasmania's knowledge, there is no long-range forecasting of these systems.

BoM's seasonal outlooks represent the best combined information available at the time. The seasonal outlook issued in late August 2015, at the start of the low inflow sequence, predicted average rainfall for September 2015. As late as 24 September 2015, BoM was forecasting only slightly below average rainfall for October. On 7 October 2015, BoM took the step of re-assessing the rainfall outlook for October as extremely dry. By this point, Hydro Tasmania's energy in storage was down to 31 per cent and Basslink was running on strong import (average import flow was 408MW for the first week of October) in response to the unexpected low inflows.

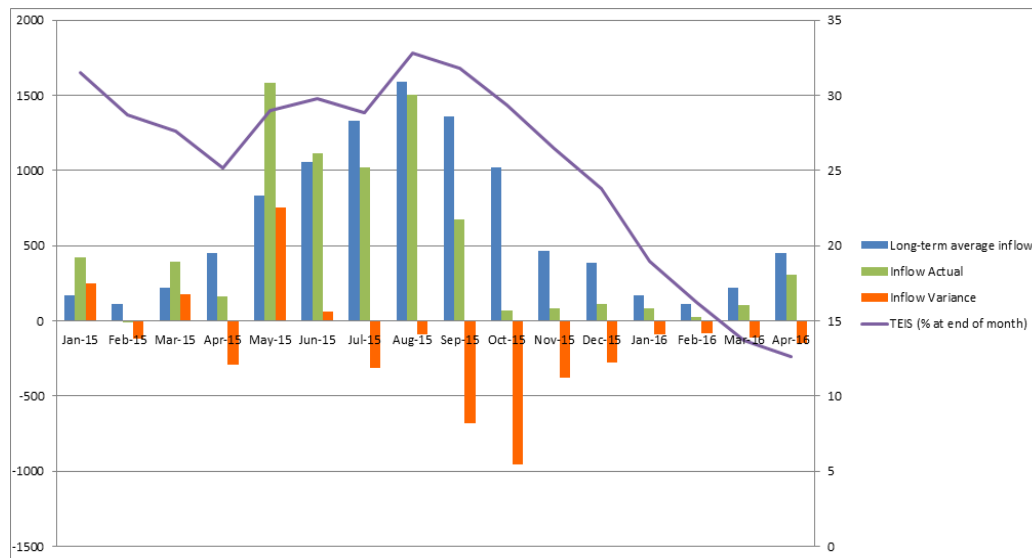
Spring 2015 inflows were the worst on record for Hydro Tasmania. The months of October and November 2015 and the periods September to November 2015 and July to December 2015 all recorded the lowest inflows to storages since our records began in 1924. Low rainfall was exacerbated by high temperatures, leading to reduced run-off into storages. High temperatures also increase evaporation rates, leading to a reduction in storage levels.

### **Response to changing weather patterns**

Hydro Tasmania was a net exporter across Basslink from May to August 2015. This period was wetter than average, and Hydro Tasmania's storages built steadily. Figure 3 charts total energy in storage (TEIS) along with actual and long-term average inflows. By the end of August, Hydro Tasmania's smaller head storages were around 10 per cent, well above the seasonal target, and the system was operated to minimise the risk of spill.

If Hydro Tasmania does not generate from smaller, seasonal storages, we 'spill' or waste water in significant inflow sequences, as water flows into storages more rapidly than our power stations can

use that water. Energy generated in excess of Tasmanian demand is able to be exported across Basslink.



**Figure 3. Storage and Total Energy in Storage (TEIS)**

In September 2015, when it became clear inflows into hydro storages were falling further and further behind the average, Hydro Tasmania reduced hydro generation and Tasmania imported additional energy across Basslink from late in the month. This helped preserve hydro storage levels, although these continued to fall, as they do annually when winter/spring rains cease.

Between October 2015 and when the fault in Basslink occurred on 20 December 2015, Tasmania imported 839.1 GWh of energy across Basslink (average import price was \$37/MWh). In the same period, Tasmania exported only 10.4GWh. This included 9GWh in December because prices were high enough to justify this action (average export price was \$198/MWh). 9GWh is equivalent to about one-third of a day’s average Tasmanian demand.

