

Introduction

Purpose

BMP 1.3 reads, in part: water agencies shall "...assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters" for CII customers.

The purpose of this spreadsheet is to help water agencies complete this assessment. It does this by calculating the net present value (NPV) to your water agency of such a program.

Simply put, the NPV is calculated by summing the present value (discounting future costs and benefits for the time value of money) of each year's costs and benefits to the water agency over the life of the project.

If the NPV is positive then the present value of the benefits to the water agency over the life of the project exceed the present value of the costs and the program may have merit. If the NPV is negative, the the opposite is likely to be true and the program may not have merit.

The NPV is calculated based in the information you enter into the spreadsheet.

The NPV calculation is graphed on the bottom of worksheet #2, along with the NPVs of an example (included for illustration purposes) and a "What If" scenario you can use to test different inputs.

Background

This spreadsheet is only a guide, and you may need to adjust it to meet the unique requirements of your service area.

The worksheet #1 may seem long, but for a reason. We want to show you each step in the process of calculating the merits of the program, as opposed to embedding multiple steps within a single formula.

This spreadsheet seeks to balance ease of use with accurately modeling the 'real world' of each water agency. Because each water agency is unique, perfectly modeling each agency would result in a very complex spreadsheet. In order to keep this model from becoming too cumbersome certain simplifying assumptions are made. For example, we assume costs and benefits inflate at the same rate. Also we don't try to model every water agency's rate structure; instead, the spreadsheet was made flexible enough for water agencies to approximate the impact of their unique rate structure on this assessment.

Using this spreadsheet for BMP Compliance

We recommend you start on worksheet #1, but realize that many of the formulas on worksheet #1 rely in part on information you enter into worksheet #2. So as you enter info into worksheet #1, don't be surprised if the formulas don't result in the calculated values you anticipated. If you are concerned about a calculations, enter all the information into both worksheets and then go back and review the calculation.

You can always go back to one or the other spreadsheet and change the values.

1st: Read the introduction on worksheet #1, then enter appropriate values in the input cells.

2nd: Read the introduction on worksheet #2, then enter appropriate values in the input cells.

3rd: On worksheet #2, use the input cells and chart shown in Table 1 to search for scenarios where the Program would have merit for your water agency.

4th: Write an assessment, based on the above, of the merits of a program to provide incentives to switch mixed-use CII accounts to dedicated landscape meters. The assessment should:

- * Be one or more pages in length,
- * Describe the scenarios your looked at, based on values you entered in worksheet #1 and #2;
- * Explain why your chose the values you did in key input cells, especially those in worksheet #2, and why those values are reasonable for your water agency.
- * Explain under what conditions such a program would have merit in your service area. And given those conditions, whether such a program be feasible.

Worksheet #1. General Inputs

BMP 1.3: Assessing the Merits of a Program to Provide Incentives to Switch CII Mixed-use Accounts to Dedicated Landscape Meters

Where to enter values into this worksheet

It is recommended that you complete this worksheet (#1) first, then complete the second worksheet (#2).

Entering Data:

Enter values in cells like this

: Enter values into cells with red text and gold background.

Entered on worksheet #2

: Green cells have values that you will enter on the row labeled "Your Agency", in Table 1 of worksheet #2 (approx row 50 on worksheet #2). Hold the [Ctrl] key and press [G] then type "Table1" to go to the table.

These cells contain formulas

: All other cells contain formulas; their contents should not be changed.

I. Discount rate and useful life of the project

Annual discount rate

Because this spreadsheet does not inflate costs and benefits, the discount rate simply reflects the time-value of money. Therefore, a reasonable discount rate would be 2% or 3%. In any case, it will not have a big impact on the merits of your Program. For example, increasing the discount rate by 100% (for example: going to 3% from 1.5%), may have only a 10% change in the net present value of your Program.

2.50% discount rate

Enter what you expect to be the useful life of the project, in years

The life of the project is roughly the number of years the project will impact the customer. A reasonable project life would be between 15 and 20 years.

15 years

II. Water and sewer rates and charges

WATER RATES

Your customer is currently using water through a mixed-use account to irrigate its landscape.

