



Nov 7, 2018

294 Chandler Measurement & Verification Findings

Summary Findings

The following Measurement and Verification (M&V) analysis demonstrate the positive effect the H2minusO Flow Management Device (FMD) have had on the meter reading efficiency at 294 Chandler, and the reduction in water consumption experienced as a result of the recent toilet retrofits. We were provided consumption data for 2016, 2017 and 2018 measurement periods. After a detailed analysis of the datasets, the meter reading efficiency showed significant improvement. The daily consumption decreased by an average of 51.26% with a payback in .09-years, exceeding the ROI projections of 5% with a payback in 1.01-years.

The results, however, needed to be normalized given we learnt that toilet retrofits were completed in the last 2-weeks of the M&V cycle. Because of this overlap, with multiple variables being changed in the same M&V period, we have used the upper end of the industry average (40%) for toilet retrofit savings in order to normalize the post-installation consumption data. This allows us to reasonably determine how much savings should be allocation to each of the technologies. And of course more specifically what portion of the measured savings should be allocated to the FMD.

Note: The savings range for toilet retrofits is between 30-40%

Key Project Metrics

One time project investment: \$8,495.00
Projected consumption 2018: 35,118 m3 or \$168,215.21
Cost per m3: \$4.79
Install date: Oct 9, 2018

Pre-Installation

Projected Savings: \$8,410.79
Projected Savings: 5.00%
Projected ROI (Yrs): 1.01 years

Post-Installation

<u>Combined Technology Savings</u>	<u>H2minusO FMD Savings</u>
Measured Savings (\$): \$86,227.12	Measured Savings (\$): \$18,941.03
Measured Savings (%): 51.26%	Measured Savings (%): 11.26%
Measured ROI (yrs): .09 Years	Measured ROI (yrs): .44 Years



M&V Findings

This facility exhibited consumption patterns that were inconsistent from reading to reading post-installation of the FMD. Furthermore, the Year-Over-Year (YoY) comparisons showed no consistency from period to period and thus we could not confidentially confirm that the FMD was performing as it should. This required us to remove it and establish a more reliable baseline over a longer period of time. The lack of historical data was the main reason for the inability to establish the baseline and thus the FMD performance. We were subsequently provided a complete 3-year history of the consumption data and we were then able to establish a credible baseline as well as have verifiable data in order to complete our YoY M&V analysis.

The FMD was installed on Oct 9, 2018. Toilet retrofits commenced on/about Oct 17, 2018 and were completed on/about Oct 22, 2018. Table-1 summarizes the consumption results for the FMD pre-installation and post-installation periods from 2016 – 2018. Column-7 shows the average daily consumption (m3/day) based on the start and end period as indicated in column-3 and column-4. Row-2 and row-3, column-8 shows the measured change in consumption between the pre-installation periods and row-5 and row-6 shows the measured change in consumption between the post-installation periods.

Consumption during the pre-installation periods, in all 3 years, consistently remained above 100 m3/day. This may be largely a result of it being the summer months but what is important is that it provides us with verifiable data relative to the seasonal consumption pattern in this building. Only one of the two post-installation periods exceeded 100 m3/day average (row-5 column-7). The consumption, YoY in 2016, although less than 100 m3/day average, was still above 90 m3/day average (row-5 column-7). The post-installation period for 2017 registered consumption of 113.97 m3/day average (row-5 column-7) representing a 20.88% (row-5 column-8) increase in consumption relative to the same period in 2016 (row-4). Row-6 column-7 shows that after the installation of the FMD and toilet retrofits, consumption experienced a marked drop by 51.26% (row-6 column-8) relative to the prior 2017 period.

Although the toilet retrofits were started about 9-days after the installation and start of the M&V process for the FMD, we have made reasonable assumptions based on industry averages to determine what portion of the overall savings should be attributed to the FMD. We have concluded that, when accounting for average industry savings post-toilet retrofits (40%), we can confidently say that post-installation of the FMD, the meter reading efficiency has improved by about 11.26% (row-6 column-9).