As the low inflow sequence continued, and storage levels dropped below the preferred operating zone and into prescribed risk zones, Hydro Tasmania established a working group to oversee the business response to the emerging situation. On 2 November 2015, “level 3 situation management” was activated internally according to Storage Management Guidelines. A ‘crisis management team’ was formed and met regularly to manage the situation. This process reviewed plant utilisation across the state, including deferring planned maintenance on hydro generation assets and initiating the return to service of the TVPS CCGT unit.

As a result of the record dry spring, the Tasmanian Government initiated the Water Storage Advisory Committee (WSAC) overseen by the Department of State Growth. Hydro Tasmania provided regular reports to this Committee.

On the basis of credible inflow and outage scenarios, including sensitivity to lower than usual inflows, Basslink imports and supply from the TVPS when it was fully operational, Hydro Tasmania continued to have a high level of confidence that state energy security would not be compromised in

the lead-up to the winter of 2016, even in the event of an extended Basslink outage of two months as per its contractual agreement. This was the position immediately before the Basslink outage on 20 December 2015.

## Response following Basslink outage

### Basslink - timeline of announcements

The Basslink outage commenced at 2.10pm (market time) on 20 December 2015. Initially, no details about the cause or extent of the possible return-to-service date were communicated by BPL to the Australian Energy Market Operator (AEMO), the Tasmanian Government or Hydro Tasmania.

On 22 December 2015, BPL advised the market, Hydro Tasmania and the Tasmanian Government that the outage had been caused by a fault on the subsea cable. BPL advised the national market of a 60-day outage of the cable. This reflected the contractually-agreed performance standard which stated the expected maximum duration of a continuous interconnector outage was two months.

Following is a timeline of BPL's advice concerning the Basslink outage since the original announcement of 22 December 2015:

- BPL issued a media release on 14 January 2016, with a revised return-to-service date of 19 March 2016 (90-day outage).
- BPL issued a media release on 12 February 2016 indicating there were problems identifying the cable fault location and that the 19 March return to service date would not be achieved.
- BPL issued a media release on 8 March 2016 that provided an update on progress and estimate of late May for return to service.
- The Basslink interconnector was cut on Friday 11 March 2016. In a media statement on 13 March, BPL indicated that the fault was determined to be in the northern section. BPL advised that the southern section of cable had passed initial testing.
- On 29 March 2016, BPL announced that it had successfully identified the fault and removed it from the cable, and was preparing for the jointing phase to connect a replacement section of cable. BPL advised that the northern section of cable had passed initial testing and advised key stakeholders to prepare for a mid-June return-to-service date.
- On 22 April 2016, BPL announced it had successfully completed the first of three cable-jointing exercises, with 1355 metres of new cable laid. While its work is highly susceptible to weather, BPL indicated it still expected to meet the June return-to-service target.
- On 3 May 2016, BPL advised severe weather conditions had impacted on the repair project. It reconfirmed the mid-June return to service date but noted the timeline may need to be revised if poor weather extended past allocated contingency days.
- On 13 May 2016, BPL again repeated its concerns as outlined on 3 May regarding weather-related delays and reconfirmed an anticipated return to service by mid-June.

The cause of the Basslink cable fault remains unknown.

## **Government and Hydro Tasmania response**

Following the announcement of the Basslink fault, the situation was escalated within Hydro Tasmania to a level 4 emergency management event. The Energy Supply Management Team (ESMT) chaired by the CEO was formed as the forum to oversee relevant management activities and first met on 22 December 2015. This forum has met on a regular basis (minimum once per week, often three times a week) since then.

