

## Net Present Value Definition:

*From Wikipedia, the free encyclopedia*

In [finance](#), the **net present value (NPV)** or **net present worth (NPW)**<sup>[1]</sup> of a [time series](#) of [cash flows](#), both incoming and outgoing, is defined as the sum of the [present values](#) (PVs) of the individual cash flows. In the case when all future cash flows are incoming (such as coupons and principal of a bond) and the only outflow of cash is the purchase price, the NPV is simply the PV of future cash flows minus the purchase price (which is its own PV). NPV is a central tool in [discounted cash flow](#) (DCF) analysis, and is a standard method for using the [time value of money](#) to appraise long-term projects. Used for [capital budgeting](#), and widely throughout [economics](#), [finance](#), and [accounting](#), it measures the excess or shortfall of cash flows, in present value terms, once financing charges are met.

*The NPV of a sequence of cash flows takes as input the cash flows and a discount rate or discount curve and outputting a price; the converse process in DCF analysis, taking as input a sequence of cash flows and a price and inferring as output a discount rate (the discount rate which would yield the given price as NPV) is called the [yield](#), and is more widely used in bond trading.*

## Purpose:

The purpose of NPV is to develop one annual per acre-foot cost sufficient to purchase all the water needed in each pool<sup>1</sup>. Each year, the subscription cost<sup>2</sup> would be adjusted by the “time value of money” (TVM). For instance if the TVM was 5% then each year the per unit subscription cost would increase by 5%. For example if year one the subscription cost was \$100 per unit, year two would be \$105, year three would be \$110.25, year four \$115.76 and so on. The following charts present a hypothetical simplified example which assumed a constant water acquisition<sup>3</sup> of 100 units per year and a constant subscription rate of 100 units per year. The TVM (or CAP earning rate) and the rate of water acquisition cost increase were varied. More complicated examples of non-uniform water acquisitions and a non-uniform subscription values could be used, but the same general shape of the curves were still be prevalent. Fifteen years was picked arbitrarily; any numbers of years could be used, and the general shapes of the curves would not change.

## General Observations:

1. When the water acquisition prices increase faster than the CAP earning rate, entities that subscribe to ADD in the beginning years pay more than the value of the actual water acquired. The larger the difference between the CAP earning rate and the water acquisition price increase, the more the earlier ADD water subscribers pay. Chart 1 shows the dollars impacts of a single CAP earning rate

