



Municipal Water Demand and Forecasting Technical Work Group: Agenda & Key Questions

January 15, 2013 2:00 p.m. – 4:00 p.m. C.S.T

Meeting Purposes:

1. Provide a more detailed overview of the draft municipal water demand forecast methodology.
2. Identify and discuss major factors (“drivers”) to include in the quantification of current and future municipal water use.
3. Obtain support from the Municipal Demand Technical Working Group to have CDM Smith begin the path forward in the development of the scenarios and assumptions, and completion of the draft municipal water demand forecast.

The role of the Technical Working Group is to review the draft methodology, provide input and information, and work with the consultant as we develop the draft municipal water demands for the Arkansas Water Plan Update.

Agenda:

2:00 p.m. – 2:15 p.m. – Review of December 17th demand methodology meeting

2:15 p.m. – 2:45 p.m. – Outline of municipal water demand forecast methodology, available data, and preliminary assumptions

2:45 p.m. – 4:00 p.m. – Discussion/Questions

Initial Approach and Assumptions

It should be noted that the draft methodology white paper is to serve as an initial outline for approaching water demand forecasting for the Arkansas Water Plan Update. Any assumptions presented may be adjusted or revised based upon the input and expertise of the Technical Working Group and incorporation of data and new information as we conduct data collection and analysis.

It is important to recognize the difference between regional (or statewide) water demand forecasting and utility-level water demand forecasting. Individual utilities develop water demand forecasts with more detail regarding customer classifications, unique service area characteristics (e.g., more affluent neighborhoods), distribution system characteristics (e.g., different pressure zones), and other characteristics that affect water demand. Regional water demand forecasting, however, seeks to provide a higher resolution (i.e., less detailed)



estimate of future water demands for a wide variety of service areas based upon common data and consistent methodologies. Thus, comparability and consistency are critical elements in the development of the municipal water demands for the Arkansas Water Plan Update. These elements allow for a common technical platform for assessing all regions and for identifying larger scale needs and trends, but admittedly may not fully capture system specific challenges.

Drivers are factors that could directly impact the demand for municipal water use. There is a large spectrum of drivers affecting municipal water demands due to the variety of uses for municipal water. Based upon research and past planning experience, it is recommended that future municipally-supplied *domestic* water use be driven by projected trends in county-level population. A baseline per capita rate of use times municipally-supplied population is a relatively simple method of forecasting future municipally-supplied domestic water demand. Using this method, future efficiency gains through means such as behavioral changes or adoption of more efficient water using fixtures can be captured through adjustments to baseline per capita use rates.

There are social and economic drivers that could be argued to cause an increase or decrease in municipally-supplied non-domestic water use (this is water use attributed to non-residential customers). Typically, forecasting non-residential water use, such as commercial and industrial water demand, is achieved by applying some index of economic activity to baseline water use. Many drivers could impact economic patterns and, consequently, municipally-supplied non-domestic water use. These drivers can include, but are not limited to: new or emerging industries, changes in national and international consumption patterns, availability of labor and employment growth, availability of water, competition with other demand sectors, and new or changing regulatory requirements. Potential changes in water use per unit of production add additional complexities.

It is anticipated that it will be difficult to establish specific probabilities of occurrence with any specific individual or combination of drivers and their associated effect (increase and/or decrease) on both state and county level economic growth (or decline). With these points in mind, CDM Smith recommends the following as the starting point for the approach to the forecast:

- a. Initial assumption – For domestic water demand, future water use is driven by projected population by county. Three population projection sources have been identified with each utilizing a different methodology resulting in different state and county population estimates, thus allowing for three different domestic water demand scenarios. The primary exception to this approach that should be considered is for multi-county regions that are served by a regional water provider. In these cases it may warrant summarizing the water demand at the service area boundary level.
- b. Initial assumption – For municipally-supplied non-domestic water demand, future water use is driven by projected rates of growth or decline in employment by county



(see below for additional detail on this assumption). Other appropriate drivers of water demand may be considered if credible and consistent data are identified and available.

- c. Potential modification to the initial assumptions will be evaluated during data collection to determine if there are geographic-specific or other technical, social, economic or regulatory drivers that would warrant inclusion in the forecast methodology.
- d. Provider level survey(s) could be useful to identify unique needs or challenges that may not be captured by county-level forecasts. At this time we have not identified a specific need for provider surveys but would like to solicit input from the work group on this topic.
- e. Water demand by residences of each county that are outside of municipal water system service areas are classified as *self-supplied domestic* water users. Water demand by this group of users is likely similar to municipal water use patterns, and the forecast methodology is related to the methodology recommended for the municipal domestic users, as discussed below.

Data collection and research will diligently seek to identify and quantify any major drivers that should be incorporated into the forecast. The remainder of this paper presents key questions and issues that will help refine these initial assumptions and/or to identify key drivers.