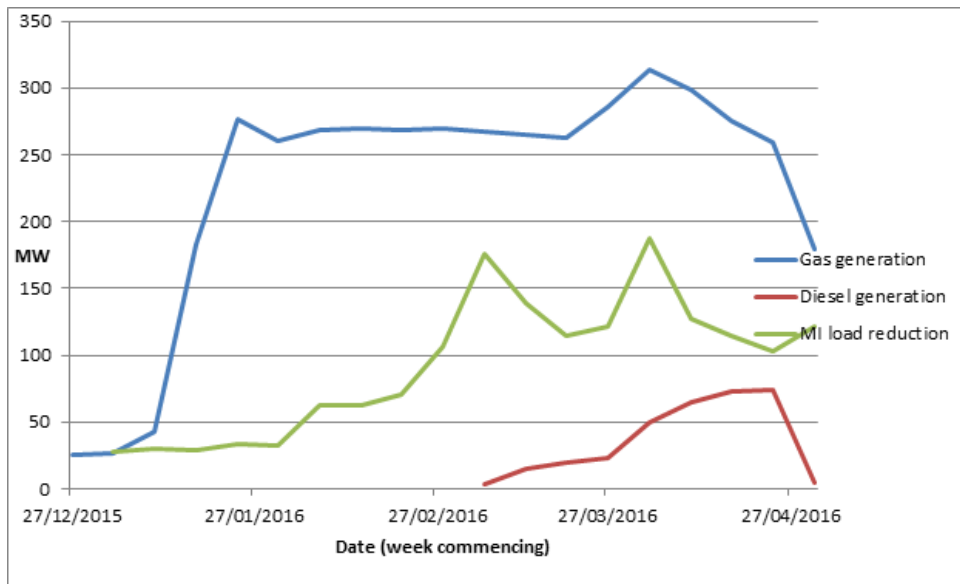
On 14 January 2016, the Tasmanian Government announced the establishment of the Energy Cabinet Sub-Committee to be chaired by the Energy Minister. It met for the first time on 15 January and has met weekly since then.

## **Energy Supply Plan**

Low rainfall and an extended fault in the Basslink interconnector are both contingent events that had been identified as risks by Hydro Tasmania, and for which Hydro Tasmania has contingency plans. The combination of a sudden, severe rainfall deficiency and a Basslink outage compounds these risks, especially as Basslink has been unable to return to service within the contracted, and initially advised, repair period.

These compounding risks, which have never been experienced previously, required Hydro Tasmania to employ an escalating array of mitigating responses, which, in consultation with the Tasmanian Government, have been incorporated into an Energy Supply Plan to meet Tasmanian energy demand through to the winter rains without Basslink in operation, allowing for continued low inflows and a further adverse contingency. The plan was released in February, and regular updates have been provided to the Tasmanian community by the Government and Hydro Tasmania on its implementation and progress through a variety of channels, including media releases, press conferences, interviews, printed editorial and advertisements, as well as online, primarily on Hydro Tasmania's website.

The response encompasses a range of actions that are detailed below. They demonstrate a prudent approach to ongoing uncertainty over inflows and the repair of Basslink, building on pre-existing planning. Figure 4 on page 21 is illustrative of the impact of the combined responses.



**Figure 4. Energy Supply Plan responses (MW versus time)**

The actions encompassed within the Energy Supply Plan in response to the unprecedented situation, are:

#### ***Gas generation***

All of Hydro Tasmania’s gas generation is located at the TVPS Station.

The Combined Cycle Gas Turbine (CCGT), with a capacity of 208 MW, was commissioned in April 2009 and has been well maintained throughout and remains in good condition today. The CCGT was placed in dry lay-up from 8 July 2013, apart for a period from 10 December 2013 until 3 June 2014, to preserve it in good condition while it was not required to run within the generation portfolio. In response to the crisis management situation being escalated to level 3, the decision to return the CCGT to service was made in late November 2015. The CCGT was successfully returned to service on 20 January 2016 and has since operated reliably on a round-the-clock basis.

The Open Cycle Gas Turbine (OCGT), a Rolls Royce ‘Trent’ unit, with a capacity of 58 megawatts (MW), was commissioned in 2009. In September 2014, Hydro Tasmania was advised by Rolls Royce that the unit contained a design fault which required off-site repair. To rectify this defect in September of 2015, prior to the current energy supply situation, the unit was shipped to Abu Dhabi for repair. The original expected return date of the Trent was mid-2016, however as storage levels deteriorated, Hydro Tasmania engaged with Siemens, who had acquired the Rolls Royce business, and worked to expedite the unit’s return. The unit was returned to Australia by air freight and successfully returned to service on 31st March 2016.

The OCGT Pratt & Whitney units, each with a maximum capacity of 40MW, were purchased second-hand in 2006, in response to capacity concerns that emerged early in the 2006-2008 drought. These units are aged and not considered reliable. They have, however, provided significant support both in terms of energy output and ancillary services required for system stability.

