

Hydro Tasmania Water Price for water takes from 1st May 2009 to 30th April 2010

Reservoir or River	Generation foregone MWh/ML	Annual Price per ML	Summer Price per ML	Winter Price per ML
Arthurs Lake	1.8878	\$ 152.07	\$ 168.09	\$ 136.04
Great Lake	2.2394	\$ 180.39	\$ 199.40	\$ 161.39
Ex Poatina or S.Esk	0.2844	\$ 22.91	\$ 25.33	\$ 20.50
Parangana (ex mini)	0.7308	\$ 58.87	\$ 65.07	\$ 52.67
Cluny Lagoon	0.1119	\$ 9.02	\$ 9.97	\$ 8.07
Lake Meadowbank	0.0722	\$ 7.00	\$ 7.00	\$ 7.00
Lake Palooka	0.0742	\$ 7.00	\$ 7.00	\$ 7.00



Minimum Fee
\$ 7.00 per ML

Water Price = Value of Generation x Generation Foregone

Value of Generation = Flat Swap Contract price + 1/2 REC price + Water Scarcity Premium^{^1} (if dry)

Generation Foregone = MW hours per Mega Litre^{^2}

^{^1} - The Water Scarcity Premium is a percentage of the Peak Swap Contract Price

^{^2} - Generation foregone depends on the 'head' of the water and on which power stations the water runs through

Note.
This methodology will be reviewed and may change if the underlying character of the electricity market changes. For example, when the final shape and impact of the proposed carbon pricing mechanism is known the pricing method may need to be modified.

Explanation of Value of Generation: Calculations

See next page for more detailed explanation on the three components

Value of Generation \$/MWh			
Component	Annual	Summer	Winter
1 Flat Swap	\$ 47.54	\$ 55.63	\$ 39.45
2 RECs @ 50%	\$ 26.53	\$ 26.93	\$ 26.13
3 Scarcity Premium #1	\$ 6.49	\$ 6.49	\$ 6.49
Total	\$ 80.55	\$ 89.04	\$ 72.07

#1 Scarcity premium is charged at the same rate over all irrigation takes because it is triggered on previous hydro system yields and doesn't depend on when the water is taken.

The value of water that Hydro Tasmania transfers to other water users is based on the revenues that could have been earned had the water been used to generate electricity (i.e. the value of generation). Electricity can effectively be sold in advance via the contract market and can also earn income through Renewable Energy Credits (RECs). This means the potential earnings from that water for the year ahead is public knowledge.

Hydro Tasmania calculates a new water value in April each year based upon the contract market and the REC market prices. The prices used in the calculation are those as published on publicly available web sites on the second business Friday in April.

- Because there is not yet a publicly traded Tasmanian forward contract market the Victorian contract electricity prices are used.
- Because on average the stations pass their baselines only about half the time, and for simplicity, only half a REC is claimed as the value lost.

Note that **all** the generation above a defined station baseline earns RECs, so if the station had been going to pass its baseline, **any** water taken for irrigation reduces the potential number of RECs that could have been produced.

The value of generation is converted to a water value based on the station efficiency. Water is more valuable from high head reservoirs.

Water values are published for the following periods (the periods will correspond with the periods on water licences):

- Dam filling (winter)
- Direct takes (summer)
- All year

After a prolonged period of low inflows a premium is added to the water value to reflect the higher costs (hence value foregone) to Hydro Tasmania.

1: FLAT SWAP CONTRACT PRICE

Victorian Swap Contract Market Prices #2

Period	Peak	Flat	
Q209	\$ 52.10	\$ 38.15	
Q309	\$ 55.50	\$ 40.75	
Q409	\$ 57.50	\$ 40.15	
Q110	\$ 126.80	\$ 71.10	Difference
Annual	\$ 72.98	\$ 47.54	\$ 25.44
Summer	not used	\$ 55.63	
Winter	not used	\$ 39.45	

#2 Based on Sydney Futures Exchange on..... 19th April 2009

The electricity forward contract market uses a naming convention where for example, Q212 means the second quarter (April, May, June) of 2012. Contract prices vary over the year depending on the expected demand and availability of generation plant across the entire network.

