July 6, 2010

Add Water – NPV Water Acquisition Example

This document illustrates the concept defined in Q17-18, Item #3 of the Summary of Emerging Consensus (SEC) "Capital Costs – Supply"

> 3. The costs of acquisition and development of the water supplies that CAP has identified and made available for contract would be shared proportionately and on a net present value basis among all ADD water contractors who contract for those supplies. Where costs exceed the projected net present value, future contractors will assume the additional costs. Where costs are lower, existing contractors will receive a refund. **[Policy Paper #10, summary of emerging consensus]**

Three cases are included:

Base Case – This case illustrates a 15-year scenario in which water supplies are acquired in various quantities and at various prices. The amounts collected from contractors are based on the net present value (NPV) of the anticipated acquisition costs. While actual costs vary over time, the NPV cost is a gently rising smooth curve, as illustrated by the first graph. The second graph illustrates that cumulatve contract subscriptions are never allowed to exceed to amount that has been acquired; i.e., acquisitions must stay ahead of the amount that are offered for contract (this graph remains the same for all three cases and is not included for Case 1 and Case 2).

Case 1 – This case illustrates what would happen if actual costs for an acquisition in the future was less than had been originally anticipated. The SEC specifies that the existing contractors would receive a refund, based on the NPV of their overpayments. However, future contractors would enjoy a lower subscription cost.

Case 2 – This case illustrates what would happen if actual costs for an acquisition in the future was more than had been originally anticipated. The SEC specifies that the new contractors would assume the additional costs, including those costs that were undercollected from previous contractors.

These examples illustrate water supply acquisitions, but could also be extrapolated to infrastructure. They could also be modified for other changes in assumption over time such as discount factors or interest rates, etc.

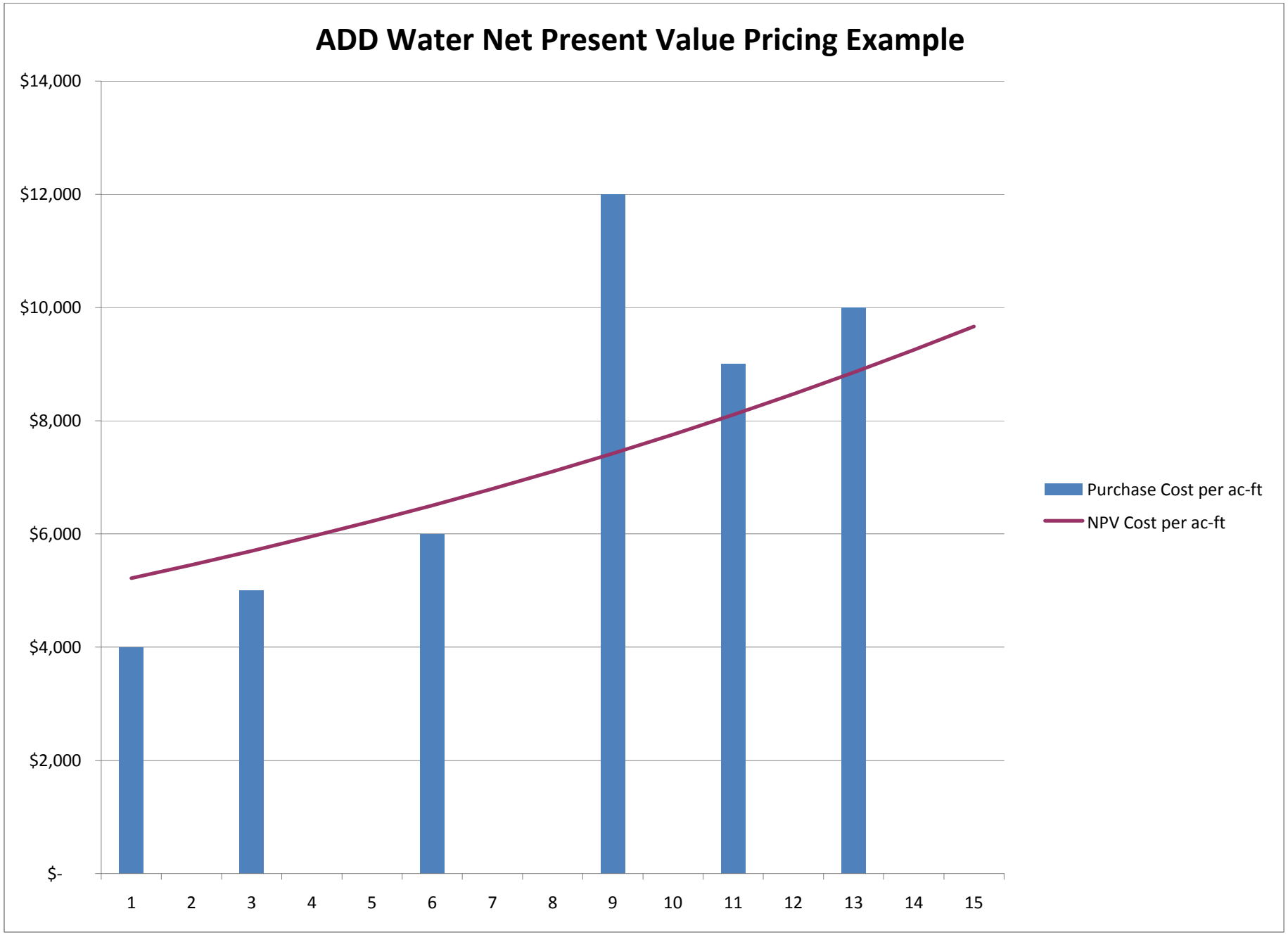
These examples are done on a cash basis. They are not intended to illustrate bonding options – that will come later. Negative cash balances could be addressed by short-term borrowing or a "seed money" reserve account.