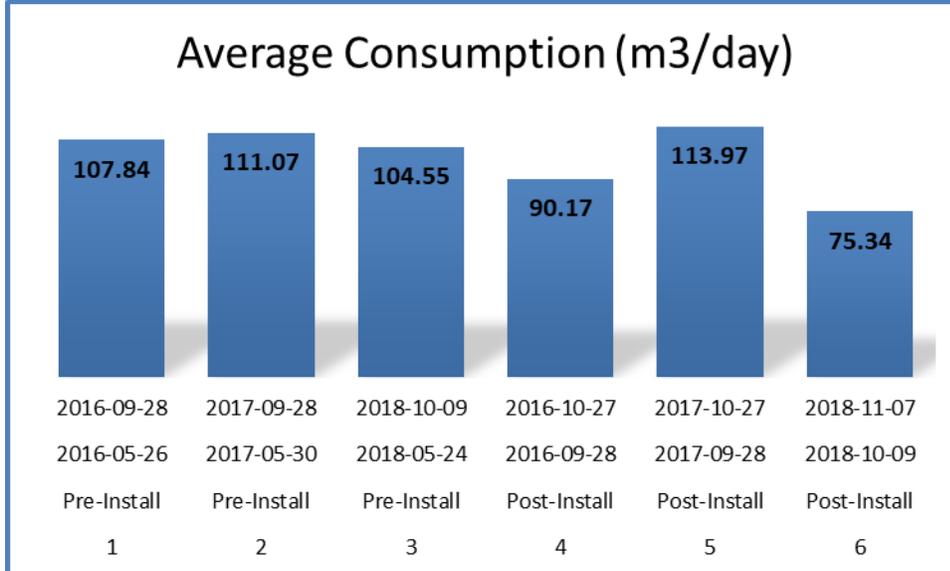
Table 1: M&V Summary Results

#	H2 Reference	Start Period	End Period	Consumption (m3) in Period	# Days in Period	Average Consumption (m3/day)	Change in Consumption (%) YoY Same Period	Change in Consumption (%) YoY Same Period Normalized
1	Pre-Install	2016-05-26	2016-09-28	13,480	125	107.84		
2	Pre-Install	2017-05-30	2017-09-28	13,440	121	111.07	2.91%	
3	Pre-Install	2018-05-24	2018-10-09	14,428	138	104.55	-6.24%	
4	Post-Install	2016-09-28	2016-10-27	2,615	29	90.17		
5	Post-Install	2017-09-28	2017-10-27	3,305	29	113.97	20.88%	
6	Post-Install	2018-10-09	2018-11-07	2,185	29	75.34	-51.26%*	11.26%*

*Data has been normalized using the upper end (40%) of the industry averages for savings on toilet retrofits.



Graph 1: Average Consumption (m3/day) – Year-Over-Year (YoY)/Period-Over-Period (PoP)



Graph 1 shows the average daily consumption (m3) for the measurement period based on the start and end date pre/post-H2minusO FMD installation.

Graph 2: Change in Consumption (%)– Year-Over-Year (YoY)/Period-Over-Period (PoP)

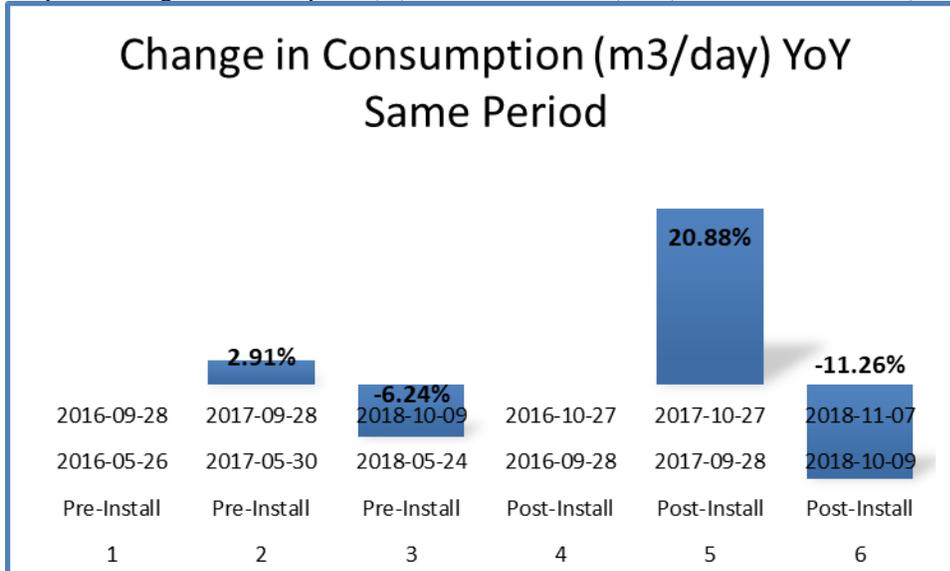


Chart 3 shows the average percentage change in consumption for the measurement period based on the start and end date pre/post-H2minusO FMD installation.