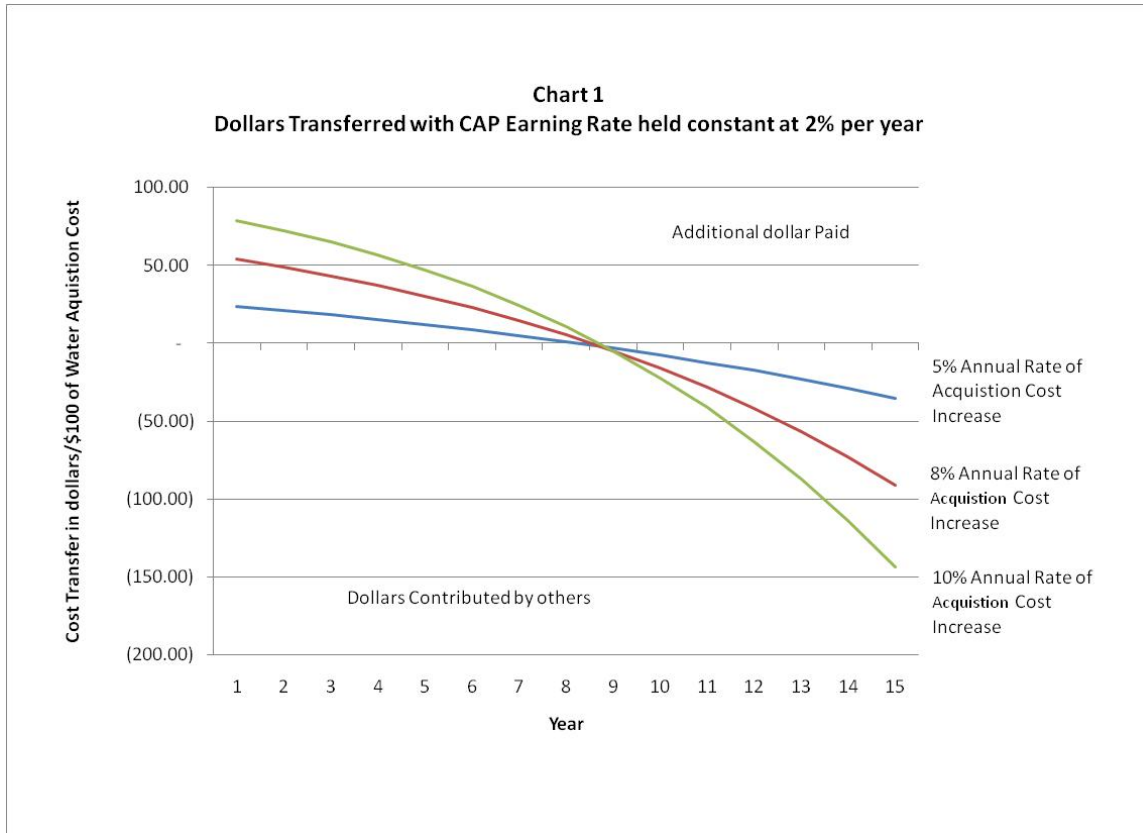
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<sup>1</sup> For purposes of this discussion, the volumetric pool of water has yet to be decided.