Key Questions/Discussion Items:

The following discussion items are grouped into municipally-supplied domestic use, self-supplied domestic use, and municipally-supplied non-domestic use.

Municipally-Supplied Domestic Water Use

- Rate of use by county: It is recommended to use the ANRC Water-Use Registration Database (WUDBS) to analyze multiple years of municipally-supplied domestic water deliveries in order to derive a baseline county gallon per capita per day (gpcd) rate of use. The county gpcd will be calculated using data from individual providers and will be a weighted county average with domestic population served as the weighting factor.
- Counties with insufficient data may be assigned an average per capita value from adjacent counties if appropriate, or the statewide average.
- We have also obtained a database containing current average demand and domestic population served by public supply system from the Arkansas Department of Health. We believe these data to be a valuable resource, however, they are not at a level of detail sufficient to identify and establish baseline demands for different use types by



provider (i.e., domestic vs. non-domestic). Furthermore, we have obtained several Department of Health Sanitary Surveys. Again, while these data will provide valuable information, detail with respect to demand and deliveries by water use type are not available in these documents. In addition, many of these documents are not in a digital format, making data collection, organization, and analysis extremely time-intensive.

- Future population projections by county: We have identified three sources of county population projections for Arkansas. Each method of projection utilizes different statistical approaches which provide for a range of potential total population by county by decade (some will need to be extrapolated to 2050) and therefore provides a good foundation for competing forecast water needs. We propose to use the county-level population projections for the three different scenarios as the drivers for estimating future municipally-supplied domestic water demands. We will provide these population projections shortly following the call to get additional input from the work group.
- Percent of population served by county: Preliminary data analysis reveals an increasing trend in the proportion of the statewide population that is municipally-served over the past few decades (76% municipally-served in 1990 to 93% in 2005).
 - Is it anticipated that these trends will continue?
 - Is it reasonable to assume that 100% of each county's population will be municipally served by 2050, or is there a reasonable limit to the percent served in rural areas?

Self-Supplied Domestic Water Use

- USGS identifies county-specific self-supplied domestic per capita rates of use between 80 and 97 gpcd to estimate self-supplied domestic water demands. These rates of use are based on research conducted in the late 1970s.
- A preliminary analysis of municipally-supplied domestic per capita water use rates shows an average of about 75 gallons per capita per day, with some significant variation by county.
- No data is available to derive an empirically-based self-supplied domestic rate of water use.
- It is recommended to assume that self-supplied domestic households use water at the same per capita rate as municipally-supplied domestic households within the same county. We have heard some concerns with this assumption because of potential differences (possible increased use) in outdoor water use in rural areas compared to more urban areas.



- Is there evidence or information to support an adjustment to a county municipally-supplied domestic per capita rate of use that would better depict the county rate of self-supplied domestic water use?

Municipally-Supplied Non-Domestic Water Use

- The WUDBS includes data that allows for the identification of municipally-supplied non-domestic water deliveries for the following categories: commercial, industrial, mining, agriculture, and irrigation. The specific business type or activity associated with these water deliveries cannot be identified from this database.
- It is recommended to use the WUDBS to extract historical municipally-supplied non-domestic water deliveries by water use type to establish baseline levels of municipally-supplied deliveries by water use type for each county.
 - Data from multiple years will be used to determine average annual municipally-supplied non-domestic usage by county unless a significant shift in use is evident warranting consideration of a baseline level of use pertaining to a particular representative time period. Quality of the data may determine the feasibility of this approach.
- It is recommended that projected rates of growth or decline for broad employment categories be used to drive future water use for the municipally-supplied non-domestic water use categories listed above. The table below links the municipally-supplied non-domestic water use category with the proposed broad employment category that will be used to drive future water demands.

Sub-Sector	WUDBS Municipally-Supplied Water Use Category	Employment Group (NAICS) Driving Future Water Demand
Industry	Industrial	31-33 - Manufacturing
Mining	Mining	21 – Mining, Quarrying, and Oil and Gas Extraction
Agriculture	Agriculture	11 – Agriculture, Forestry, Fishing and Hunting
Commercial	Commercial	All other employment groups
Irrigation	Irrigation	None

- Employment projections by Workforce Investment Area (WIA) (from 5 to 12 counties per area) area available from the Arkansas Department of Workforce Services. These projections have employment by major employment groups for 2008 and 2018 (state-



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level data for the years 2010 and 2020 have been developed but are not yet available by WIA).

- These employment projections are by large areas and are assumed to be applicable to individual counties within each area.
- The employment growth rates only extend to 2018 and will need to be extended to 2050.
- Note that water demands of self-supplied businesses and industries within each county will be addressed by a separate work group. However, coordination will be required to avoid overlap or double counting of non-domestic water demands of each county.
- It is recommended to explore other data sources through which major non-domestic municipally-supplied water users can be identified by county. The business type, water source, and average water use for these users must be identifiable. For these users, the rates of growth in employment for more specific employment groups can be used to drive future demands for water.