All gas-fired generation was backed off in early May 2016, as sustained and significant rainfall produced sufficient inflows into Hydro Tasmania's seasonal storages to allow, and require (to avoid spill), a substantial increase in hydro generation.

### ***Load reductions***

As an alternative to additional generation, Hydro Tasmania has negotiated load reduction arrangements with major industrial customers since January 2016. Load reduction arrangements are useful as they can be implemented much more quickly than the installation of additional generation.

Initial load reduction arrangements commenced in January 2016, and additional arrangements were reached over February and March. These initially focused on the period to the end of April (when Basslink was expected to return to service in March), and then extended as Basslink return to service was also extended. These arrangements have provided a voluntary reduction in Tasmanian demand of between 95MW and 105MW on a sustained basis since 4 March 2016.

Briefer arrangements (of between four and 12 days) have provided further reductions in addition to the sustained reductions described above.

The terms of load reduction arrangements vary from customer to customer, depending on each customer's specific circumstances and pre-existing contractual arrangements.

Hydro Tasmania and TEMCO entered into a load reduction agreement) which saw TEMCO load reduced by approximately 30MW in January and February, and 65MW in March and April.

This is in addition to reductions of 43MW at Norske Skog's Boyer Mill for one week (now concluded), and up to 40MW by Bell Bay Aluminium since February 2016.

In an extension of the agreement with Norske Skog, the business voluntarily reduced load at its Boyer Mill in early May. This reduction was timed to coincide with a planned maintenance outage and involved a reduction of 85MW/h over the additional four days of downtime. These arrangements are temporary and have had no effect on the Boyer workforce.

### ***Temporary diesel and dual fuel generation***

From February, Hydro Tasmania has progressively installed temporary diesel generation at a number of sites across Tasmania, as a further mitigation against future contingencies. With significant preparatory work and longer lead times than expected, diesel generation has had a limited impact on the Tasmanian electricity supply system to date, but is important to provide support for the system should Basslink remain out of service for longer than expected and low inflows return.

At 16 May 2016, Hydro Tasmania had approximately 220MW of temporary diesel capacity installed. The amount of diesel generation running at any given time will vary depending on the current level of inflows to hydro storages, individual storage levels, the short-term inflow and wind forecast (next seven days), and the expected timing of the return to service of Basslink.

The rollout of Hydro Tasmania's temporary diesel generation has been a major logistical and project management challenge. In April, Hydro Tasmania estimated approximately 330 people were working on the response.

The following table shows a breakdown of the estimate at that time (reflecting people whether full-time or not):

Activity	Approx. number of people involved (Hydro Tasmania)	External Contractors
Situation response activities	77	20
Temporary generation activities	73	130
TVPS activities	15	15
<b>Estimated total people: approximately 330</b>		

**Table 4. Number of people involved in implementing the energy supply plan**

Temporary diesel generation installations throughout the state are subject to approval by the Environment Protection Agency (EPA).

Hydro Tasmania continues to engage with relevant stakeholder groups, including local councils and communities, to keep them informed as this work has unfolded.

### **Cloud seeding**

Cloud seeding is a proven technique that increases rainfall in a target area. Cloud seeding can only occur if cloud conditions are favourable. Due to the unprecedented dry conditions, Hydro Tasmania began cloud seeding on 1 April, one month earlier than usual. There have been a number of successful seeding flights over a range of our catchments in the six-week period since.

While seeding over hydro generation catchments has the highest priority, Hydro Tasmania is also undertaking cloud seeding over agricultural catchments.

More details of the Government and Hydro Tasmania's response can be found in the current version of the Energy Supply Plan at [www.hydro.com.au/energy](http://www.hydro.com.au/energy).

## **Impact of the unprecedented challenges**

### **Financial**

Maintaining energy supply in Tasmania has come at a considerable cost. The cost of implementing the Energy Supply Plan will be borne by Hydro Tasmania. We will make an operating loss for 2015/16 as a result, and our financial results are not expected to return to previously anticipated levels for a further three years after this. We do not expect to provide dividends to the Tasmanian Government for the next three years as we recover from the impact of the Basslink outage and record low rainfall and focus on rebuilding hydro storages.