ADD Water Net Present Value Pricing Example

Base Case

CAP financing/Earning Rate 4.5%

	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
		Purchase 1		Purchase 2			Purchase 3			Purchase 4		Purchase 5		Purchase 6		
Supply Purchases (ac-ft)	150,000	40,000	-	30,000	-	-	30,000	-	-	20,000	-	10,000	-	20,000	-	-
Purchase Cost per ac-ft	$ 6,800	$ 4,000	$ -	$ 5,000	$ -	$ -	$ 6,000	$ -	$ -	$ 12,000	$ -	$ 9,000	$ -	$ 10,000	$ -	$ -
Total Cost (Millions)	$ 1,020.0	$ 160.0	$ -	$ 150.0	$ -	$ -	$ 180.0	$ -	$ -	$ 240.0	$ -	$ 90.0	$ -	$ 200.0	$ -	$ -
Cash Flow (Millions)	$ 1,020.0	$ 160.0	$ 20.0	$ 65.0	$ 65.0	$ 40.0	$ 140.0	$ -	$ 50.0	$ 95.0	$ 95.0	$ 90.0	$ 15.0	$ 92.5	$ 92.5	$ -
Present Value Cash Flows (Millions)		$782.9	$818.1	$855.0	$893.4	$933.6	$975.7	$1,019.6	$1,065.4	$1,113.4	$1,163.5	$1,215.8	$1,270.6	$1,327.7	$1,387.5	$1,449.9
NPV Cost per ac-ft		$ 5,219	$ 5,454	$ 5,700	$ 5,956	$ 6,224	$ 6,504	$ 6,797	$ 7,103	$ 7,423	$ 7,757	$ 8,106	$ 8,470	$ 8,852	$ 9,250	$ 9,666
Subscriptions (ac-ft)	150,000	30,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000	5,000	5,000	10,000
Subscription Fees (Millions)	$ 1,015.8	$ 156.6	$ 54.5	$ 57.0	$ 59.6	$ 62.2	$ 65.0	$ 68.0	$ 71.0	$ 74.2	$ 77.6	$ 40.5	$ 42.4	$ 44.3	$ 46.2	$ 96.7
Beginning Cash Position		-	(3.6)	32.4	25.5	20.9	45.1	(31.2)	38.4	62.1	43.2	26.9	(23.5)	4.0	(46.2)	(96.7)
Expenditures	(1,020.0)	(160.0)	(20.0)	(65.0)	(65.0)	(40.0)	(140.0)	-	(50.0)	(95.0)	(95.0)	(90.0)	(15.0)	(92.5)	(92.5)	-
Collections	1,015.8	156.6	54.5	57.0	59.6	62.2	65.0	68.0	71.0	74.2	77.6	40.5	42.4	44.3	46.2	96.7
Ending Cash Position	(4.2)	(3.4)	31.0	24.4	20.0	43.2	(29.9)	36.8	59.5	41.4	25.8	(22.5)	3.8	(44.3)	(92.5)	(0.0)
Earnings/(Interest)	4.2	(0.2)	1.4	1.1	0.9	1.9	(1.3)	1.7	2.7	1.9	1.2	(1.0)	0.2	(2.0)	(4.2)	(0.0)
Ending Cash Position	(0.0)	(3.6)	32.4	25.5	20.9	45.1	(31.2)	38.4	62.1	43.2	26.9	(23.5)	4.0	(46.2)	(96.7)	(0.0)
ADD Water Supplies (ac-ft)		40,000	40,000	70,000	70,000	70,000	100,000	100,000	100,000	120,000	120,000	130,000	130,000	150,000	150,000	150,000
ADD Water Contracts (ac-ft)		30,000	40,000	50,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	125,000	130,000	135,000	140,000	150,000


