

**USGA**®



## Water Pricing Projection Tool: User Manual

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# Table of Contents

- Project Background .....2**
- Operating Assumptions Tab .....3**
  - Revenue..... 3
  - Course Characteristics ..... 3
  - Water Composition Assumptions ..... 3
  - Operating Cost Assumptions ..... 4
  - Inflation Assumptions..... 6
- Water Use Reduction Strategies Tab.....6**
  - Turfgrass Reduction..... 6
  - Irrigation System Upgrades ..... 7
  - Change in Precision Seeding & Turf Type ..... 7
- Baseline O&M Cost Tab .....8**
  - Variable Cost ..... 8
  - Cash Fixed Cost..... 9
  - Total Cost Expenditure Before Adaptation..... 9
- Water Reduction Cost Savings Tab .....9**
  - Water Use Reduction Strategies ..... 9
  - Total Cash Expenditure Adaptation..... 9
- Profit & Loss Tab .....9**
  - Total Revenue..... 9
  - Total Operating Cost ..... 9
  - Profit..... 10
  - Discount Rate ..... 10
  - Net Present Value..... 10

# Project Background:



## Project Overview

### Context

- Water management is a primary operational cost for golf courses.
- Increasing cost of water & regulatory changes will require new water management techniques and infrastructure.

### Task

- Develop 20-year Excel model projecting water cost for golf courses in Phoenix and Minneapolis.
- Use Phoenix and Minneapolis water policy research to develop a generalizable model that the USGA can apply to sites across the country.
- Build in uncertainties into model key parameters.

## Project Objectives

### Scope

- Identify best management practices for water operations on golf courses and build into model.
- Consider 10 years of water policy implications and create projections for an additional 10 years. ▪
- Water policy research specific to Phoenix and Minneapolis.
- Provide implementation guidelines for expanding use of model across geographies.
- Provide insight into the benefits of golf courses to the community and for water management from the City’s perspective.

# Operating Assumptions Tab:

- REVENUE

Revenue
Revenue

- Step 1: Enter yearly revenue

- COURSE CHARACTERISTICS

Course Characteristics
Water Consumption (gallons per year)
Acres of Turf

- Step 2: Enter yearly water consumption in gallons
  - *Assumptions/Where to find information:* Yearly water consumption in gallons can be found at the aggregate level (reported by the USGS). This can also be found by contacting golf course facilities directly or contacting regulatory body where golf courses report consumption.
- Step 3: Enter current acres of turf
  - *Assumptions/Where to find information:* Acres of turf is directly related to and drives water consumption. This can be found by contacting golf course superintendents directly, or the golf course superintendent association.

- WATER COMPOSITION ASSUMPTIONS

Water Composition Assumptions
Percentage of Water from Municipal
Percentage of Water from Industrial/Ground
Percentage of Water from Surface (On-Site)
Total

- Step 4: Enter current composition of water consumption (%)
  - *Assumptions/Where to find information:* Water comes from many sources, and this varies by region. Aggregate sources are reported by the USGS. Water consumption composition for golf courses is either is driven by policy, controlled through private contracts, or simply reported by the state regulatory body. If they are available, projecting from historic consumption patterns is useful.

- OPERATING COST ASSUMPTIONS \*\*Only enter pertinent costs

Operating Cost Assumptions
<b>Variable Costs</b>
Volume Usage Charge (USD/gallon)
Environmental Charge (USD/gallon)
Electricity Cost (USD/kWh)
Summer Surcharge (USD/gallon)
% of Consumption Impacted
Other Variable Costs (USD/gallon)
<b>Fixed Costs</b>
Monthly Service Charge (USD/month)
Water Use Permit Fee (USD/year)
Increase in Water Use Permit Fee (USD/year)
Other Fixed Costs (USD/month)

- Variable
  - Step 5: Enter volume usage charge (USD/Gal)
    - *Assumptions/Where to find information:* Individual municipalities will have rate structures listed based on type of user, type of water, and water volume. For some areas, like industrial well users in Phoenix, the Department of Water Resources lists withdrawal fees.
  - Step 6: Enter environmental charge (USD/Gal)
    - *Assumptions/Where to find information:* Some cities have built in environmental charges into rate structures. This information will be called out in the utility/municipal rate structure.

