

A tool for assessing winery wastewater treatment costs

Introduction

In a recent audit of wineries, it was estimated that the cost of treating liquid waste from some wineries exceeded \$30/tonne equivalent crush for many small wineries. The data used in that survey were incomplete – for example they did not include the cost of labour. It's likely that many wineries do not appreciate the cost of treating their wastewater.

This article describes a tool that can be used in-house to estimate the cost of treating winery waste. The tool has been designed to be 'fit of purpose' and is not exhaustive. Where possible, default values have been supplied. These values will be used unless they are over-written by entering data in the yellow squares.

To use the spreadsheet

Enter the crush weight in the purple cell B8

Hover the pointer over the yellow cells and provide entries where possible using the prompting script

Your answers will be in the blue section at the bottom of the sheet

There are some general variables that are readily known – these are cost of water cost of power, interest rate and cost of labour (including on-costs such as leave loading, workers compensation etc.)

Background information

The information in this section gives a rationale for the formulae that are used in the spreadsheet. In most cases information used have been gained from the survey of wineries.

General values

The cost of power is likely to change with time and between regions, so it is important to enter a value in this cell. A domestic default for South Australia of \$0.22 per kilowatt/hour is used otherwise.

The life of the plant is required for the calculations – this could be the life of the plant or the time before you expect it to be obsolete – whichever is the shorter. A default value of 20 years has been assumed.

The interest rate should be the interest rate payable on a loan or on an overdraft – default is 10%, but this figure is subject to change.

Cost of employment should be the actual hourly cost of employing a person – if several people are involved supply an average value. The value should take into account such factors as the cost of

engaging the person, leave (sick leave, long service leave, public holidays, workers compensation insurance and other on-costs). A default value of \$30 per hour has been assumed.

General description

It is essential that the size of the winery is entered – the cell has been highlighted in purple. This will be in tonnes/year crushed, but should be increased by tonnes of juice supplied from another source.

Default water usage has been based on data obtained from an audit of wineries where it was found that wineries that did not bottle used 1.39 kL/tonne, whereas those that bottled used 2.33 kL/tonne. Provision has been made for variable amounts of bottling. The water usage affects the size of the required treatment plant.

Capital cost

The value of the land used for the treatment plant (and any associated woodlot devoted to the treatment plant) should be included. The default area has been taken from the survey as being 0.49 m²/kL. This land was assumed to have a value of \$50,000 / ha.

Capital cost also requires the cost of the following items

Civils includes the cost of earthworks and provision of power to the treatment site;

Dam liners and covers;

Mechanical includes the cost of pumps, aerators, holding tanks and pipe work (including pipes dedicated to move wastewater to a disposal site);

Sludge dewatering equipment; and

Cost of design and permits.

A default value for the capital cost was taken from data obtained from the survey - \$173/tonne for wineries less than 2,500 tonne, \$82 per tonne for wineries 2,500 – 10,000 tonne and \$38/tonne for large wineries.

Operating costs

The cost of electricity if known can be entered, If that cell is completed, no other data will be required, and the cells will turn green.

If the total power consumption is known, that can be entered and no further data will be required. If the data are not available, estimates can be obtained by considering the size of the equipment and the operating time.

There is provision for entering the cost of chemicals used in the wastewater treatment. These may include lime for pH or SAR (Sodium Adsorption Ratio) adjustment, polymers to assist in sludge removal and other chemicals. It does not include the cost of chemicals used in the winery.

Labour costs include not only time operating the wastewater plant but also time spent in sampling woodlots or other disposal areas.

A default operating cost is available from the survey, namely \$9.1 per tonne for wineries less than 2,500 tonne crush, \$7.0 per tonne for 2,500 – 10,000 tonne and \$4.7 per tonne for larger wineries.

Miscellaneous

Miscellaneous items include removal of sludge offsite, removal of liquid waste offsite, collection of samples both from the waste stream and from the disposal site, EPA license fee, any local government charges, cost of running any laboratory onsite, charges for analyses by offsite laboratories, and any plant maintenance.

Output

The capital cost component for the land occupied by the treatment plant is calculated as its value multiplied by the interest rate. The capital cost component of the treatment plant is also expressed as the interest on the capital but an allowance is also included made for depreciation of the system. These two components are added to give the capital cost component shown in the summary.

A summary of the running costs and miscellaneous costs are calculated as the sum of the components. Finally a total cost is given. The costs are expressed as the total, on a per tonne basis and on a per bottle basis (assuming 750 bottles of wine per tonne of crush).

Closing remarks

A better knowledge of the components of the cost will assist winery management with their decision making when they come to modify their wastewater treatment plants. For example, in obtaining a quote for an aerated lagoon, the spreadsheet would be used to assess the new capital cost and in addition the data could be used to estimate the amount of electricity consumed. In this manner a comparison might be made of the cost of installing an aerated lagoon compared to installing an anaerobic lagoon. Unfortunately there is too much variation between wineries to give useful defaults on the prices for various treatment options.

It is hoped that this spreadsheet can be used by wineries to obtain some idea of the cost associated with treating their wastewater.