

Automated Enforcement of Outdoor Watering Restrictions Pilot Program: Implementation Plan

1. Background

On January 14, 2010, the Fresno City Council approved a contract with Badger Meter, Inc. to provide a Fixed-Network Automated Meter Reading (AMR) and Metering System, in response to a requirement that all federal Central Valley Project water users install meters and bill for water usage at a metered rate. The citywide water meter installation project was completed in 2013, resulting in water meters with Advanced Metering Infrastructure (AMI) technology (aka – “Smart Meters”) installed on every residential property within the City of Fresno.

On October 19, 2017, the Fresno City Council adopted updates to the City’s Water Shortage Contingency plan, enacting new permanent water conservation measures for the City of Fresno. In addition to prohibiting various water-wasting practices, these measures set a threshold for “Excessive Water Use” of potable water in excess of 300 gallons per hour during days or hours when outdoor irrigation is prohibited, as observed by City staff or recorded by the City’s water meter reading system. An updated fine schedule was adopted with the updated water conservation measures, as outlined below:

1. First incident – Notice
2. Second incident – \$50 fine
3. Third incident – \$100 fine
4. Fourth incident & every incident thereafter – \$200 fine
5. If a customer has more than six consecutive months of water waste, water service may be terminated.

Note: Incident counts are to be reset on January 1 of each year

Finally, on March 8, 2018, the Fresno City Council approved a contract with Badger Meter for a new water meter reading system and data management system (Beacon System) to allow for full utilization of the AMI technology within the City’s metering system. This data management system includes the Eye on Water customer access portal, through which customers are able to retrieve hourly water usage data for their property.

Currently, Smart Meter data is only utilized by City staff to target visual inspections of properties that are suspected to be over-using water. This enforcement method requires significant effort by City staff and consequently cannot and does not cover all

violations. Therefore, the City is ready to begin utilizing the AMI technology and Beacon data management system to enforce water conservation in a more efficient and effective manner.

Recognizing that moving to a fully automated enforcement system could present a logistical challenge to the City, the Department of Public Utilities has partnered with the University of Chicago Urban Labs (UChicago) to implement a pilot program to test different variants of enforcement in order to determine which implementation best balances increased compliance, decreased water use, and customer satisfaction.

2. Design

2.1 Research Groups

The pilot project will cover all single-family residential customers with eligible water meters in the City of Fresno, which constitutes approximately 115,500 households. Customers will be *randomized* into research groups that differ along two dimensions: enforcement method and fines. Historical data suggests that up to 5,000 notifications might be issued in the first month of the pilot program – however, this number does not account for the impact of messaging prior to the start of the pilot, or any other behavioral response, rendering it an unlikely upper bound. The City has historically issued approximately 1,000 notices per month, so the Department of Public Utilities and UChicago are collaborating to ensure the City has sufficient resources to support this pilot project.

2.1.1 Varying Enforcement Method

Each customer will be randomly assigned to one of two enforcement methods: 1) the current visual inspection system, or 2) the new system of automated enforcement based on Smart Meter data. Comparison of these two groups will provide an evaluation of the effectiveness of utilizing automated meter readings to reduce water use.

- a) **Visual Inspection:** In this method of enforcement, customers will receive a notice or fine if a violation is observed by a visual inspection. Smart Meter data is utilized by City staff to focus visual inspections on those properties that are flagged as having possible violations, but notices and fines are only issued if staff actually observes a violation.
- b) **Automated Enforcement:** In this method of enforcement, customers will receive a notice or fine if a violation is detected by Smart Meter data. Within this method, the enforcement threshold (the hourly usage

level during prohibited watering hours, beyond which a customer receives a notice or fine) will be further randomized into three groups:

1. Baseline (300 gal/hr threshold)
2. Reduced Enforcement 1 (500 gal/hr threshold)
3. Reduced Enforcement 2 (700 gal/hr threshold)

The Baseline threshold is the measure of excessive water use that was approved by the Fresno City Council in October 2017. Reduced Enforcement 1 and Reduced Enforcement 2 thresholds have been selected to reduce the expected number of automated fines issued by 50%, and 25% relative to the baseline of 300 gal/hr.

The Department of Public Utilities has limited capacity to issue and follow up with an increased number of notices and fines. As a result, the majority (55%) of customers will be assigned to the status quo Visual Inspection research group. This group is expected to receive fewer violations than the Automated Enforcement research groups, resulting in significantly fewer fines overall.

2.1.2 Varying Fines

Each customer will also be randomized into one of three levels of fine schedules: 1) Baseline Fine, 2) 50% Fine Reduction, and 3) 75% Fine Reduction. The purpose of testing varying fine schedules is to determine whether a reduced fine level will result in a reduction of violations – and therefore behavior change – similar to the currently approved fine schedule, yet with a reduced burden to customers.

