Commercial Water Consumption in Phoenix Active Management Area Municipalities

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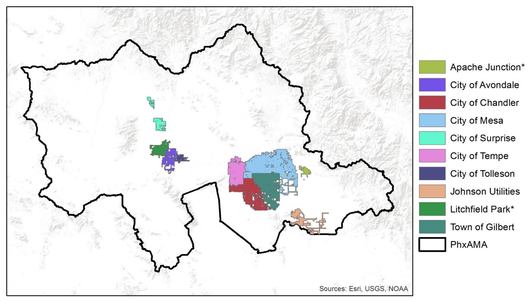
Motivation

While residential water consumption trends have been researched intensively and the wealth of knowledge on best practices continues to grow, there has been little research done on non-residential water consumption. Of the non-residential sectors, the commercial sector dominates water usage in Phoenix area municipalities, making up 17% of municipal water consumption. It is important to examine trends in the commercial sector in order to fully understand where the future of water is headed and to plan effectively. Therefore, I ask: ***what have been the trends in commercial water consumption in Phoenix area municipalities over the last 8 years?***

Consumption by Sector: Phoenix Area Municipalities

Methods

- Entered data on commercial water consumption for 10 Phoenix-area large municipal providers, per their annual reports submitted to ADWR. Graphed commercial use by municipality (Figure 1).
- Normalized the commercial data by dividing by number of meters served and compared water consumption per meter between the commercial sector and the residential sectors (Figure 2).
- Graphed the data on commercial consumption per meter for the 10 providers over 8 year period in order to identify trends from 2006 to 2014 (Figure 3).



Findings

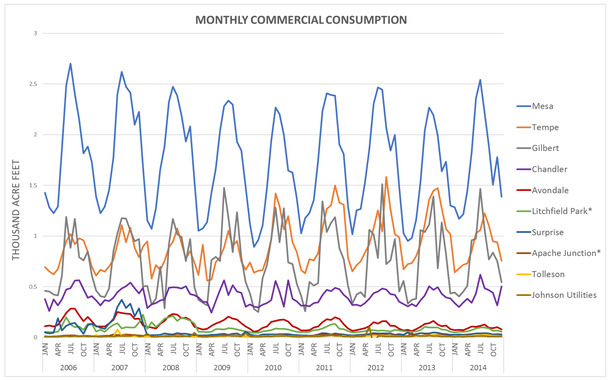


Figure 1: Monthly consumption patterns over 8 years for each of the 10 selected water providers.

Commercial water consumption is highly subject to seasonal variation – peaking in summer months and dipping in the winter months. The larger the service area, the higher the seasonal variation; for example, ~1,500 AF difference in Mesa vs. <100 AF difference in Surprise.

Commercial consumption lies between ~300,000 - 800,000 gallons per meter depending on the month, whereas single-family residential consumption falls between ~80,000 – 140,000 gallons per meter. This equates to the commercial sector having ~3.5 times greater seasonal variance in water consumption.

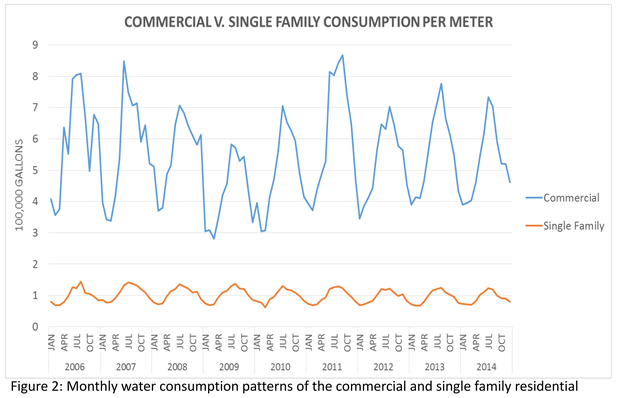


Figure 2: Monthly water consumption patterns of the commercial and single family residential sectors per meter for all 10 municipal providers combined.

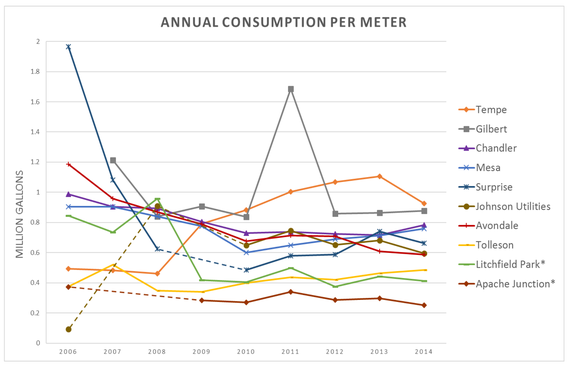


Figure 3: Consumption of the 10 providers annually broken down per meter. The dotted lines represent an assumed line between the two points as data was missing from a specific year (e.g. 2009 for the City of Surprise)

*Litchfield Park is represented by Liberty Utilities
*Apache Junction is Represented by Apache Junction Water District

Overall, in the 8 year period, commercial water consumption has not shown a clear trend. Select providers do show a increasing or decreasing trend. For instance, Tempe's water consumption per meter has been increasing – starting at ~500,00 gallons and rising to ~900,000 gallons, whereas Avondale has seen about a 50% decrease in consumption per meter – starting at 1.2 million gallons and falling to 600,00 gallons. The peaks in 2006 for Surprise and 2011 for Gilbert appear to be anomalies or flaws in data reported by the provider.

Conclusions

- The commercial sector, while not increasing consumption, has not made progress in significantly decreasing water consumption per meter over the last 8 years. Increased conservation efforts (e.g. xeric landscaping, water efficient technologies) may have the potential to curb commercial consumption downwards in the future.
- More water is consumed per meter in the commercial sector than single family residential sector and is subject to about 3.5 times greater seasonal variation in demand.
- The commercial sector is very responsive to seasonal temperature change, demanding the most water in the summer months. This is likely due to outdoor water consumption, which is known to peak in summer months.

Future Research

- Which factors cause the commercial sector to be so responsive to temperature change (e.g., turf, air conditioning/cooling, use of misters), and what are the ways to reduce water demands?
- Explore in further detail the specific municipalities which show trends – why is the city of Tempe's commercial consumption trending upwards? Why is Avondale's water consumption trending downwards?
- This research period was limited to 8 years by data availability – 8 years may be too short of a time period to come to accurate conclusions about trends. Collecting a longer time series of data would be more useful to see which direction commercial consumption has trended and why.
- Future studies should include all municipal providers in the Phoenix Active Management Area. 10 out of 43 large providers in the Phoenix AMA were used in this study due to time and data limitations.

Acknowledgment

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