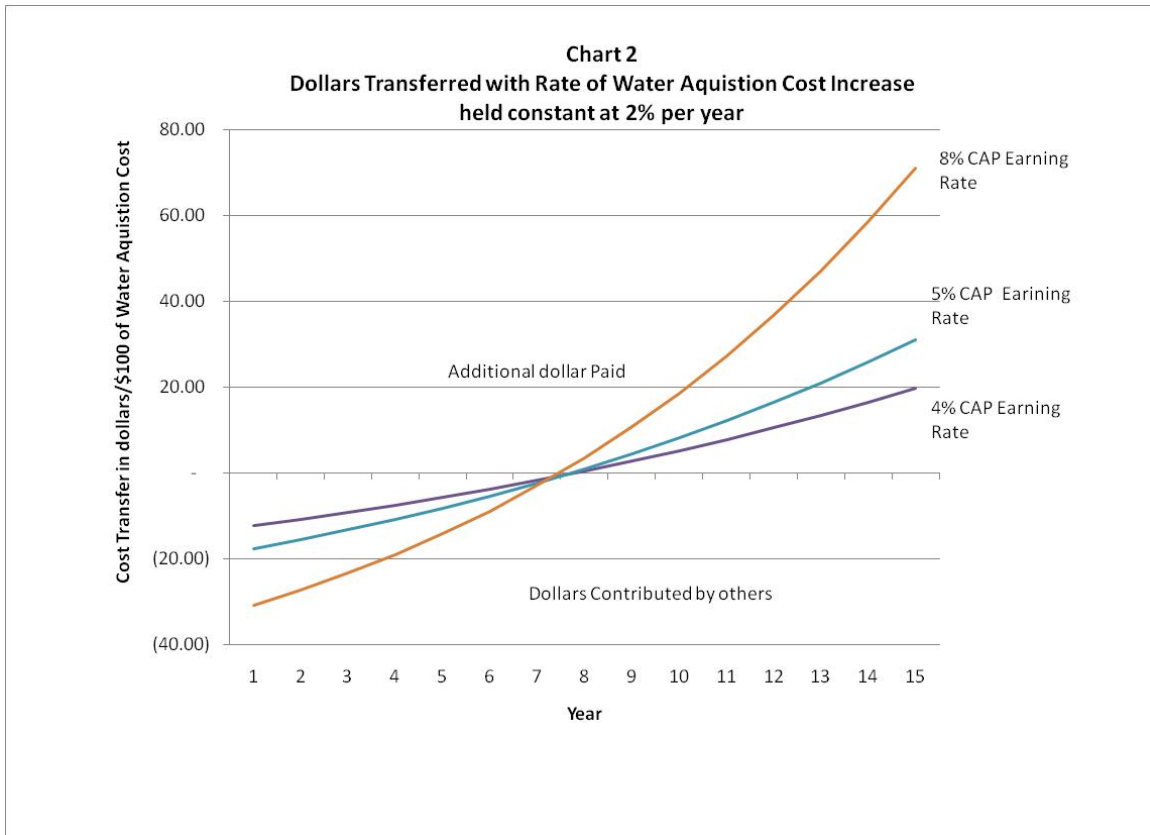
<sup>2</sup> Subscription cost is the money the end user pays to CAP to participate in ADD water. This is expressed in \$/acre-foot.