Table 1: Schedule of Fines

Annual Violation Schedule	Baseline Fine	50% Fine Discount	75% Fine Discount
1 st Month with Violation	Notice Only	Notice Only	Notice Only
2 nd Month with Violation	\$50.00	\$25.00	\$12.50
3 rd Month with Violation	\$100.00	\$50.00	\$25.00
4 th (or greater) Month with Violation	\$200.00	\$100.00	\$50.00

2.1.3 Random Assignment and Groups Size

55% of customers will be randomized into the Visual Inspections research group in order to help minimize the number of fines issued. The majority of customers will be assigned to receive the baseline fine schedule, as currently outlined in the Fresno Municipal Code, and the remaining Visual Inspection customers will be split equally into the discounted fine schedules groups outlined in **Table 1**.

45% of customers will be randomized into Automated Enforcement research groups. Each of these nine research groups, as defined by a different usage threshold and fine schedule, will contain 5% of the entire population of single family residential customers. It is expected that there will be a little more than 5,000 customers in each of these test groups.

Table 2: Schedule of Fine Thresholds and Probabilities

Fine \ Method	Visual Inspection	Automated Enforcement		
	300 Gal	300 Gal	500 Gal	700 Gal
Baseline Fine (\$50, \$100, \$200)	45% (~45,000 hhds)	5% (~5,000 hhds)	5% (~5,000 hhds)	5% (~5,000 hhds)
50% Fine Discount (\$25, \$50, \$100)	5% (~5,000 hhds)	5% (~5,000 hhds)	5% (~5,000 hhds)	5% (~5,000 hhds)
75% Fine Discount (\$12.50, \$25, \$50)	5% (~5,000 hhds)	5% (~5,000 hhds)	5% (~5,000 hhds)	5% (~5,000 hhds)

Given this configuration of thresholds and fine schedules, 50% of single family residential customers will receive enforcement at the current 300 gal/hr threshold and current fine schedule (45% via Visual Inspection, 5% via Automated Enforcement), while 50% of customers will receive reduced enforcement – either via higher usage thresholds and/or decreased fines. It is to be noted, also, that these notices and fines are only issued for outdoor irrigation use during prohibited days/times – the water use threshold does not apply to anyone irrigating during the proper days/times.

2.2 Power Calculations

The sizes of each research group have been selected to minimize the number of fines the City will issue while still ensuring that there is enough statistical power to detect 1.7% reduction in average daily water use between research groups in either dimensions of the pilot (water use threshold and fine schedule).

2.3 Measured Outcomes

The outcomes tracked to assess the success of the implementation will include the following measures:

1. Customers' daily water use
2. Compliance with regulations in research groups with Automated Enforcement
3. Compliance with regulations in research groups with reduced fine schedules
4. Number of phone calls and complaints received by City staff

3. Implementation Logistics

3.1 Council Approval

This pilot program will require City Council approval. Council will also have to approve an amendment to the Master Fee Schedule to reflect a temporary change to the excessive use watering fee schedule for the purposes of carrying out this pilot program.

3.2 Communication Strategy

To ensure the success of the pilot project in terms of encouraging water conservation and minimizing the number of notices and fines assessed, UChicago will support the City of Fresno in enacting a communication campaign based on mailers, utility bill inserts, and a website dedicated to the pilot project.

3.2.1 Mailers

Customers in each research group will receive different mailers based on their particular research group, indicating their assigned enforcement method, usage threshold, and fine schedule. The first mailer will be sent on June 1st, notifying customers about the program and providing them with information about the specific research group to which they have been assigned. A second mailer will arrive on July 1st, reminding customers of the program and their assigned research group as the pilot project begins.

3.2.2 Utility Bill Inserts

The City's utility bill inserts will be utilized to reference to the pilot project and direct customers to the project website, and will provide an email address and contact phone number for additional information.

3.2.3 Website and Social Media

UChicago will assist the City with the design of a page on the City's website which explains the purpose of the pilot project and the implications for customers. The web page will allow customers to identify their assigned enforcement method and fine schedule by entering their property address. Information about the Eye on Water customer portal, which allows customers to review their hourly water usage, will also be provided.

Social media will be utilized to remind customers of the pilot project, the watering schedule, and the Eye on Water customer portal.

3.3 Implementation

3.3.1 Visual Inspections

Visual inspections will be conducted by City conservation representatives utilizing the current enforcement method. This method utilizes meter read data to flag possible violations and deploy staff to the field for visual confirmation of violations before issuing a notice or fine.

3.3.2 Automated Enforcement

Through the Automated Enforcement method, notices and fines will be issued automatically based on meter usage data. To reduce time spent by City staff to identify violators, Beacon (Badger Meter) will implement a module that will automatically pull data for all customers whose water use exceeds a set threshold. Additionally, UChicago, in partnership with City staff, will write software to automatically generate a daily list of customers whose water use has exceeded their assigned threshold.

City staff will continue to exercise discretion around issues such as marginal violations, leak issues, and pool refills. However, when practicable, steps will be taken to automate this process to reduce the time burden on Conservation staff.