ADD Water Net Present Value Pricing Example
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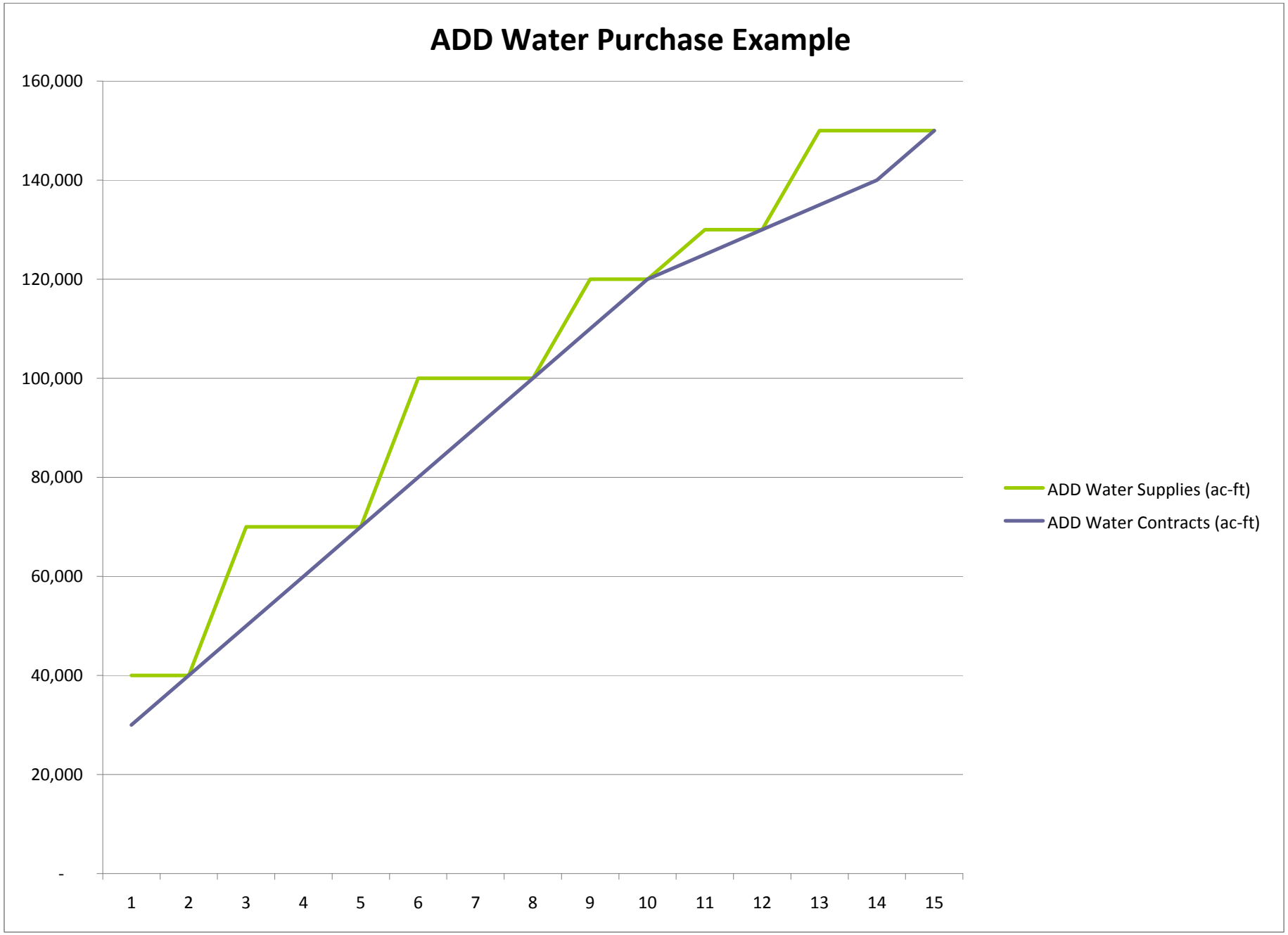
Purchase Cost per ac-ft
NPV Cost per ac-ft