<sup>3</sup> Water Acquisition cost is the price CAP pays to acquire and or develop a water supply. This is expressed in \$/acre-foot.

compared the various water acquisition price increases. For example at year 2, those entities subscribing to ADD pay \$18.20 more per \$100 of water purchased (if water acquisition prices increased at 5% a year) and in year 13, those entities subscribing to ADD pay \$28.86 less per \$100 water purchased (if water acquisition prices increased at 5% per year).



2. When the rate of water acquisition prices increase at the same rate as the CAP earning rate, all ADD water subscribers pay the same costs for water.
3. When CAP's earning rate is higher than water acquisition price increase rate, later ADD water subscribers pay more than the value of the actual water purchased. Chart 2 shows the impacts for water acquisition prices increasing at 2% per year and CAP earning rate varying. For example at year 2, those entities subscribing to ADD would pay \$9.28 less per \$100 of water purchased (if CAP earning rate was 4% a year) and in year 13, those entities subscribing to ADD pay \$16.50 more per \$100 of water purchased (if CAP earning rate was 4% a year).



**Group alternative viewpoints**

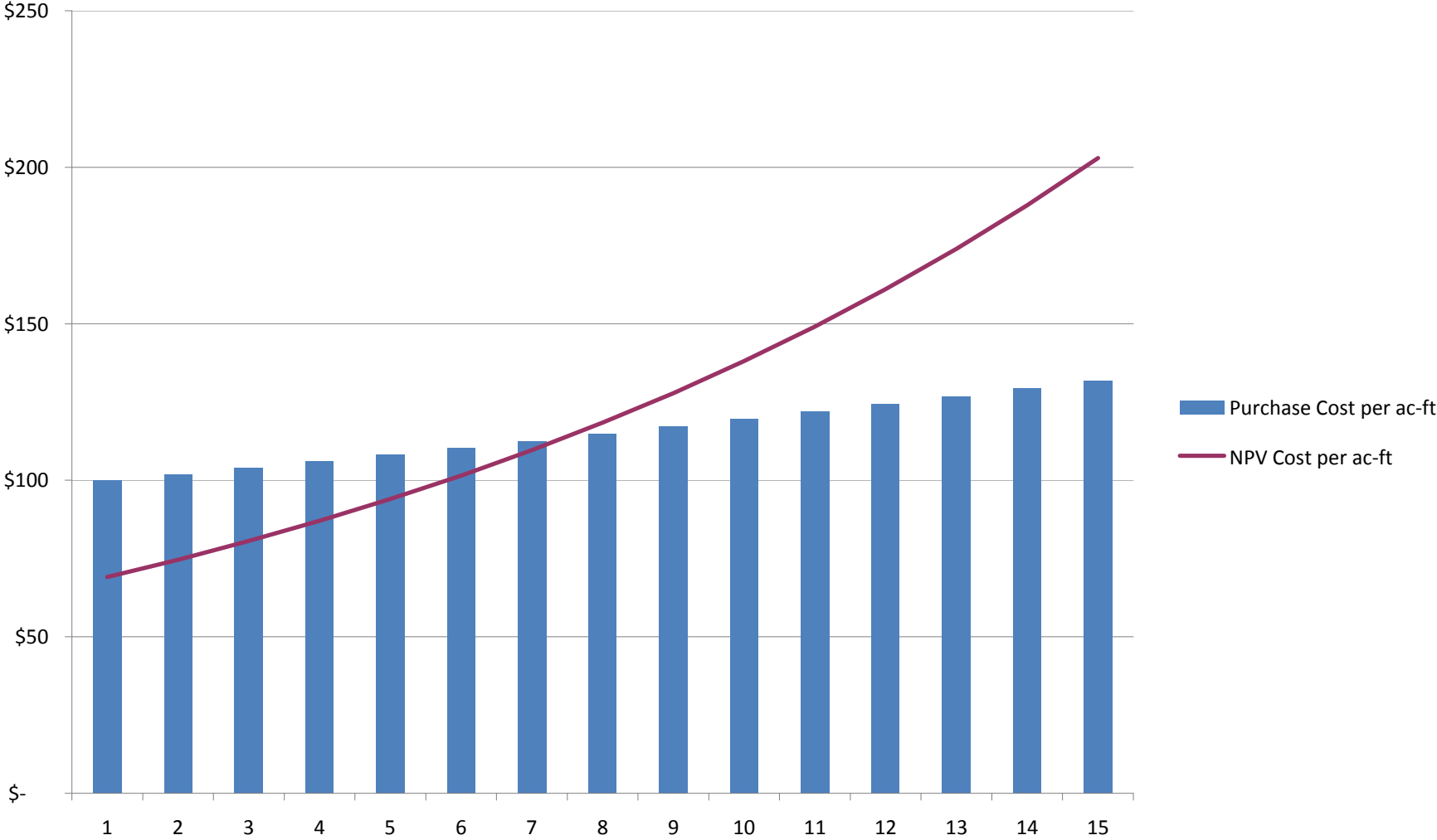
Some in the group do not want to “subsidize” future water purchases.

Some in the group want to keep the same present day water purchase costs for all ADD water participants.