Enter the approximate price the customer is paying, per HCF, for that water

\$3.00 per HCF

If you have a uniform rate for CII customers with mixed-use meters, enter that rate here. If you have block rates, make an assumption about the average rate a customer participating in the Program might be paying to irrigate their landscape prior to installing the dedicated landscape meter; this could be the highest tier, or an average of all your tiers, or your average CII customer's average marginal rate.

Average rate for irrigation water as a percent of the mixed-use rate you entered above.

For more information about this number, click on the small red "comment" triangle on column 'E' of Table 1, on worksheet #2.

100% from worksheet #2

SEWER

For many customers, the biggest incentive they will have to switch to a dedicated landscape meter will be to eliminate some or all of the sewer fees they currently pay on water used for landscape irrigation. Your customers may save significantly more money by greatly reducing or eliminating sewer charges than they will save from buying less irrigation water; this fact may have a huge impact on the cost-effectiveness of your Program.

Therefore, even if your agency does not provide sewer service, by completing this section with the best information available to you, you will create the most accurate assessment of the merits of the Program. If your customers are served by many different sewer agencies, estimate the average of these charges.

Sewer Volumetric Charge

In this section, provide the information needed to calculate the potential savings to the customer in sewer volumetric charges when they switch to dedicated landscape meters from mixed use meters.

Line #1, below: if you have a tiered sewer rate, enter your best estimate of the average of the rates being paid by customers that might participate in your Program. If you have a uniform rate, enter that.

Line #2, below: in some communities, the sewer volumetric bill for CII customers is calculated by multiplying the sewer rate times 100% of the water passing through the water meter. In other communities, the sewer volumetric bill is based on the sewer rate times a portion of the water passing through the water meter; for example, sometimes the customer's volume of sewage is estimated using low winter flows.

If yours is not a wastewater agency and you are not sure what to enter in lines #1 and #2, check with your local sewer agencies and enter your best estimate.

...on the existing mixed-use meter

1. Enter the average sewer volumetric charge per HCF for mixed-use meters

\$0.33

2. On average, what percent of the water passing through the mixed-use meter does this volumetric charge apply

85%

...on the proposed dedicated landscape meter

If there is no sewer volumetric charge associated with dedicated landscape meters, enter '0' on both of the following cells.

1. Enter the **average sewer volumetric charge per HCF** for landscape meters (if any)

\$0.00

2. On average, what **percent** of the water passing through the dedicated landscape meter does this volumetric charge apply (if any)

0%

Sewer Fixed Charge

In some communities CII customers that have mixed-use meters are assessed a fixed sewer charge, a charge which may be reduced when a dedicated landscape meter is installed.

If your service area has such a charge (whether assessed by your agency or another agency), enter your estimate of the reduction the customer will see on an ANNUAL basis if they participate in the Program.

In some cases the fixed charge is based on the size of the mixed-use meter. As a simplifying assumption we will assume the size of the mixed-use meter will not change.

If this section does not apply to your customers, enter "\$0".

Enter the **ANNUAL reduction** in your CII customer's fixed sewer charges, if any, when they transfer some of their mixed-use meter demand to a dedicated landscape meter

\$100 reduction per year

III. How much water will your customers apply to their landscapes AFTER they convert to a dedicated landscape meter from a mixed use meter?

This is where we estimate how much water your customers will apply, in inches per year, after they install a dedicated landscape meter.

If you already know how many inches of water are being applied each year, on average, at sites in your service area that already have landscape meters, enter it into "A", below. If you don't know, we have provided three (3) tools, below, to help you calculate this number.

NOTE if your water agency's service areas has two or more regions with significantly different ETo values:
A region's ETo will have a huge impact on the amount of water needed for landscape irrigation; so if your service area has two or more regions with great differences in their ETo, this Program might be cost effective in some regions and not in others.

For example: a 10% increase in ETo from one region to the next may result in a 12% increase in the net present value of the Program (re: more water will be saved by installing the dedicated landscape meter).

Consider using this spreadsheet to assess the merits of the Program separately for each of your major ETo regions.