ADD Water Purchase Example
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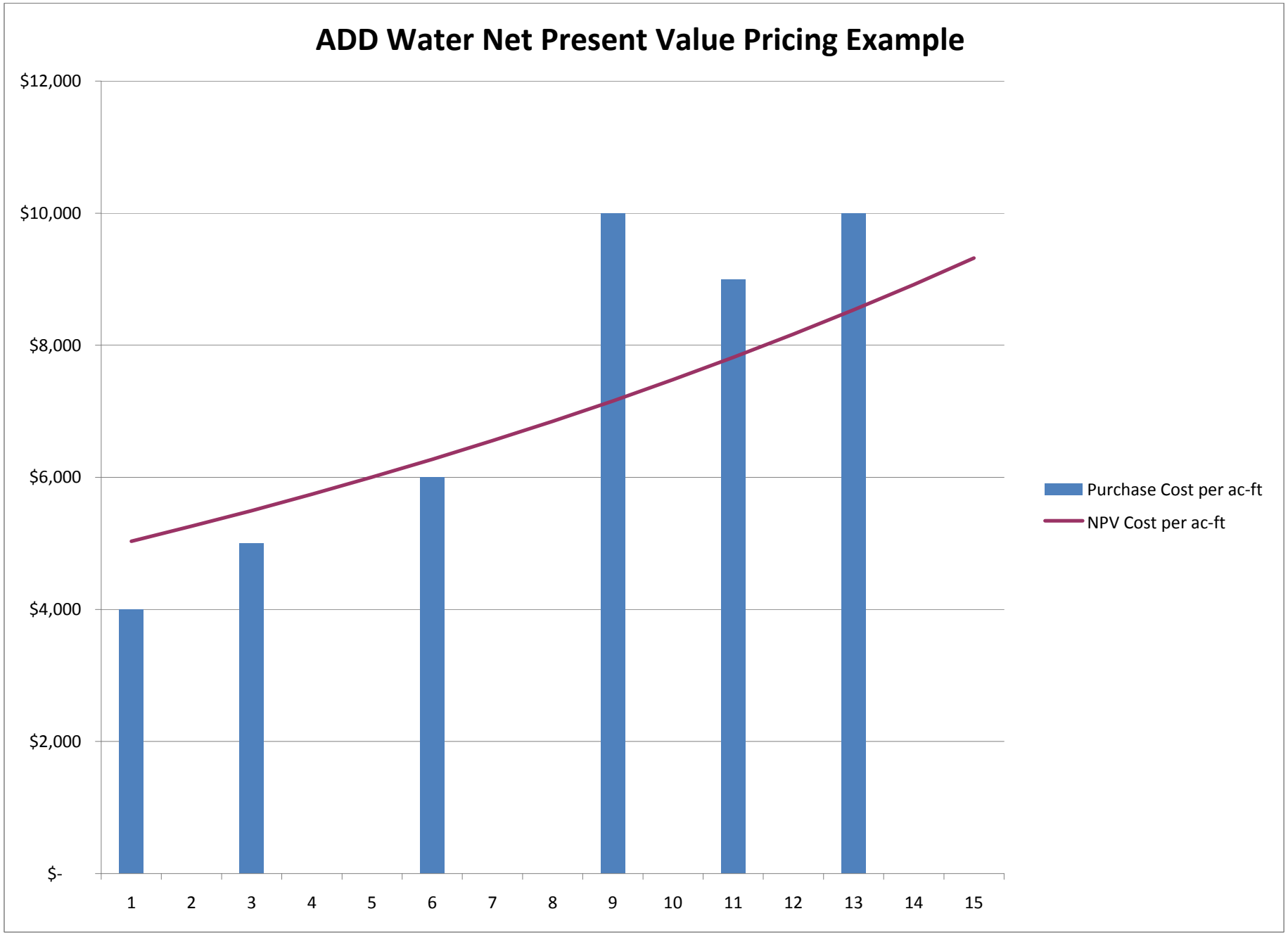
ADD Water Supplies (ac-ft)
ADD Water Contracts (ac-ft)