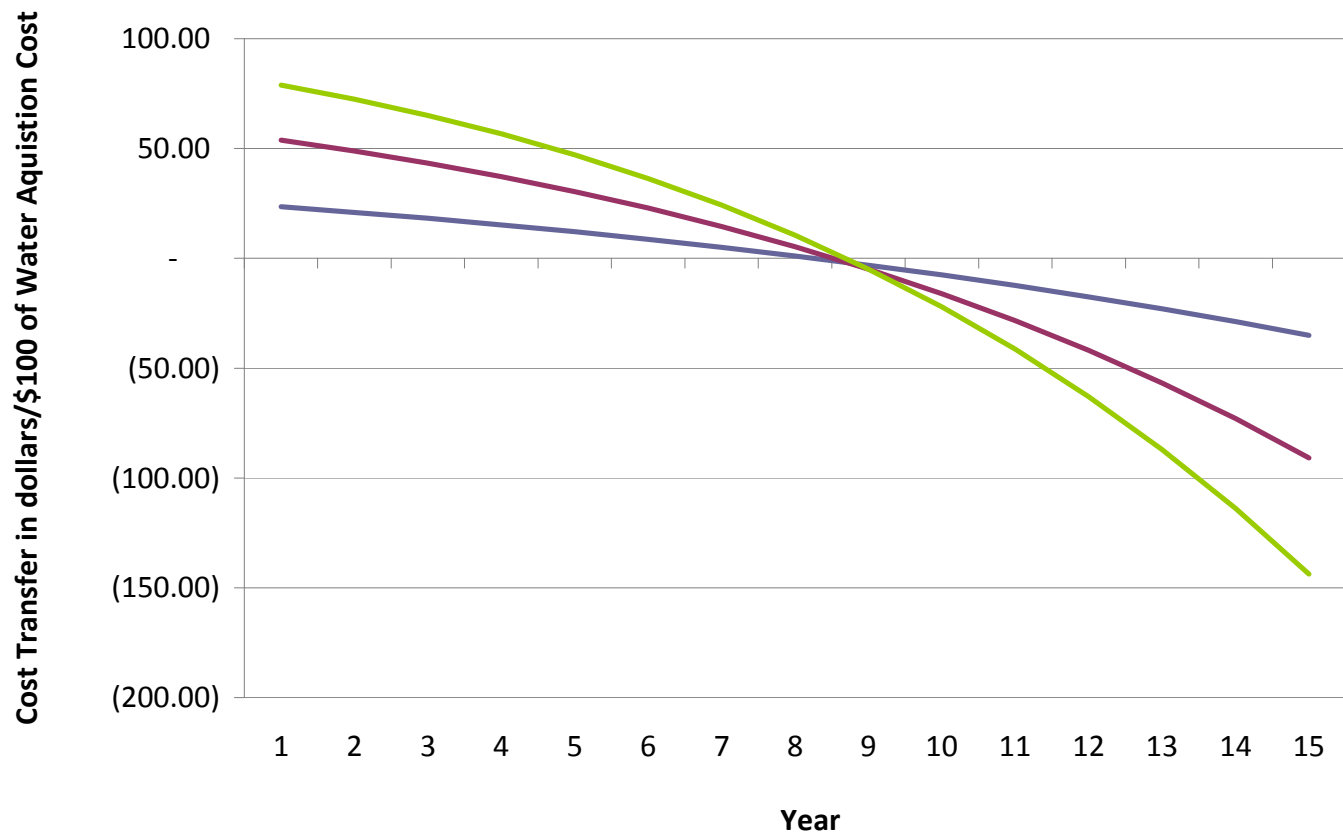
**Questions to help the discussion:**

1. Will future water purchase rate increases be higher or lower than CAP interest rates?
2. What is the certainty of future water purchase rate increases and CAP interest rates? (The longer the time frame to purchase a pool of water, the more uncertain the future water purchases rates increases and CAP interest rates are).