The final cost to the business and the State of maintaining energy supply will depend on a range of unknowns such as rainfall, inflows to storages, how much gas and diesel we use and the return to service date of Basslink. These will be partially offset by Hydro Tasmania not paying the Basslink facility fee during the outage.

The cost to secure and install approximately 220MW of temporary diesel generation includes installation and equipment hire cost of approximately \$50.5 million. The monthly operational cost was originally estimated at approximately \$11 million per 100 MW. The final costs will depend on how long and how many of the temporary diesel generators are operated. The operating times of the diesel generators will depend on inflows into storages, energy demand and the return to service of Basslink.

Our focus continues to be on doing all that is required to maintain energy security in a cost-efficient manner.

### **Environmental**

The ongoing dry conditions and extended Basslink outage are having an environmental impact in some of our storages. It is expected this will continue for some time to come and be dependent on the level of winter rains through to next summer when it will return to drier conditions.

Low lake levels, particularly in Great Lake, are putting pressure on aquatic species and lake ecosystems. We continue to monitor those impacts carefully. Our approach to environmental monitoring and risk management enables the business to assess impacts and respond where possible.

We have been working with experts from the University of Tasmania, independent researchers, and specialist Hydro Tasmania and Entura staff to update risk assessments, and design monitoring and mitigation measures.

We are working with our key stakeholders, including: the Inland Fisheries Service; the Department of Primary Industry, Parks, Water and Environment; the EPA; and the federal Department of Environment to keep them informed.

### **Storages**

Good rainfall has continued across the state since the start of May which has led to storages rising strongly. At 16 May total energy in storage was 20.0 per cent, which was an increase of 7.5 per cent from the lowest point of 12.5 per cent on 30 April 2016. The business is taking a cautious and prudent approach to recovering from the current situation.



## **Part B**

### **Specific Response to the Inquiry Terms of Reference**

In response to the Inquiry's specific terms of reference, annexed to this submission is a bundle of documents. Where those documents contain information which is commercially sensitive to our business, our customers or suppliers, are subject to confidentiality obligations or legally privileged, these are provided to the Committee on a confidential basis (or otherwise redacted).

#### **TOR1: The financial positions of the Government-owned energy entities (Aurora Energy, Tasmanian Networks and Hydro Tasmania) and their interrelationships, considering their recent financial reporting, including their half-yearly financial statements and Corporate Plans**

The Committee is provided with the Hydro-Electric Corporation Half Year report for the six months ending 31 December 2015 and with the most recent Performance Report provided by Hydro Tasmania's Chief Financial Officer to the Corporation's Board for the period ending 31 March 2016.

As the Committee would appreciate, the final 2016 financial results will depend on water inflows, when Basslink is returned to service and how long the contingencies outlined in the Energy Supply Plan remain in place. Given these uncertainties, Hydro Tasmania agreed with its shareholders to submit the 2016/17 Financial Year draft Corporate Plan by 31 May, 2016. At the time of writing, the draft Corporate Plan is still under development.

#### **TOR2: Factors currently impacting on the financial performance of the energy entities**

Hydro Tasmania is currently disconnected from the NEM and implementing the Energy Supply Plan.

Future costs will depend on water inflows, when Basslink is returned to service and how long the contingencies outlined in the Energy Supply Plan remain in place. Hydro Tasmania is currently experiencing high inflows into its storages as a result of ongoing rainfall. The storage position once these inflows abate will significantly influence future Energy Supply Plan requirements and Hydro Tasmania's financial position.

Accordingly, Hydro Tasmania has sought from the Committee an extension of time of two weeks to make a supplementary submission.

#### **TOR3: Any strategies being implemented by the energy entities to address their current and future financial performance**

Hydro Tasmania continues to operate in accordance with its 15/16 Corporate Plan.

**TOR4: Past and current Government's energy security policies and management, including risk management strategies and plans**

TOR4 is directed to government.

**TOR5: Past and current Governments' and Government-owned energy entities energy-mix policy decisions and challenges;**

Hydro Tasmania energy mix policy decisions and challenges are described in Part A of our submission.

Hydro Tasmania has provided the Committee with a number of documents relevant to this term of reference.