A. For your CII customers that already have dedicated landscape meters: enter how many inches of water they apply to their landscape in an "average" year

70 inches per year

By taking the average amount of water actually used, we capture things like the actual average irrigation system efficiency, effect of your service area's average rainfall and ETo, the amount of rainfall that actually offsets landscape irrigation, and how well or how badly people maintain and manage irrigation systems.

Tool #1: using square feet and HCF of water use of current dedicated landscape accounts

To make this calculation you'll need two pieces of information: (a) the amount (in square feet) of landscape irrigated by some or all of your landscape accounts; and (b) the average amount of water, in HCF, consumed per year by these accounts.

You do **NOT** need to get the square feet of landscape and water use of every site irrigated though a dedicated landscape meter. You just need a sample large enough to give you confidence that your findings, broadly speaking, reflect the actual water use of your CII customers that have dedicated landscape meters.

When calculating the "average" annual water use, it's best to include an average of many years. The more years you have, the better job you will do factoring out the effects of things like differences in weather.

Enter the number of landscape accounts in your sample, where you know both:
a. their average annual water use.
b. the square feet being irrigated. 50 accounts

Enter the total annual usage for **all** these dedicated landscape accounts (in HCF): 2,178 HCF/ year
Enter the total combined landscaped area of **all** these accounts (in square feet): 43,560 sf
= inches of water applied per year (enter this into "A", above) 60 inch/ year

Tool #2: using acres of land and AF of water used by existing dedicated landscape accounts

This is similar to Tool #1, but it uses different inputs: using acres of land irrigated rather than square feet; and acre-feet of water used rather increments of HCF.

Enter the total annual usage for **all** these dedicated landscape accounts (in AF): 5.0 af/ year
Enter the total combined landscaped area of **all** these accounts (in acres): 1.0 acres

= inches of water applied per year (enter this into "A", above) 60.0 inch/ year

Tool #3: using your service area's ETo, rainfall and irrigation system efficiency

This tool is less accurate than Tool 1 or Tool 2, but is easier to use if you cannot get information on your existing landscape accounts (i.e., the square feet being irrigated and/or the average annual water use).

Enter your service area's average annual ETo 40 inch/ year

Is the landscape grass? This tool assumes the landscape being irrigated is mostly grass; if the landscape is something other than grass you should adjust the estimate accordingly. If grass, keep at "100%", otherwise enter the crop coefficient relative to grass (drought-tolerant would likely be 25% to 35%). 100%

Enter the average annual rainfall of your service area 14 inch/ year

Enter the percent of rainfall that offsets the need for landscape irrigation 25% of rainfall
This number will vary from region to region; use your agency's best estimate. (CLCA assumes about 30%, 25% was the default in the landscape water manager software from Irrigation Association).

=Subtotal 37 inch/ year

Enter your assumptions about the average irrigation system and operational efficiency in your service area 55% efficient
Typical irrigation efficiency for spray systems is about 50% to 60%; very efficient systems may reach 85% efficiency.
 = inches per year (enter this into "A", above) 66 inch/ year

IV. How much water will your CII customer save by installing a dedicated landscape meter?

Average water use where dedicated landscape meters are used:

Percent of additional watering taking place because a mixed-use meter is being used rather than a dedicated landscape meter:

70 inch per year
10% from worksheet #2

For more information about this number, click on the small red "comment" triangle on column 'A' of Table 1, on worksheet #2.

= Water saved by installing a dedicated landscape meter (inch per year):

NOT included in this assumption about how much water is saved, is the expected water savings from improving the irrigation system, such as installing water efficient nozzles and/or WBICs. These additional water savings would be included under separate projects that many water agencies have, such as rebates for WBICs and for efficient nozzles.

7.0 inch per year
 0.58 =saved CF/ yr/ sf
 0.01 = saved HCF/ yr/ sf

Total pre-project irrigation
 77.00 =Total inch/ year
 6.42 =CF/ yr/ sf
 0.06 =HCF/ yr/ sf
 5.89 =AF/ yr
40,000 sf

The size of the landscape in your assessment (in square feet):

For more information about this number, click on the small red "comment" triangle on column 'F' of Table 1, on worksheet #2.