- Step 7: Enter summer surcharge rate structure (USD/Gal)
  - *Assumptions/Where to find information:* Some areas have seasonal variability included in their rate structure. The summer surcharge is documented on the permitting application for water withdrawals or usage.
- Step 8: Enter summer surcharge percent of consumption impacted (%)
  - *Assumptions/Where to find information:* Consumption in summer months is usually a higher proportion of the total consumption. Most golf courses know their consumption levels, so the best way to know summer consumption is contacting superintendents.
- Step 9: Enter electricity cost (USD/kWh)
  - *Assumptions/Where to find information:* This is an important component of water cost because it takes electricity to pump water. This can be found on golf course utility bills.
- Step 10: Enter other variable costs not captured by the volume usage charge (USD/Gal)
  - *Assumptions/Where to find information:* Fines or water scarcity pricing measures could be included. Regulators would directly provide these financials.
- Fixed
  - Step 11: Enter monthly service charge (USD/Month)
    - *Assumptions/Where to find information:* Municipalities will list a flat rate monthly service charge.
  - Step 12: Enter the water use permit fee (USD/Year)
    - *Assumptions/Where to find information:* The permit fee can be found on the state regulatory application for water use.
  - Step 13: Enter annual increase in water permit fee (USD/Year)
    - *Assumptions/Where to find information:* This can be calculated by projecting linear trends from the historic growth in the water use permit fee.
  - Step 14: Enter other fixed costs not captured from the costs listed above (USD/Month)

- INFLATION ASSUMPTIONS

Inflation Assumptions
Water Cost Escalation Rate
General Inflation Rate
Electricity Cost Escalation Rate

- Step 15: Enter water cost escalation rate (%)
  - *Assumptions/Where to find information*: This can be found by finding historic water cost, and modeling linearly the escalation. Some areas have an escalation rate built in to policy measures (which would be found in comprehensive plans, or water management plans).
- Step 16: Enter general inflation rate (%)
  - *Assumptions/Where to find information*: This is well documented in multiple primary literature articles.
- Step 17: Enter electricity cost escalation rate (%)
  - *Assumptions/Where to find information*: This is calculated from historic electricity cost. Some areas have an escalation rate built in to policy measures (which would be found in comprehensive plans, or water management plans).

## Water Use Reduction Strategies Tab:

- TURFGRASS REDUCTION

Turfgrass Reduction
Number of Acres Reduced
Year
Estimated Capital Expenditure
Water Cost Savings per Acre

- Step 18: Enter number of acers turf reduced
- Step 19: Enter year in which turf reduction occurred

- Step 20: Enter estimated capital expenditures
  - *Assumptions/Where to find information*: Contacting subject matter experts who have tackled turfgrass reduction strategies and what their expenses were can provide good insight into expected capital expenditures.
  
- Step 21: Enter the water cost savings (%)
  - *Assumptions/Where to find information*: The percentage of water cost saved is dependent upon what the turf is replaced with. A range of 50-60% cost savings per acre is an acceptable expectation when reducing turf, if turf is replaced with native plant landscape. This range was developed from an informational interview of Mr. Mike Huck, CA turfgrass consultant.

- IRRIGATION SYSTEM UPGRADES

Irrigation System Upgrades
Year
Estimated Capital Expenditure
Water Cost Savings

- Step 22: Enter year in which irrigation upgrades took place
  
- Step 23: Enter estimated capital expenditures
  - *Assumptions/Where to find information*: Contacting subject matter experts who have tackled irrigation system upgrades can provide good insight into expected capital expenditures. Irrigation system producers can also be a good source.
  