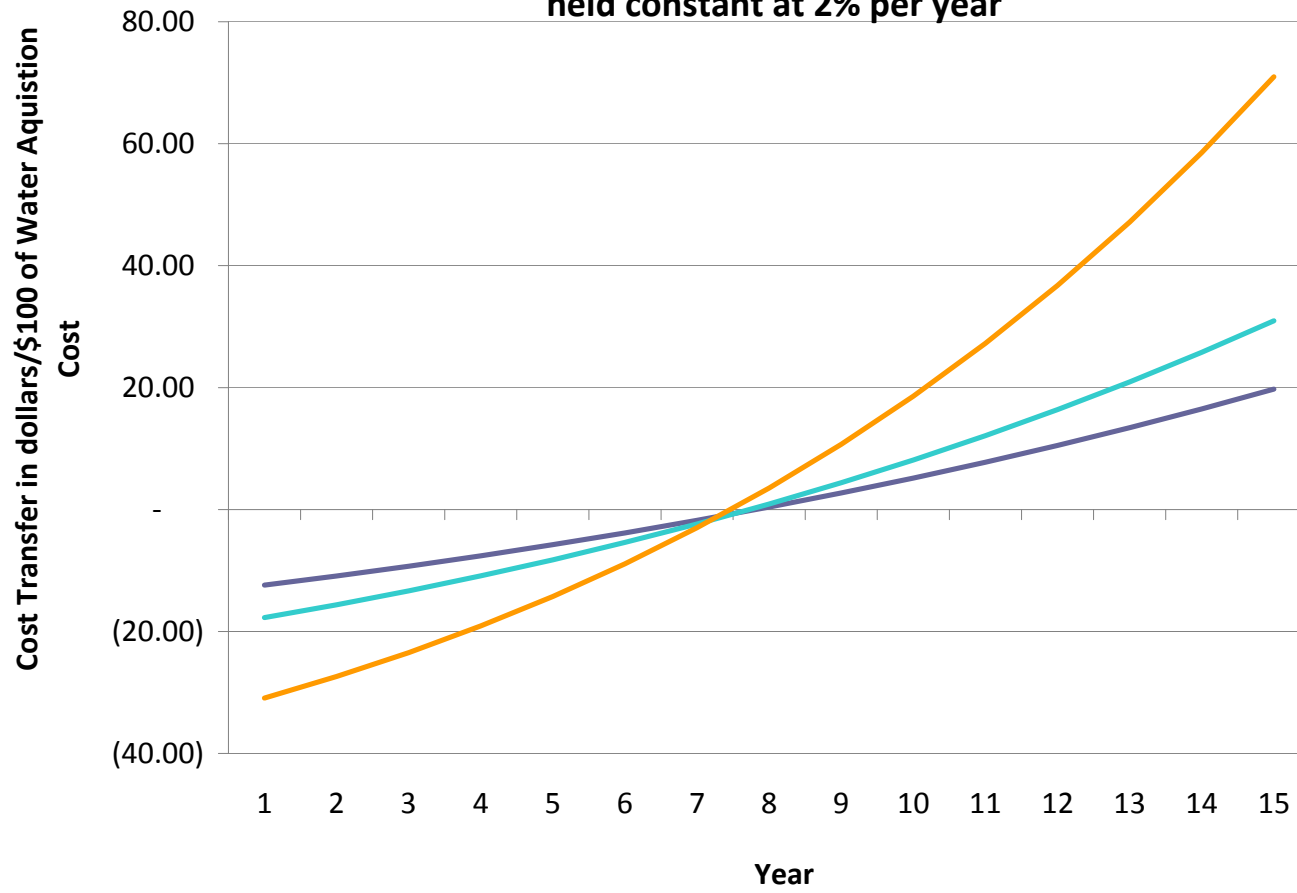
# ADD Water Net Present Value Pricing Example