= Water saved by installing a landscape meter on the landscape in your assessment:

...in HCF per year
 ...in acre-feet per year

233.3 HCF per yr
 0.54 AF per yr

...in acre-feet over the life of the project

8.03 AF per life of Project

V. Benefit to your agency of reduced irrigation runoff

When your conservation efforts reduce landscape irrigation runoff, many benefits may accrue in addition to "just" conserving water. For example, reduced pollution into local waterways may improve the local environment and your community's quality of life. Additionally, outside funding may be available to your water agency for this type of program. For example, sometimes funding is available to reduce non-storm runoff into local waterway, TMDL reduction, and to avoid the cost of treating or managing runoff.

While these are not benefits typically accounted for in a water agency's cost-benefit analysis, if those potential benefits (especially outside funding for your Program) are likely to be realized by your Program you should place a value on those benefits.

Enter the benefit of reduced landscape runoff per acre-foot conserved

= Benefit of reduced runoff over life of Project

\$20 per af conserved
 \$161 over life of project

VI. Will your agency need to provide an incentive to lower the customer's annual water bill?

Most of your customers will only participate in a program like this if it saves them money on their water

and/or sewer bills. Many water and sewer bills include both fix and volumetric charges.

This section compares

1. how much of a reduction in the annual water and sewer bill will your customer demand in order to participate;
2. to the reduction in the bill are they likely to get by installing the dedicated landscape meter.

If #2 is less than #1, then your water agency will have to make up the difference if the Program is to succeed. This incentive, if any, will get rolled into the overall assessment of the merits of the Program.

Will there be a change in the customer's annual fixed charges?

It could be the case that when a customer transfers some of its demand to a dedicated landscape meter from a mixed-use meter, that the size of the mixed-use meter could be decreased. This decrease in meter size may result in a lower daily service charge. However, we make the simplifying assumption that a decrease in the daily service charge would be offset by an increase in the capital cost of installing the smaller mixed-use meter.

For each new landscape meter

Enter the **average** size of the customer's **new** dedicated landscape meter(s)

2.00 inch

Next, we ask for your agency's "daily" service fee, or connection fee. But if your agency's fixed fees are monthly as opposed to daily, divide the monthly fee by 30.5 days. If your fixed fees are bi-monthly fees, divide the bi-monthly fee by 61 days. Etc.

Enter the **average daily** service fee per **new** landscape meter (if a fee is charged)

\$0.60 per day

= Annual service fees

\$ 219 per year

If a backflow device must be installed on the new landscape meter(s):

Enter the **average annual** fee for testing/ repair of a backflow device (may be '\$0')

\$200 per year

Enter the number of new landscape meters to be installed

1 meter(s)

Minus the reduction in Fixed Sewer Charges

\$ 100 per year

= **Reduction (increase) in customer's annual fixed charges**

\$ (319) per year

Will there be a change in the customer's annual volumetric charges?

Before project

WATER volumetric charge for landscape irrigation BEFORE project

\$ 7,700

SEWER volumetric charge for landscape irrigation water BEFORE project

\$ 720

= subtotal

\$ 8,420

After project

WATER volumetric charge for landscape irrigation AFTER project

\$ 6,930

SEWER volumetric charge for landscape irrigation water AFTER project

\$ -

= subtotal

\$ 6,930

= **Reduction (increase) in customer's annual volumetric charges**

\$ 1,490

Will these changes meet the customer's minimum expectation?

For more information about this number, click on the small red "comment" triangle on column 'C' of Table 1, on worksheet #2.

Minimum reduction demanded by the customer in the annual water and sewer bill

\$ 842

vs. Actual reduction in customer's annual water and sewer bill

\$ 1,171

= **Your agency's incentive (if any) to lower the customer's annual water bill:**

\$0

10% reduction

VII. Capital costs your customer will incur, and the incentive, if any, your agency will have to contribute

By participating in the Program, your CII customer will need to invest money in things like a new dedicated landscape meter, isolating the irrigation system from the existing mixed-use water system, etc.

Yet CII customers only invest capital when they have an expectation that the benefits (financial returns) of the investment will exceed the investment itself within a certain period of time.