- Step 24: Enter the water cost savings (%)
  - *Assumptions/Where to find information*: The percentage of water cost saved is dependent upon how old the previous irrigation system was and if soil moisture monitoring was previously used. A range of 10-15% is an acceptable range, if the system being replaced is at least 15 yrs old and that soil moisture, if measured, was not playing a large role in water management decisions. This range was developed from an informational interview of Mr. Mike Huck, CA turfgrass consultant.



- CHANGE IN PRECISION SEEDING & TURF TYPE

Change in Precision Seeding & Turf Type
Year
Estimated Capital Expenditure
Water Cost Savings

- Step 25: Enter year in which seeding Best Management Practice (BMP) or turf type changes took place
- Step 26: Enter estimated capital expenditures
  - *Assumptions/Where to find information*: Contacting subject matter experts who have tackled changes in seeding BMP strategies and inquiring what their expenses were would be the best information source.
- Step 27: Enter the water cost savings (%)
  - *Assumptions/Where to find information*: The percentage of water cost saved is dependent upon new genetically modified turfgrass being made available to the market as well as winter seeding practices being poor. A range of 10-15% cost savings is an acceptable expectation if winter over seeding was already occurring or if a more drought tolerant turf is available. This range was developed from an informational interview of Mr. Mike Huck, CA turfgrass consultant.

## Baseline O&M Cost Tab:

- This tab relates the total operations and maintenance cost of the golf course.
  - VARIABLE COST
    - The volume usage charge, electricity cost, summer surcharge and other variable costs all feed into the total variable cost.
      - Volume usage charge: adjusted for both general and water cost escalation rate.
      - Electricity cost: adjusted for electricity cost inflation rate.
      - Summer surcharge: adjusted for general inflation and the water cost escalation rate.
      - Other variable costs: adjusted for general inflation rate.
    - This is then broken down into the variable cost per gallon.

- CASH FIXED COST
  - The monthly service charge, water use permit fee, and other fixed costs all feed into the total fixed cost.
    - Monthly service charge: adjusted by the general inflation rate
    - Water use permit fee: adjusted by the water use permit fee increase and the general inflation rate
    - Other fixed costs: adjusted for the general inflation rate
- TOTAL COST EXPENDITURE BEFORE ADAPTATION
  - This is the summation of the variable and fixed costs

## **Water Reduction Cost Savings Tab:**

- This tab shows the effect in terms of employing the water reduction strategies selected in the water use reduction strategies tab in terms of percentage and dollar savings.
  - WATER USE REDUCTION STRATEGIES
    - This section takes each water reduction strategy selected, in the water use reduction strategies tab, and determines the dollar savings that results. It takes into account the year in which savings can be expected.
  - TOTAL CASH EXPENDITURE POST ADAPTATION
    - This gives the total cash expenditures less the amount saved as a result of employment of the water reduction strategies displayed in both percentage and dollar savings.

## **Profit & Loss Tab:**

- This tab is a summary of revenue, costs, and the resulting profit.
  - TOTAL REVENUE
    - This displays the revenue of the gold course by year for 20 years. It is inflated by the general inflation rate. This tab allows the user to view what the courses revenue would be up to 20 years in the future considering all else equal.
  - TOTAL OPERATING COST
    - This is the summation of both the variable and fixed costs, adjusted for general inflation, both inputted in the operating assumptions tab.

- PROFIT
  - This shows the difference between the total revenue and total operating cost.
- DISCOUNT RATE
  - Step 28: Enter the discount rate
    - *Assumptions/Where to find information*: A general discount rate could be considered 6% in recreational facilities, however can fluctuate greatly when it comes to individual golf courses. It is possible that your golf course has its own acceptable discount rate. It is this rate that should be entered here.
- NET PRESENT VALUE
  - The net present value is the sum of all present values of profits over the course of the projected timeline. This acts as a single point guideline for the bottom line impact of the assumptions and water reduction strategies assumed.