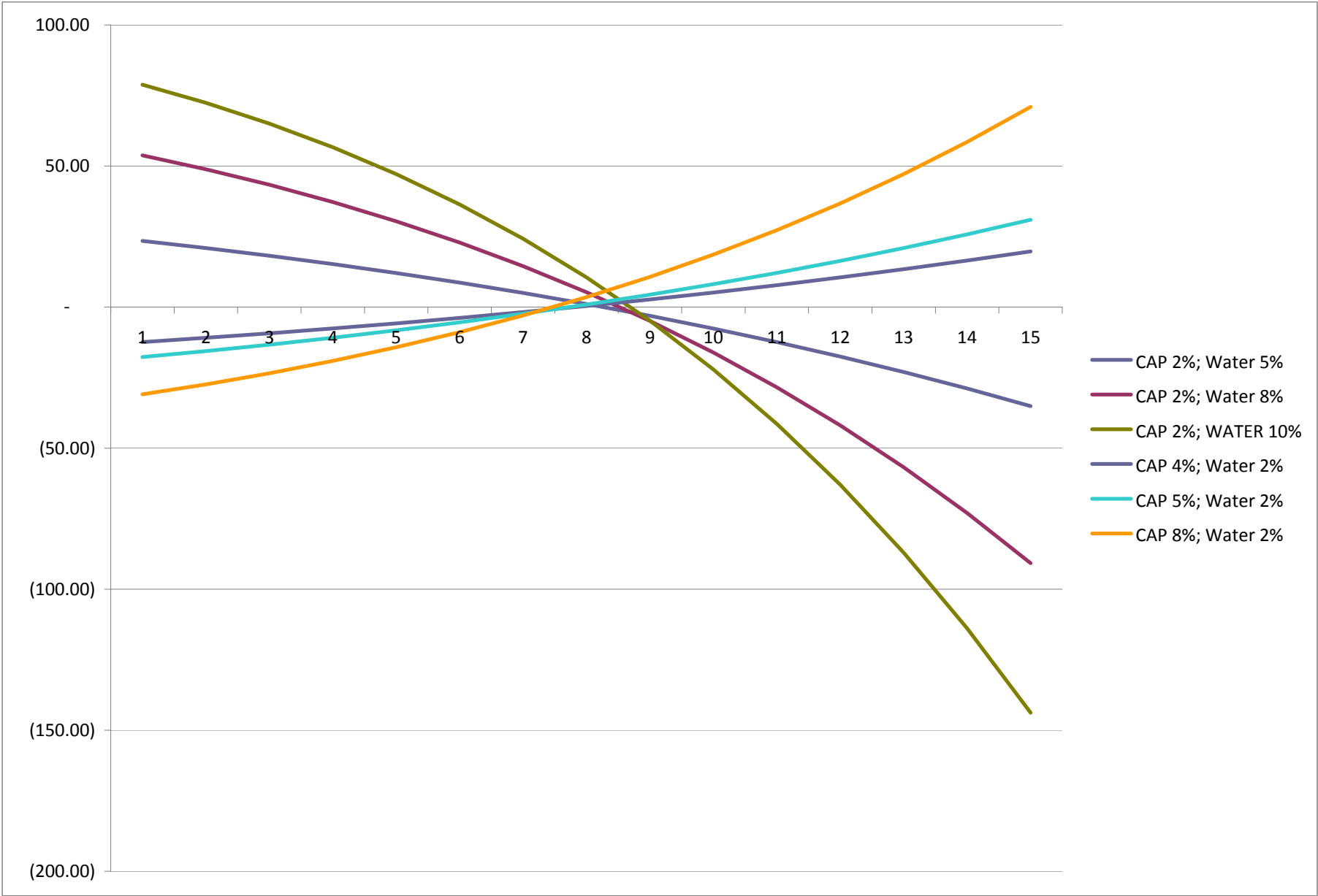


**Chart 1**  
**Dollars Transferred with CAP Earning Rate held constant at 2% per year**



**Chart 2**  
**Dollars Transferred with Rate of Water Acquisition Cost Increase**  
**held constant at 2% per year**





ADD Water Net Present Value Pricing Example



		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	TOTALS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Annual Water Purchase	100															
CAP financing/Earning Rate	8.0%															
Water Inflation Rate	2.0%															
Supply Purchases (ac-ft)	1,500	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Purchase Cost per ac-ft		\$ 100	\$ 102	\$ 104	\$ 106	\$ 108	\$ 110	\$ 113	\$ 115	\$ 117	\$ 120	\$ 122	\$ 124	\$ 127	\$ 129	\$ 132
Total Cost (Millions)	\$ 0.2	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0
Cash Flow (Millions)	\$ 0.2	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0
Present Value Cash Flows (Millions)		\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.2	\$0.3	\$0.3
NPV Cost per ac-ft		\$ 69	\$ 75	\$ 81	\$ 87	\$ 94	\$ 102	\$ 110	\$ 118	\$ 128	\$ 138	\$ 149	\$ 161	\$ 174	\$ 188	\$ 203
Subscriptions (ac-ft)	1,500	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Subscription Fees (Millions)	\$ 0.2	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0
Beginning Cash Position		-	(0.00)	(0.01)	(0.01)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Expenditures	(0.2)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Collections	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ending Cash Position	0.0	(0.00)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Earnings/(Interest)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Ending Cash Position	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
ADD Water Supplies (ac-ft)		100	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
ADD Water Contracts (ac-ft)		100	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500