In this section you estimate how much your customer is willing to invest based on the expected annual savings on the water and sewer bills, how much your customer needs to invest. If the former is less than the actual costs, your water agency will have to make up the difference if the Program is to succeed. This incentive, if any, will get rolled into the overall assessment of the merits of the Program.

How much capital your CII customer is willing to invest

Annual rate of return you customer will expect on its investment (ROI)

20% ROI

For more information about this number, click on the small red "comment" triangle on column 'B' of Table 1, on worksheet #2.

Actual annual return on investment (i.e., the reduction in annual water & sewer bill; see above)

\$ 1,171 yearly

= Maximum investment your customer willing to make based on this rate of return

\$ 5,855 Subtotal

How much capital your CII customer needs to invest

...installing the new meter, backflow, etc.

Size of meter(s)	2.0 inch
Enter the fee your agency charges for each new meter installed	\$5,000 per meter
Enter the average cost for other permits and inspection fees for each meter installed	\$100 per meter
If backflow devices must be installed, enter the average cost, per meter installed, for the BF devices	\$100 per meter
= total capital cost per meter	\$ 5,200
Number of Meters installed	1 meters
= Subtotal	\$ 5,200 Subtotal

...isolating the irrigation system and connecting it to the new meter

How many discrete areas is the total landscape broken into? (1, 2, 3, ?)	2
<i>For more information about this number, click on the small red "comment" triangle on column 'G' of Table 1, on worksheet #2.</i>	
Enter the CAPITAL cost to the customer of isolating the irrigation system in each discrete area from the existing mixed-use system and connection it to the new irrigation meter(s)	\$2,000
= Subtotal	\$ 4,000 Subtotal

...planning and managing the project

Enter the PLANNING & MANAGEMENT cost to the customer of isolating the irrigation system in each discrete area	\$500
Customer's total capital cost	\$ 9,700

How much of an incentive, if any, your water agency will need to contribute

If "\$0", then the actual return to the customer on its investment (in the form of lower utility bills) should be enough to incentivize the customer to participate in the Program.

\$3,845

VIII. Does the program have Merit for your water agency?

Net present value of: your agency's annual avoided cost of water minus the annual incentive to lower your customer's volumetric bills, over the life of the project

Your agency's avoided cost of water, per af saved	\$900 per af
<i>For more information about this number, click on the small red "comment" triangle on column 'D' of Table 1, on worksheet #2.</i>	
Acre-feet saved by this project	0.54 af per year
= Annual benefit to your agency of the water saved by this project	\$482 per year
Minus your agency's annual incentive to lower the customer's water and sewer bills	\$0 per year
= Net annual benefit (cost) to water agency	\$482 per year
= NPV of lifetime stream of [Avoided Cost] minus [Annual incentive]	\$6,093 life of project

Your agency's incentive to lower capital costs

-\$3,845

Programmatic costs incurred by your agency for each customer that participates in the Program

For each customer you find that is willing to participate in this project, your water agency will have had to research who the customers are that might qualify and might be interested, and then your agency will have to market the program to those potential program participants.

Enter general program costs, such as marketing, divided by the number of customers you expect to sign up (enter a negative number): that is, the net cost per customer signed up: (\$1,500)

For each customer that signs up for this program, your water agency staff will have to manage that individual project, from the time the customer signs up to when the construction is completed, to managing the agreements and financial systems/controls with the customer related to capital incentives and/or incentives for water volumetric charges, etc.

Enter the expected cost of managing each customer's account that signs up for the Program (enter a negative number) (\$1,000)

= total programmatic costs \$ (2,500)

Benefit to your agency of reduced runoff

\$ 161

= NPV or Merit of the Program to your agency

\$ (91)

The project you described, using the input cells, probably DOES have merit if the NPV is greater than "\$0"; it probably does NOT have merit if less than "\$0".

Worksheet #2. Key Inputs and NPV Graph

Purpose of this worksheet

This worksheet serves a dual purpose:

- 1) It's where you enter values for several of the most important variables that determine the merits of the Program for CII customers and
- 2) It's where you can create different scenarios based on different values for these key variables, looking for realistic scenarios with the most merit.

