March 18, 2021

Water Loss Peer Review Summary and Responses

Summary

Overall, the peer reviewers found the model and assumptions mathematically sound and correct. They discovered one inverted inflation calculation and a mistake in a typed reference equation, but no other errors. However, the reviewers did suggest changes for the model, which are detailed below. Many of these changes are clarifications and additional guidance for model users, and a few of these would cause changes to the model itself: changing the average survey leak detection frequency to a specified number of miles per month for suppliers of all sizes; using the "all prices" rather than the "commodities" Consumer Price Index (CPI); and adding additional compliance costs to the 5.9% expected annual rise in the price of water.

The inverted inflation calculation error previously resulted in a value of $1,093 for the marginal avoided cost of water. The corrected inflation calculation instead results in a value of $1,171. A second error was found in the typed derivation equations in the 'Equations' tab of the model; however, this error did not extend to the model calculations. Staff have corrected the errors in the model.

The reviewers provided the following suggestions to improve the clarity of the model:

- On the Outputs sheet, clarify that if the Benefit-Cost Ratio is shown as "N/A" (Cells G7, G10, G13, and G16) that means it is less than 1.
- On the Outputs sheet, clarify when current leakage level to be used is in gallons per connection or gallons per mile.
- Include guidance instructing users to increase the Infrastructure Condition Factor (ICF) based on the age of their distribution network.
- Provide information from the original reference (Lambert 2009) on how the minimum reported and unreported leakage equations were developed.

The reviewers provided the following suggestions regarding economic aspects of the model:

- Use the "all prices" rather than the "commodities" CPI.
- Add additional compliance costs of Sustainable Groundwater Management Act (SGMA) implementation and other upcoming regulations (such as PFAS treatment) on top of the 5.9% expected increase in water price.
- Allow suppliers to request to use a different value, possibly based on their own historical data on the increase in prices or their expectations about increased compliance costs under upcoming or recent regulations.
- Allow users to change the life cycle cost accounting time horizon in the model to provide flexibility for users to foresee the effects of short-term and medium-term interventions of the water loss control program.

One reviewer suggested altering the average survey leak detection frequency to reflect all leak detection survey frequencies in miles per month rather than the hybrid approach of miles per month (for suppliers with 4,000 or more miles) and fully surveying the system in a specific timeframe (for suppliers with fewer than 4,000 miles).

The reviewers made the following two suggestions that would change how the model was used in the rulemaking:

- Adding a buffer to the cost-benefit ratio of one since ratios close to one may be artifacts of model uncertainty.
- Filling out the model three times with three sets of parameters: best guess, worst case, and best case. The three separate model results would function as sensitivity analyses for each supplier, and if the net benefits are not positive in all three sets, the supplier may be given the chance to argue for the approach that they believe best fits their situation.

In addition, one reviewer suggested taking into consideration the environmental costs of water loss reduction in subsequent versions of the model.

Staff Response

The State Water Board staff would like to thank the reviewers for their thorough and thoughtful work in reviewing the economic water loss model and its assumptions. The two errors that were found have been fixed as recommended by the peer reviewers, and all four clarification suggestions were implemented in the model.

Escalation Rate for the Price of Water

The reviewer recommendation to use the “all prices” rather than the “commodities” CPI has been implemented. This modification changes the average annual rise in the inflation-adjusted price of water for the period 2008 to 2020 from 5.9% to 4.6%.

Staff appreciates the reviewer suggestion that water prices may increase at a higher rate due to SGMA implementation and new treatment regulations (i.e., PFAS, PFOA). However, given the uncertain effects and timeline, staff recommends against using a higher escalation rate at this juncture. Moreover, a higher escalation rate would increase the benefit-cost ratios; the model should therefore be interpreted as taking a conservative approach that will not overstate benefits.

While the model could allow water suppliers to enter their own estimate for water price escalation, staff recommend against this approach because it would result in divergent methodologies for evaluating price increases. Staff believe that a uniform approach to estimating price increases is an appropriate policy choice for a rulemaking that covers over 400 urban water suppliers.

Time Horizon/Lifecycle Cost Analysis

According to US EPA guidelines,[1] "A guiding principle (of choosing time horizon) is that the time span should be sufficient to capture major welfare effects from policy alternatives." In the current model, the present value of the annual benefit is estimated about $161 million dollars in 2051, which is not negligible. If possible, a longer lifetime horizon would be more consistent with the guidelines. Staff have chosen 30 years as the length of analysis to balance between short-run challenges some suppliers may face and the long-run benefits of water loss reduction.

Leak Detection Survey Frequency

While reflecting all leak detection survey frequencies in miles per month would be consistent across all urban retail water suppliers, it would cause large jumps in survey frequency assumptions at relatively arbitrary values for smaller systems. In addition, when the survey frequency is based on a specified time period, it allows the frequency assumption to grow with the size of the supplier. For example, suppliers with between 1,000 and 4,000 miles are all assumed to complete a full survey of their system in three years. However, the miles that are assumed to be surveyed each month are very different for a supplier with 1,100 miles (31 miles per month) and a supplier with 3,900 miles (108 miles per month). Therefore, staff recommend against implementing this suggestion.

Benefit-Cost Ratio

A reviewer suggested adding a buffer to the benefit-cost ratio of one to account for uncertainty in the model and assumptions. However, a separate provision has already been included in the regulation to account for uncertainty: adding a compliance buffer to supplier standards, which allows suppliers to remain in compliance with leakage levels up to 5 gallons per connection per day above their standard after initial compliance in 2028. In addition, as previously stated, the benefit-cost ratio of the model can be interpreted as a lower bound since the price of water is expected to increase faster than calculated in the model. Exempting suppliers with positive benefit-cost ratios from the regulation means that net benefits are being lost. Therefore, staff recommends against implementing this suggestion.

While changing the model inputs to provide best and worst case scenarios can be an informative exercise for water suppliers, adding this analysis as a regulatory requirement would likely cause confusion and add unnecessary complexity to the water loss regulations. This change would require each supplier to develop three sets of parameters, each of which would require research and documentation (time and resources) to confirm. The requirement may prove to be overly burdensome and does not necessarily provide a benefit to water suppliers. Therefore, staff recommend against implementing this suggestion.

[1] Guidelines for Preparing Economic Analysis (2014), published by the US EPA