Apparent Loss Economic Model

A model that maximises revenue

The International Water Association (IWA) Apparent Loss Initiative has defined a reference minimum for apparent (commercial) losses as 5% of the volume of water measured by customers' meters. As this is a generalized default value, each utility's water meter fleet will achieve a different level of apparent losses that is dependent on various factors including meter type and their age profiles.

The replacement interval for a meter, and hence the associated volume of apparent loss is influenced by several factors that include the following:

- Meter purchase and installation costs
- Water tariff (cost)
- Water demand
- Discount (interest) rate, and
- Rate of decay of meter measurement error

GHD has developed an Apparent Loss Economic Model that facilitates the establishment of the level of apparent losses where revenue is maximised and losses are minimised.

For more information

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Meter Accuracy

The accuracy of mechanical water meters tends to change as the volume of water passing through it accumulates over time. Hence, the age of a meter can be used as a substitute variable when related to the volume of water registered by the meter. There is a resultant decay in the meter's measurement error. This rate of decay varies for different sizes, makes and types of meters, as well as with varying water quality.

The analysis of water volumes measured by meters requires determination of a particular meter's signature (error) curve and demand (usage) profile for a specific customer type. This analysis establishes the weighted error of measurement of a meter. Estimating the volume of lost revenue water is a function of both the meter's weighted error of measurement and the decay in this measurement error.

As there is an evolution in meter technologies that includes manufacture from more energy efficient and environmentally friendly materials, so there will be a change in the decay characteristics of meter measurement errors.

Economic Model

The economic model is based upon the justification for the replacement of water meters that compares the savings (i.e. benefits) achieved from an improvement in the volumes of water measured due to the installation of new meters (e.g. savings in apparent losses) and the costs of the associated meter replacement program. This analysis takes into consideration the time value of money and the sequencing of the meter replacements as summarised as follows:

- The present value (PV) of the increased volume of water measured by the new replacement meters is compared with the present value of the cost of purchasing and installing new meters over the meter replacement period. This present value technique utilises discounting to find the present value of each benefit achieved and/or cost incurred for the meter replacement cycle.

- Determination of the volume saved because of the replacement of old meters with new, more accurate meters. The model takes into consideration the average age of the existing meter fleet, weighted error of measurement of the existing meters, the decay in error of measurement for both old and new meters and the duration of the meter replacement cycle to establish the volume of water saved.

Maximising Revenue and Minimising Apparent Losses

GHD's Apparent Loss Economic Model provides the water utility with a method of supporting its meter replacement policy, determines the optimal replacement period for its meter fleet and identifies the minimum level of apparent losses relevant to the specific meter type.

Benefits of GHD's Model

The key benefits of implementing GHD's Apparent Loss Economic Model include the following:

- Correct sizing and selection of meters
- Determination of current level of apparent losses
- Establishes the optimal level of expenditure
- Establishes the volume and value of savings
- Establishes the optimal meter replacement period
- Provides a step-by-step process for maximising revenue.

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