ADD Water Net Present Value Pricing Example

Case 1 - Lower Cost in Years 8-10

CAP financing/Earning Rate 4.5%

	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
		Purchase 1		Purchase 2			Purchase 3			Purchase 4		Purchase 5		Purchase 6		
Supply Purchases (ac-ft)	150,000	40,000	-	30,000	-	-	30,000	-	-	20,000	-	10,000	-	20,000	-	-
Purchase Cost per ac-ft	$ 6,533	$ 4,000	$ -	$ 5,000	$ -	$ -	$ 6,000	$ -	$ -	$ 10,000	$ -	$ 9,000	$ -	$ 10,000	$ -	$ -
Total Cost (Millions)	$ 980.0	$ 160.0	$ -	$ 150.0	$ -	$ -	$ 180.0	$ -	$ -	$ 200.0	$ -	$ 90.0	$ -	$ 200.0	$ -	$ -
Cash Flow (Millions)	$ 980.0	$ 160.0	$ 20.0	$ 65.0	$ 65.0	$ 40.0	$ 140.0	$ -	$ 40.0	$ 80.0	$ 80.0	$ 90.0	$ 15.0	$ 92.5	$ 92.5	$ -
Present Value Cash Flows (Millions)		$754.9	$788.9	$824.4	$861.5	$900.3	$940.8	$983.1	$1,027.3	$1,073.6	$1,121.9	$1,172.4	$1,225.1	$1,280.3	$1,337.9	$1,398.1
NPV Cost per ac-ft		$ 5,033	$ 5,259	$ 5,496	$ 5,743	$ 6,002	$ 6,272	$ 6,554	$ 6,849	$ 7,157	$ 7,479	$ 7,816	$ 8,168	$ 8,535	$ 8,919	$ 9,320
Subscriptions (ac-ft)	150,000	30,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000	5,000	5,000	10,000
Subscription Fees (Millions)	$ 979.5	$ 151.0	$ 52.6	$ 55.0	$ 57.4	$ 60.0	$ 62.7	$ 65.5	$ 68.5	$ 71.6	$ 74.8	$ 39.1	$ 40.8	$ 42.7	$ 44.6	$ 93.2
Beginning Cash Position		-	(3.6)	32.4	25.5	20.9	45.1	(31.2)	38.4	46.1	39.3	35.6	(16.0)	10.3	(41.3)	(93.2)
Expenditures	(980.0)	(160.0)	(20.0)	(65.0)	(65.0)	(40.0)	(140.0)	-	(40.0)	(80.0)	(80.0)	(90.0)	(15.0)	(92.5)	(92.5)	-
Collections	998.2	***156.6***	***54.5***	***57.0***	***59.6***	***62.2***	***65.0***	***68.0***	68.5	71.6	74.8	39.1	40.8	42.7	44.6	93.2
Refunds	(22.9)	-	-	-					(22.9)							
Ending Cash Position	(4.7)	(3.4)	31.0	24.4	20.0	43.2	(29.9)	36.8	44.1	37.6	34.1	(15.3)	9.9	(39.5)	(89.2)	(0.0)
Earnings/(Interest)	4.7	(0.2)	1.4	1.1	0.9	1.9	(1.3)	1.7	2.0	1.7	1.5	(0.7)	0.4	(1.8)	(4.0)	(0.0)
Ending Cash Position	(0.0)	(3.6)	32.4	25.5	20.9	45.1	(31.2)	38.4	46.1	39.3	35.6	(16.0)	10.3	(41.3)	(93.2)	(0.0)
ADD Water Supplies (ac-ft)		40,000	40,000	70,000	70,000	70,000	100,000	100,000	100,000	120,000	120,000	130,000	130,000	150,000	150,000	150,000
ADD Water Contracts (ac-ft)		30,000	40,000	50,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	125,000	130,000	135,000	140,000	150,000