3.4 Customer Service

3.4.1 Expected Number of Calls

An increased number of customer phone calls has been identified as a significant concern with this pilot project. Based on past experience in Water Conservation, this pilot project is expected to generate phone calls at a rate of approximately 50% of the number of enforcement notices and fines that are issued (at most ~2500 calls in the first month, based on the upper bound of ~5,000 notices and fines to be issued in the first month). If each of these calls takes an average of 7.5 minutes to resolve, this will result in approximately 10 staff hours of work per day dedicated to customer service in relation to this project.

3.4.2 Customer Service Tools

To assist with customer service calls, UChicago and City staff will work together to create a tool that will allow the City's customer service staff to easily identify a customer's research group while assisting customers. UChicago will also work with the Department of Public Utilities staff to write a script and FAQ sheet to guide customer service representatives through calls.

UChicago and City staff will also set up a callback system to aid with any congestion of the phone lines. This system will ask callers to leave their name and number so they can be contacted by next available representative.

3.4.3 Opting Out

While messaging, phone scripts, and temporary staff training will be designed to ease customers' concerns, there inevitably will be customers who are truly insistent on opting out of the pilot. Customers will be reminded that they will not be negatively impacted by remaining in the pilot, and they perhaps may even receive a benefit, since they will receive either the same enforcement that they would receive anyway, or less stringent enforcement guidelines, depending on the test group to which they are assigned. Half of the population will see no difference in their enforcement or fine schedule with the program, while the other half will actually see less stringent enforcement. Therefore, there is no real benefit to opting out. Customers who still elect to opt out will receive enforcement in accordance with the current enforcement regulations as described in

the Fresno Municipal Code. Opting out will be available via the website, email or phone.

3.4.4 Pausing the Pilot Project

The City will have the option to pause the pilot project if there is an excessive number of public complaints, or if the systems cannot handle the volume of notices and fines issued or phone calls received. If the decision is made to pause, then the issuance of new notices and fines for violations will cease. One week after the decision to pause is made, the City will reevaluate the systems and will only resume issuing notices and fines for violations if it is determined that the systems are sufficiently prepared to handle the expected volume of phone calls, notices and fines, or public complaints.

4. Resources Needed for Implementation

4.1 City of Fresno Resources:

1. Document preparation and City Council approval of project
2. Staff time for increased customer service calls
3. Initial and reminder notices – printing and mailing costs
4. Outreach communications and reminders about project, outdoor watering schedule, and Eye on Water customer portal
5. Provision of work space for UChicago-hired temporary staff to assist with increased volume of customer service calls

4.2 UChicago Resources:

1. Analysis – In addition to the historic data analysis conducted over the past two years, UChicago has allocated an additional analyst to work on the Pilot Project, bringing the total staff working on this project to five. Once the pilot begins, UChicago is prepared to assist both remotely and locally to ensure smooth operation. After the pilot ends, UChicago will analyze all the data that has been collected and present the City of Fresno with an evidence-based report on the configuration of a watering enforcement system that maximizes water conservation while minimizing the burden on customers.
2. Scripts for customer service staff – To be developed in conjunction with messaging and web page. Scripts will encourage customers to sign up for the Eye on Water customer portal to allow customers to view their own water use data. This is expected to drastically cut down callbacks, thereby reducing customer service call volume over time.
3. Programming/software development services

4. Hiring of 2-4 temporary staff to assist City staff with increased volume of customer service calls for the duration of the pilot program.

5. **Proposed Timeline, Pending Council Approval:**

- June 1: Eye on Water launch
- June 1: Initial Pilot Project mailers sent out
- June 1: Utility bill inserts go out
- June 1: 3-Day Watering Schedule begins
- July 1: Pilot Program begins
- July 1: Reminder mailers sent out
- September 1: 2-Day Watering Schedule begins
- September 30: Pilot Project ends
- October 1: Enforcement reverts to current methods
- October 1: UChicago begins to analyze data
- November 30: UChicago presents initial findings to City

6. **Long-Term Benefits to the City**

This pilot program will give the City valuable data on what combination of penalty amount and threshold of “excessive water use” is most effective at generating compliance with the pre-existing water conservation ordinances. Once the ideal “excessive water use” threshold is identified, the City will be able to harness its existing meter capabilities for automated enforcement citywide. This will free Water Conservation staff to focus on education, outreach, and enforcement of water conservation violations that cannot be detected by automated meter data. The pilot will also assist the City in determining the lowest effective penalty amount for excessive water use, thereby reducing the burden on customers.

In addition to performing the statistical analysis that will provide the City of Fresno with these insights, UChicago will also be providing technical support to DPU. Improvements to the technical infrastructure of DPU, specifically in the form of computer programs, will further integrate Beacon into the practices of City staff. With these improvements, the City will be able to fully harness the potential of the Beacon system, and City staff will be provided with simple, easy-to-use tools that will allow them to continue to fluidly utilize Beacon data after the pilot ends.

Finally, it is expected that this pilot will decrease residential water use, although it is difficult to determine in advance exactly how large the reduction will be. The resulting decrease in water use will help to ease some of the load on the City’s water system, thereby helping the City to bring its water system into balance, as mandated by the State of California through the Sustainable Groundwater Management Act (SGMA).