It is recommended that you complete worksheet #1 before completing the following worksheet.

You cannot determine the merits of the program (i.e., the Net Present Value) until both worksheets have been completed.

How to use this worksheet

This worksheet allows you to view three scenarios concurrently: one with what you think are the most accurate input values for your water agency, another is an example of what a scenario might look like, and a third is to help you search for cost-effective scenarios using the "What If" function.

Each of the three scenarios are created based on numbers entered into the table shown below.

Row titled "Your Agency"

In this row you enter the values that most accurately reflect the actual conditions in your service area. These are the values used to calculate the NPV; that is, they are used to determine the merits of the Program.

A recommended approach to using this spreadsheet is to enter the values in this row from #A through #E, then change the amount of square feet (#F) and the number of discrete landscaped areas at the customer's facility (#G) that would have to be tied into the new irrigation meter. Keep changing #F and #G until the chart shows that you are at or near the breakeven point (NPV = \$0). What this tells you is that the Program should have merit for CII customers that have at least that many square feet of landscape spread out over no more than X number of discrete areas.

Row titled "Example"

You cannot change these values.

The purpose of this example is to help illustrate the kinds of values an agency might enter and the impact on the NPV.

Row Titled "What If Scenario"

You can use this row to experiment with different values. Changing these values does not change the NPV calculation for your agency (that's done in the row titled "Your Agency"). Changing the "What If Scenario" values only changes the bar on the graph below labeled "What If Scenario"

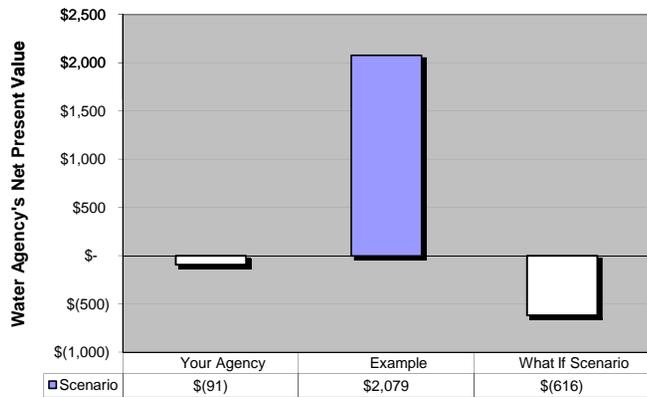
By changing these values one-at-a-time and viewing the impact of the change to the graph, you will get an idea of the influence that variables have on the merits of the Program. For example, you might find that just about any reasonable value for #B (Customer's expected RIO) has very little influence on the merits of the Program, in which case it may not be worth spending a lot of time trying to determine the exact value for #B. Conversely, you might find that small changes in #A have a big impact on the merits of the Program, which in turn justifies spending more time determining the best, most accurate value for your agency.

Another way to use this row is to set all the values in this row equal to the values in "Your Agency" row. The two bars in the graph should be the same. Then, just dealing with one variable at a time, change to value in the "What If Scenario" row to see how it effects the bar in the graph (the merits of the Program), searching for scenarios that have merit.

Table 1. Key Inputs & NPV Chart

3 Scenarios	What will it take to get your CII customers to participate?			Your Agency		Enter #A-#E, then adjust these to find break-even point		NPV
	A	B	C	D	E	F	G	
	Percent additional watering because there is not a landscape meter	Your CII customer's expected ROI (annual return on their capital investment)	Your CII customer's expected annual reduction in the water &/or sewer bills	Water agency's avoided cost of water (per acre-foot)	Your agency's average irrigation water rate, as a percent the average mixed-use CII rate	Square feet of landscape at the customer's site	# of discrete areas in landscape that need connecting to the new meter	
Your Agency	10%	20%	10%	\$900	100%	40,000	2	\$ (91.29)
Example	12%	20%	10%	\$900	100%	40,000	2	\$ 2,078.96
What If Scenario	12%	20%	10%	\$800	100%	35,000	2	\$ (616.17)

Merits of Program: NPV of each scenarios



Summary of "Your Agency" costs and benefits

