



Chicago Metropolitan Agency for Planning

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MEMORANDUM

To: Mayors Metropolitan Caucus Environmental Committee
From: Margaret Schneemann
Date: April 7, 2010
Re: Heterogeneity and Water Conservation BMP Implementation

Implementation of water conservation programs, including conservation pricing, in the presence of service area (community) heterogeneity and heterogeneity across households within service areas, including the fraction of income devoted to water expenditures, lot size, number of bathrooms, home age, family size, etc., affects responsiveness to price and non-price water conservation programs alike. The use of aggregate data does not allow for control of household heterogeneity,¹ which has been found to result in differential responses to conservation measures. As one example, while aggregate estimates of price elasticity are available, such estimates are not recommended for use in policy implementation due to heterogeneity across utility service areas², including utility-specific characteristics such as non-linear price schedules,³ endogenous price structures, and existence of other conservation programs correlated with both price schedule choice and elasticity of demand. Disaggregate (household level) data allows for estimates more appropriate for actionable policy-making.

A wealth of research indicates that different communities, and, within communities, different types of households, have differing behavioral responses to conservation pricing and other conservation best management practices – for this reason, use of aggregate level data (county, total water pumped) and associated recommendations may not result in the most cost effective nor efficient outcome. Intuitively, the most cost-effective best management practices for one community may not be the same for another –nor will the targeted level of per capita water use be the same --- moreover, different households within communities will respond differently to different BMPs (based on lot size, income, etc.). Municipalities implementing water conservation programs maximize their investments in such

¹ See “Heterogenous responses to water conservation programs: the case of residential users in Los Angeles” W. Michael Hanemann and Celine Nauges 2005.

² Aggregate data analysis may also lead to artificial intraregional distinctions and unrealistic interregional uniformity (Bockstael).

³ Non-linear price schedules are used by 90% of the water suppliers in northeastern Illinois. as the pricing structure itself can have behavioral impacts independent of the price level effect. Estimation is particularly difficult under block rates, where the prices are endogenous to the model, as has been addressed extensively in the literature.

programs through identification of optimal best management practices ensuring that both revenue neutrality/stability (survival of the utility) and conservation targets (community and household specific) are met. To perform such an analysis, household level data is necessary from the utility, albeit identifiers can be stripped from the data and results presented in aggregate form without reference to geographical area.

Analysis of household level data can be useful to utilities in determining the role of rate setting in demand management programs – whether it be a passive role (raising rates due to increased costs, such as in response to costs of non-price conservation programs) or an active role – intentionally designing the rate structure to encourage conservation. The AWWA states that a rigorous demand forecasting should be one of the first evaluations conducted by a utility considering using demand side management, to reduce costs to both taxpayers and the utility. Failure to account for the effect of prices on demand utilities will result in over-investments in capacity expansion, and alternately, overinvestment in the demand side management programs needed to delay that capacity addition. Demand management programs explicitly tailored to household behavior and housing characteristics will likely increase residential water consumer response in both short-term water consumption and long-term investments in water conservation devices.