ADD Water Net Present Value Pricing Example
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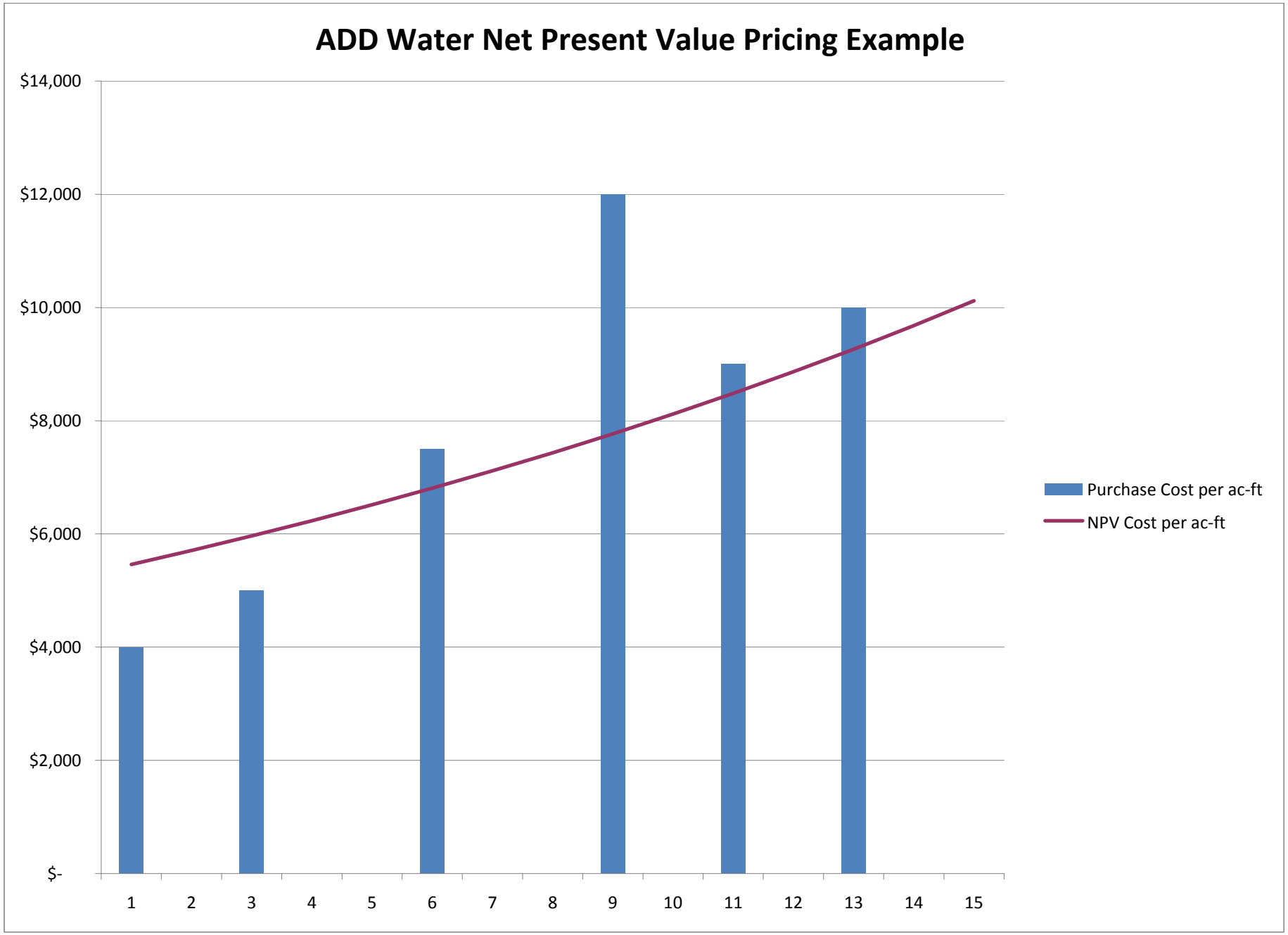
Purchase Cost per ac-ft
NPV Cost per ac-ft