- The Summer direct take price is based on the average of electricity contract prices for Q4 of the current year and Q1 of the next year.
- The Winter dam fill price is based on the average of electricity contract prices for the two winter quarters, Q2 and Q3.
- The Annual price is the average of the last three quarters of the current year and the first quarter of the next year.

The "Flat" price for electricity is the average of all prices. The "Peak" price for electricity is the average of prices during the hours from 7am to 10pm on business days. The "Peak" price for electricity is used in determining the scarcity price if the previous two years have been very dry (see below for detailed explanation).

2: REC PRICE

Price of Renewable Energy Credits (RECs) #3

Period	RECs	Contribution
Cal 09	\$ 52.25	
Cal 10	\$ 55.45	
Annual #4	\$ 53.05	\$ 26.53
Summer (Q4&Q1)	\$ 53.85	\$ 26.93
Winter (Q2&Q3)	\$ 52.25	\$ 26.13

#3 Based on prices from Australian Financial Markets Association on..... 19th April 2009

#4 3/4 of year on plus 1/4 of year 2

RECs are calculated after the calendar year has finished and so prices are quoted in calendar years. The value of the contribution is weighted according to the year the RECs are created.

Each MWh above a station's baseline creates one REC. However, because stations on average cross their baselines only half the time, and for simplicity, only half a REC is considered to be lost value.

3: WATER SCARCITY PREMIUM

	Yield (GWh)	Penalty	#5
Expected Yield	8700	\$ 0.00	
Trigger (95% of exp)	8265	\$ 0.00	
Moving Avg	7932	\$ 6.49	
Maximum (80% of exp)	6960	\$ 25.44	

#5 Premium is derived by linear interpolation between trigger and maximum .
Maximum premium is Annual Peak minus Annual Flat

Historical Yields in GWh

	Actual	Moving Avg #6
Mar-07	125	8501
Apr-07	100	8398
May-07	1414	8774
Jun-07	604	8719
Jul-07	690	8446
Aug-07	1836	8372
Sep-07	864	8249
Oct-07	1510	8245
Nov-07	108	7882
Dec-07	243	7422
Jan-08	-80	7242
Feb-08	72	7272
Mar-08	102	7317
Apr-08	476	7015
May-08	499	6739
Jun-08	839	6895
Jul-08	1198	6987
Aug-08	907	6964
Sep-08	1711	7286
Oct-08	632	7256
Nov-08	475	7378
Dec-08	514	7579
Jan-09	332	7609
Feb-09	71	7621
Mar-09	347	7732
Apr-09	500	7932

#6 24 month moving average yield in GWh expressed as an annual figure

Explanation

After an extended period of low inflows, Hydro Tasmania increases the price that it offers electricity into the market to reflect the lower water levels in its storages and to ensure that the storages are not emptied. If water levels are very low then the water must generally be valued higher than Victorian electricity prices and will remain high until storages are able to recover and the risk of supply shortfall is very small. Storage recovery may take a year or more.

In such a situation Tasmanian generation cannot sustainably supply all the Tasmanian electricity demand. The extra electricity needed has to be imported from Victoria via Basslink including during periods of peak electricity prices. As such, during periods of low water availability a water scarcity premium is added onto the water price to reflect the increased cost of meeting Tasmania's electricity demand. In these circumstances all the available low prices are fully used up for importing and so any extra importing (or reduced exporting) must be done at the very high prices found during peak hours.

The water scarcity premium is related to the value of peak energy contracts. Because there is not yet a publicly traded Tasmanian forward contract market the Victorian "Peak" energy price is used as a surrogate.

The premium only applies if system wide inflows over the previous two years have been less than 95% of the expected (this is not common). The premium is calculated using the formula below where EAY = expected annual yield.

$$\text{Premium} = \frac{[(95\% \text{ of EAY} \text{ minus Moving Average Yield}) / (95\% \text{ of EAY} \text{ minus } 80\% \text{ of EAY})] \times \text{Vic Peak Swap Price}}$$

The graph below shows how the premium is interpolated as the moving average yield becomes drier.