ADD Water Net Present Value Pricing Example

Case 2 - Higher Cost in Years 5-6

CAP financing/Earning Rate 4.5%

	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
		Purchase 1		Purchase 2			Purchase 3			Purchase 4		Purchase 5		Purchase 6		
Supply Purchases (ac-ft)	150,000	40,000	-	30,000	-	-	30,000	-	-	20,000	-	10,000	-	20,000	-	-
Purchase Cost per ac-ft	$ 7,100	$ 4,000	$ -	$ 5,000	$ -	$ -	$ 7,500	$ -	$ -	$ 12,000	$ -	$ 9,000	$ -	$ 10,000	$ -	$ -
Total Cost (Millions)	$ 1,065.0	$ 160.0	$ -	$ 150.0	$ -	$ -	$ 225.0	$ -	$ -	$ 240.0	$ -	$ 90.0	$ -	$ 200.0	$ -	$ -
Cash Flow (Millions)	$ 1,065.0	$ 160.0	$ 20.0	$ 65.0	$ 65.0	$ 50.0	$ 175.0	$ -	$ 50.0	$ 95.0	$ 95.0	$ 90.0	$ 15.0	$ 92.5	$ 92.5	$ -
Present Value Cash Flows (Millions)		$819.4	$856.3	$894.8	$935.1	$977.1	$1,021.1	$1,067.0	$1,115.1	$1,165.2	$1,217.7	$1,272.5	$1,329.7	$1,389.6	$1,452.1	$1,517.5
NPV Cost per ac-ft		$ 5,463	$ 5,708	$ 5,965	$ 6,234	$ 6,514	$ 6,807	$ 7,114	$ 7,434	$ 7,768	$ 8,118	$ 8,483	$ 8,865	$ 9,264	$ 9,681	$ 10,116
Additional Cost per ac-ft						$ 193	$ 202	$ 211	$ 221	$ 231	$ 241	$ 252	$ 263	$ 275	$ 287	$ 300
Subscriptions (ac-ft)	150,000	30,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000	5,000	5,000	10,000
Subscription Fees (Millions)	$ 1,063.1	$ 163.9	$ 57.1	$ 59.7	$ 62.3	$ 65.1	$ 68.1	$ 71.1	$ 74.3	$ 77.7	$ 81.2	$ 42.4	$ 44.3	$ 46.3	$ 48.4	$ 101.2
Beginning Cash Position		-	(3.6)	32.4	25.5	20.9	39.7	(68.1)	5.3	33.3	19.1	8.1	(40.0)	(9.8)	(57.0)	(104.2)
Expenditures	(1,065.0)	(160.0)	(20.0)	(65.0)	(65.0)	(50.0)	(175.0)	-	(50.0)	(95.0)	(95.0)	(90.0)	(15.0)	(92.5)	(92.5)	-
Collections	1,069.2	***156.6***	***54.5***	***57.0***	***59.6***	***67.1***	***70.1***	***73.2***	***76.5***	***80.0***	***83.6***	***43.7***	***45.6***	***47.7***	***49.8***	***104.2***
Refunds	-	-	-	-												
Ending Cash Position	4.2	(3.4)	31.0	24.4	20.0	38.0	(65.2)	5.1	31.9	18.3	7.7	(38.3)	(9.3)	(54.6)	(99.7)	(0.0)
Earnings/(Interest)	(4.2)	(0.2)	1.4	1.1	0.9	1.7	(2.9)	0.2	1.4	0.8	0.3	(1.7)	(0.4)	(2.5)	(4.5)	(0.0)
Ending Cash Position	(0.0)	(3.6)	32.4	25.5	20.9	39.7	(68.1)	5.3	33.3	19.1	8.1	(40.0)	(9.8)	(57.0)	(104.2)	(0.0)
ADD Water Supplies (ac-ft)		40,000	40,000	70,000	70,000	70,000	100,000	100,000	100,000	120,000	120,000	130,000	130,000	150,000	150,000	150,000
ADD Water Contracts (ac-ft)		30,000	40,000	50,000	60,000	70,000	80,000	90,000	100,000	110,000	120,000	125,000	130,000	135,000	140,000	150,000


ADD Water Net Present Value Pricing Example
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Purchase Cost per ac-ft
NPV Cost per ac-ft